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**JOB OPPORTUNITIES**

LETTERS

THE ROLES OF ABSTINENCE AND CONTRACEPTION IN DECLINING PREGNANCY RATES

Santelli et al.1 appear to have underestimated the contribution of current sexual activity to declining pregnancy rates among adolescents aged 15 to 17 years. The authors calculated a contraceptive risk index (the weighted average of estimated “typical use” failure rates for contraceptive methods reportedly used at last intercourse), assuming this index accurately reflects the risk of pregnancy among sexually active adolescents. But a review of pregnancy data for 1995 and 2002 reveals that the calculated index does not consistently correspond with actual pregnancy risk for sexually active adolescents aged 15 to 17 years.

Pregnancy risk among sexually active adolescents can be calculated more accurately by dividing the pregnancy rate by the proportion of adolescents who are sexually active. In 1995, the pregnancy rate for girls aged 15 to 17 years was 64.1 per 1000.2 Because 28.2% reported recent sexual activity in 1995, the pregnancy risk among sexually active girls was actually 0.227 (0.0641/0.282), not 0.344 as estimated by the authors. In 2002, the pregnancy rate among girls aged 15 to 17 years was 0.0423. Because 23.4% reported recent sexual activity in that year, the pregnancy risk among sexually active girls was 0.181 (0.0423/0.234), similar to the authors’ estimate of 0.186.

Repeating the authors’ calculations with the more accurate estimates of pregnancy risk among sexually active adolescents aged 15 to 17 years, we found that reduced pregnancy risk among sexually active adolescents accounts for 54.7% of the decline in pregnancy rates, whereas the reduced proportion of adolescents who are sexually active accounts for 45.3%. An alternative approach is to calculate the anticipated change in pregnancy rate were sexual activity to decline without any change in pregnancy risk for sexually active adolescents. Had this occurred, the 2002 pregnancy rate would have been 0.053 (0.234 × 0.227). By contrast, had there been no change in recent sexual activity, and pregnancy risk for sexually active adolescents had declined, the 2002 pregnancy rate would have been 0.051 (0.282 × 0.181). Using either approach, the contributions of declining sexual activity and reduced risk of pregnancy among sexually active adolescents are actually quite similar.

Additional research is needed to determine why standard contraceptive effectiveness rates may not apply to adolescents (differences in the frequency of intercourse and the consistency and correctness of use compared with adults are possibilities). Meanwhile, researchers should not assume that pregnancy risk among sexually active adolescents is only a function of contraceptive choice.

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Contributors
J. R. Mann originated the letter. Both authors collaborated in writing the letter.

References

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We thank Mann and Stine for their interest in our recent article. We examined data on sexual activity and contraceptive use from the National Survey on Family Growth (NSFG) and found that most of the declines in US adolescent pregnancy from 1995 to 2002 could be attributed to improved contraceptive use: for 77% of the decline among those aged 15–17 years and for all of the decline among those aged 18–19 years.

The methodological improvement in calculating attribution—in our journal article and a previous article1—was to calculate pregnancy risk by combining data on sexual activity, contraceptive use, and contraceptive failure rates. Mann and Stine suggest an alternative method for calculating attribution that uses data for a single variable: sexual intercourse in the past 3 months. We would note that the decline in sexual intercourse in the past 3 months for 15- to 17-year-olds (from 28.2% to 23.4%, a decline of 17%) does not reach statistical significance (P=0.065). By contrast, the decline in pregnancy risk among sexually active adolescents (45.9%) was highly significant (P<.001).

Mann and Stine describe a calculation of pregnancy risk that should more properly be called a pregnancy rate among sexually active teens. Their calculation is very different from our measure of pregnancy risk, which is based on behavioral data. Moreover, our overall pregnancy risk index calculates the risk of becoming pregnant, not the risk of
completing a pregnancy. Given these differences, the absolute value of our pregnancy risk index will not equate with actual pregnancy rates; however, changes over time in pregnancy risk and pregnancy rates should be similar, as we described in our article.

In addition, Mann and Stine suggest that standard contraceptive failure rates may not apply to adolescents. This is not true. In fact, typical-use contraceptive failure rates from the NSFG are calculated using data from both young women (aged 15–19 years) and adult women (aged 20–44 years). Method-specific failure rates from the NSFG are virtually identical for adolescents and adult women and did not change between 1988 and 1995. Calculations on the basis of typical-use contraceptive failure rates and contraceptive use at last intercourse inherently reflect correctness and consistency in use as well as coital frequency.

Finally, could other factors be influencing trends in pregnancy risk among sexually active adolescents? Certainly! In our article we discussed the possibility of changes in other factors driving fertility trends; however, we are not aware of any evidence supporting such a change, from this country or elsewhere.

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References
This issue of the Journal highlights a group of articles published in Framing Health Matters that contributes to our understanding of sexual life from a sociocultural perspective. Using a qualitative approach, each examines the sociocultural and economic context of a particular country and reveals how the context contributes to HIV transmission. Based on the findings, the authors further suggest potential intervention strategies.

Although 3 of the ethnographic studies were carried out in different developing nations, they were remarkably consistent in their findings surrounding the sociocultural forces driving HIV infection. Generally, all found that a number of factors, most notably migration for work, cultural beliefs and norms, gender inequality, socioeconomic status, and the social context of marriage worked together to promote men’s extramarital sexual activity, thus contributing to an increased risk for HIV infection among their wives.

As the articles elegantly show, sociocultural and economic structures intersected in each community to promote infidelity among married men, and the factors or structures that discouraged it were not strong enough to counteract the practice. This situation, coupled with inconsistent, and in most cases, no condom use, left the wives of these men vulnerable to HIV infection. Across the cultures, the authors found that married men’s infidelity did not challenge their marriage as long as their wives accepted the fiction of fidelity. Moreover, use of condoms, if they could be obtained, would challenge this fiction that both husband and wife had an interest in maintaining. Furthermore, infidelity for the men in these cultures was a sign of masculinity and a topic for discussion with their male peers. Another important characteristic of these communities was work-related migration—men typically left their communities to find work—which provided an opportunity for extramarital sex (to ease the loneliness), socializing with other men (to demonstrate their masculinity), and disposable income to spend on extramarital liaisons. It was these social forces operating within each culture, rather than some moral failing on the part of married men (who had an interest in maintaining at least the appearance of a solid marriage, a sign of adulthood), that converged to promote infidelity.

Another key finding so beautifully illustrated by these papers is that one must understand the social construction of marriage in addition to the other social forces that place married women at risk for HIV infection. With this understanding, each author suggests potential interventions to reduce the risk. However, as Smith (Nigeria) very thoughtfully points out, “In the longer term, the structural underpinnings of economic and gender inequality that undergird a significant proportion of extramarital relationships require social and economic transformations beyond the scope of conventional public health programs.”

Nonetheless, Smith and Hirsch et al. (rural Mexico) argue that, in the short term, certain structural changes can be implemented. For example, Wardlow (Papua New Guinea) suggests that, because labor migration provides the opportunity for men’s extramarital sex, employers should offer family housing for workers so that men do not experience periods of separation from their families. Therefore, public health interventions must focus on what is realistic in the short term (specific structural changes that will encourage fidelity and promote condom use) but also must take into account any action that may challenge the moral significance that couples attach to the institution of marriage within each culture.

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Sexuality, Health, and Human Rights

Over the past 25 years, there has been a veritable explosion of public health research on sexuality. Never have sex and sexual matters been more topical or more worthy of scientific attention.

After a brief interlude of research attention to the subject of sex in the mid-20th century, when the controversial Kinsey studies were published, research focusing on sexuality at the population level languished, and financial support for such work was almost nonexistent. Particularly in the wake of the emerging HIV/AIDS epidemic in the 1980s, the consequences of this long-term neglect of inquiry into sexuality and health became apparent, as did the limitations of existing conceptual frameworks and methodological approaches.

The urgent need for more innovative approaches to the study of sexual life became evident.

As public health researchers and practitioners have struggled to address these issues in recent decades, a new wave of research, intervention, and sexual health promotion began to take shape, usually from the ground up, in response to the needs and demands of local communities struggling to respond constructively to a range of sexual health challenges.1

SEXUALITY AND SOCIAL MOVEMENTS

Contrary to what is commonly supposed, the impetus for present-day concern for sexuality and sexual health emerged not from within mainstream biomedicine and public health but from fields peripheral to these—in particular, from the “Cinderella specialties” of genitourinary medicine and reproductive health and from community activism to secure the rights of women, gay men, and other marginalized groups.

Indeed, one of the key aspects of research and intervention on sexuality and health that has distinguished this area of work from many others is the extent to which it has been shaped by an evolving set of highly active and engaged social movements.

It is impossible to imagine the recent explosion of work in this area independent of the development of the feminist and women’s health movements. The analysis of gender and gender power differentials as central to any full understanding of sexual relations and interactions has been a crucial contribution of feminist analysis, one that has shaped our understanding of the most pressing research issues and the most difficult barriers to effective interventions for sexual health. But just as the feminist and women’s health movements shaped our understandings of the sexual field, so too have the lesbian, gay, bisexual, transgender, and queer (LGBTQ) movements.

Emerging before AIDS in many industrialized countries, and often in the wake of AIDS in many developing nations, LGBTQ scholarship and activism have played a central role in calling attention to sexual diversity. In so doing, LGBTQ scholarship and activism have caused us to rethink our understanding of taken-for-granted categories and classifications—male/female; woman/man; heterosexual/homosexual; normal/abnormal—that had been used hitherto to map out the sexual field. Like feminism, LGBTQ thinking has drawn attention to the relationship between sexuality and power and has highlighted the need for new conceptual frameworks, novel sampling strategies, and innovative methodological approaches to the study of sexual communities and sexual life.

Finally, perhaps inevitably, drawing strength from the...
One of the key insights that has emerged from these social movements, and from the work of researchers influenced by them, is the conviction that sexuality cannot be understood apart from social, political, and economic structures or without reference to the cultural and ideological discourses that give sexuality meaning. Sexual health problems are never evenly distributed across all population groups. On the contrary, sexual health problems are systematically shaped by multiple forms of structural violence—institutionalized poverty, racism, ethnic discrimination, gender oppression, sexual stigma and oppression, age differentials, and related forms of social inequality—in ways that typically harm and negatively affect groups and populations already marginalized or oppressed.

We are only beginning to understand the concrete mechanisms through which various forms of structural violence work in synergy to shape key sexual health problems in specific locations and how these problems then reinforce the very forms of oppression that helped to create them, undermining community structures and rolling back development. Nowhere can this cycle be seen more clearly than in HIV-related stigma and the manner in which those most vulnerable are blamed for engaging in behaviors that expose them to infection and being seen as unworthy of public health attention.2

By confronting the challenges to sexual health and well-being, we are forced to move beyond a concept of public health practice as a technical exercise and to rethink moral, ethical, and political dimensions of our work as part of a broader process of social change. Although this idea has long been one of the guiding principles of social medicine and public health, it has become especially relevant in sexuality and health and is crucial in the move from research to practice in sexual health promotion.3

SEXUALITY AND HUMAN RIGHTS

One of the key consequences of the important role played by social movements in relation to sexuality and health has been the calling of attention to the need to speak of research and intervention as extensions of broader struggles for human rights and social justice. Whether the focus is HIV/AIDS, unwanted pregnancy, sexual abuse and violence, or any other major sexual health issue, sexual health promotion programs around the world have emphasized the profound importance of empowerment, or socially engaged agency, as a precondition for reducing risk and vulnerability. Human rights approaches offer one of the theoretical and methodological underpinnings of effective sexual health promotion. Sexual rights is still a relatively new area of the human rights discourse—it has been called “the new kid on the block” in international debates4—but it is clear that sexual rights embrace those human rights already recognized in national laws, international human rights documents, and similar consensus documents developed with the United Nations and its various agencies.

Sexual rights include “the right of all persons, free of coercion, discrimination and violence,” to attain the highest possible “standard of sexual health, including access to sexual and reproductive health services.”5 Sexual rights also include the right to seek, receive, and pass on information about sexuality and the right to sexuality education. Sexual rights include, above all, the right to have one’s bodily integrity respected and the right to choose—to choose whether or not to be sexually active, to choose one’s sexual partners, to choose to enter into consensual sexual relationships, and to decide whether or not, and when, to have children.

Ultimately, what might be described as true sexual citizenship is possible only when all people have the right to pursue a satisfying, safe, and pleasurable sexual life. But the full realization of sexual citizenship depends on more than state-protected rights. The idea of sexual pleasure, its definitions, its language, and its expression all typically come from the grassroots—from society at its most basic, local level—rather than from government or scientific bodies.

Social, cultural, religious, biomedical, scientific, and other nonstate actors are primarily responsible for respecting (or not) the right to sexual pleasure, by abiding (or not) by fundamental principles of equality, freedom, and human dignity.6

Although it is clear that we are still far from fully realizing the potential of sexual rights in any society, it is equally evident that the road to sexual health is underpinned by the struggle for sexual rights. Without being firmly rooted in a conception of and commitment to sexual rights, sexual health promotion can never be effective. Equally important, how the field of public health approaches sexuality shapes society’s ability to realize sexual rights as part of a broader commitment to human dignity and worth. The current wave of public health research and intervention on sexuality and health marks an important step in this direction.

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References

Directly Observed Highly Active Antiretroviral Therapy for HIV-Infected Children in Cambodia

| Patricia Myung, MD, David Pugatch, MD, Mark F. Brady, BS, Phok Many, Joseph I. Harwell, MD, Mark Lurie, PhD, and John Tucker |

Antiretroviral medications are becoming available for HIV-infected children in resource-limited settings. Maryknoll, an international Catholic charity, provided directly observed antiretroviral therapy to HIV-infected children in Phnom Penh, Cambodia. Child care workers administered generic antiretroviral drugs twice daily to children, ensuring adherence.

Treatment began with 117 late-stage HIV-infected children; 22 died of AIDS during the first 6 months. The rest were treated for at least 6 months and showed CD4 count increases comparable to those achieved in US and European children. Staffing cost for this program was approximately US $5 per child per month, or 15% more than the price of the medications. Drug toxicities were uncommon and easily managed.


Fewer than 10% of the 660,000 children worldwide who are HIV infected and in need of antiretroviral treatment receive such treatment.1 Cambodia continues to have one of the highest rates of HIV infection in Asia, with a national prevalence of 1.9%.2 It is estimated that between 3800 and 12,000 Cambodian children younger than 16 years were living with HIV as of 2003.3 Recently, in the wake of dramatic price reductions, highly active antiretroviral therapy (HAART) has become available to a limited number of Cambodian children who are HIV infected, and Cambodian pediatricians are receiving training in the use of HAART. As of 2004, approximately 4200 adults and 314 children were receiving antiretroviral therapy in Cambodia.2 The Ministry of Health of Cambodia declared a national target of having 1500 children on antiretroviral therapy by 2005.2

Although community-based treatment models for children with HIV infection will be indispensable for worldwide antiretroviral therapy scale-up, the feasibility of such programs remains largely untested. Adequate adherence to antiretroviral medications is crucial for successful treatment.4–6 Ensuring medication adherence is a particular problem for children who are HIV infected, because they must be given often-unpalatable liquid medications by diverse caregivers. One approach to optimizing medication adherence in children is directly observed treatment.7

THE MARYKNOLL LITTLE SPROUTS PROGRAM

The Little Sprouts program of Maryknoll, an international Catholic charitable organization, has provided directly observed treatment with HAART to orphans who are HIV positive in Phnom Penh since June 2002.6 It is the first program in Cambodia to treat children with HIV infection using directly observed treatment. The Little Sprouts program maintains group homes for children who are HIV positive and whose parents have died of AIDS. The program also has a home-based care program for orphans who live with extended family. Children receive their antiretroviral medications from a child care worker who observes the ingestion of medication twice daily.

A series of didactic training sessions are given by the Little Sprouts program manager to new child care workers, who also participate in fieldwork with veteran workers or the program manager. Medication adherence is recorded and verified during twice weekly meetings between child care workers and project managers. Each child care worker is responsible for approximately 10 children. All child care workers have cell phones and are encouraged to call the project manager directly when problems arise, such as missed doses.

In addition to the child care worker, a case manager is assigned to each child; the case manager visits the child and family twice per week to monitor general health and well-being. If health concerns arise, the child is taken to the Little Sprouts clinic for evaluation by a physician. There are well-child checks every 3 months with the same Little Sprouts doctor.
KEY FINDINGS

- Orphaned children who died of AIDS-related illness within 6 months of beginning antiretroviral treatment appeared to have very-late-stage HIV disease.
- Cambodian children who received directly observed treatment with HAART for at least 6 months showed substantial improvements in CD4 counts and percentages similar to those seen in other cohorts of children who received HAART without directly observed treatment.
- Children in the program showed significant and sustained improvement in nutritional status.
- Toxicities of antiretroviral drugs were uncommon and easily managed.
- Directly observed treatment of HAART to orphaned children appears to be a feasible and inexpensive way to ensure medication adherence in a resource-limited setting.

During the evaluation, children rarely changed households. In 1 case, a family moved because of a house fire, but medical care was continued. In instances when the child was not in the household at the time the child care worker arrived, the decision to leave a single dose of HAART for the family to administer was made on a case-by-case basis. For all cases in which a child was not present, after administering medication to the rest of their patients, child care workers returned to either give the child HAART or verify that the family had given the child the medication. Missed HAART doses occurred, but were rare. During the evaluation, fewer than 1% of all scheduled doses were missed.

Children were monitored for possible drug toxicities and for change in CD4 levels. Other observations included weight, hemoglobin, common illnesses, and mortality. Each child received daily multivitamin supplementation, nutritious food, nutritional monitoring, and general medical care as a part of the program.

All children in the Little Sprouts program who were HIV infected underwent baseline basic blood tests, including complete blood count, level of the liver enzyme alanine transaminase (ALT), absolute CD4 count, and percentage of lymphocytes that were CD4 cells (CD4 percentage). Children whose CD4 counts were below 15% were started on HAART. CD4 measurements were routinely repeated every 6 months. The Little Sprouts program did not provide antiretroviral medicine to adult caregivers—the adults were helped by other programs.

PROGRAM EVALUATION AND RESULTS

A retrospective record review was conducted for all children enrolled in the Maryknoll Little Sprouts program in Phnom Penh between August 2002 and October 2004 (Figure 1). The study population included children aged 1 to 18 years who had documented HIV infection measured by an HIV antibody test and were living in an orphanage or with families in the community.

Medical records of all children started on directly observed treatment with HAART were reviewed. The 95 children who received at least 6 months of twice-daily directly observed treatment with HAART and had both baseline and at least 1 subsequent CD4 count measurement were included in the analyses. CD4 measurements were repeated after a mean of 6.2 ±0.7, 12.3 ±0.2, and 18.8 ±0.9 months of directly observed treatment with HAART. Sixty-eight of the children received 12 or more months of treatment, and 33 received approximately 18 months of directly observed treatment with HAART. Mean age at treatment initiation was 5.5 years (SD = 2.5 years), with a range of 1 to 13 years. The group comprised 54 boys and 41 girls. Thirty-three orphans were living in group homes, and 62 were living in family settings.

DRUG REGIMEN, TOXICITIES, AND MORTALITY

Children received a HAART regimen of nevirapine (NVP) or efavirenz (EFV) plus stavudine and lamivudine (all antiretroviral drugs used were manufactured by Government Pharmaceutical Organization, Bangkok, Thailand). Children younger than 3 years or weighing less than 10 kg were started on an NVP-based regimen. Drugs were given in accordance with World Health Organization dosing guidelines. Liquid formulations of NVP, lamivudine, and stavudine were given to children who did not meet appropriate weight criteria to receive tablets or capsules or who could not swallow pills. Fifty-nine children were started on an NVP-based regimen, and 36 were started on an EFV-based regimen. Five children who were receiving concomitant tuberculosis treatment were treated with EFV.

There were no deaths attributable to antiretroviral drug toxicities. Four children developed NVP skin rashes, which were easily managed by switching to EFV.

![Figure 1](image-url)
Five children started on NVP switched to EFV because of elevated liver enzymes after beginning treatment. One patient switched from NVP to EFV because of treatment failure on NVP (defined as no significant rise in CD4 count after 6 months). Twenty-two patients, all of whom completed less than 6 months of HAART, died from AIDS-related illness; they were not included in the analysis of CD4 cell changes because follow-up CD4 measurements were not available. Baseline CD4 measurements were available for 8 of the 22 children who died before receiving 6 months of antiretroviral treatment. Baseline CD4 counts (mean of 53 cells/mm³) and percentages (mean of 1.98%) were significantly lower ($P < .01$) than those for the surviving children (255 cells/mm³ and 6.84%, respectively). Although these CD4 cell data are incomplete for the children who died, they suggest that mortality may have been attributable to later-stage disease at initiation of antiretroviral treatment. One child who received 15 months of directly observed treatment with HAART died of chronic cryptosporidial diarrhea.

### OUTCOMES AND COSTS

Before receiving directly observed treatment with HAART, children were significantly underweight. Average weight-for-age $z$ scores were calculated for children who received 6 or more months of treatment using Epi-Info version 3.3.2 (Centers for Disease Control and Prevention, Atlanta, Ga). An increase in weight-for-age $z$ scores with directly observed treatment with HAART was seen over time, as shown in Table 1. Improvements in mean absolute CD4 count and CD4 percentages in the cohort are shown in Table 1. The mean absolute CD4 count increased from 255 cells/mm³ at baseline to 656 after 6 months of directly observed treatment with HAART, 854 after 12 months, and 992 after 18 months. These improvements in T-cell immunity compare favorably with those reported in other cohorts of children in both the developed and the developing world, none of which used directly observed treatment.

The relatively low cost of employing trained child care workers in Cambodia to administer daily HAART made it feasible to ensure nearly 100% medication adherence in the children enrolled in the Maryknoll program. The additional cost of personnel plus training to provide directly observed treatment to children in this program was estimated to be US$5 per child per month or $60 per child per year. This represents an additional 15% cost for directly observed treatment.
beyond the cost of HAART medications. It is hoped that directly observed treatment with HAART will result in long-term cost savings by optimizing medication adherence and postponing the development of drug resistance and treatment failure, which necessitate switching to more expensive second-line regimens.

**IMPLICATIONS**

To our knowledge, there are no published reports on outcomes of orphaned children in resource-poor settings receiving directly observed treatment with HAART. Considering that children who are HIV infected will likely need to receive HAART indefinitely and that the cost of second- and third-line regimens will be burdensome in resource-poor settings, it is of particular importance that medication adherence remain optimal to decrease the risk of treatment failure. Directly observed treatment with HAART may be especially useful for maintaining medication adherence and thus preventing viral resistance and treatment failure.

The outcomes seen in the children of the Maryknoll Little Sprouts program suggest that directly observed treatment with HAART to children who are HIV infected can be feasible and effective in a resource-poor setting and can employ locally trained personnel at a reasonable cost. The orphaned children in this cohort were started on antiretroviral therapy at a very late stage of disease, and we speculate that better clinical outcomes may be achievable if children can begin directly observed treatment with HAART earlier in the disease course. Further data are needed to evaluate the long-term sustainability of directly observed treatment with HAART programs for children, optimal duration of directly observed treatment, and acceptance by older children, adolescents, and the local community.

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D. Pugatch and J. Tucker supervised the program evaluation. Data was collected and organized in Phnom Penh by P. Myung and P. Many. P. Myung, D. Pugatch, J. I. Harwell, and M. F. Brady wrote the first draft of the article. D. Pugatch, M. F. Brady, P. Myung, and M. Lurie conducted the data analysis.

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**References**


Minding the Gaps: A Reassessment of the Challenges to Safe Motherhood

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Maternal and perinatal mortality reduction has remained a priority on the international health agenda for nearly 2 decades. During this time, strategies for achieving these goals have shifted in emphasis from prevention of pregnancies to provision of care. Robust evidence is limited, particularly regarding what works best in delivering care in specific health system settings and at the population level.

We describe the limited evidence base using a framework that highlights the consequences of the major gaps in measurement, evidence, and action, and we discuss existing opportunities for bridging these gaps at the policy level. Capitalizing on current global policy interests and generating demand-driven evidence is a priority for enabling documentation of progress toward reaching the United Nations Millennium Development Goals for 2015. (Am J Public Health, 2007;97:978–983. doi:10.2105/AJPH.2005.073692)

SINCE THE LAUNCH OF THE international Safe Motherhood Initiative in 1987,1 widely endorsed initiatives such as the 1994 International Conference for Population and Development and the 1997 Safe Motherhood Technical Consultation2 have emphasized the need for an increased focus on reductions in maternal mortality. Although the priority health outcomes have essentially remained the same—less maternal and perinatal mortality—the intervention strategies have shifted in emphasis over time, from prevention of pregnancies to traditional birth attendant training on safe delivery care or provision of emergency obstetric care in hospitals.3,4

The reasons for such shifts are varied; they include the changing agendas of international organizations, a degree of disillusionment regarding progress, and intensified competition for scarce health resources. As of yet, what has not been available to inform these shifts is what works best for a particular health system at the population level. This lack of knowledge is a reflection of 3 significant, interrelated gaps—in measurement, evidence, and action.

Twenty years would seem like a sufficient time for these gaps to be narrowed and health burdens to be reduced. The reality is that the gaps still limit both our expectation and demonstration of progress. The United Nations Millennium Development Goals (MDGs), which aim to reduce global poverty and, in particular, seek a three quarter reduction in maternal mortality by 2015, have now brought a new timeline into focus.5 What, then, are the prospects for narrowing the gaps during the next decade?

THE MEASUREMENT GAP

—A goal which cannot be monitored cannot be met or missed.

Johansson and Stewart5(p2)

The data currently available on the magnitude, trends, and differentials for maternal and perinatal mortality and morbidity are woefully inadequate in those countries where the need for data is greatest. This data deficiency is not just a consequence of underdevelopment; it is also a contributory factor.6 There are many historical examples of how demonstrating improvements in public health can have the power to enhance the supply of and demand for health services. Indeed, it has been argued that providing access to reliable information is the single most cost-effective achievable strategy for sustainable improvements in health care.7 To date, only a few developing countries—Sri Lanka, Thailand, and Honduras, for example—have shown progress in reducing maternal mortality nationally.8,9 The reductions have been dramatic in some cases—for example, maternal mortality in Sri Lanka dropped 80% over a 20-year period.8 One reason for the success of these countries may have been that they had statistics to parade before policy decisionmakers and the public to break the vicious cycle10 of poor expectation and demonstration of improvements.8,9 The reductions in mortality have been written on the inadequacies of poor data, thus low priority, thus limited resources, and so poor data.

Why are the data still so inadequate and why does it matter? These 2 crucial questions are part of the vicious cycle but also part of the solution. Much has been written on the inadequacies,11,12 with weak routine information systems often unfairly blamed. This analysis of the problem has led to a lack of data on maternal and perinatal outcomes being considered normal. Continuing to work with dubious data is necessary to avoid a total stalling of commitment.13 It should be accompanied by
taking on the grand challenge of making the deaths and disabilities of women and their babies lead to ethical, political, and numerical improvements.14 Currently, there are still arguments that the magnitude of these deaths and disabilities is unacceptably high—which is undoubtedly true, but how high and for whom? If we do not know the level of the current burden of maternal and perinatal conditions, how can we know whether progress has been made and what made the difference?

Many district health directors in the poorest countries still have no reliable recent information on the number of maternal deaths, stillbirths, or early neonatal deaths in health institutions, let alone those occurring silently and tragically at home or when mothers are on their way to seek help. Few ministers of health in these countries can confidently state their national maternal mortality ratios or perinatal mortality rates. For example, crude modeled estimates suggest that the number of maternal deaths per 100,000 live births could be 630 or it could be almost 3 times this figure.15 Major international initiatives such as the Global Burden of Disease (a part of the World Bank’s Disease Control Priorities Project) do not include stillbirths, and only deaths and disabilities attributed to direct obstetric complications are captured in the maternal category.16 Maternal mortality is 1 of 3 MDGs that cannot be monitored directly, the others being poverty and HIV/AIDS.5 The omission from the Global Burden of Disease initiative of countries lacking data also removes those facing the greatest challenges, potentially giving an inflated impression of the proportion progressing toward the 2015 targets.

The measurement gap is therefore the difference between measurements that are sufficient for advocacy purposes (i.e., adequate and accurate data) and measurements that can inform actions (i.e., data that can help us to monitor trends). But there are now heightened opportunities for bridging this gap by building upon what may be called “heads of steam” to create momentum. These are highly topical and often sensitive issues currently at the forefront of the attention of national and international players.

The Gender Disparity

The invisibility of maternal death and disability is not just a matter of failing health information systems. It is also a symptom of constraining social environments in which the rights to life, health, and reproductive autonomy are far from reality for most girls and women.17 The comparative lack of gender-disaggregated data—not just in the health sector but also in employment, education, and wealth indicators, for example—continues to disguise profound gender imbalances.18 Recognition of the importance of prioritizing gender issues is increasing, however, and the 10th International Conference for Population and Development in 2004 reinforced key messages on women’s empowerment and equality as global goals.

There are also a growing number of countries in which governments have been encouraged to address preventable causes of maternal death that violate women’s rights to life and health.19 The head of steam behind this rights-based approach can provide the momentum needed for generating and meeting heightened demands for data to show the extent and nature of discrimination, including disproportionate burdens on particular socioeconomic groups or regions. One example is Brazil, where there are well-documented inequalities between geographical regions and significant gender discrimination.20

The Poor–Rich Disparity

Equity in health and reduction of poverty are not new objectives, but they are currently dominant among the international rhetoric of development.5,6,21 The millennium declaration has given added impetus to defining, measuring, and taking action against poverty. A variety of indicators try to capture the so-called poor–rich gap, both within and across countries. For women’s health, most markers reflect health service utilization rather than health outcomes. In a recent analysis of 52 developing countries, for example, there was an average of 4 times the difference in the use of professional assistance during birth between the poorest and richest quintiles of society.21

Monitoring poverty-reduction strategies only in terms of coverage statistics does not, however, provide proof of equitable health gain or indeed equitable survival.22 Increased use of health care by the poorest women is a necessary but insufficient condition for the reduction of maternal and perinatal mortality at the population level, particularly if the quality of care is not also ensured. Maternal death and disability is widely regarded as a sensitive barometer of the functioning of the entire health system,6,23–25 and tracking poverty differentials in these outcomes can thus also highlight market and government failures in the system. The head of steam currently behind poverty-relevant indicators, therefore, provides an opportunity to rally concerted popular and political support for better data on maternal and perinatal conditions.

The Tools-and-Technology Disparity

The need for generating reliable information on health outcomes is not unique to safe motherhood, but is part of a “gathering storm” of demands from monitoring initiatives, such as the MDGs and Poverty Reduction Strategy Papers that threaten to disrupt local health information systems by placing different priorities in competition with each other.26 The storm could, however, be harnessed to reform and strengthen these systems, particularly if competition between special programs is managed and transformed into collaboration. This would require effective mechanisms for sharing lessons—such as the Health Metrics Network, which aims to improve country health information.
systems—as well as for placing a premium on methods and tools of wider relevance and application than on single, vertical initiatives. The measurement needed for maternal and perinatal outcomes could act as an entry point for systems-wide improvements in the quality and quantity of health information, both institutional and population based.

Aside from the need for a larger array of validated instruments and mechanisms for identifying adverse maternal and perinatal events, there is also a need to bridge the digital- and paper-based technology divide. In 2000, a lack of paper for essential tasks such as printing health records or plotting utilization figures was standard in many poor countries where the printed word is still preferred by health professionals. This is despite the fact that 10 years earlier it seemed the world was entering the information age and technology would help overcome major barriers in the capture, management, and dissemination of reliable, relevant health information. The head of steam created by the ongoing global review of access to health information in developing countries should be a stimulus to developing, testing, and sharing measurement tools and technologies as global public goods.

Research will play a crucial role in helping to narrow the so-called 10/90 gap—the term for the fact that only 10% of global expenditure on health research and development is allocated to the poorest 90% of the world’s population.

**Bringing the Measurement Gap**

The measurement gap can be bridged by using the gender disparity, poor–rich disparity, and tools-and-technology disparity to yield benefits beyond safe motherhood. Enhanced tools for monitoring differentials in the improvement of maternal care (MDG 5), for example, would also aid in tracking progress in poverty reduction (MDG 1) and gender-disparity reduction (MDG 3). Improvements in generic methods, information systems, and technologies to measure mortality would help with reducing child mortality (MDG 4), combating diseases (MDG 5 and MDG 6). Given that in 2004 neonatal deaths represented an estimated 36% of all deaths in children younger than 5 years old, it is crucial to be able to monitor these events, many of which are associated with maternal complications.

Measurement, however, is not an end in itself but rather a means for informing decisions to achieve a higher-level objective—the reduction of maternal and perinatal mortality and morbidity. The tools and mechanisms currently available are inadequate for generating timely, relevant, and appropriate information on these outcomes and thus for monitoring and attributing progress. Consequently, precious human and financial resources are being allocated to major safe motherhood interventions whose effectiveness in improving maternal and perinatal conditions at the population level is unproven. As the competition for these limited resources continues to intensify, decisionmakers will need to answer some hard questions about the value of investment posed by political powers and by civil society.

**THE RELEVANT EVIDENCE GAP**

—We have evidence on how to reduce deaths and improve health.

Evidence is currently a much used and abused term in international public health. After being imported from the original domain of medicine into health policy and programs, the term has become ambiguous. In the context of safe motherhood, this ambiguity has led to more ambiguity about claims of “knowing what works.” Regarding the core components of the discrepancies or gaps in our understanding of safe motherhood, 3 important clarifications are needed: the certainty or quality of the “knowing” (advice vs evidence), the level of the “what” (the intervention), and the generalizability of the “works” (how evidence can be applied and reapplied in different contexts and large-scale programs).

**The “Level-of-Intervention” Discrepancy**

The underlying causes of maternal and perinatal death and disability are multiple, complex, and closely intertwined. The final medical causes, however, are distinct entities and are mostly amenable to specific clinical interventions for preventing death. At this latter level, the focus is on the individual woman or baby, or both, and avoidance of death implies a secondary prevention model and thus an emphasis on emergency obstetric care. There is a huge knowledge base on best clinical practice, much of it derived from decades of accumulated conventional wisdom and increasingly proven by robust research using gold standard methods such as randomized controlled trials.

Naturally, there is still room for the improvement of specific technologies, but it is also reasonable to claim that “we know what works” at the patient level and for many conditions. Proof of a single intervention’s efficacy or effectiveness at preventing individual-level death or disability, however, is not proof of benefit for an entire population, because interventions still need to be supplied through a functioning health system and on a scale that meets demand. These systems comprise many other interventions—of known or unknown benefit—and operate in the real world in which there are a host of other influences on the death, disability, and health of mothers and babies.

At the population level, it is therefore less helpful to discuss single interventions—there are no “magic bullets” or quick fixes. Rather, the debate needs to encompass whole composites of interventions—here called intervention strategies—that imply not only content (the components) and implementation (the delivery of components) but also context—the settings in which strategies become implemented as programs. Categorizing or...
Typifying intervention strategies highlights differences in emphasis in what might be called the underlying model of intent or belief. At the extreme ends, for example, are the strategies based on a philosophy or belief that emphasizes secondary prevention (emergency obstetric care) versus those prioritizing primary prevention (family planning). In practice, many developing countries have multiple and overlapping programs being implemented. Differentiating them on the basis of underlying models enables major units of resource expenditure to be isolated and valid questions to be answered on the cost-effectiveness at the population level.

**The Advice-Versus-Evidence Discrepancy**

Acknowledging the difference between knowing what works for individual case management versus entire societies requires political champions, at the national and international levels, who can turn to advantage the inevitable uncertainties in programming priorities that this acknowledgment will generate. These uncertainties can create a head of steam for robust evaluation and so help bridge the gap in safe motherhood between opinion and evidence.11 There are areas of clinical practice whose efficacy, effectiveness, and sometimes cost-effectiveness have been rigorously assessed. Most of these areas were selected for assessment on the basis of expected health gain or cost minimization. Conversely, there is a notable dearth of robust evaluations of major health policies or programs in safe motherhood, even though one might expect improvements in health or resource use from such evaluations.

Why is this? A multitude of explanations could be given; for example, the argument that scarce resources should be used for implementation rather than evaluation. Another set of reasons relates to the challenges regarding measurement that evaluations of intervention strategies present.37 These challenges are undeniably significant and fall within the domain of scientific research, which must drive the search for solutions. Not only are realistic and appropriate measurement tools needed to track changes in key health outcome and process indicators, but also innovative thinking is needed to grapple with the complexities of content, implementation, and context that are characteristic of intervention strategies. Measurement and evidence gaps need to be addressed together. These major evaluations require the capture and management of a wide range of types of information, both primary (new) and secondary (existing), which can be assessed from a variety of perspectives, including the use of conventional grades of evidence related to, for example, randomized trials or observational studies.

Modeling techniques can be used on secondary data to predict potentially cost-effective intervention strategies,46 and opportunities to test these techniques may arise where enhancements to ongoing programs are possible. Technological innovation is needed in knowledge management, both on the input side and on the user interface, and this innovation can have major spin-offs into other health service areas in which, ironically, information dearth is replaced by information overload.26 The units of evidence need to be pieced together to create a coherent story of the cost-effectiveness of alternative intervention strategies in reducing maternal and perinatal death and disability and of the pathways or mechanisms by which these benefits are achieved. The novel concept of causal networks, which are complex explanatory models of cause and effect,37 holds promise as a “story-telling device” and has particular relevance to the generalizability of findings through control for key contextual factors. Moreover, when fundamental questions regarding which intervention strategies achieve greatest health gain are investigated, a causal network approach would require that a host of additional subquestions be answered along the causal pathway, through primary or secondary research, thereby increasing the overall evidence base for safe motherhood.

The continuous process of improving the quality and scope of evidence must, of course, happen alongside promoting use of the “best” evidence available at the time to inform policy and program decisionmaking.

**The Going-to-Scale Discrepancy**

There is much current debate about identifying and reducing crucial bottlenecks in the scaling-up of health services, particularly in resource-poor countries. The nature of these bottlenecks varies, and thus there is concern about applying lessons learned in 1 country to another country or applying lessons learned in pilot or demonstration projects to another situation. In safe motherhood, there is a presumption that increased investments of human and financial resources should be channeled to doing more of the same but on a bigger scale. Increasing the dimension or coverage of care, however, can adversely affect the supply side of the health system, such as, quality assurance and the role of the private sector. Alternative service arrangements are relevant to different points in the continuum of care, from home-based self-care to emergency clinical care, and these will have different implications for scaling-up health services. Enhancing supply arrangements may, however, upset the equilibrium between supply and demand in the health system.38

There is limited evidence on which intervention strategies effectively correct the underutilization of health care,37 but there is a strong sense that effectiveness will be context specific, particularly in the case of social or community mobilization initiatives. If this assumption is true, generalizability between countries and from specific evaluations is dependent on the availability and use of sensitive tools to describe the context or setting. Evaluations to identify cost-effective intervention strategies, whether comparing differences in scale...
alone or also in content, are thus needed. These contextual factors are also crucial to other bases on which to judge what works at a population level—namely, equity and sustainability.

THE ACTION GAP

—The "know–do" gap is at least as great in developing as in developed countries.

Godlee et al. 29(p298)

There is a large and growing literature indicating that generating evidence on “what works best” does not guarantee its use.38,40 There are 2 interrelated aspects to this “know–do gap”—accepting or taking up the knowledge and putting it into action. Developing the tools necessary to create knowledge or evidence does not ensure its application. Behavior change among the intended beneficiaries of evidence and tools is poorly understood in general and certainly no clearer in the area of safe motherhood.42 Bridging the measurement and evidence gap is thus a necessary but insufficient condition for reducing maternal and perinatal mortality and disability. Rapid action based on evidence also is required.

A relevant lesson that has both historical and contemporary resonance is the importance of creating demand. The recent work of Godlee et al.29 on health information systems has many parallels here; they noted the continuing tendency to supply information to potential users rather than responding to and strengthening the demand of the information needs of those users. In safe motherhood, there is now a critical mass of demand for evidence and thus tools, not the least of which is the desire to achieve the MDGs as well as the implementation of Poverty Reduction Strategy Papers. At a country level, this desire necessitates a particular type of listening partnership that identifies, fosters, and delivers on the demand for evidence by decisionmakers.

To strengthen the demand for evidence on the cost-effectiveness of safe motherhood intervention strategies, the capability of both institutions and of decisionmakers within countries must be increased. Explicitly fostering this demand fundamentally involves understanding and acknowledging the priority questions as identified by decisionmakers in the context of their own settings. Satisfying these demands will require research methods and partnerships that draw upon collaborative networks and dissemination technologies that encourage demand rather than supply. Researchers must therefore be responsive to the ultimate users of research products, seeking their perspectives on tools and evidence from the outset and identifying early applications to policy and practice. For example, methods developed to describe the health systems context of safe motherhood programs clearly have broader relevance to the health sector as a whole, and the architects can facilitate wider demand by partnering with international agencies, such as the World Health Organization, that have broader mandates.

The researcher–user interface is crucial not only in regard to the demand for or acceptance of evidence but also for taking action for safe motherhood at a variety of levels.37,39,40,43 This fact highlights the importance of having a broad constituency of partners, of using interdisciplinary approaches, of positioning research in a broad international context, and of grounding the lessons in practical program implementation. Developing methods and using them to evaluate the cost-effectiveness of specific intervention strategies may be described simply as an “alongside initiative,” but the politics of such partnerships are far from simple, and time is needed to build mutual confidence and understanding. Generating and sharing demand-driven evidence and ensuring its use cannot be achieved overnight, but there are now brighter prospects for minding the gaps in safe motherhood.

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Contributors

W.J. Graham originated the study and led the writing. J. Hussein assisted with the writing and drafting of the article. Both authors originated the ideas and reviewed drafts of the article.

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References

Recently Arrived Immigrant Latino Men Identify Community Approaches to Promote HIV Prevention

Scott D. Rhodes, PhD, MPH, and Kenneth C. Hergenrather, PhD, MSEd, MRC

LATINOS IN THE UNITED STATES continue to be disproportionately affected by the HIV epidemic. North Carolina has one of the fastest-growing Latino communities in the United States and carries a disproportionate HIV infection burden. Nine recently arrived, monolingual (Spanish-speaking), immigrant Latino men in Winston-Salem, NC, used photovoice to explore HIV prevention within their communities.

Photovoice, a qualitative and exploratory methodology founded on the principles of constructivism, empowerment education, and documentary photography, enables participants to record and reflect on the strengths and concerns of their community through photographic images and group discussion. Photovoice involves a series of steps that include determining photo assignments through consensus, distributing cameras and providing instruction on camera use, and discussing selected photographs with root-cause questioning and discussion, a technique derived from the work of Paulo Freire, in which individuals and communities dig deeply into a problem to understand the fundamental causes of that problem.

The questions used to trigger discussion were (1) What do you see in this photograph? (2) How does this photograph make you feel? (3) What do you think about this? and (4) What can we do collectively?

The Latino immigrants, who were aged 18 to 29 years, took photographs for 4 cycles, convening after each cycle to discuss the photographs and determine the next photo assignment.

Image 1, a photograph of condoms placed on a map of North Carolina, initiated a discussion about community-driven approaches to HIV prevention. The men described the need for information and access to resources, including condoms and Spanish-language HIV counseling and testing services. They also focused on the potential to harness informal social networks within their communities. As one man commented during a photo discussion, “We should be talking to our sons, to our daughters, our nephews, our brothers and sisters. Hand out a condom and tell someone you know how to use it.”

Image 2 was of a Latino nightclub. The men identified Latino nightclubs as a potentially effective and untapped setting to reach Latinos and raise awareness about HIV transmission and prevention. As one man shared,
“I am talking about a thousand men right there. We need information to be safe, but I have never seen any information or even a condom there. It doesn’t have to be that way.”

Image 3 was given the caption, “Tiendas [small Latino groceries] are a place that we all turn to, especially newcomers.” It was noted that Latino men rely on local tiendas because they sell food, medicines, and other products that are sold in their countries of origin; offer services to send money to their families in their countries of origin; and serve as a meeting place. One of the men wondered, “Why doesn’t [name of local tienda] have information about settling into life here, like how to access medical services? They could be trained about [accessing] the health clinic and share with their customers, other Latinos like us.”

After a quarter of a century of the HIV epidemic, building on existing community strengths may be key to reducing the burden within communities disproportionately affected. Innovative public health strategies that are community generated and build on local assets must be supported, developed, and evaluated. As one of the men noted, “We help each other get a [US] driver’s license. We help each other go through the steps. Now we must help each other learn the steps to prevent HIV.”

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Contributors
S. D. Rhodes was the principal investigator; oversaw the project; supervised data collection, analysis, and interpretation; and drafted and finalized the article. K. C. Hergenrather provided technical support during all phases of the project and contributed to drafting and finalizing the article.

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References
Marriage presents the single greatest risk for HIV infection among women in rural Mexico. We drew on 6 months of participant observation, 20 marital case studies, 37 key informant interviews, and archival research to explore the factors that shape HIV risk among married women in one of the country’s rural communities. We found that culturally constructed notions of reputation in this community lead to sexual behavior designed to minimize men’s social risk (threats to one’s social status or relationships), rather than viral risk and that men’s desire for companionsate intimacy may actually increase women’s risk for HIV infection. We also describe the intertwining of reputation-based sexual identities with structurally patterned sexual geographies (i.e. the social spaces that shape sexual behavior). We propose that, because of the structural nature of men’s extramarital sexual behavior, intervention development should concentrate on sexual geographies and risky spaces rather than risky behaviors or identities. (Am J Public Health. 2007;97:986–996. doi:10.2105/AJPH.2006.088492)

For a growing number of women in rural Mexico—and around the world—marital sex represents their single greatest risk for HIV infection. That women are infected by the very people with whom they are supposed to be having sex—indeed, according to social convention in Mexico, the only people with whom they are ever supposed to have sex—challenges existing approaches to HIV prevention. In this context, abstinence is impossible, unilateral monogamy is ineffective, and marital condom use is (as we have argued previously) complicated by women’s deep, culturally supported commitment to the fiction of fidelity.

We sought to extend our previous work in Degollado (a small rural community in Mexico), which focused primarily on women’s perspectives, to a discussion of how social, cultural, and economic factors intertwine to shape married women’s risk of HIV infection. In rural Mexico, reputation is a critical aspect of sexual identity, and thus attention to socio-sexual reputations provides insight into why people act in ways that are socially safer but physically more risky. We also sought to describe the intersection of culturally constructed notions of reputation with structurally patterned socio-sexual geographies—that is, that particular kinds of social spaces (bars, the main plaza, private trucks, transnational migrant communities in Atlanta) shape sexual behavior in important ways. Sexual geography calls attention to how sexual practices which would be shocking in one space are normal, and even expected, in another. Overall, our point is that extramarital sex, although typically portrayed (in Mexico and elsewhere) as a breach of social norms, is a fundamental if tacit dimension of gendered social organization rather than the product of individual moral failings or a breakdown in social rules.

The research described here focused on 1 of the sites involved in a 5-site comparative, ethnographic investigation funded by the National Institute of Child Health and Human Development that explored the social organization of married women’s HIV risk. Our goal was to assess how men contribute to women’s HIV risk, going beyond the focus on ideological aspects of masculinity that characterizes current programmatic approaches which seek to improve women’s reproductive health by shifting norms of ideal masculinity. To do so, we relied on Connell’s idea of gender regimes as composed of the intersecting micro- and macrolevel domains of labor (who does what work, both domestically and in societies), power (macrolevel decisionmaking as well as social, political, and military deployment of authority), and affect (socially constructed desires and the emotions that surround those desires).

Our study lends support to Connell’s emphasis on affect as a critical aspect of gender, because we highlight the ways in which affect is a critical path through which gender inequality shapes risk. This point has been made previously in reference to women’s HIV risk denial but has not been made with regard to men. We also introduce the concept of extramarital opportunity structures, drawing on the sociological concept of opportunity structures to call attention to how extramarital sex is shaped by social, cultural, and economic forces. The intent of this construct is to emphasize how social structure shapes and constrains the options available to people.

FIELD SITE BACKGROUND

Our study was conducted in Degollado, a town of approximately 15,000 residents (although the actual population ebbs and flows with the patterns of seasonal migration between Mexico and the United States) situated in the semirural western Mexican state of Jalisco. Degollado’s main sources of income have traditionally been agriculture and migrant remittances; however, the 2000 census indicates that the balance has tipped decisively away from agriculture, with only 30% of residents reporting agriculture as their main source of support, down from more than 90% in 1960. The area’s distorted age structure reflects the institutionalization of labor migration: 2000 census data showed that there were 702 men for every 1000 women in the 20- to 29-year age group, traditionally the peak age range for labor migration.

The county seat, Degollado also has 2 banks, a number of schools including a high school, many small grocery stores, a central market, and 2 modern supermarkets, as well as a small private hospital, several Internet cafes, and a number of other local businesses. Recent at-
tempts at local economic development include the opening of a clothing factory (which promised many more jobs than it has been able to offer\textsuperscript{13})\textsuperscript{,} planting of agave in response to worldwide increases in tequila consumption,\textsuperscript{11} and development of a regional stone carving industry.

**HIV IN MEXICO**

Mexico’s HIV/AIDS epidemic is concentrated, with HIV prevalence rates of 0.3\% in the general population and up to 15\% in high-risk subpopulations.\textsuperscript{12} Of the approximately 160,000 adults with HIV at the end of 2003, two thirds were men believed to have been infected while having sex with another man;\textsuperscript{13} consequently, the more recent “heterosexualization” of the epidemic is thought to be attributable to women becoming infected during sex with male partners who have sex with men.\textsuperscript{14}

Rural Mexico, where gender ratios among those living with AIDS are lower than ratios in urban areas, is at the forefront of this heterosexualization. Rural women are thought to be at particularly high risk of marital transmission because of the high rates of labor migration from rural areas to the United States and the ways in which migration represents a risk factor for HIV infection, with migrants networking sexually among populations with higher HIV prevalence rates, having limited access to preventive or curative health services, and frequently dealing with the social isolation of the migrant experience by seeking comfort in sex—quently dealing with the social isolation of the epidemic.\textsuperscript{10}

HIV prevalence rates, having limited access to fieldwork on an earlier project conducted in this community allowed for much more rapid start-up than would normally be the case for community-based ethnographic research.\textsuperscript{19} Sampling of Degollado residents as participants in the marital case studies, which were conducted between February and June of 2004, proceeded through the technique of systematic ethnographic sampling.\textsuperscript{20} In systematic ethnographic sampling, the idea of stratification is used to deliberately incorporate diversity into the small samples that are critical to the success of qualitative research. This approach represents one of the innovative methodological elements of the Love, Marriage and HIV multisite project, of which this study was a part. Neither qualitative research as generally practiced in public health research nor research within the tradition of ethnography tends to employ such sampling principles.

If culture is conceptualized solely as a complex set of shared ideas that only can be explored through intensive, in-depth research with a necessarily small number of participants, then convenience sampling does not present a problem in terms of generalizability. Here, however, our theoretical framework explores how culture intertwines with social inequality to shape health practices. It was critical, therefore, to ensure that—and despite the small sample—participants were selected to include diversity in terms of the elements of social organization that previous research had indicated were most likely to influence the health practices of interest. As a result, across all 5 sites, our marital case study participants were selected to incorporate variation in (1) whether 1 member of the couple was currently or had been involved in labor migration, (2) whether (in comparison with other members of their community) the couple was well-off financially, and (3) whether couples were recently married, well established in their family-building projects, or already grandparents (Table 1).

Systematic ethnographic sampling reflected the present project’s theoretical framing at the intersection of cultural and political–economic perspectives. It also provided a framework allowing for cross-site exploration of differences and similarities in the ways in which factors such as labor migration or the life course shaped marital HIV risk across the study sites.

The final data set was comprised of field notes based on the participant observations of the 3 principal members of the research team and the transcribed interviews. J.S.H. read and coded the data using ATLAS.ti version 5.0 (ATLAS.ti Scientific Software Development, Berlin, Germany) with the goals of (1) developing complete descriptive data on circumstances, settings, reasons for, and local meanings of extramarital relationships at the field site; (2) gaining an understanding of the association between the social organization of marriage and extramarital relationships; and (3) locating marital and extramarital relationships within a variety of broader social forces. The analyses presented here drew primarily on participant observations, on the marital case study interviews, and on key informant interviews. We used archival research to provide background on economic, demographic, and epidemiological contexts.

The 2 principal limitations of the research design were related to the fluidity of the population under study. First, our use of a single research site precluded fieldwork with men from Degollado who were living or working in the United States, making it impossible to explore how variations in the specific characteristics of migrant-receiving communities may shape risk.\textsuperscript{22} However, there were enough return migrants remaining in Degollado to provide some sense of what life is like on the other side. Second, our focus on married couples led to the exclusion of men and women whose marriage had ended as a result of conflict, which may have biased the sample toward those whose marriage was “successful” enough that they were willing to be subjected to the researchers’ gaze. The final sample, however, was quite diverse in terms of affective experiences: a number of the women wept while recounting their marital suffering, and one of the men, when asked how he felt about his spouse, replied that “the more I know my wife, the more I love my dog.”

**MEN’S MARITAL IDEALS**

Previous research, conducted primarily with women, has described an increasingly
TABLE 1—Overview of Ethnographic Methods: Specific Contributions to Research Goals and Method-Specific Description of Sample: Degollado, Mexico, 2004

<table>
<thead>
<tr>
<th>Data Collection Method</th>
<th>Specific Data Elicited and Relationship to Project Objectives</th>
<th>Sample Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Participant observation</td>
<td>During the 6 months in which 3 of the authors (J. S. H., S. M., and B. T.) lived in the study community, participant observation focused on domestic life and communal social life. Specific areas of focus included courtship, marriage, family life, and men's patterns of socializing and nightlife. Through participant observation, we gained a rich contextual knowledge about economic organization, family life, sex-segregated socializing, and ideas about sexuality.</td>
<td>Families and domestic life: Sunday lunches, afternoon visits, birthday parties, casual socializing, and weddings. Social spaces where &quot;nice&quot; women do not go (e.g., cantinas, commercial sex venues). Adolescent social life and courtship: indoor soccer leagues, discos, sewing, and terrazas (open air bars). Public spaces: the plaza, church, the Sunday market.</td>
</tr>
<tr>
<td>Marital case studiesa</td>
<td>In the 20 marital case histories, we collected data from men and women (most of whom were married couples) on marital histories (including extramarital sexual relationships). Over the course of 3 interviews, the men and women talked about childhood and family life, courtship norms and experiences, and premarital, marital, and extramarital sexuality and provided detailed descriptive information on the social organization of gender (particularly around the key categories of labor, power, and emotion) within their marriages. These stories, together with the stories of 3 couples we became acquainted with through participant observations, were the &quot;outcome&quot; data we sought to explain.</td>
<td>2 newly married couples with first young child with no history of migration/mobility and low economic status. 1 newly married couple with first young child with no history of migration/mobility and high economic status. 1 newly married man with first young child with no history of migration/mobility and high economic status. 1 newly married woman with first young child with a history of migration/mobility and low economic status. 1 newly married man with first young child with a history of migration/mobility and high economic status. 1 couple with children who were not yet grandparents with no history of migration/mobility and low economic status. 1 couple with children who were not yet grandparents with no history of migration/mobility and high economic status. 1 woman with children who was not yet a grandparent with no history of migration/mobility and high economic status. 3 couples with children who were not yet grandparents with a history of migration/mobility and low economic status. 2 couples with children who were not yet grandparents with a history of migration/mobility and high economic status. 3 grandparents/couples with adult children with no history of migration/mobility and low economic status. 1 grandparent/woman with adult children with no history of migration/mobility and high economic status. 2 grandparents/couples with adult children with a history of migration/mobility and low economic status. 2 grandparents/couples with adult children with a history of migration/mobility and high economic status.</td>
</tr>
<tr>
<td>Key informant interviews</td>
<td>37 interviews with people with special, privileged knowledge of the reasons for and consequences of men's (and women's) extramarital relationships, as well as greater understanding of circumstances within which such relationships are most likely to occur.</td>
<td>Interviewees were 2 priests, 3 health professionals, 2 lesbians, 15 adolescent girls, 6 feminine-appearing men who have sex with men, and 9 women with local reputations for &quot;sexual behavior.&quot;</td>
</tr>
<tr>
<td>Archival research</td>
<td>Analysis of current and historical popular media, review of regional demographic data collected over the past 50 years, and collection of locally important religious texts on marriage, sexuality, and the family; the goal was to analyze the data on individual experiences within economic, social, and cultural contexts.</td>
<td>Analysis of current media contexts, including newspaper articles on gender, sexuality, migration, and HIV; locally popular magazines and telenovelas; and movies.</td>
</tr>
</tbody>
</table>

aAs described in the Methods section, all 5 sites of this multisite project selected marital case study participants using a systematic ethnographic sampling approach in which the goal was to purposively construct a sample that included diversity in terms of (1) the length of time couples had been married and where they were in the cycle of family reproduction, (2) their engagement with labor migration, and (3) their relative economic position in comparison with other members of each specific fieldwork community.
widely, companionate marital ideal in which intimacy, communication, and sexual pleasure figure prominently as measures of a successful relationship. This companionate ideal frames women’s commitment to the appearance of fidelity and the denial of marital HIV risk within the broader goal of building a publicly successful relationship. However, the focus on women in this earlier work has left unanswered the questions of the extent to which men share this commitment to marital companionship and fidelity and, if they do, whether that has any influence on their extramarital sexual behavior.

In the interviews and case studies conducted in the spring of 2004, we found that young men across social classes share with their wives a marital ideal characterized by emotional intimacy, sexual pleasure, trust, and warmth, whereas men of older generations focus more on respect and fulfillment of gendered obligations. Emotional compatibility figured prominently in young men’s responses both as a reason to get married and as a characteristic of a successful marriage. As in the similar generational shift observed previously with women, the growing prominence of a companionate marital ideal among men does not mean that younger men love their wives more than their fathers did. Rather, the shift is more in the way that emotional intimacy, sexual pleasure, and personal satisfaction have gained prominence as goals in and of themselves as opposed to being byproducts of a life well lived.

Men’s feelings for their wives, although not the sole determinants of their extramarital sexual behavior, shape the cultural context of marital HIV risk in complex ways. For some, the love they have for their wives means that they would not be able to face them if they were unfaithful; for others, it merely means greater discretion so that their extramarital activities do not infringe on the companionate intimacy they are building with their wives. Ironically, this loving attention to appearances may actually increase married women’s risk of HIV infection.

**REPUTATION AND PUBLIC SEXUAL IDENTITIES**

Sexuality researchers working in the area of HIV/AIDS have used the axes of sexual identity most salient in Euro-American culture—object choice (gender of the object of one’s desire), emotion, and “transactionality” (i.e., whether sexual intercourse is gay or straight or for love or money)—as cultural universals; thus, even when object choice is not a locally meaningful identity category (such as was the initial intent of the “men who have sex with men” category), identity still becomes insistently transposed into a category that is ultimately about object choice. One of our major findings was the importance of reputation as a locally meaningful axis of sexual identity. People in Degollado almost invariably talked about their own or others’ social and sexual identities by using reputational categories. Men, for example, would refer to themselves as serio (serious), calmado (calm), or similar adjectives or as sinvergüenza (lacking in shame) or descarados (boldfaced); women would talk about themselves as recogida (under control) or volada (out of control).

People invest in and draw from these sexual identities in gendered ways. When men resist the temptations of extramarital sex, they often talk about preserving their local reputations. One of our participants reported that he had never gone beyond flirting with the attractive young secretaries in his family business:

> out of fear that someone would say “that guy is really looking for sex”; it would drag me into a really big problem—[someone would say] “hey, your husband is coming on to me.” More than anything, I avoid it so I don’t get burned. I definitely notice other women, but “pueblo chico, chisme grande” (“small town, big gossip”).

This concern with reputation was expressed by manual laborers as well as the business owners for whom they worked and members of the town’s professional class. Reputation is also considered a family characteristic, so women worry when their daughters marry the sons of notorious adulterers. A woman’s adultery constrains the marriageability of her children and shows profound disrespect for her husband. Moreover, one young man in our study attributed his recent slide into alcoholism to the humiliation of having the whole town know that his father had discovered his mother in bed with her lover. This young man’s peers agreed that trying to drink himself to death was the best response to his situation.

Men have a particularly complex task in regard to these sexual selves because they serve 2 contradictory functions: men build relationships with other men by demonstrating an assertive, competent, and sexually independent masculinity, but they also demonstrate their respect (and sometimes their love) for their wives through carefully maintaining the appearance of fidelity. There is a type of built-in symbolic tension for men in which succeeding too well at either extreme inherently means failing at the other.

During the course of our participant observations, we learned that a man does not provoke censure for a drunken fling, but he does for driving down the street in broad daylight accompanied by a woman other than his wife. As an example, mockery was heaped upon a prominent local businessman whose wife taped him having sex with his secretary in Chicago and then parlayed the video into a handsome divorce settlement in a US family court. This ridicule, certainly tinged with envy rooted in the man’s economic success, did not center around his having had a lover (many successful men do); rather, it involved his inability to manage his affairs: he should have known better than to bring his secretary into his home.

The aphorism hay que saber donde y con quien (“you have to know where and with whom”) goes to the heart of the reputational dimension of sexuality, and we organized the following 2 sections accordingly. We examined how this overriding concern with reputation as the central element of sexual identity was reflected in the study area’s local sexual geography (the “where”) and then explored the ways in which the cultural construction of risk intersects with reputation and sexual geography to shape partner choice (the “with whom”).

**REPUTATION AND SEXUAL GEOGRAPHY**

Men and women in rural Mexico preserve public face by navigating strategically through 2 parallel dimensions of the local sexual geography. Public, heterosocial spaces such as the central plaza and Sunday market form a sort
of stage for the “performance” of men’s and women’s respectability. In contrast, in the semiprivate spaces in which men drink together, including cantinas, pool halls, table-dance bars, and liquor stores, men engage in a variety of sexual behaviors, secure in the knowledge that the town’s gossip networks do not extend back to their wives. Although not exclusively male, these spaces are known as places “where women do not go”—that is, where “decent” women do not go—and when married men spend the evening visiting a brothel or a table-dance bar, they rely on the unspoken agreement that they will cover for each other.

One married man, remembering how his girlfriend would meet him at a local cantina, noted, “I would tell her to come meet me, but no one saw us, only the people in the cantina.” (There are no parallel spaces in which women can develop extramarital relationships with the full knowledge of their female friends.) In contrast to these “unseen” meetings in the cantina, another one of our participants, Roberto, talked about his shock at a Cantina, another one of our participants, Roberto, talked about his shock at a brothel.

When we were in the town of Huascalato at a restaurant, I saw an uncle—he’s very well known here in town—come in with a friend of his and 2 women, and you know perfectly well, “There’s my uncle with a woman that is not my aunt.” I was with my mother, as well as my father, and without any shame [my uncle] goes and sits there and was drinking and joking with the girls, and you say to yourself, “How totally shameless, no?”

Rather than being a response to his uncle’s apparent infidelity, Roberto’s shock derived from the context, that is, the violation of the rules of the local sexual geography which dictates that men should not be seen in specific public places with their lovers.

Men’s patterns of movement—and therefore their access to the sexual geography’s risky spaces—differ quite sharply from women’s. These gendered patterns of mobility reflect the gendered organization of labor, which is related, in turn, to how these very concerns about sexual reputation have traditionally limited women’s physical mobility. Men’s greater physical mobility resulting from their jobs—manifested locally through their disproportionate access to horses, bicycles, cars, and other means of transport and internationally through their participation in labor migration—simultaneously justifies their journeys out of town and gives them money for extramarital sex while they are away.

The conceptual division of social space into a female casa (house) and a male calle (street), which is additional element of this sexual geography, is the cultural reflection of men’s historically greater access to economic opportunities; this access to disposable income (whether men spend it on commercial sex or on gifts for a girlfriend) combines with men’s physical mobility to create gender differences in opportunities for extramarital sex. This culturally meaningful gendered physical landscape, intricately intertwined with economic organization, is what we mean by extramarital opportunity structures.

Interviews and everyday conversations provided countless stories of men who took advantage of this mobility to seek extramarital sex, including a man who drove a highway delivery truck for his family’s business and reportedly knew every brothel along the way and a group of prominent businessmen from town who went together to Cuba on what was widely known to be a sexual tour. Another example is a US-based restaurant who, during his long vacations in Dotolado, took many trips to Guadalajara, supposedly to stock up on decorative handicrafts for his restaurants; however, these work-related responsibilities invariably provided cover for a trip to his favorite massage parlor.

International labor migration provides the most extreme illustration of how the gendered organization of labor intertwines with these concerns about reputation. It has been an overwhelmingly male practice because of the gendered demand for labor in the United States, gendered concerns about women’s sexual respectability, and gendered demands on men to support their families. Some couples do remain faithful over the course of long separations—one informant, giggling, recounted how a friend had told her about having regular “phone sex” with her husband during their migration-related separations—but men’s long absences lower the reputational risk of infidelity by ensuring that it occurs far away.
The importance of women's sexual respectability also contributes to men's quest for sexual variety outside of marriage. A number of men noted that "if they wanted to eat beans (i.e., something wholesome, basic, and not particularly spicy), they could do it at home." Traditionally in Mexico, men have feared that to stray too far from the missionary position will insult their wives, and women have feared that a willingness to engage in more varied sexual play will risk their status as a respectable woman of the home as opposed to a shameless woman of the street; this situation has led to men's reliance on women other than their wives for sexual variety.

As demonstrated by the tables laden with thongs and lacy bras at the Sunday morning market—as well as by the number of young couples who reported viewing pornographic videos together—sexual variety has gained new respectability as part of the companionate ideal, with a consequent expansion in even a decent woman's sexual repertoire. However, gendered ideals for women's sexual respectability continue to form the backdrop for the extramarital pursuit of sexual variety among men whose marriages lack the confianza (trust) that would facilitate such variety.

The very centrality of marriage as a form of domestic organization also contributes to the pervasiveness of men's extramarital sex.
Ideologically, marriage is increasingly positioned as a structure for intimacy and self-realization; in actuality, however, many of the couples in this study had remained married despite the affective quality of their relationship rather than because of it. The woman whose husband quipped about preferring the company of the family dog, for example, responded tersely though no less acidly to the parallel question about how she felt about him by saying “I hate him.” Nonetheless, their marriage endured, as did many other equally unhappy ones, sustained not by love but by social convention, gendered economic opportunities, and gendered patterns of social reproduction; men and women may not necessarily like each other, but they need each other.

Men encapsulate the unshakable commitment they feel to their wives in the phrase es la madre de mis hijos (“she is the mother of my children”). To abandon their children’s mother for the pleasures of a lover would be to demonstrate publicly that they allowed emotion to get the better of them, that they did not know “where and when.” Our interviews and participant observations provided ample evidence of women who stay with their husbands because of economic security and the respectability conferred by being under the moral protection of a man. Moreover, in spite of the emergence of the companionate ideal, most women in these rural areas of Mexico still do not feel that mutual incompatibility justifies ending a marriage.18

Compulsory heterosexuality39 is another path through which the kinship system, of which marriage is a critical element, structures men’s engagement in extramarital sex. Marriage is a required step in the journey to being an adult, as well as a means through which men ensure their biological and social reproduction. Because in rural Mexican marriage is a requirement and not a choice, compulsory heterosexuality forces men who experience same-sex desires to marry and seek extramarital pleasure rather than assuming a public gay identity.40 As expressed by the saying “cualquier aguayo, aunque sea caballero” (“any kind of hole, even if it’s a gentleman’s”), shared laughingly by a key informant as part of his explanation of why he never had trouble finding partners to play the insertive role in anal intercourse, the gender of a man’s extramarital partner is not necessarily a critical factor in his social identity.

Gendered social organization and traditional sexual cultures in rural Mexico intertwine to produce, simultaneously, great stress on compliance with gendered norms of self-presentation along with a certain degree of flexibility with regard to sexual object choice. As Carrillo and others have described,42 and as was supported by many conversations during our participant observations and interviews with key informants, traditional Mexican constructions of sexual and gender identity divide men who have sex with men into 2 categories: masculine-appearing activo (literally “active” but figuratively “insertive”) or feminine-appearing pasivo (literally “passive” but figuratively “receptive”).

In Degollado, we became acquainted with a number of feminine-appearing men who had a great number of sexual partners locally, many of them married men, some of whom paid them, some of whom they paid, and others with whom they had sexual intercourse in a context of short-lived romantic affectivity. We also observed masculine-appearing men in pursuit of these feminine-appearing men or, when drunk, in pursuit of each other. This sexual intercourse between men represented socially safe sex: a man could easily slip off to the cantina bathroom for casual sex, cruise the gay disco in neighboring La Piedad, or invite a male sex worker strolling in the plaza to take a late-night ride in his chrome-laden pickup, secure in the knowledge that this was a “low-risk” activity. Neither man would fall in love (supposedly), neither could get pregnant, and another man could certainly be trusted not to tell one’s wife.

Both masculine- and feminine-appearing men who enjoy sex with other men almost always marry, both for cover and for convenience. Sometimes they do so with the full knowledge of their partner; in other cases, these men’s preferences come as a surprise to their wives or remain unacknowledged. The “with whom,” then, can easily be another man, as long as men comply with the public demands of respectable rural masculinity: hat, boots, mustache, etc.

All of the men interviewed expressed concerns about marital transmission of sexually transmitted infections (STIs), which they saw as a failure of men’s responsibility to protect their families, expressed here as the inability to control viral or bacterial incursions into one’s domestic space. Esteban, for example, continues to suffer from remorse about having infected his wife with human papillomavirus.43 Indeed, he was so aware of the possible consequences of his infidelities that he talked at length about his simultaneous desire for an HIV test and his fear of what he might learn.

Marital disease transmission violates the central symbolic division of space in Mexican society—between the safe, ordered house and the dangerous, disorderly street—and thus forces a couple to acknowledge those extramarital partnerships that reputational concerns dictate must not be discussed even within the privacy of the couple. It is this open acknowledgment, even more than the infidelity itself, that represents the breach of social expectations. Consequently, we saw in our participant observations how couples collude in maintaining appearances around men’s sexual behavior: women tell men not to be unfaithful, or they tell them that if they must be unfaithful, then do it in a way that will not humiliate them; men rote deny their infidelities, regardless of their actual behavior, as part of being a good husband.

Social Safety and Physical Risk

Given the importance of public sexual selves, a major element shaping extramarital sex is the ease with which it can be hidden. Most of the men included in our marital case studies talked about deliberately seeking out women who did not pose a risk of emotional or economic entanglement so that there would be no leakage of this semiprivate behavior onto the public stage of reputation. A majority of rural Mexican men who engage in extramarital sex take great care to practice “safe sex,” not in terms of using a condom but in terms of being discreet: for them, the most visible risk is a contaminated reputation rather than a viral infection. Commercial sex is the central means through which men seek socially safe sex.44 Their view is that, despite the fact that commercial sex workers are people’s daughters, wives, and mothers, their reputation has already been ruined, and they can have sex with these women without running
Love and HIV Risk

Given the fact that all of the men expressed a fear of STIs, why did only some report that this fear actually shaped their behavior? Love, we would argue, is the reason: men who love their wives protect their marriages more broadly. First, given the ways in which people navigate suggests that the reputational dimension of sexual identity in constructing an alternative masculinity. Even a cursory glance at the media environment in which people navigate suggests that men in rural Mexico are surrounded by images of alternative masculinity: a glowing father with his small child on the cover of Padres (Parenting) magazine emphasizes the intertwining of attentive fatherhood and success in consumer society, as does the extensive coverage of Father’s Day in the regional newspaper. Although few men in Degollado go to the extreme of changing diapers in their performance of modern masculinity, this style is clearly part of the local cultural lexicon, and men may find it attractive as a strategy for a type of symbolic social mobility when more material routes are less accessible.

IMPLICATIONS FOR PREVENTION

The reputational dimension of sexual identity has implications both for HIV prevention locally and for framing prevention programs more broadly. First, given the ways in which men are expected to manage their extramarital sexuality, a man who infects his wife is likely to be the subject of scorn. It
might seem that a solution would be to frame HIV prevention messages around men’s responsibility to protect their wives. Public silence, however, has been a crucial strategy through which men protect their wives from the social risks of infidelity, and so creating effective community-based dialogues about marital HIV risk faces the formidable challenge of how to raise the issue, as it were, without breaking the silence.

Second, we must take social risk seriously, remembering that the individuals we aim to reach with our prevention programs do not necessarily have maximization of their own individual health as their foremost goal. The intersection of sexual geography and reputation means that a husband’s love for his wife may increase her risk by leading him to seek out relatively higher risk partners. Love and a shared desire to keep up appearances shape both partners’ commitment to denying that risk. Local constructions of sexual risk have much more to do with reputation than disease; at the moment, the social risk of sexual intercourse feels much more real to people in Degollado than does the HIV risk (although this perception may change as the epidemic takes shape locally), and they behave accordingly.

Third, we should consider grounding community-based HIV prevention programs in this notion of sexual geography. Just as the first major anthropological critique of HIV research called attention to risky acts, not risky people, here we are saying that it is time to go beyond an overly individualistic emphasis on preventing risky acts and consider the utility of working in risky spaces. The intersections of socially shaped sexual geography and culturally constructed notions of reputation and risk form a set of local extramarital opportunity structures within which it becomes possible to gain an understanding of the processes that result in most men in this specific context being likely to engage in extramarital sex. Using the idea of sexual geography would mean constructing contextually specific maps of risky spaces and developing spatially specific interventions to modify risks.

Fourth, the concept of externalities—a cost of the production process for which neither the consumer nor the producer pays—can help us link our own patterns of consumption, global reliance on migrant labor, and marital HIV risk. Both this article and the others in this issue from the same project highlight labor migration as a critical element of extramarital opportunity structures; marital HIV risk is an externality of the use of migrant labor, just as surely as carbon dioxide is an externality not yet accounted for by the low price of incandescent bulbs. The gold wedding band made with ore extracted by Huli miners increases Huli women’s HIV risk, just as the burrito produced by Mexican migrant labor in California and served by Mexican workers in New York increases the risk for women in rural Puebla or Michoacán. The borders that separate those who benefit from these unmeasured costs and those who bear their burden make it challenging to conceive of how to ameliorate this situation, but consumers should consider that the low prices of goods produced through migrant labor contribute to global health inequities.

Fifth and finally, we have highlighted the structure of men’s extramarital sex, emphasizing the inadequacy of strategies that focus on changing individual behaviors and promoting marital fidelity. It may be possible to achieve reductions in the number or frequency of men’s extramarital partnerships; however, given the complex and intertwined types of support for such behavior, merely telling men to decrease their extramarital sexual activities is unlikely to be successful.

Short of interventions that propose to reduce men’s access to extramarital sex through a major feminist transformation, we argue for taking a harm reduction approach to extramarital sex through a major feminist transformation. Regardless of what these extramarital passions and pecadillos might look like to us—whether from a feminist or a Christian fundamentalist standpoint—we suggest that they are a deeply rooted aspect of social organization. As a consequence, rather than funding interventions that satisfy our own moral sensibilities, we should consider structural interventions designed to reduce the likelihood that existing patterns of behavior will serve as the conduits through which the HIV epidemic will continue to grow.

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Contributors
J.S. Hirsch originated the study, supervised all aspects of its implementation, conducted interviews with the married female respondents, conducted the formal data analysis, and drafted the article. S. Meneses conducted fieldwork with the male respondents, contributed substantially to the preliminary data analysis, and commented on drafts of the article. B. Thompson conducted interviews with adolescent girls, contributed to the preliminary data analysis, and commented on drafts of the article. M. Negroni and B. Pelcastre provided institutional support in Mexico, contributed to the preliminary data analysis, and commented on drafts of the article. C. del Rio provided scientific and professional mentorship during the development of the initial grant proposal as well as throughout the fieldwork and analysis and commented on drafts of the article.

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Endnotes

About the Authors


6. We credit Constance Nathanson for coining this phrase.


14. Ibid.


17. Sanchez et al., “The Epidemiology of HIV.”


19. This earlier research had also made clear the necessity of having a man on the research team (see Hirsch, A Courtship after Marriage), and so the second member of the field team was a Mexican physician and medical anthropologist in his mid-20s, Sergio Meneses, who hails from a middle-class town in southern Mexico, that is similar to Degollado in size and provincial tone. The third member of the team was Brenda Thompson, an American MPH student who was conducting a supplemental study on adolescent girls’ notions of sexuality and HIV risk. The team also counted on the assistance of 2 local helpers: Alan Lujambio, a well-respected, college-educated, recently married member of the town’s upper class, and Estela Mata, a mother of 7 who helped with the study when she was not working part-time cleaning at a local primary school. Lujambio and Mata provided entrée into their respective social worlds within the broader Degollado community; they also located prospective informants for the marital case histories, shared stories about notable cases of infidelity, and provided critical commentary on the vagaries of life in Degollado.


24. As described in the sections on reputation and in the final section, there are many factors other than marital affect that shape men’s participation in extramarital sex. Among the couples included in the marital case studies, for example, there were some older men who expressed little warmth and intimacy toward their wives but who nonetheless denied having had extramarital sex; these men refrained from extramarital sex out of a desire to demonstrate public respectability and restraint. Don Carlos (names are pseudonyms), for example, beat his wife Doña Esperanza quite severely in the early years of their marriage—at one point, she recounted that he might have killed her had her brother not intervened—but he also vigorously asserted that to have been unfaithful would have been to do no better than an animal.

25. This is described elsewhere in terms of public perceptions of adolescent sexual behavior (see Hirsch, A Courtship after Marriage, 95–111).


27. The comment “small town, big gossip” refers to a telenovela, Pueblo Chico, Inferno Grande (small town, big hell), that focused on the scandals and suffering endured by community residents who did not intervene—but he also vigorously asserted that to have been unfaithful would have been to do no better than an animal.


29. The disco is an exception to this rule: respectable
young women do go to the disco, as long as they leave, for example, by 10 pm on a Sunday night (see Hirsch, A Courtship after Marriage); Brenda Thompson, “Protecting Your Image: An Ethnographic Look at Courtship and Sexuality From the Perspective of Muchachas in a Mexican Migrant-Sending Town” (master’s thesis, Emory University, 2005).

30. The fundamentally gendered nature of reputation is further underlined by gender differences in how women manage sexual gossip and the ways in which women deploy information against other women to their own advantage (see Thompson, “Protecting Your Image”).

31. All names are pseudonyms, and some details have been changed to prevent identification of informants.

32. Men’s economic power comes into play in other ways in cases such as that of our informant Juan, who sanguinely reported having taken advantage of the power he had over his young female factory employees to dole out work opportunities in exchange for sex.

33. At the heart of this association between mobility and sexual misbehavior is the belief that fear of gossip provides a crucial brake on bad behavior, and thus the opportunity to do things without harming one’s local reputation provides a temptation too great to resist.


35. We cannot answer the question of what approximate percentage of men in the study community engaged in this behavior because the goal of this type of research is to assess local forms and meanings of phenomena rather than their distribution; see J. Pulevitz et al., “Extrarelational Sex Among Mexican Men and Their Partners’ Risk of HIV and Other Sexually Transmitted Diseases,” American Journal of Public Health 91 (2001): 1630. However, according to our observations, approximately half of the men with whom we spoke and got to know well—perhaps 50 in all—had engaged in extramarital sex. We focus here exclusively on men’s extramarital sexual behavior, we will address the behavior of married women, who also engage in extramarital sex despite the much higher reputational risks, in a subsequent article.

36. Although the norms regarding acceptable behavior for “decent” women have changed, the persistent classification of women into “those of the house” and “those of the street” also facilitates men’s access to extramarital sex by ensuring the availability of partners: a group of women who, having lost access to the resources of a good reputation, face limited options in terms of respectable partnerships, few moral opportunity costs to continued discrepant behavior, and a solid local niche as a seller of sex. Once a woman’s reputation is sullied, there is virtually no social salvation (although women do, of course, manage to live satisfying lives in spite of these reputations). Women’s participation in transactional sex is often attributed to the plight of single mothers and women’s limited options for supporting their children, but what is less frequently traced out as part of this explanation is the way in which the ideals of womanhood constrain women’s relationship and economic options. A woman with a bad reputation is virtually unemployable as a domestic servant and is even undesirable as an employee in a family-owned business; thus, once a woman slips off the straight and narrow, she is virtually forced to specialize in being a bad woman. The virgin—whose purity serves not only to screen women into preserving their sexual reputation but also to ensure a steady stream of women with whom men can transgress.

37. One of the veiled threats behind men’s requests for sexual variety—and the reason, perhaps, for Maríana’s comment that “you have to be willing to be a little bit of a whore for your husband”—is that women fear that if they do not hold their husband’s sexual attention through variety, men will look for it elsewhere. As reported by women, the main areas of focus of these increasingly common marital discussions in which men press their wives for more sexual variety and a more modern, intimate life are anal sex and fellatio. Many women reported that their husbands requested anal sex “to see what it feels like.” Given how common sex between men appeared to be, we suspect rather than that many men already knew what it felt like and liked it. It is difficult to determine the extent to which anal sex was common in married couples, because most women did not want to provide such information. Oral sex, which was somewhat less contentious, seems to have moved clearly into the range of the permitted for younger couples (e.g., “After all, as long as they are well bathed, what’s wrong with it?”). A drienne Rich, “Compulsory Heterosexuality and Lesbian Existence,” in Blood, Bread, and Poetry: Selected Prose 1979–1985 (New York: W. W. Norton & Company, 1986).

38. Demographic evidence bears out this point; divorce rates are increasing throughout Mexico, but rates in rural areas lag considerably behind those in urban areas (see “Mexico en Corte: Matrimonios y Divorcios en Mexico,” http://www.inegi.gob.mx/inegi/contenidos/espanol/prensa/contenidos/estadisticas/2005/matriomonio05.pdf (accessed July 20, 2006.)


40. Residents of large urban centers such as Mexico City and Guadalajara can join growing communities of gay-identified men (and women), but these identities and communities barely exist at the local level. In fact, the level of discrimination in rural areas and provincial cities against men who are perceived to be homosexual has been recognized and is being addressed through a national HIV prevention program that frames gay rights as a critical element of effective HIV prevention. More information on OASIS can be found on HIV and Human Rights, including the media spots used in the campaign, is available on the Web site of the Mexican Commission on Human Rights, http://www.cndh.org.mx/progante/vihsalud/vihsal2.htm (accessed March 12, 2007). See also Fatima Estrada Márquez, Carlos Magis Rodríguez, and Enrique Bravo García, “Estigma y Discriminacion en Hombres que Tienen Sexo con Hombres,” in Carlos Magis Rodriguez, Hermelinda Barrientos Bárcenas, and Stefano Michele Bertozzi Kenedz, eds., SIDA: Aspectos de Salud Publica, http://www.salud.gob.mx/comisida/otraspartes/manualsisda/ cap08.pdf (accessed March 12, 2007).

41. Although this may strike the reader as a somewhat crude aphorism, the fact that it is widely known suggests that norms for talking about sex among men in rural Mexico assume a shared set of values about the value of pleasure-oriented sexual interactions, regardless of partner choice. For more on language as a critical lens for learning about social values, see Jennifer Hirsch, “Between the Missionariness’ Position and the Missionary Position: Mexican Dirty Jokes and the Public (Sub)Version of Sexuality,” Critical Matrix: Princeton Working Papers in Women’s Studies 5 (1990): 1–27, on Mexican scatological humor; see also Richard Parker, Bodies, Pleasures and Passions: Sexual Culture in Contemporary Brazil (Berkeley: University of California Press, 1991), particularly the discussion of sacamangas, roughly translated as sexual misbehavior, in Brazil.


43. This case was not only confirmed by his wife but commented on by several of our other informants, both male and female.

44. See also González-López, Erotic Journeys, 62–97.

45. Given the small number of marital case studies and the likelihood that individuals from this community will have access to published materials resulting from our study, it is not entirely meaningful to provide specific data stratified according to social class.

46. See, for example, M. C. Gutmann, The Meanings of Macho: Being a Man in Mexico City (Berkeley: University of California Press, 1996).

47. One story, for example, disturbingly reported on how a Mexican movie star bragged about staying up all night with his baby and—heroically—learning to distinguish between a healthy “poopy” diaper and diarrhea; see “Cumplen su Rol mas Padre!, Entrevistas Sobre la Experiencia de ser Padre en Primera Pagina,” Moral, Seccion D Gente (June 20, 2004): 1.


Modern Marriage, Men’s Extramarital Sex, and HIV Risk in Southeastern Nigeria

Daniel Jordan Smith, PhD, MPH

For women in Nigeria, as in many settings, simply being married can contribute to the risk of contracting HIV. I studied men’s extramarital sexual behavior in the context of modern marriage in southeastern Nigeria. The results indicate that the social organization of infidelity is shaped by economic inequality, aspirations for modern lifestyles, gender disparities, and contradictory moralities. It is men’s anxieties and ambivalence about masculinity, sexual morality, and social reputation in the context of seeking modern lifestyles—rather than immoral sexual behavior and traditional culture—that exacerbate the risks of HIV/AIDS. (Am J Public Health. 2007;97:997–1005. doi:10.2105/AJPH.2006.088583)

Data from around the world, including Nigeria, suggest that married women’s greatest risk of contracting HIV is through sexual intercourse with their husbands. The implication is that men are acquiring HIV outside of marriage and infecting their wives. At first glance, modern marriage in Nigeria would seem to offer women greater autonomy and equality and perhaps protection from HIV. The growing prevalence of monogamy, declining fertility, a trend toward neolocal residence (establishing marital residence independent of kin) and nuclear household organization, women’s increasing education and participation in the formal workforce as more people migrate to cities, and the rise of love and commitment rather than simply attributing the marital transmission of HIV to men’s behavior. Men’s extramarital sexual practices are situated in economic, social, and moral contexts. The social organization of extramarital sexuality is shaped by aspirations for modern amenities and middle-class consumption, the influence of urban fashions, and changing expectations of sexuality. My findings show that these goals and values are themselves shaped by economic inequality, gender disparities, and powerful and contradictory moralities. I argue against notions of African traditions, promiscuous women, and pervasive immorality as the causes of Nigeria’s and Africa’s AIDS epidemic.

The data demonstrate that married men’s risky sexual behavior and their wives’ inability to protect themselves can be understood and explained without resorting to the common fallacy of blaming the victims. It is people’s anxieties about sexual morality in the context of seeking modern lifestyles—rather than immoral sexual behavior somehow associated with traditional culture—that exacerbate risks produced by poverty and inequality. The focus here on how men navigate modernity, morality, and masculinity as they engage in extramarital relationships highlights the importance of intervening directly with men to address women’s risk of contracting HIV. Public health interventions focusing on men in Nigeria and similar settings where men’s extramarital sex is common and gender inequality is marked are urgently needed.

Nigeria is the most populous country in Africa, with more than 130 million people. With the current adult HIV seroprevalence estimated at 5%, some 3.5 million people are infected. Worst-case scenarios suggest that in the next decade infection rates could escalate to 20%, producing more than 10 million new cases. More moderate forecasts, such as the Nigerian government’s estimates, acknowledge that by 2015, some 8 million Nigerians will have died from AIDS-related causes. With the country’s testing and antiretroviral therapy programs still reaching only a fraction of the target population, effective prevention efforts remain a crucial strategy. But perhaps not surprisingly, in a context in which both popular and political discourse on the disease continue to emphasize sexual immorality as a primary risk factor, little appetite exists for focusing on the risks of marital transmission. Even as—and largely because—marriage remains the single most important social duty and marker of adulthood in Nigeria, both policymakers and ordinary citizens remain resistant to the idea that marriage must be understood as a risk factor for HIV infection.

STUDY SETTING AND RESEARCH DESIGN

The study was undertaken in 2 communities in Igbo-speaking southeastern Nigeria, where I have worked and conducted research since 1989. The project areas included the seminatal community of Ubakala in Abia State and the city of Owerri in Imo State. Ubakala is made up of 11 villages and has a total resident population of approximately 24,000 people. Most households rely...
and a migrant husband, and in a household in Owerri with a young newlywed couple. Four local research assistants were hired to assist with marital case-study interviews in both sites. Two female research assistants conducted the marital case study interviews with women in Ubakala; I conducted the interviews with men. In Owerri, male and female assistants conducted the marital case study interviews with men and women, respectively. I conducted participant observation in both settings and was responsible for key informant interviews in each venue.

Table 1 provides a summary of key participant observation venues and activities. Key informants included community leaders, religious leaders, government and nongovernment medical and public health officials, commercial sex workers, and people living with HIV/AIDS. Popular cultural and archival materials related to marriage, sexuality, and Nigeria’s HIV epidemic were also collected.

Marital case studies were conducted with 20 couples, 14 residing in Ubakala and 6 residing in Owerri. The couples were selected opportunistically with the objective of sampling marriages of different generations and duration, couples with a range of socioeconomic and educational profiles, and marriages in both rural and urban settings. People in Owerri and Ubakala were better off economically than were residents of some other regions of Nigeria. Although the sample in the marital case studies is skewed to what might be described as an aspiring middle class (most couples were not actually middle class), because of rising education levels and increasing urban exposure that are common in southeastern Nigeria, most Igbo people share characteristics and aspirations evident in the sample. For individual couples, men were almost always older than their wives (typically by 5–10 years) and tended to have higher incomes. However, educational disparities between husbands and wives, although skewed in favor of men, were relatively small, reflecting both the overall increase in access to education and people’s preference to marry partners of similar accomplishment. A breakdown of the marital case study sample is provided in Table 2.

Interviews were conducted in 3 parts, generally in 3 sessions, each approximately 1 to 1.5 hours in duration. Husbands and
wives were interviewed separately. All respondents agreed to participation after being presented with protocols for informed consent approved by institutional review boards in both the United States and Nigeria. The first interview concentrated primarily on pre-marital experiences, courtship, and the early stages of marriage. The second interview examined in greater depth the overall experience of marriage, including issues such as marital communication, decisionmaking, child rearing, resolution of disputes, relations with family, and changes in the marital relationship over time. The final interview focused on marital sexuality, extramarital sexual relationships, and understandings and experiences regarding HIV/AIDS. All interviews were tape recorded and transcribed, and the interviews were coded using ATLAS.ti (ATLAS.ti GmbH, Berlin, Germany) ethnographic software.

MODERN MARRIAGE IN SOUTHEASTERN NIGERIA

Scholars of West African society have long recognized the pronounced social importance of marriage and fertility in the region. Over the past several decades, African societies changed dramatically, and with these changes the institution of marriage was also transformed. Modern marriages were becoming increasingly common in urban centers in West Africa more than 50 years ago, and in some places these changes have even earlier roots. In Igbo-speaking southeastern Nigeria, urban elites have practiced what might be called modern marriage since the 1950s, but only in the past 2 or 3 decades have new forms of marriage become common among ordinary people, including in rural areas.

Perhaps the most concise way to contrast modern Igbo marriages with the past is to note that young couples see their marriages as a life project in which they as a couple are the primary actors, whereas their parents’ marriages were more obviously embedded in the structures of the extended family. The differences are most pronounced in narratives about courtship, in the way husbands and wives describe how they resolve marital quarrels and in the way they make decisions about and contribute to their children’s education. In each of these arenas, people in more modern marriages tend to emphasize the primacy of the individual couple, often in conscious opposition to the constraints imposed by ties to kinship and community. Table 3 summarizes the predominant characteristics of modern marriage in southeastern Nigeria.

It is important not to exaggerate these trends. Even in the most modern marriages, ties to kin and community remain strong, and marriage and child rearing continue to be strongly embedded in the values and social networks of the extended-family system. Indeed, the continued importance of ties to family and community and ongoing concerns about the collective expectations of wider social networks permeate people’s stories of modern courtship, the resolution of marital disputes, and decisions about child rearing. The choice of a spouse based on love is, in almost all cases, still subjected to the advice and consent of families. The fact that modern marriage in southeastern Nigeria remains a resolutely social endeavor creates contradictions for younger couples, who must navigate not only their individual relationships but also the outward representation of their marriages to kin and community. Most couples seek to portray their marriages to themselves and to others as being modern but also moral, and this is crucial to explaining the dynamics of men’s extramarital sexual relationships, married women’s responses to men’s infidelity, and the risk of HIV infection in marriage.

**TABLE 3—Characteristics of Modern Marriage in Southeastern Nigeria: 2004**

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Individual choice of spouse</td>
<td>Most people now describe the decision about whom to marry as an individual choice, but the advice, consent, and involvement of family is still common and influential.</td>
</tr>
<tr>
<td>Romantic love as a criterion for marriage</td>
<td>Younger couples almost universally agree that romantic love is an important ingredient for a successful marriage, but many other concerns, including fertility, economics, religion, and a mutual commitment to family progress are viewed as equally important.</td>
</tr>
<tr>
<td>Monogamy and Christianity</td>
<td>Monogamy is seen as modern and Christian and is almost universally preferred by the younger generation, but notions about men’s polygamous nature and entitlement affect understandings of extramarital sexuality.</td>
</tr>
<tr>
<td>Neolocal residence</td>
<td>Most couples aspire to start separate households from their parents and kin, and many do so as part of migration from rural to urban areas, but ties and obligations to extended family remain extremely powerful.</td>
</tr>
<tr>
<td>Nuclear household organization</td>
<td>Even among couples who remain in rural extended-family compounds, family tasks such as educating children, economic maintenance, and cooking are increasingly likely to be organized by the nuclear family.</td>
</tr>
<tr>
<td>Lower fertility preferences</td>
<td>Couples married less than 5 years generally aspire to having 3 to 4 children; their parents’ generation generally wanted 6 to 8.</td>
</tr>
<tr>
<td>Primacy of the conjugal relationship</td>
<td>The relationship between husband and wife is more important vis-à-vis other kin and social relationships, with greater emphasis on issues such as sexual pleasure, privacy, and joint decisionmaking.</td>
</tr>
<tr>
<td>Individual/couple vs. collective unit</td>
<td>Overall, marriage is part of a more individualized orientation to the world, where couples prioritize their own family units over the larger collective, although continuing duties to extended families often produce conflict and contradictions in marriage.</td>
</tr>
</tbody>
</table>

*Establishing marital residence independent of kin.*
GENDER AND THE SOCIAL ORGANIZATION OF EXTRAMARITAL SEX

The prevalence of married men’s participation in extramarital sex in Nigeria is well documented. However, conventional scholarly understandings and explanations for the phenomenon are not persuasive. Because they tend to reproduce common stereotypes, they often ignore the diversity and complexity of these relationships and overlook men’s ambivalence that sometimes accompanies this behavior. As in many societies, people in southeastern Nigeria commonly attribute men’s more frequent participation in extramarital sexual relationships to some sort of innate male predisposition, and this perspective is well represented in the literature. Some men and women interviewed in the marital case studies articulated this view. In response to a question about why married men seek extramarital lovers, a 54-year-old civil engineer in Owerri repeated a pidgin English phrase heard frequently among Nigerian men: “Man no be wood. It’s something men need, especially African men. You know we have a polygamous culture. This practice of marrying only one wife is the influence of Christianity. But men still have that desire for more than one woman.” Only a piece of wood, he implies, lacks an outward-looking sexual appetite.

Although it is important to note that many Nigerian men and women share a conception of men’s sexual desire that includes a notion that men naturally need or want multiple sexual partners, not everyone sees it this way. Further, explaining men’s extramarital sexual behavior in these terms is insufficient because sexual desires do not emerge or operate in a social and cultural vacuum. Rather, interviewing men about their extramarital relationships, listening to men’s conversations among themselves pertaining to these relationships, and observing men interacting with their extramarital partners in various public or semi-public settings revealed several patterns in the social organization of extramarital sex. Three sociological factors are particularly important for explaining the opportunity structures that facilitate men’s participation in extramarital sexual relationships: work-related migration, socioeconomic status, and involvement in predominately male peer groups that encourage or reward extramarital sexual relations. Table 4 summarizes the explanations of how each of these factors functions.

Mobility and Migration

Of the 20 men interviewed in the marital case studies, 14 reported having extramarital sex at some point during their marriages, and of the 6 who said they had not engaged in extramarital sex, 4 had been married less than 5 years. Approximately half of all the cases of extramarital relationships described in the interviews occurred in situations in which work-related mobility was a factor. In contemporary southeastern Nigeria, both short-term and long-term absences caused by work-related mobility and migration are exceedingly common. For men and women who work for the government, by far Nigeria’s largest formal employer, frequent transfers often separate families. Further, the country’s insecure economy and the prevalence of participation by Igbo people in commercial activities of every scale require frequent mobility and migration, often resulting in periods of spousal separation.

Men whose work takes them away from their wives and families are more likely to have extramarital relationships, and they frequently attribute their behavior to the opportunities and hardships produced by these absences. A 47-year-old civil servant whose postings frequently took him away from his family explained a relatively long-term relationship with a woman in 1 of the places he was transferred: “I stayed a long time without my wife. But eventually this woman befriended me. She was a widow and a very nice woman. She cooked for me and provided my wife. But eventually this woman be-
Male infidelity is socially acceptable, it is even more strongly expected that outside affairs should not threaten a marriage, and this mandates discretion. Many men were ambivalent about their extramarital sexual behavior, but in most cases they viewed it as acceptable, given an appropriate degree of prudence so as not to disgrace their spouses, themselves, and their families.

**Masculinity and Socioeconomic Status**

For the vast majority of male interviewees, issues of socioeconomic status, specifically the intersection of economic and gender inequality, featured in accounts of their extramarital relationships. Most often, a man’s relationship to his female lover included an expectation that the man provide certain kinds of economic support. Men frequently view extramarital relationships as arenas for the expression of economic and masculine status. Indeed, it is necessary to understand the intertwining of masculinity and wealth, and gender and economics more generally, to make sense of the most common forms of extramarital sexual relationships in southeastern Nigeria.

In popular discourse, the most common form of economically driven extramarital relationships is said to be so-called “sugar daddy” relationships, wherein married men of means engage in sexual relationships with much younger women with the expectation that the men will provide various forms of economic support in exchange for sex. Although many Nigerians, including many of the participants in these relationships, view sugar daddy relationships in fairly stark economic terms—evidenced by a common expression among secondary school girls and university women that there is “no romance without finance”—a closer look at these relationships suggests that they are much more complicated than portrayed in the stereotypical image of rich men exchanging money for sex with impoverished young women. Young women frequently have motives other than the alleviation of poverty. Indeed, typical female participants in these sugar daddy relationships are not the truly poor but rather young women who are in urban secondary schools or universities and who seek and represent a kind of modern femininity. They are frequently relatively educated, they are almost always highly fashionable, and although their motivations for having a sugar daddy may be largely economic, they are usually looking for more than money to feed themselves.

For married men, the pretty, urban, educated young women who are the most desirable girlfriends provide not only sex but also the opportunity, or at least the fantasy, of having more exciting, stylish, and modern sex than what they have with their wives. At a sports club in Owerri where I spent many evenings during fieldwork and where men frequently discussed their extramarital experiences, a 52-year-old businessman described a recent encounter with a young university student to the delight of his mates: “Sometimes you think you are going to teach these girls something, but, hey, this girl was teaching me.” Married men who have younger girlfriends assert a brand of masculinity wherein sexual prowess, economic capability, and modern sensibility are intertwined.

**Male Peer Groups**

Masculinity is created and expressed both in men’s relationships to women and in their relationships with other men. In male-dominated social settings such as social clubs, sports clubs, sections of the marketplace, and particular bars and eateries, Igbo men commonly talk about their girlfriends and sometimes show them off. Male peer groups are a significant factor in many men’s motivations for and behaviors in extramarital relationships.

Although it is not uncommon to hear men boast about their sexual exploits to their peers—frequently alluding to styles and practices that are considered simultaneously wild and modern, another strand of discourse emerges when men explain their motivations. Many men reported that they enjoyed the feeling of taking care of another woman, of being able to provide her with material and social comforts and luxuries. In a candid discussion over beers with several men about men’s motives for extramarital lovers, a 46-year-old man known among his peers as One Man Show for his penchant for keeping multiple young women, explained, “It’s not only about the sex. I like to buy them things, take them to nice places, give them good meals, and make them feel they are being taken care of. I like the feeling of satisfaction that comes from taking care of women, providing for them.” Masculinity proved by provisioning a girlfriend parallels the way men talk about taking care of their wives and families. It foregrounds the connections between masculinity and money and between gender and economics more generally.

It is clear that men with money have easier access to and, it seems, more frequent extra-marital sex. But poorer men engage in extramarital sex as well, and their relationships with female partners also typically include some form of transaction, whether it is paying a sex worker or giving gifts to a girlfriend, albeit at a lower financial level than that of more elite men. Although there is no doubt that the desire to forge and present a modern masculine identity combines issues of economics and gender, not all men’s extramarital relationships can be easily explained in these terms. Nearly all men noted the importance of keeping affairs secret from their wives, but in the marital case-study interviews, many men emphasized discretion much more broadly. They hide their extramarital relationships not only from their wives but from virtually everyone. In such cases it is not easy to attribute men’s motives to their desire to appear masculine and economically potent to their fellow men, although men’s more private relationships may still be internalized expressions of masculinity and status.

Some men had occasional extramarital sexual liaisons that appeared to be about little more than sex. In a few cases men seemed genuinely unhappy in their marriages, and in rare instances men fell in love with their extramarital partners. But by and large, men tended to see their extramarital relationships as independent of the quality of their marriages, and in their minds, extramarital relationships posed no threat to a marriage so long as they were kept secret from wives and so long as men did not waste so many resources on girlfriends that they neglected their obligations to their wives and families.

**SEX, SECRECY, AND THE RISK OF HIV**

Unraveling the issue of secrecy in relation to men’s extramarital sex is crucial for understanding some of the contradictory dynamics.
that contribute directly to the ways that men’s extramarital sexual relationships translate into married women’s risk of contracting HIV from their husbands. On the one hand, nearly all men want to keep their extramarital relationships secret from their wives, although on rare occasions a man in a troubled marital relationship in which there is no longer much pretense of harmony will openly flaunt his infidelity. On the other hand, for a significant proportion of men—in this sample about half of all men who admitted having extramarital sex—it is apparent that there would be much less benefit to having extramarital affairs without the opportunity to display masculine sexual and economic prowess to peers. But even among men who like to show off their girlfriends to their male peers, there is a general tendency to try to hide these relationships not only from their wives but also from their extended families and their communities, especially in the village setting. In part, this is a means of protecting their wives and children from harmful gossip, but it is also a means to protect their own reputations. In their church congregations, their village associations, and their extended families, men live up to very different expectations than in some of their more urban-influenced peer groups.

The correlation between concerns about social reputation and secrecy regarding extramarital sex also strongly influences the approach of most women to their husbands’ infidelity. In effect, women have multiple reasons to remain silent about suspicions or evidence of their husbands’ extramarital affairs. In more modern marriages, in which couples conceive of their marriage as their own choice, romantic love is frequently an important reason for marrying, and the conjugal unit is viewed as the primary locus of family decisionmaking. Women risk undermining whatever leverage they have, because their influence is directly tied to the presumption of an intimate and trusting relationship, by openly confronting infidelity. Further, in modern marriages, women are less willing to call on their kin and in-laws for support in such cases, not only because these marriages are more independent from extended families but also because of the ideology that in such marriages a man’s happiness (and thus his proclivity to seek outside women) is directly related to the capacity of his wife to please him.

What this means for many Igbo wives is that they risk not only losing their husbands’ support if they confront his cheating but also possibly bearing the blame in the eyes of their community (including their female peers) for allowing (or even pushing) their husbands to stray. Most women in the marital interviews were more comfortable talking about other people’s experiences with husbands’ infidelity than about their own, but many women described a common dilemma. A 38-year-old married mother of 4 living in Ubakala said, “In this our society, when a man cheats on his wife, it is often the wife who will be blamed. People will say it is because she did not feed him well, she refused him in bed, or she is quarrelsome. And it is often our fellow women who are most likely to blame the wife.” As a result, although almost all women acknowledged that many men cheat, very few would say openly that they think their own husbands cheat.

CONDOMS AND PERCEPTIONS OF SEXUAL MORALITY

For women whose husbands cheat, protecting themselves through condom use is difficult, if not impossible. Further, they cannot expect that their husbands will have used condoms in their extramarital relationships. Before public awareness about HIV was widespread in Nigeria, many factors contributed to relatively low use of condoms. Levels of awareness, availability, and affordability remain issues for the poorest and least-educated segments of the population. The impediments to condom use are heightened by popular misperceptions about HIV/AIDS. Even among people who know about condoms, widely circulating rumors suggest they are sometimes ineffective and potentially threatening to health. Further, a common perception exists that condoms symbolize impersonal or promiscuous sex. Together, such factors inhibit condom use in many premarital and extramarital relationships, despite the fact that usually neither party wants a pregnancy. In addition, in many extramarital relationships, economic, gender, and generational inequalities make it difficult for women to negotiate condom use with their typically older and wealthier male partners. Ironically, the HIV epidemic has further complicated possibilities for condom use because, in a context in which the risk of HIV is popularly associated with sexual immorality, suggesting a condom is tantamount to asserting that one’s partner is risky and hence guilty of sexual impropriety.

For women who suspect their husbands of infidelity, suggesting condom use for marital sex poses multiple problems. Asking for a condom may imply she does not want to become pregnant, which itself can create tension because reproduction is so highly valued. Perhaps worse, her request may be interpreted as indicating that she suspects not only that her husband is cheating but that the type of extramarital sex he is having is risky and, by implication, debauched. What is more, the meaning of her request may be inverted by her spouse and turned against her with an accusation that it is she who is being unfaithful.

Responding to a question about whether his wife had ever asked him to use a condom, a 34-year-old father of 3 exclaimed, “How can she? Is she crazy? A woman asking her husband to use a condom is putting herself in the position of a whore. What does she need a condom with her man for, unless she is flirting around outside the married house?” All of these possibilities have become more highly charged in the era of HIV/AIDS, when sexual immorality is associated with a deadly disease.

The ultimate irony is that for women in the most modern marriages, in which the conjugal relationship is primary and romantic love is often an explicit foundation of the relationship, confronting a man about infidelity or insisting on condom use may be even more difficult. In such marriages, a woman challenging her husband’s extramarital behavior or asking for a condom may be undermining the very basis for the marriage and threatening whatever leverage she has with her husband by implying that the relationship itself has been broken. In southeastern Nigeria, where it remains socially imperative to be married, women cannot easily confront, challenge, or control their husbands’ extramarital sexual behavior. The secrets and silences that result from these
relationship dynamics can exacerbate married women’s risk of HIV infection.

CONCLUSIONS

The reasons that men in southeastern Nigeria engage in extramarital sex cannot be reduced to a simple formula that privileges uniquely innate male needs and appetites, even if Nigerian men and women sometimes reproduce this all too common explanation. Indeed, among men who have extramarital partners, the terms of the relationships differ. Some men clearly show off their girlfriends to male peers and enjoy the social status that accrues in certain types of predominantly male social settings; others keep their affairs secret from their peers. Many men see the separations caused by work-related mobility and migration as creating need and opportunity and providing a justification for extramarital sex; others have partners who live closer to their married homes. Some men develop long-term relationships with their lovers, providing them with (and receiving) emotional as well as material support; others prefer the relative brevity and anonymity offered by commercial sex workers. In some cases, it really does seem to be just about sex; in other instances, extramarital relationships are as much about the performance of masculinity or social class as about sex itself.

Although it is impossible to pigeonhole the variety of men’s extramarital sexual relationships in southeastern Nigeria, several intertwining issues link an otherwise diverse ensemble of behaviors. Specifically, understanding the social organization of men’s extramarital sex requires connecting gender, economics, and morality. For most Nigerian men, masculinity is closely tied to economic capacity. In the context of contemporary southeastern Nigeria, the paramount test of masculinity for adult men is getting married and having children. With the high cost of bridewealth (wealth required for the completion of a marriage ceremony) and the growing expenses of educating children, these tasks alone are a challenge for the majority of men. For men who eschew extramarital sexual relationships it is often the moral imperative of providing for their families that is the greatest guide for their conduct. Wealthier men are more likely to have extramarital sex not only because they are more attractive to potential partners, and not only because they can display both masculinity and social status through their girlfriends, but also because they can have affairs without the risk of failing to provide for their families. Indeed, although it is widely known that many men cheat on their wives, those who do so at the expense of providing for their wives and children are most likely to face opprobrium from their peers. Very few men leave their wives for their lovers, and men are under strong social pressure to take care of their families.

With the changes in marriage in southeastern Nigeria occurring over the past few decades, it is important to understand how women in modern marriages deal with their husbands’ infidelities and, more specifically, why they appear to be so tolerant. Observations and anecdotes collected during the study indicate that some women do try to challenge and control their husbands’ extramarital behavior through a variety of strategies, including drawing on ideals of trust and fidelity implicit in some conceptions of modern marriage. But although almost all women wish for and try to encourage their husbands’ fidelity, many women choose to ignore their suspicions. Further, among those who cannot ignore them, very few women think a man’s extramarital affair is grounds to end a marriage. The reasons for this include intense social pressure to stay married, reinforced to various degrees by women’s economic and social dependence on men (including, for example, Igbo’s patrilineal system of kinship, which assigns “ownership” of children to the father) and by the knowledge that men’s extramarital affairs do not, in fact, threaten marriage—at least not in formal terms. In other words, women, as well as men, recognize the primacy of marriage, and they know that their husbands will not likely leave them for another woman.

Although one might imagine that the HIV/AIDS epidemic in Nigeria would create a new urgency for addressing the possible health consequences of prevailing patterns of extramarital sexuality, the popular association of the disease with sexual immorality has, if anything, contributed to the complex web of silences and secrets that surround extramarital sex. Although I heard some men talk about the necessity of condom use during extramarital sex because of the fear of HIV, many other men denied or ignored these risks. The fact that a significant proportion of extramarital sex in southeastern Nigeria involves relationships that have emotional and moral dimensions—they are not just about sex—means that men imagine these relationships, their partners, and themselves in ways that are quite distanced from the prevailing local model that the greatest risk for HIV/AIDS comes from immoral sex. Further, it is clear from this study that most married women have good reasons to remain silent and keep secret their husbands’ extramarital affairs. Ironically, the risk of HIV/AIDS only adds to the secrets and silences. For most men and women in southeastern Nigeria, maintaining a cordial conjugal relationship, as well as keeping up the appearance of a healthy and peaceful marriage, is a more important concern than addressing the specter of illness and death from a disease that remains socially distant because it is so highly stigmatized and stigmatizing.

The implications of these findings for designing appropriate public health interventions to reduce the marital transmission of HIV are complex. In the longer term, the structural underpinnings of economic and gender inequality that undergird a significant proportion of extramarital relationships require social and economic transformations beyond the scope of conventional public health programs. Clearly, many of the unmarried female partners of married men would not participate in these extramarital relationships in contexts of less poverty and greater economic and gender equality. International donors and governments such as Nigeria’s must recognize that public health goals are inextricably intertwined with larger processes of social and economic development. To pretend that Nigeria’s and Africa’s AIDS epidemic can be adequately addressed without also reducing poverty and both economic and gender inequality is unrealistic. But this should not be interpreted by public health practitioners to mean that the root of the problem lies outside the purview of public health. To the contrary, such findings suggest all the more strongly the need for advocates...
of public health to emphasize the connections between inequality and ill health and to participate in larger processes of political and social transformation.

Despite the scale of the problem, the findings here suggest other measures that can be implemented in the shorter term, interventions that take into account the changes associated with modern marriage, the social organization of extramarital sex, and the centrality of powerful and often contradictory moralities in people’s assessments of marriage, extramarital sex, and HIV/AIDS. Perhaps the most important step is to design interventions that help reduce the popular association of HIV risk with immoral sexual behavior. The tragic consequence of this stereotype is that few people take steps to reduce their own risk, because no one likes to imagine his or her behavior as immoral. Given how important Christianity is in southeastern Nigeria, efforts to work with churches to promote a message that reduces the association of HIV with immorality, thereby minimizing the stigma of the disease, would be an important step in getting ordinary men and women to think more clearly about their own risks.

But reducing the moral stigma of HIV/AIDS must go hand in hand with taking advantage of powerful moralities that guide people’s conduct. Given how entrenched extramarital sex is in larger structures of economic inequality and in the social construction of gender, it seems impractical—and perhaps even counterproductive—to suggest that short-term public health interventions should focus on curtailing men’s extramarital behavior. Even more unrealistic is the idea that women should be encouraged to use condoms with their husbands. But it does appear that men’s peer groups offer a logical locus for intervention. If undertaken in combination with wider efforts to reduce the association of HIV/AIDS with immoral behavior, efforts to reach men with messages that capitalize on their sense of moral responsibility for their families and their wives (and for their extramarital partners) could be effective. Specifically, men could be encouraged—and peer group pressure could be created—to treat their duty to prevent the transmission of HIV with the same obligatory imperative that they see in taking care of their dependents. In short, condom use in extramarital sexual relationships must be associated with demonstrating masculinity.

In southeastern Nigeria, marriage is sacred, and yet men’s infidelity is common. It seems unlikely that anybody—men or women—will be receptive to the idea that wives should leave their cheating husbands or that they should insist on using condoms with their philandering spouses. Much more realistic is building on men’s existing sense of responsibility to their families, a sense of responsibility that already limits infidelity for many men and motivates most men to be very discreet. Encouraging this sense of responsibility takes advantage of men’s concern with their masculinity rather than undermining it. Women’s interests will be best served by creating more responsible men, and larger long-term social and economic transformations are needed to make it less likely that women enter into sexual relationships with men because of poverty, inequality, and gender double standards.

But none of these strategies is likely to be effective in reducing the risk of HIV until the disease itself is less stigmatized. Clearly, social inequalities of various dimensions drive the epidemic, and it is often anxieties about morality and reputation that prevent people from protecting themselves. Public health programs must harness morality without simultaneously exacerbating the moral stigma of HIV/AIDS.

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**Human Subject Protection**

This study was approved by the Brown University (United States) and Abia State University (Nigeria) institutional review boards.

**Endnotes**


15. It is important not to overemphasize this point. The fact that most men want to keep their affairs secret from their wives is partly the result of the fact that husbands know there will be consequences if wives find out—consequences that the women themselves can impose. Several men and women in the study recounted the ways that women punished and curtailed men’s infidelities, including withholding food, withdrawing financial support, preventing sexual access, and on much rarer occasions, publicly humiliating them or even retaliating with affairs of their own. Women are by no means powerless pawns in these modern Igbo marriages, but they have good reason to keep secrets or stay silent about their husbands’ extramarital sexual behavior.

16. None of the men in the marital case studies admitted to visiting brothels or patronizing commercial sex workers, perhaps an indication of the perceived moral differences between extramarital sexual relations that involve having a girlfriend and paying for a prostitute. There are, of course, numerous brothels and large numbers of sex workers in southeastern Nigeria. Given that condom use is associated with promiscuous sex and immoral partners, it is likely that condoms are more easily acceptable for sex with sex workers. As part of the study, I interviewed half a dozen sex workers in Owerrri, and all of them indicated that the vast majority of their clients agreed to use condoms.


Men’s Extramarital Sexuality in Rural Papua New Guinea

Holly Wardlow, PhD, MPH

Married women in rural Papua New Guinea are at risk for HIV primarily because of their husbands’ extramarital relationships. Labor migration puts these men in social contexts that encourage infidelity. Moreover, many men do not view sexual fidelity as necessary for achieving a happy marriage, but they view drinking and “looking for women” as important for male friendships.

Although fear of HIV infection is increasing, the concern that men most often articulated about the consequences of extramarital infidelity was possible violent retaliation for “stealing” another man’s wife. Therefore, divorced or separated women who exchange sex for money are considered to be “safe” partners. Interventions that promote fidelity will fail in the absence of a social and economic infrastructure that supports fidelity. (Am J Public Health. 2007;97:1006–1014. doi: 10.2105/AJPH.2006.088559)

Epidemiological and ethnographic research in a wide range of societies has found that married women are at risk for HIV primarily because of their husbands’ extramarital sexual liaisons, and wives have little control over this risk, which is not lessened by their own fidelity. Such findings indicate that to understand the dynamics of marital HIV transmission, it is necessary to delineate the economic, social, and cultural factors that propel and structure men’s extramarital sexuality. Although it is probably present to some extent in all societies, men’s extramarital sexuality varies widely in terms of frequency, pattern, cultural meaning, and personal significance. Socioeconomic contexts structure both opportunities and disincentives for men’s extramarital liaisons; thus, whether and how often a married man engages in extramarital sexual relations depend on a wide range of material and ideological factors, including geographical opportunity, the degree of stigma or prestige conferred by extramarital liaisons, male peer group patterns of socializing, and so on. Accordingly, I analyzed the economic and cultural contexts that shape the behavioral patterns and social meanings of men’s extramarital sexuality in rural Papua New Guinea.

An important yet rarely acknowledged factor that potentially influences men’s extramarital sexuality is the social construction of marriage, i.e., the emotional, cultural, and economic meanings of conjugality in a society. The ethnographic record shows that husbands’ and wives’ economic and emotional roles and expectations of each other vary culturally and are influenced by other factors, such as a society’s economic organization, political organization, religion, and gender relations and a couple’s socioeconomic status. However, “ABC” approaches to HIV/AIDS prevention (promoting sexual Abstinence before marriage, Being faithful within marriage, and using Condoms with sexual partners when the first 2 behaviors are not possible) are premised on a unitary and highly idealized Western construction of the marital relationship. The social science literature often refers to this as companionate marriage, where marriage is expected to be a person’s primary source of emotional gratification and marital sexual fidelity is a key symbol of this intense emotional bond. Thus, engaging in extramarital sexual relations forsakes or violates this bond. The literature on ABC approaches to HIV/AIDS prevention rarely acknowledges that the marital relationship may not be universally conceptualized as companionate in accordance with an idealized Western model or that there may be competing economic and ideological pressures on men that minimize the value and practicability of marital fidelity.

My case study of the Huli in Papua New Guinea shows the problems that are associated with uncritically advocating and expecting marital fidelity. Findings from the study included:

• Huli men’s mobility and labor-related absences from home put them in social contexts in which extramarital sexuality is extremely likely.
• Huli men view extramarital sexual relations more as a potential transgression against other men and less as a transgression against their wives or the marital bond.
• Economic decline and men’s long-term absences from home have resulted in a growing number of Huli women who have sexual relations in exchange for money. These women are often described as “safe” extramarital partners because sexual relations with them are unlikely to result in retaliation from absent husbands.
• Most Huli men do not see sexual fidelity as necessary for having a successful and happy marriage, and they assert that seeking out alternative sexual partners is appropriate at some junctures during the course of a marriage.

These findings indicate that there are more socioeconomic structures that promote, enable, and normalize Huli men’s extramarital sexuality—and thus increase women’s HIV risk—than constrain or discourage it. Furthermore, this research suggests that rather than conceptualize marital infidelity as a matter of individual choice over which men can and should exert control regardless of context, HIV/AIDS prevention policies and programs should specify and target the socioeconomic structures that make the choice of extramarital sex so likely.

RESEARCH SETTING

With a population of almost 6 million, Papua New Guinea occupies the eastern half of the island of New Guinea and some surrounding smaller islands. It gained independence from Australia in 1975, and although 1 of the official national languages is English, it is home to more than 850 indigenous languages. Steep mountains, dense tropical rain
forest, and lack of infrastructure impede the delivery of government services and the development of the country’s wealth of mineral resources. Recent economic decline and deterioration in the quality of governance has resulted in worsening health indicators. The current estimate of HIV prevalence is 1.6% among those aged 15 to 49 years, with rates between 2% and 4% in urban areas, along major highways, and in the rural areas that surround resource development sites, such as gold mines. Gender inequality, high rates of untreated sexually transmitted infections, and high prevalence of sexual violence against women are significant factors in the spread of HIV in Papua New Guinea.

This research was conducted in the small rural town of Tari, Southern Highlands Province, among the Huli, a cultural group of approximately 100,000 individuals. Most Huli are still primarily subsistence horticulturalists; however, cash is required for school fees, basic household goods, and some food staples. Because little wage or salaried labor is available in Tari, most people make money by selling coffee and other agricultural produce. Remittances from family members who work outside of Tari also are important. In 2004, when this study was conducted, the Papua New Guinea currency had undergone a precipitous decline and was worth one third of its value 10 years earlier. The costs of store-bought goods had increased accordingly, but wages and the prices that people could command for their agricultural products had not.

Interviews and informal conversations showed that many people could no longer afford to pay for their children’s school fees or for food staples, such as canned mackerel, that had previously been a regular part of the local diet. Crime also had increased, and many salaried employees had fled the area, which led to the closure of some primary schools and health centers, the small bank, and the post office.

Tari District Hospital began testing for HIV in 1996 and had documented 72 cases by mid-2004. The head nurse was familiar with all 72 cases, and her description of each case indicated that at least 19 of the 31 women who were HIV-positive or who had died of AIDS had been infected by husband-to-wife transmission.

In the anthropological literature, the Huli are known for gender avoidance, i.e., for having a set of cultural beliefs and practices that minimizes contact between men and women. In the past, for example, husbands and wives lived in separate houses, worked in separate agricultural fields, and did not cook or eat together. Traditional Huli aphorisms warn that immoderate marital contact—particularly sexual contact—can result in sickness and worsening fortunes among men and premature aging among both men and women.

Since the late 1960s, the influence of Christian missionaries has diminished the importance of traditional gender avoidance beliefs and practices. Most married couples now live together in 1 house, and churches play a powerful role in shaping day-to-day social activity by sponsoring sports games, youth groups, women’s groups, prayer groups, Bible study groups, and Huli literacy classes. Christian churches also have shaped local understanding about AIDS, which is described by many Huli as either divine punishment or a message from God that people must renounce their sinful ways and embrace Christianity. Likewise, many people object to condom promotion and describe condoms as a technology that enables people to evade God’s will that they either embrace moral sexual practice (marital sexual relations only) or be punished with disease for failure to do so.

METHODS

This study was conducted between February and August 2004. The data were obtained through participant observation, interviews with key informants (experts with local knowledge on particular aspects of marriage or men’s extramarital sexuality), collection of both popular media and official documents about HIV/AIDS and marriage, and interviews with 40 married Huli men and 25 married Huli women. The interview subjects were selected with the objective of achieving diversity in the sample along 3 axes: generation, socioeconomic status, and postmarital migration experience (Table 1). Interviews were tape recorded, transcribed, and then analyzed to identify overarching themes and to delineate whether and how these themes corresponded with the axes of participant diversity.

Like the other researchers in this 5-country comparative study (the other countries are Mexico, Nigeria, Uganda, and Vietnam), I had intended to carry out marital case study interviews. This methodology specified that I, as a woman, interview the married women and that trained Huli male field assistants interview the husbands of these women. However, this particular methodology was not feasible at the Papua New Guinea project site. Specifically, men wanted to be interviewed first and, once interviewed, refused to allow their wives to be interviewed. Women that I interviewed were similarly unwilling to ask their husbands to participate in the study. Consequently, the research team interviewed men and women who were married but not to each other.

In addition to the interview questions used at all 5 country field sites, Huli men were asked why they were reluctant to let their wives participate in the study. The most common assertion was that no self-respecting man would permit his wife to participate in a study that included questions about sexual relations and marriage because (1) talking about sexual relations automatically aroused a woman’s desire, which would consequently make a wife more likely to stray; and (2) a husband’s authority might be undermined, because wives were likely to use the interview setting as a venue for airing complaints and even deriding a husband. These concerns suggest that the idealized model of companionate marriage—with its presumptions of mutual trust—does not carry much emotional weight with Huli men and that male authority continues to be central to their models of marriage.

RESULTS

Men’s Extramarital Sexuality

Ethnographic research among the Huli from the 1970s and 1980s suggests that male infidelity was strongly discouraged and rarely practiced, in part because of pronounced fears of female sexual fluids, and in part because almost all adult women were married, and extramarital sexuality thus constituted the appropriation of another man’s wife. Moreover, newly married couples were taught that their own individual moral conduct could affect the other’s
health and well-being. For example, a man’s infidelity was said to make his wife and young children sick and exhausted, even in the absence of physical contact with them. This lesson is still a part of marriage rituals, and it was the examination offered by men in the newly married generation for why they did not engage in extramarital sexual relations. Furthermore, men learn in church and through Christian youth groups that extramarital sexual relations are a sin in the eyes of God. Finally, an important marker of adult masculinity is getting married and having children, and maintaining a smoothly functioning household is important to this vision of competent adult masculinity. Men whose wives make public scenes about their husbands’ philandering are seen as less capable. To summarize, there are many factors that would seem to motivate men to refrain from extramarital sexuality.

Nevertheless, almost all of the men who were interviewed had engaged in extramarital sexual relations at some point, and many had done so within the past month. Men described most of their liaisons as brief encounters in which the women were paid. However, they did distinguish between the nature of the liaisons they had when away from Tari and those that occurred in Tari. Liaisons away from Tari typically lasted longer—overnight, for example—and were often described as opportunities for men to experiment with sexual practices they had seen in pornographic videos. By contrast, time was a luxury that men said they did not have during their liaisons in Tari. There were no brothels in Tari; thus, most illicit sexual transactions occurred outdoors and entailed ducking off into roadside underbrush without being seen and quickly completing the act before being caught. As one man said, “We can’t take the time to do different styles of sex. What if someone should come by and find us? We have to do it very quickly. If we could do it in a house somewhere, it would be all right. But we’re just there in the bush or just off the road. And if we were caught, it would be much worse to be caught doing some kind of untraditional style.” Many of the men said the anxiety about being caught and the consequent need to finish quickly also deterred them from using condoms.

Men’s extramarital liaisons were primarily shaped by 4 interlocking factors: (1) the role of male mobility and migration in creating social contexts in which extramarital sexual relations are the norm, (2) the significance of bride wealth (goods given by the groom’s family to the bride’s family to formalize a marriage and to compensate for the loss of her labor and fertility) in shaping the social constructions of marriage and infidelity, (3) the growing pool of sexually available and “safe” women caused by local economic decline and men’s long-term absences from home, and (4) the homosocial nature of Huli

### Table 1—Overview of Ethnographic Methods: Case Study, Tari, Papua New Guinea, February-August 2004

<table>
<thead>
<tr>
<th>Method</th>
<th>Description of Method and Relationship to Project Objectives</th>
<th>Description of Sample</th>
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<tbody>
<tr>
<td>Participant observation</td>
<td>Six months of observational data on domestic life and social life to better understand the marriage experience, men and women’s patterns of socializing, and health worker-patient interactions.</td>
<td>The households of married couples; Tari market; Tari District Women’s Center; Tari District Hospital.</td>
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<tr>
<td>Semistructured interviews</td>
<td>Interviews with 40 married men conducted by 4 Huli male field assistants who were trained in interviewing skills and research ethics. Interview questions elicited information on courtship, premarital sexuality, marital sexuality, extramarital sexuality, ideals and expectations of marriage, household decisionmaking patterns, household division of labor, marital emotional life, patterns of spousal communication, and causes and outcomes of marital conflict.</td>
<td>3 newly married men with no history of migration/mobility with low economic status. 2 newly married men with a history of migration/mobility with low economic status. 1 newly married man with a history of migration/mobility with high economic status. 5 middle-aged men with no history of migration/mobility with low economic status. 11 middle-aged men with a history of migration/mobility with low economic status. 4 middle-aged men with a history of migration/mobility with high economic status. 4 grandparents/men with adult children with no history of migration/mobility with low economic status. 7 grandparents/men with adult children with a history of migration/mobility with low economic status. 3 grandparents/men with adult children with a history of migration/mobility with high economic status.</td>
</tr>
<tr>
<td>Key Informant interviews</td>
<td>5 interviews with people who had expert local knowledge on particular aspects of marriage and men’s extramarital sexuality.</td>
<td>1 priest, 3 health professionals, 1 women’s center staff member.</td>
</tr>
<tr>
<td>Archival research</td>
<td>Collection of written and other media to identify cultural, religious, and demographic factors that shape individual behavior.</td>
<td>Popular media (primarily newspaper articles about HIV/AIDS, marriage, bride wealth, and the mining industry); educational videos about HIV/AIDS distributed by the Papua New Guinea National AIDS Council; reports based on demographic data collected for 25 years by the Tari Research Unit; religious instructional texts on marriage, sexuality, and the family.</td>
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Note. Men who had been married less than 5 years were categorized as newly married; men who had been married 5 years or more but who did not yet have adult children were categorized as being middle aged; men who had grandchildren or adult children were categorized as being part of the grandparent generation. Postmarital migration and mobility was defined as having lived outside of Tari for at least 6 months after marriage or as having made overnight trips away from Tari at least a few times a month. A man was categorized as having high economic status if he had a waged or salaried job or made enough money selling coffee to live in a fiberboard house with a metal roof; men who did not have jobs and who lived in bush material houses were categorized as having low economic status.
sociality, i.e., men find it difficult to spend time at home and far easier to spend time with male friends.

**Male Mobility and Labor Migration**

Migration outside of Tari, whether for work or some other purpose, seemed to all but guarantee men’s extramarital sexual relationships. For example, when asked whether they had ever had extramarital relationships, the bus and truck drivers in the sample responded, “Of course, I’m a driver!” They spoke candidly about not only sexual liaisons with commercial sex workers along their routes but also exchanging transport for sexual relations with women who could not afford to pay their fares. Additionally, most men in the sample took the occasional trip to larger towns, the closest of which is about a 6-hour bus ride away and typically requires a stay of at least 1 night. Men often described the process of becoming familiar with a new urban area as an almost ritualized event that involved being taken to bars by urban-based kin or friends and then bringing women they met at the bars and paying for the beer and women is a way for male hosts to provide hospitality, and accepting these gifts enables new arrivals to experience modern urban masculinity.

In addition to their brief trips, many men in the sample had worked outside of Tari. There have long been high rates of labor-related migration among the Huli men, in part because of colonial period economic policies that were designed to shape Southern Highlands Province into a labor pool for coffee, tea, and copra plantations located in other provinces. Migration data for 1982, for example, show that in some areas around Tari, approximately 45% of men aged 20 to 39 years were absent from their homes (Figure 1). Lack of economic opportunity, the extension of a paved road to Tari in the 1980s, and daily plane service have contributed to continuing high rates of men’s labor-related migration, these days to work at mine sites more often than plantations.

This kind of long-term labor-related migration is associated with extramarital sexual relationships and with what might be called men’s extramarital sexual debut. As one man said, “After I was married, I left my wife and children and went to Goroka for work, and it was there that I had sex with another woman. That was the first time. I went with another man. It was his idea—he was my boss and I was the driver. He said, ‘Let’s go around and find some women. I’ll pay for some food and I’ll pay for the guest house.’ So I did this the first time because I was with him. We took a car and we went together. We impressed the women by riding around in a car. Lots of working men do this—they pressure each other to go drink and have sex with prostitutes.”

Men’s narratives of the extramarital liaisons they had had during the course of labor-related migration typically emphasized both missing their families and feeling an exhuberant sense of freedom from community scrutiny. The narratives also told of predominately male work places where drinking and paying for sexual relations was the norm at the end of a long and arduous work week and of the fact that women tended to target employed men by gathering outside popular bars on men’s paydays. As one man said, “Sex is like money; they are temptations. If a man offers you money, you don’t say no. How can you make yourself say no when he is holding out his hand and giving it to you? The same is true when a woman offers to have sex with you. You just say yes.”

Men often expressed ambivalence about this form of relaxation: on the one hand, they found the male camaraderie and the attention of women fun and relaxing; on the other hand, many expressed guilt and anxiety about spending their money on such fleeting pleasures when they could have sent the money home to their families. In other words, many men expressed a strong sense of loyalty to their wives; however, this loyalty was demonstrated primarily through material support, not sexual fidelity. Moreover, because labor migration was the context for many men’s first forays into extramarital sexual relations, it enabled them to experience it in a particular way—as a kind of exciting yet inconsequential leisure activity that men do together as members of male peer groups.

**Bride Wealth and the Social Constructions of Marriage and Infidelity**

The interviews revealed clear generational differences in Huli men’s social constructions of marriage. Men in the grandparent generation articulated a marital model that focuses more on the emotional quality of the relationship. For example, men were asked, “What do you do to be a...
good husband? In other words, in your own opinion, what do men need to do so that they will have good marriages? Typical of the older generation was this quote from a 72-year-old participant, who had 3 concurrent wives at the time of the interview: “Women expect that a man will have enough land to divide evenly among his wives, enough pigs so that they all have some to raise, and that he will provide protection for his wives and children. If a man does this equitably, his wives will think he is a good man. . . . A woman shouldn’t feel like a slave—she should know that the work she does raising pigs and growing sweet potatoes will benefit her own kin when they are in need.”

As this quote suggests, older men in the sample emphasized the importance of women’s agricultural labor and maintaining good relations with a wife’s extended family in order to have a wide range of political alliances and economic resources. Moreover, many older husbands assumed that their wives’ primary emotional attachments and loyalties would be to their own natal kin, even after years of marriage.

By contrast, when the same question was asked of men in the middle-aged and newly married generations, the following quote was characteristic of their answers: “Before I speak to her, I think about what I need to say to her that will make her happy, how I should express something in a way that she will understand and accept. . . . If I do this, then she will have empathy for me and I will have empathy for her. Even if I can’t give her money or food, we will still get along if we are communicating well and if I speak kindly to her.”

Men in the newly married and middle-aged generations also were more likely than men in the grandparent generation to say that if they learned a joke, some gossip, or some important news, they would most want to share this with a wife rather than with male friends, which is another indication of the increased emotional centrality of the marital relationship. Thus, middle-aged men and particularly newly married men tended to describe their marriages in ways that resemble social scientists’ descriptions of companionate marriage, with its emphasis on emotion and verbal communication.

This apparent generational change in ideologies about marriage is likely because of the younger generation’s greater exposure to Christian missionary teachings, formal education, and popular media.

Nevertheless, regardless of generation or socioeconomic status, almost all the men in the study emphasized the importance of bride wealth in determining spouses’ obligations to each other and, in particular, justifying a man’s authority over his wife. During their interviews, Huli men from all generations repeatedly invoked bride wealth as an explanation for why wives were expected to do more agricultural labor than their husbands were, why wives had to ask permission to leave the household, why wives had to comply when a husband requested sexual relations, and why wives had to obey a husband’s explicit instructions, such as fetching something when asked. If anything, the importance of bride wealth has intensified in the contemporary context because of its inflation and because many families now expect some of it to be paid in cash rather than with pigs, as has been the traditional custom. Two consequences of this change are that young, unemployed men now find it very difficult to acquire a wife, and once married, husbands often expect obedience from wives as a kind of recompense for the hardships they endured and the debts they incurred amassing the money for bride wealth.

The interviews also showed that bride wealth shapes the social and moral meanings of extramarital sexual relations. For example, some men asserted that fidelity was expected of their wives because of the bride wealth that was given for them, but fidelity was not expected of men because they were the givers of bride wealth. Additionally, men said bride wealth distinguished which women were sexually off-limits because they “belonged” to their husbands. Once a man had given bride wealth to his wife’s family, it was understood that he had sole claim to her sexual and reproductive body. Thus, bride wealth is as much a compact between men as it is a tie of obligation between husband and wife, and marital infidelity—at least with married women—was described by most men in the sample as a transgression against other men. This male compact is enforced by the threat of violence: adultery, which in the Huli language literally means stealing a man’s wife, can lead to not only punitive violence against the wayward wife but also retaliatory violence against her male partner and his clan. Thus, although some men in the sample—particularly men in the middle-aged and newly married generations—described extramarital sexual relations as a transgression against one’s wife, they expressed more fear about the potentially deadly responses from the clansmen of their extra-marital partners. When asked what the possible consequences were if a man had extramarital sexual relations, the most common answers were “tribal warfare,” “being taken to village court,” and “having to pay compensation to a woman’s husband.” Anxieties about damaging one’s marriage or a wife’s feelings were less common.

An important consequence of this conceptualization of marital infidelity is that as long as a man’s extramarital sexual liaisons do not infringe upon other men, little moral disgrace and few social or economic penalties are attached to the liaisons. As many men said, it is only common sense for a man to avoid marital discord through secrecy about his extramarital liaisons, but he has a moral obligation to protect his kin from tribal fighting and compensation claims by choosing “safe” partners—traditionally, widows and divorced women. This construction of what constitutes a safe partner clearly departs from the standard biomedical definitions of safe sexual relations.

**Women Who Don’t Belong to Anyone**

This social construction of infidelity, men’s absence from their communities because of labor migration, and the economic decline of the last 10 years have resulted in a pool of “safe” women in Tari who have sexual relations in exchange for money. Traditionally, the only safe extramarital female partners were widows and divorced women, i.e., women who occupied a liminal social position because their earlier marriages had removed them from the custody of their fathers but whose divorces or spouses’ deaths meant that they were no longer in the custody of husbands. However, there is now another group of safe women—specifically, sex workers and women who engage in transactional sexual relations; locally, they are collectively referred
to as passenger women. The following quote was typical of what men had to say about their safe extramarital partners: “I have been careful not to have sex with married women. I wanted to avoid any trouble with other men, and so I’ve had sex with divorced women or widows. I’ve also avoided young women who had reputations for being well controlled by their parents or brothers. Usually, I just try to find passenger women. You know—women who don’t belong to anyone.”

Despite the last part of that quote, many of the women that men refer to as passenger women are officially married and thus do actually “belong” to someone. In other words, bride wealth was given for them, they have had children with their husbands, and neither they nor their husbands have sought a divorce. However, many of these women know or suspect that they have been abandoned by husbands who left Tari to find work. Some women learn from returning migrants that their husbands have established new households elsewhere with other female partners; others strongly suspect that they have been abandoned because they have not been seen or heard from their husbands in months or even years. In fact, absentee men’s silence does not always mean they have absconded. Many men stated in their interviews that even when they had the opportunity to send messages home, they were too ashamed to do so if they were unable to send their wives money as well.

Passenger women themselves cited a wide range of motivations for engaging in transactional sexual relations: lack of money for children’s school fees and other necessities, encouragement from female kin to actively search for a new husband rather than waste fertile years waiting for an existing one to return, and a desire for retaliatory sexual relations upon learning that a husband has taken up with another woman elsewhere. The inflated cost of goods and services and a decrease in economic opportunities have exacerbated this situation. As one man said, “We would have to blindfold ourselves not to see all the willing women here now.”

**Heterosocial Households and Homosocial Peer Groups**

Although men’s extramarital sexual liaisons were clearly tied to their mobility and migration experiences, it also is important to note that for many men, extramarital sexuality does not stop upon returning home. The literature on migration and men’s extramarital sexuality sometimes seems to bracket off men’s episodes of labor migration, as if the episodes had no enduring consequences for men’s gender identities or sexual behaviors at home. However, many of the interviews in this study suggest that labor migration initiated men into a culture of masculinity in which extramarital sexuality was considered normal, modern, and an expression of male autonomy; thus, it set in motion an enduring pattern of extramarital sexuality.

This pattern is buttressed by the homosociality of adult life among the Huli, which makes many men feel out of place in their own households and results in men’s leisure time being spent with male peers. Most married couples now live together in the same house, which is a significant departure from the precolonial period when adult men who belonged to the same clan typically lived together in an all-male residence. However, this change in living arrangements does not necessarily mean that men are completely comfortable inhabiting what are usually referred to as family houses.

Although most men in all the generational groups said they enjoyed the company of their wives, and some said that they preferred the company of their wives to other people, most men also expressed discomfort and irritation with having to stay for extended periods in the family house, particularly as the number of children in the household grew and the wife became absorbed in the labor of being a mother.

Men also commented, often unhappily, on the changes they observed in their wives once they had had 3 or more children. Specifically, wives were said to become more willful, demanding, and quarrelsome. As one middle-aged man said, “When women have children, there are changes. Before, my wife was young and she never talked back. She just sat there and agreed with me and laughed at my jokes. But once she had children, she decided that she was a citizen—that she had the right to speak, the right to carry a stick and hit me when she was angry, the right to disagree with me. She really thought she was a citizen. And when we had children, she got very busy with the children and only thought about them, and they were always around crying or demanding something. This would get on my nerves, and I lost interest in being at home with my wife.”

Such changes are not surprising when they are understood in terms of how women’s social power changes during the course of the life-cycle: women gain authority not from being good emotional and erotic companions to their husbands but through bearing and raising children. Having children gives them the legitimate right to make demands of their husbands, and it gives them some leverage for refusing requests made by their husbands. Thus, women can be seen as patiently biding their time, and perhaps biting their tongues, until childbearing enables them to be more forthright. Huli men tend to “biologize” these changes, by describing women as “naturally” docile when they are young and then as “naturally” becoming more querulous because of physiological changes associated with reproduction. Discretely seeking out alternative sexual partners at this juncture in a marriage was described as normal, harmless, and even beneficial for the marriage—certainly wiser than attempting to demand sexual activity from a tired and irritable wife.

Spending more time with male peers also was expected at this point in a man’s marriage, and boasting about extramarital liaisons, exchanging information about women, and spending Friday nights drinking and looking for available women were important components of masculinity and male friendship, which is seen in these 2 quotes:

“Yes, I boast to my friends—it’s something I show off about. I get very graphic. I say, ‘This woman is willing to do this and that’ or ‘This woman’s genitals looked like this’ or ‘That woman’s genitals felt like this.’ We all talk about women in this way.”

“Yes, I boast about this to my male friends. I tell them when I’ve had sex with another woman and what we did together. And sometimes I tell my friends what she’s like, what she is willing to do, how much you have to pay her. And then my friends can go ask her for sex. But I know that I got there first and was able to tell them all about it.”

**Condom Use**

Although the immediate concerns of many men in this study were to minimize the potential
negative sociopolitical consequences of extramarital sexual relations by choosing “safe” partners, they also sometimes used the English word safety to refer to condoms, and most were aware of the possibility of marital transmission of sexually transmitted infections and HIV. They expressed a range of attitudes toward condoms, with a few saying they used them scrupulously, a few saying they never used them and did not intend to, and most saying they used them sometimes. Most of the men volunteered lack of access as a substantial obstacle to use. Because of the dominant social conservatism of the community, local stores do not sell condoms, and many men expressed shame about asking for them at the hospital, where the staff were known to be reluctant distributors. Most men in this sample relied on what might be called an underground informal condom economy, in which some men stocked up on condoms from health centers and pharmacies in larger towns and then sold them surreptitiously in Tari.

CONCLUSIONS

ABC approaches to AIDS prevention assume that marital sexual fidelity has an inherent moral value and is what all married people everywhere know they should be striving for at all times. By contrast, many Huli men consider extramarital sexual relations to be acceptable after a man has successfully established a family, and many assert that marital fidelity takes a toll on a marriage and that extramarital sexual relations are generally harmless. Labor migration often initiates men into a masculine subculture in which extramarital sex is overdetermined and all but inevitable. Moreover, sexual relations with sex workers is seen as unproblematic and safe, because passenger women “don’t belong to anyone.”

These findings show a range of arenas in which HIV risk reduction measures can be implemented. First, there must be greater recognition that men’s labor migration plays a large role in (1) initiating some men’s extramarital sexual debut, (2) immersing men in work site subcultures in which extramarital sexuality is seen as both normal and an important means for enacting modern masculinity, and (3) creating pools of women at home who are more likely to have sexual relations in exchange for money. The public health community has accumulated more than enough epidemiological and ethnographic evidence that shows men’s risk for HIV—and thus also their wives’ risk—is strongly associated with economic structures that require men to leave home to support their families and that put men into high-risk social environments. The risks seem especially pronounced when the work sites in question are resource extraction sites, such as mines, perhaps because of their predominately male workforces and their arduous working conditions.

The single most important recommendation is that employers should be encouraged to provide family housing for their workers who come from far away. Family housing would reduce the loneliness and sexual deprivation that some men said encourages extramarital sex; it would create a community—similar to that of the men’s home communities—that discourages risky practices through the everyday scrutiny of community members’ behavior, and it would decrease the number of married women who have sexual relations in exchange for money because of a husband’s prolonged absence. Recent research has suggested that family housing could significantly reduce the risk for HIV infection.

There also is a need for more aggressive workplace AIDS education and condom distribution, particularly at work sites where a large percentage of the workforce is male and has emigrated. In countries like Papua New Guinea, where a long history of Christian missionization has made rural communities highly resistant to the social marketing of condoms, such workplace interventions are particularly important. The 4 male field assistants in the study stressed the importance of promoting structured recreational activities for men—both at work sites and in home communities—such as sports teams, literacy and vocational training classes, and political discussion groups.

Finally, it is important to acknowledge the structural nature of men’s extramarital sexual behavior. Interventions that promote fidelity appear to make certain assumptions about the marital relationship, such as the universality of a Western model of companionate marriage or, more fundamentally, that spouses are actually living together in 1 place. However, simply telling men to be faithful is not likely to be effective in the absence of a social infrastructure that makes fidelity more possible. Such infrastructure could certainly include faith-based initiatives, such as workplace support groups for male migrants or pastoral guidance for married couples that goes beyond the existing premarital counseling and that candidly acknowledges the many challenges to marital fidelity in resource-poor settings where economic opportunities are few and where men must often leave home to make a living. Socioeconomic initiatives that enable men to live at home or that enable wives to live with their migrant husbands also are necessary.

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References

FRAMING HEALTH MATTERS


2. An older generation of ethnographic research demonstrated that cultural variations in marriage—the presence or absence of polygamy, dowry, or bridewealth, for example, or whether wives are expected to be more loyal to their husbands or to their own natal families—strongly correlate with specific economic and ecological factors. J. Goody, Production and Reproduction: A Comparative Study of the Domestic Domain (Cambridge: Cambridge University Press, 1977).

3. Meggitt, “Female-Female Relationships in the High-


5. The author recognizes that women can also expe-


6. J. Shelton, D. Halperin, V. Nantulya, M. Potts, H. Gayle, and K. Holmes, “Partner Reduction is Crucial for Balanced ‘ABC’ Approach to HIV Prevention,” Brit-


7. For more on the history and nature of com-

8. The author recognizes that women can also expe-
rience material and (perhaps less often) ideological pressures that diminish the value or practicability of marital sexual fidelity; however, this article focuses on the socioeconomic factors that promote men’s extra-

marital sexuality.


11. For example, the presence of 12 interview partic-
ipants from their home communities was considered sufficient because the study was focused on the presence or absence of polygamy, dowry, or bridewealth, and not on the number of partners in each household.

12. The author recognizes that women can also expe-

13. For more on the history and nature of com-

14. The author recognizes that not all communities or individuals will be amenable to the research methods that social scien-
tists utilize in order to standardize results and max-
imize comparability. Thus, ethnographers typically em-
ploy multiple methods to obtain data on any 1 research question, both in order to crosscheck and verify data and because the nature of research with human sub-
jects often necessitates flexibility in data collection.


16. Some female interview participants said that if they experienced unusual fatigue or malaise, they often suspected a husband’s infidelity. This belief is not at-
tributed to disease transmission (although many women are also familiar with biomedical understandings of sexually transmitted infections and HIV transmission); rather, a man’s infidelity is described as a form of pol-
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21. Some female interview participants said that if they experienced unusual fatigue or malaise, they often suspected a husband’s infidelity. This belief is not at-
tributed to disease transmission (although many women are also familiar with biomedical understandings of sexually transmitted infections and HIV transmission); rather, a man’s infidelity is described as a form of pol-
lution that contaminates his wife and children.

22. The fleeting and often anonymous nature of men’s extramarital relationships has been documented...
elsewhere in Papua New Guinea (L. Hammar, "Sexual Transactions on Daru: With Some Observations on the Ethnographic Enterprise," Research in Melanesia 16/1992:21–54). L. Hammar, “Bad Canoes and Bafalo: The Political Economy of Sex on Daru Island, Western Province, Papua New Guinea," Genders 23(1996):212–43. The National Sex and Reproduction Research Team (NSRRT), and C. Jenkins, Sexual and Reproductive Knowledge and Behaviour in Papua New Guinea (Papua New Guinea Institute of Medical Research Monograph No. 10). Goroka: Papua New Guinea Institute of Medical Research, 1994.) However, this finding likely also reflects the research site and the sample of men interviewed: Tari is quite rural and small, and it would be impossible to maintain an extramarital relationship for long without its being discovered. Moreover, most of the men in the sample were of low socioeconomic status and could not afford to economically support another woman.


26. D. Lehman, "Demography and Causes of Death among the Huli in the Tari Basin," Papua New Guinea Medical Journal (2002): 51–62. See also D. Lehman, J. Vail, P. Vail, J. Crocker, H. Pickering, M. Alpers, and the Tari Demographic Surveillance Team, Demographic Surveillance in Tari, Southern Highlands Province, Papua New Guinea: Methodology and Trends in Fertility and Mortality between 1979 and 1993 (Goroka, Papua New Guinea: Papua New Guinea Institute of Medical Research, 1997). From 1970 to 1995, a demographic database was maintained by the Tari Research Unit, a branch of the Papua New Guinea Institute of Medical Research, through a system in which Huli men were hired to keep track of 500–1000 people on their own clan territories and report all demographic events monthly. This demography was shut down in 1995 due to lack of funds and increasing crime and tribal fighting in the Tari area. More recent data than is provided in Table 2 is not available because the data compiled by the project has not been analyzed.

27. Public health practitioners have worked on delaying young people’s sexual debut with the aims of (1) shortening the period of exposure to sexually transmitted infections and HIV (2) diminishing the number of lifetime sexual partners, and (3) giving young people the opportunity to mature and to gain the education, life-skills, and relative security that might enable them to make safer sexual choices. Implicit in some of this work is the notion that the nature and social context of a person’s first sexual experience can influence the sexual choices they subsequently make. Thus, for example, if a young woman’s first sexual experience is of a commercial nature and made in a context of desperation among female peers who are making similar choices, this pattern may endure. I am suggesting here that the nature and context of men’s first extramarital sexual experiences (for example, commercial sex, far from home, surrounded by one’s drunk male peers) may similarly influence their subsequent sexual choices.


31. Women’s suspicions are probably exacerbated by the breakdown in public services; for example, the closure of the Tari post office has meant that absentees from the community cannot send letters or wire money home.

32. Significantly, men sometimes refer to “family houses” as their “wives’ houses,” suggesting that many men feel not that they have created a new kind of domestic and marital space—as the Christian missionaries who promoted this change probably intended—but instead have moved into a female space.

33. A few older men said that they wanted to educate younger men about condoms but also said that without more institutional support they would not be courageous enough to do so because of the pervasive stigma associated with condoms.


“He Won’t Use Condoms”: HIV-Infected Women’s Struggles in Primary Relationships With Serodiscordant Partners

Patricia E. Stevens, PhD, RN, Loren Galvao, MD, MPH

We investigated the sexual behaviors of 55 HIV-infected women in Wisconsin who narrated their lives in 10 interviews over 2 years during 2000 to 2003. We sought to examine the interpersonal situations in which sexual risk occurred. During the prospective period, 58% (32) were abstinent and 24% (13) practiced safe sex exclusively. The remaining 18% (10) engaged in unprotected sexual intercourse, but only in primary partnerships, almost all of which were with serodiscordant partners. We focused on experiential detail and narrative depth of 10 women who had sex without condoms. These narratives demonstrate how the women attempted to initiate condom use but engaged in unprotected sexual intercourse regularly at the insistence of their partners. Consequently, these women lived in trepidation of causing their partners’ sickness and death. (Am J Public Health. 2007;97:1015–1022. doi:10.2105/AJPH.2005.075705)

Although broad efforts at primary prevention (i.e., prevention efforts targeted at persons not infected with HIV) of HIV were prominent in the United States during the first 2 decades of the pandemic, the Centers for Disease Control and Prevention are now emphasizing secondary prevention interventions targeted to those already infected.1,2 A substantial number of persons who are HIV infected continue to engage in behaviors that place others at risk for infection, yet gaps remain in specific knowledge about women who are HIV infected and the factors that impede or facilitate their capacity to reduce risky sexual behaviors.3–5

In our longitudinal qualitative study, we investigated the sexual behaviors of 55 women who were HIV infected. We used narrative analysis techniques to compare and contrast the events, players, contexts, and women’s evaluations of their sexual lives since diagnosis, focusing particularly on how they managed HIV transmission risk during the 2-year prospective data collection period. We examined the interpersonal situations in which sexual risk occurred, identifying how many women in the sample were sexually active during the 2-year study period and who among them did not use condoms. From the perspective of those women who engaged in sexual intercourse without condoms, we analyzed efforts at condom negotiation and the meanings sexual risk held for them.

BACKGROUND

A majority of women who are HIV infected in the United States remain sexually active after they are diagnosed, and whether they practice safe sex or not has been the subject of several studies.6 Findings from the late 1990s indicated that anywhere from 22% to 38% of HIV-infected women practiced unprotected sexual intercourse.7–12 In more recent studies, reported rates of unprotected sexual intercourse are only somewhat lower: 17% to 35%.6,13–17 For instance, data from a national probability sample of persons receiving medical care for HIV indicated that 17% of women reported having unprotected sexual intercourse without disclosing their positive HIV status to their partners.14 In a more targeted study, 35% of a convenience sample of 80 infected women attending HIV outpatient clinics reported having unprotected intercourse or a newly diagnosed sexually transmitted infection in the previous 6 months.17

What provokes sexual risk taking among women who are HIV infected? Growing evidence suggests that the proliferation of HIV treatment options over the past decade may have decreased individuals’ concerns about HIV transmission. Findings from the Women’s Interagency HIV Study suggest that women engage in more unprotected sexual intercourse after they are on highly active antiretroviral treatment.16 Likewise, findings from the California Partners Study II suggest that when an infected woman’s viral load and symptoms are under control, she is more likely to engage in unprotected sexual intercourse.19,20

Interpersonal dynamics and psychosocial barriers to condom use that may impinge on the sexual lives of HIV-infected women have not been well explored. The realities of relationships between men and women are critically important, however, in shaping HIV-infected women’s behaviors.21 Introducing condoms into relationships where women are financially dependent or where traditional gender roles prevail can be difficult for women in general.22,23 How much more difficult might it be for women who are HIV infected? In addition, unprotected sexual intercourse with a primary partner may not have the same meaning or implications for the woman that it does with a casual partner.4,24,25 It is important to understand the situations in which unprotected sexual relations occur if we are to accomplish secondary prevention of HIV transmission.26 Such understanding can best be achieved through qualitative studies that elicit and systematically compare individuals’ stories of what has happened to them.

METHODS

Sharing stories builds rapport and allows research participants some control over the flow and direction of research activities.27 Personal narratives communicate the meanings
events have for individuals and the interpersonal contexts in which they occur. Narrative designs also tap into people’s everyday ways of expressing themselves, making the research accessible to women of all levels of literacy and education. Longitudinal narrative data collection allows trust to be built over time and repeated contact, facilitating depth of disclosure about such sensitive topics as sexual behavior. Longitudinal narratives collected over years also can shed light on obstacles to risk reduction that women face as they live longer and more productive lives with HIV, on how changing circumstances such as illness exacerbations or interventions by health care providers can affect HIV-infected women’s behaviors, and on the long-term resources and support women who are HIV infected need to sustain secondary prevention of HIV transmission.

Using a repeated qualitative narrative interview design, we conducted a longitudinal study of HIV-infected women from urban and rural Wisconsin, following 55 participants through a series of 10 interviews over 2 years. Using staggered enrollment, data collection occurred from 2000 to 2003. The purpose of the entire study was to develop an in-depth understanding of women’s experiences living with HIV. We gathered data focused on the vital issues of accessing health care and social services, managing symptoms, adhering to medical regimens, reducing sexual and drug use risks, and dealing with poverty and drug abuse. Although we tracked experience over time for each of these issues, we report on data about sexual risk only.

To recruit a racially diverse sample of 55 women, we used community-based purposive sampling, a deliberative process wherein participants are targeted for the rich information they are likely to yield about study phenomena. Inclusion criteria specified that participants be women at least 18 years of age, conversant in English, and self-reported as HIV infected. The targeted chain referral sampling we used depended on personal contact and invitation from trusted community members and service providers. In Table 1 we summarized the demographic characteristics of the total sample and of the subsamples relevant to our findings about sexual risk. Eleven women were unable to complete all 10 interviews in the series because of death, illness exacerbation, or relocation. Demographically, these 11 women were not significantly different from the 44 who completed all the interviews. A total of 475 interviews were conducted.

For each participant, 10 face-to-face 2-hour tape-recorded interviews were conducted at systematic intervals by a consistent interviewer in a private setting of the participant’s choice. Women received a modest incentive of $30 at each interview. Informed consent was obtained before data were collected. Interviewers had doctoral degrees and were trained and experienced in narrative interviewing. Interviewers posed open-ended, story-eliciting questions related to the specific aims of the study. General questions were asked in early interviews: What about your life has changed since you have been living with HIV? How has your sexual life been affected? What has been most difficult about sex since you have been diagnosed with HIV? Can you tell me about your mate and what life is like with him? Interviewers posed open-ended, story-eliciting questions related to the specific aims of the study. General questions were asked in early interviews: What about your life has changed since you have been living with HIV? How has your sexual life been affected? What has been most difficult about sex since you have been diagnosed with HIV? Can you tell me about your mate and what life is like with him? Interviewers followed up on sexual narratives in subsequent interviews and inquired about what had happened between interviews. Interviewers and participants discussed more sensitive topics as rapport increased, including assertiveness in

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<td>Asymptomatic HIV</td>
</tr>
<tr>
<td>Symptomatic HIV</td>
</tr>
<tr>
<td>AIDS</td>
</tr>
<tr>
<td>On HAART medication</td>
</tr>
<tr>
<td>Yes</td>
</tr>
<tr>
<td>No</td>
</tr>
<tr>
<td>Transmission category</td>
</tr>
<tr>
<td>Heterosexual sex</td>
</tr>
<tr>
<td>Injection drug use</td>
</tr>
<tr>
<td>Blood transfusion</td>
</tr>
</tbody>
</table>

Note. GED = general equivalency diploma; HAART = highly active antiretroviral therapy.
sexual relations, efforts to use condoms, and episodes of unprotected sexual intercourse.

Interviews were transcribed verbatim and imported into NVivo 7 (QSR International, Melbourne, Australia), a specialized computer program for qualitative research. The automated data handling and powerful search and retrieval mechanisms of this software facilitated data management. We first conducted a within-case analysis. For each participant, we retrieved the participant’s narration of her sexual life as an HIV-positive woman over her series of interviews, coding content and context in a dialectical process, examining reported events as well as the participant’s interpretations of what had occurred.35–38 Next, we did an across-case analysis, searching for similarities and differences among participants in what they related about their sexual lives since HIV diagnosis. We constructed qualitative matrices, plotting story elements across study participants and comparing each participant’s sexual experiences with every other participant’s sexual experiences. We identified patterns apparent across the sample for sexual events, behaviors, emotional responses, and beliefs, as well as women’s interpretations of their partners’ behaviors and perceptions of their own responsibility in sexual matters. Lastly, we selected exemplar narratives and interview excerpts that best illustrated these patterns.

Combining within-case and across-case approaches to qualitative data produces more contextually grounded, transferable findings.39 To further support the authenticity of findings and auditability of analytic processes, we (1) engaged in interrater reliability activities as we created and applied codes, (2) returned to full transcripts for grounding sexual behavior data, (3) wrote memos about our analytic decisionmaking, and (4) conducted participant validation exercises.

RESULTS

Sexual Activity and Use of Condoms in the Total Sample

During the 2-year prospective data collection period, self-reports of the 55 participants indicated that 32 (58%) were completely abstinent, 13 (24%) used condoms every time they had sex, and 10 (18%) had sex on a regular basis without using condoms (Table 2). Having sex without using condoms occurred within primary partnerships only. Those women who were not in primary partnerships were either abstinent or practiced safe sex with casual partners. Those who were in primary partnerships were monogamous; if they had sex, it was only with a primary partner.

To examine the situations in which sexual risk occurred, we focused on those 10 participants who engaged in unprotected sexual intercourse. One of these women stood out from the others, her primary partner was HIV infected (Table 2). She had lived with an HIV diagnosis longer than anyone else in the study and was among the sickest, combating opportunistic infections throughout the study period. She related that when she and her partner had first become sexually involved, they used condoms. But after a while, he insisted on having unprotected sexual intercourse because he disliked condoms so much. Although she believed it unwise, she acquiesced. She communicated no apprehension or guilt:

I could get his strain of the virus or he could get mine. But I just don’t care because I’m so far gone already anyway. My immune system is shot. I’ve been full-blown AIDS for 8 years. How much worse can it get?

Sexual narratives of the other 9 who engaged in unprotected sexual intercourse evidenced markedly different patterns from that one. These women had primary male partners who were HIV negative. Although they engaged in unprotected sexual intercourse on a regular basis in these intimate relationships, they did so reluctantly. They tried to convince their partners to use condoms but had no success. Consequently, they experienced significant trepidation about passing on the virus. In contrast to the first woman mentioned, these women seldom referred to their health status when talking about sexual activities. Results from analyses of their sexual narratives are presented in experiential detail and narrative depth in the next several sections. We conclude our findings by contrasting these sexual narratives with those of participants who were also involved with HIV-negative men but who did not engage in unprotected sexual intercourse.

Narrative Exemplar of Sexual Risk

The following account from the within-case analysis illustrates how 1 woman struggled over condom use with her HIV-negative partner during the 2-year study period. The participant was White and 40 years old at enrollment. She had been diagnosed with HIV for 13 years, married for the last 5. She was on a highly active antiretroviral treatment regimen. Her major symptoms were fatigue, joint pain, and lypodystrophy (complex syndrome involving fat redistribution). When she talked about her marriage, the points she emphasized were how much her husband loved her, the leisure activities they enjoyed together, and their compatible worldviews. She was not at ease with their sexual life, however. Early in the study, she described her emotional reactions: “My husband refuses to use condoms. We’ve been having unprotected sex the entire time we’ve been together—5 years—and he’s still HIV negative. But that doesn’t mean it can’t happen. I get so upset about it. It’s so sad to me that my husband won’t use a condom.”

Throughout the study period, she remained distressed about her husband’s refusal to engage in safe sex with her, speaking often about trying to “talk him into” using condoms. Contention about condom use seemed

<table>
<thead>
<tr>
<th>Primary Partner Status</th>
<th>Abstinent (n = 32), No. (%)</th>
<th>Safe Sex Exclusively (n = 13), No. (%)</th>
<th>Unprotected Sex (n = 10), No. (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>No primary partner</td>
<td>26 (47)</td>
<td>6 (11)</td>
<td>0 (0)</td>
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<tr>
<td>HIV-positive primary partner</td>
<td>4 (7)</td>
<td>0 (0)</td>
<td>1 (2)</td>
</tr>
<tr>
<td>HIV-negative primary partner</td>
<td>2 (4)</td>
<td>7 (13)</td>
<td>9 (16)</td>
</tr>
</tbody>
</table>
to peak about midway through the study. During the fourth interview, she reported how she had lost her temper with him the week before: “I showed him all my meds and I said, ‘Do you want to take all these?’ I shook the pill bottles in front of his face. But you can’t make him do anything. I’m so scared he’ll get infected.” During the fifth interview, she said, “We argue about condoms all the time. It is an issue almost weekly.”

In the second year of the study, she talked her husband into accompanying her to an appointment with her HIV care provider, hoping that a professional might be able to convince him to use condoms: “I had my husband come in and talk to my doctor. She gave him an ass chewing about putting himself at risk for HIV infection. The only thing he agreed to was getting tested every 6 months. But he still won’t use condoms.” She blamed herself in part for his refusal because she had never been ill from HIV-related opportunistic infections. If she had been ill, she reasoned, her husband might have understood the risk posed by unprotected sexual intercourse: “He’s never seen me sick. If he would see me sick, then it might be different. Maybe if I got sick, if I ended up in the hospital, he’d want to use a condom.”

In the final interviews, she remained heart-sick about the possibility of passing the virus to her husband. She reflected on the many times she had considered resisting his wishes for unprotected sexual intercourse but was unable to do so because of her gratitude for his kindness and acceptance: “I could say to him, ‘Look, we’re going to use a condom, otherwise you’re not getting any.’ But my husband really likes sex. He is a very good lover. He’s gentle. He’s loving. I’m in awe sometimes because he wants to be with me no matter the HIV. You see, I prayed to God to send me someone who would accept that I have HIV. And God sent me my husband.”

**Interpersonal Situations in Which Sexual Risk Occurred**

Longitudinally, there was remarkable similarity in the sexual narratives of the 9 HIV-infected women who had unprotected sexual intercourse with serodiscordant primary partners. Contemporaneous stories throughout the 2-year data collection period were about negotiating for condom use, making sense of partners’ resistance to condom use, and living with the responsibility and guilt of having unprotected sexual intercourse.

**Negotiating for condom use.** These 9 women tried very hard, over months and sometimes years, to negotiate condom use. They made concerted and repeated efforts to talk with their partners, trying to reason with them about the importance of safe sex. What became apparent in the interviews was a common trajectory of events in which talking about condom use degraded into arguments. Arguments led women to acquiesce to their partners’ demands, and episodes of unprotected sexual intercourse occurred. After multiple arguments, resulting in multiple episodes of unprotected sexual intercourse, women gave up. An uncontested pattern of sexual risk followed.

Excerpts from their interviews describe the process. Early on in the study period, women said things such as the following:

We talk about it all the time. I’m always telling him, “Please, for me, use protection.” But he won’t.

I've talked to him and talked to him until I'm blue in the face. I get nowhere. He knows I want him to use condoms. I can't do no more than that.

He hates the condoms. In his mind he sees abortion. His reply to me is “I'm as happy as I've ever been in my life. You cannot take that away from me.” But I'm the party that carries the HIV, so that makes it hard.

In later interviews, it became increasingly clear that condom use was the source of recurring arguments. Women were continually frustrated by their male partners’ unwillingness to identify with their concerns about the need for safe sex:

It pisses me off when he won't wear a condom after all I’ve tried to tell him.

I don’t want to have sex without a condom. My boyfriend is angry with me about that, and that’s why we argue. Having this disease changed my whole life. And he just doesn’t understand when I try to explain it to him, that he needs to use protection. He won't listen. He just blocks me out.

Their emerging narratives revealed a vicious cycle that was set into motion when sexual intimacy was initiated. The woman’s request for condom use was rebuffed. She pleaded. He got angry. She was silenced. He persisted. She capitulated. And they had unprotected sexual intercourse. Then she lived with the worry and guilt:

It bothers me that he won’t use protection. And I tell him that all the time. And when I tell him that, he gets angry. He gets so upset that I have to leave it alone. Then, we have sex the way he wants. It would be better not to be with him. Then I wouldn’t have all the guilt feelings I go through because he won’t use condoms.

I know I have to take charge and use condoms. But it is a hard problem. I want to be with this partner. I want to make it work with him. But he doesn’t want to use a condom. I’ve tried over and over. He gets mad. He gets to hollering and screaming, and that upsets me. What else can I do? I give in.

After living with this level of contention for some time, women eventually gave up talking and arguing about sexual activity. Later interviews indicated that they settled into a pattern of having unprotected sexual intercourse:

He won’t use condoms. It has been 3 years we will be together, and he just won’t. I let him have his way now. I don’t even talk about it anymore.

I can’t say no to sex. I’ve already tried, and it doesn’t work. And I don’t want to keep fighting with him. So I don’t even bring up condoms anymore.

**Making sense of partners’ resistance to condoms.** These women tried to make sense of their partners’ refusal to use condoms. As 1 woman said, “You would think that most men would want to use protection when the woman has HIV.” They paid attention to the reasons their partners offered and drew some of their own conclusions about men’s motivations for wanting unprotected sexual intercourse. The rationales they saw operating in their partners’ actions included love, denial of risk, God’s will, desire for full sexual pleasure, and control.

Some partners presented their refusal to use condoms as issuing from their love, an appeal that caused a great deal of consternation for these women:

He says he loves me so much that if I’m going to die, he’s going to die, too.

I want him to wear a condom because I’m infected. He says, “I don’t care about the HIV.
I love you.” But I care. I don’t want to be responsible for his death.

He says he loves me and that’s it. That’s all. End of story. Whatever is going on with me is going on with him because he’s my husband. I’m married to him and nothing is going to change that. I tell him he’s hurting himself by not using protection. He says that’s not for me to say.

Some women did feel better loved, despite the conflict it posed:

Because he wants sex without a condom and he knows I have HIV, that’s the reason I know he loves me. And that is all I ever wanted in a man, to feel that way about me. But now it scares me to death. The bottom line is I’m responsible because I’m not protecting him from getting HIV.

Some men did not believe they could be infected by their partners:

My husband is HIV negative after 8 years of having sex without a condom, so he thinks it can’t happen. He thinks he is invincible. He read in the newspaper that the spread from women to men is real low. I want to believe that, too, but what if it’s wrong?

In one case, a participant was convinced by her partner that HIV transmission was a matter of supernatural fate. Although she shared his beliefs about the supremacy of God’s will over human action, she was still troubled:

He is 50, and he says he done lived his life. If something happens, it just happens. That is his theory of it. He says he will just take it [HIV] from God if it happens. I was trying to have him use condoms, but then he even convinced me that if it is God’s will, then it will happen. Nothing we can do. But I keep feeling guilty about it.

Some men were direct about the loss of sexual pleasure they experienced when using condoms, and women wanted to please their partners:

It’s so hard when he won’t use a condom, knowing that I would be responsible for him dying.

Participants were terribly troubled by worry and guilt at having committed acts of unprotected sexual intercourse:

I feel responsible about having unprotected sex. I don’t want anyone to go through what I’ve been through with HIV. And that eats me up inside, more so than me having HIV myself. My husband acts like it’s not an issue, but it is. I don’t want it on my conscience that I hurt a single solitary soul, intentional or not intentional.

The hardest thing is I feel so bad that I could pass this HIV along to him. I don’t wish it on my worst enemy. It is such a damaging disease, a deadly disease. That lays a heavy burden on me because I feel responsible. And I feel helpless. I know I am supposed to take charge.

Absence of Health Care Providers

Health care providers did not figure prominently in the narratives that these 9 women told. Many urged and cajoled partners to come with them to health care appointments so that a doctor or caseworker could talk with them about the importance of safe sex. The women hoped a professional could have an influence they were unable to, perhaps by bullying their partners into condom use. But partners held onto their objections:

I asked him to see my doctor. I thought that being a man, my doctor could teach him and have a better chance than me of making him use condoms.

I had him talk to the counselor, a Black man at that. The counselor said, “No glove, no love.” But he said, “No, I love her for her, and I don’t want any condoms.”

In a couple of circumstances, interventions by health care providers seemed to increase the distress surrounding condom use:

My psychiatrist started talking to him about protection. He got real passsed off about that. He said he doesn’t like nobody telling him what to do about having sexual relations. Let him do what he feels he wants to do.

The counselor gave him some condoms. And he gave the condoms right back. He said, “You can take these condoms and give them to somebody who needs them.” The counselor said, “No, you are going to need them.” My fiancé got mad. He said, “I’m going to live my life the way I always have. You aren’t going to be telling me what I need to do.”

Other Women With Serodiscordant Partners

Although these findings have focused on situations in which sexual risk occurred, there were 9 other women in the study who had serodiscordant primary partners; 7 of them practiced safe sex exclusively, and the other 2 were abstinent during the study period (Table 2). When comparing all the participants who had serodiscordant primary partners, the 9 women who practiced safe sex and the 9 who did not, we were unable to find evidence that condom use varied with women’s physical health. Rather, it was interpersonal dynamics in their primary relationships that differentiated those who used condoms from those who did not.

The subsample of women with serodiscordant partners who always used condoms or were abstinent did not experience pressure from male partners to engage in unprotected sexual intercourse. Either their partners were receptive to their requests for consistent condom use, or they were mostly absent from their lives. Four described their partners as having “no problem using condoms” and being “committed to safe sex.” One reported that she was so frightened of transmitting the virus that she would not engage in sex with her partner at all, and according to her account, this was acceptable to him. The other 4 reported that their primary male partners were incarcerated during much of the study period, essentially eliminating the potential for struggle about condom use. These 9 women over 2 years of interviews did not
mention arguments about condom use or worry about HIV transmission.

DISCUSSION

Most studies investigating the sexual behaviors of women who are HIV infected indicate that the majority of these women are sexually active. In our study, however, the majority (58%) was not sexually active over the 2 years of prospective data collection. Eighteen percent of the total sample engaged in unprotected sexual intercourse, a proportion similar to that found in previous research. Findings from our study are markedly different from those of previous research, however, in that they provide experiential detail and narrative depth to an understanding of the interpersonal situations in which sexual risk occurs for women living with HIV.

Unprotected sexual intercourse occurred only in the context of primary partnerships, almost all of which were serodiscordant; that is, the male partners involved were HIV negative and continuously refused to use condoms. Not all women in serodiscordant primary partnerships practiced unprotected sexual intercourse. In fact, in our study half of the women who were partnered to HIV-negative men practiced safe sex exclusively or declined sexual activity altogether. What made their circumstances different was not that their symptoms were any more or less under control than those who practiced unsafe sex, as some researchers have found. Rather, the interpersonal dynamics of their relationships were different. Their primary male partners were agreeable to consistent condom use or were simply not present in their daily lives.

The women in serodiscordant relationships who did engage in unprotected sexual intercourse on a regular basis did so reluctantly, always fearful of passing the virus to their male partners. For them, unprotected sexual intercourse meant that they might cause their partners’ sickness and death from AIDS. Health care providers were almost absent in these narrations about sexual risk, except as occasional bit players called on to coerce condom use.

These findings suggest that HIV-infected women like those in our study do not carelessly engage in sexual risk; rather, they are well informed and deeply troubled by sexual risk. Our findings also suggest that women who are HIV infected do not wish to do harm when having sex without a condom; rather, they actively resist posing risk to anybody else. Under repeated circumstances of interpersonal duress, they give in to more dominant male partners. They try to understand why their HIV-negative partners will not use condoms and try over and over to convince these partners of their necessity. Unsuccessful in their efforts to reduce sexual risk in their relationships, they live with a sense of doom about their actions. If these data are any indication of the struggles at least some HIV-infected women may experience in serodiscordant relationships, then there are a great many unmet needs to which compassionate and knowledgeable health care providers and the systems in which they work could respond.

Recommendations

Our first recommendation to address unmet needs pertains to interpersonal conflicts over the issue of HIV infectivity. The women were convinced of the potential for transmission and were fearful about it all the time. Conversely, some of their primary partners did not seem to believe that female-to-male HIV transmission was all that likely. The men’s concrete experience of remaining HIV negative over months or years of engaging in unprotected sexual intercourse apparently reinforced their feelings of invulnerability. Data derived from US samples of HIV-serodiscordant couples indicate that, indeed, female-to-male sexual transmission of HIV is significantly less efficient than male-to-female and male-to-male. Female-to-male probability of HIV-1 transmission has been reported as 0.001 or less per coital act, but the overall risk of transmission compounded over a large number of unprotected sexual encounters in long-term, HIV-serodiscordant heterosexual couples is much higher. It is incumbent on health care providers to make this distinction comprehensible for HIV-infected women and their HIV-negative primary partners, so that mutual ground can be established for calculation of risk and consideration of options for risk reduction (e.g., engaging in a broader spectrum of sexual interactions including less risky alternatives to unprotected insertive intercourse, use of the female condom). An absolutist approach to condom use on the part of health care providers may have limited value for both HIV-infected women and their male partners, causing women to live in fear and guilt about their sexual activity and their partners to angrily rebel against efforts to control personal behaviors reflecting on their manhood. Rather, facilitating open dialogue about sexual and emotional intimacy between individual partners in HIV-serodiscordant couples may be more promising as an intervention for women who are HIV infected.

Our second recommendation concerns the importance of tailoring sexual risk reduction interventions to the needs of HIV-serodiscordant partners, particularly those in established, long-term, primary relationships. Other studies have pointed out the importance of secondary prevention of HIV in the context of primary relationships. Results from the California Partners Study II indicated that 45% of heterosexual, HIV-serodiscordant partners engaged in unprotected sexual intercourse on a regular basis. In another study, comparison of HIV-infected persons with casual and primary serodiscordant partners showed that rates of unprotected sexual intercourse were greater with primary partners than with casual partners.

What is not so clear in the literature about HIV-serodiscordant couples in the United States to date is how experiences and needs might differ depending on who in the relationship is HIV infected, the woman or the man. Our findings suggest that gender power relations may differentiate these relationships between serodiscordant partners. An international study about positive and negative life events experienced by serodiscordant couples following HIV diagnosis lends some credence to our assertion. Data collected in 3 developing countries showed that couples consisting of an HIV-positive woman and an HIV-negative man were more likely to report breakup of a marriage and breakup of a sexual relationship than were couples consisting of an HIV-positive man and an HIV-negative woman. HIV diagnosis was associated with the strengthening of sexual relationships between serodiscordant partners, except when it
was the woman who was HIV positive. The authors of the study concluded that HIV-positive women in relationships with serodiscordant partners might be particularly vulnerable to negative life events and thus need additional individual support and counseling services. Other international investigators have emphasized that men should be brought into the picture, recommending the conscientious involvement of male partners early in HIV-infected women’s counseling and primary care as well as the development of male-focused interventions to curb coercive unprotected sexual behavior by male partners. Still other researchers in sub-Saharan Africa have called for more couple-focused research and intervention as the best way to reduce risk behaviors and prevent seroconversion between serodiscordant partners.

Our third recommendation is that assistance with secondary prevention be carried out at several levels—help for individual women who are HIV infected, help for the men who are their partners, and help for couples. Our findings suggest that HIV-infected women in heterosexual relationships with serodiscordant partners are likely to need targeted, individual support in coping with oblivious or obstinate male partners who will not practice safe sex. Our findings also suggest that HIV-negative male partners may have complex reactions of their own to female partners’ HIV infection, which may fuel their refusals to use condoms, and so they may need targeted intervention as well. Qualitative studies about men’s experiences in sexual relationships with women who are HIV infected are needed to more fully understand the interpersonal dynamics of serodiscordance and sexual risk reduction. Couple-focused behavioral interventions to reduce HIV transmission risk seem appropriate as well but have not yet been widely researched or implemented in community settings in the United States. Future research should use experimental designs to test a wide range of interventions to reduce unprotected sexual intercourse between serodiscordant partners.

Our fourth recommendation comes from the finding that a majority of our sample of HIV-infected women was not sexually active over the 2 years. The consequences of abstinence and what it means to women living with HIV have not been well studied, leaving gaps in our understanding. Research is needed to answer questions such as, Do some women living with HIV actively choose a position of sexual abstinence or are they relegated to it? How is libido affected by the physiological and social changes women may experience with HIV diagnosis or HIV-related illness? What are physical health and psychosocial outcomes of abstaining from sexual activities? Is personal empowerment or liberation from dominating relationships associated with sexual abstinence? Are the needs of abstinent women being met in HIV care and social service environments?

Conclusions

Although a clear and continuous pattern of experience emerged from participants’ poignant narratives of sexual risk, we caution against generalizing from the conclusions of this qualitative study. Given the relatively small, purposive sample, experiences of these participants cannot be taken to represent the experiences of all women who are HIV infected. In particular, the subsample of 9 women on whom we focused this analysis, those who engaged in unsafe sex with serodiscordant primary partners, cannot possibly represent the breadth of sexual risk experiences HIV-infected women may have. At best, knowledge gained from this study might be transferable to other contexts involving similarly situated women. We humbly offer our interpretations and recommendations with the hope that researchers, clinicians, and policymakers might gain insights they can apply, thereby improving conditions for women living with HIV.

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Contributors

P.E. Stevens designed and conducted the study, analyzed the data, and wrote the article. L. Galvao assisted with data analysis and writing of the article.

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Human Participant Protection

This study was approved by the University of Wisconsin, Milwaukee, institutional review board.

References


13. Erbedding EJ, Stanton D, Quinn TC, Rompalo A. Behavioral and biologic evidence of persistent high-risk
Research, Curricula, and Resources Related to Lesbian, Gay, Bisexual, and Transgender Health in US Schools of Public Health

Heather L. Corliss, PhD, MPH, Michael D. Shankle, MPH, and Matthew B. Moyer, MPH

A growing body of research identifies some health disparities of the lesbian, gay, bisexual, and transgender population. For example, lesbian, gay, bisexual, and transgender people are at increased risk for experiencing mental health problems, engaging in substance use and abuse, and contending with discrimination and violence. Consequently, factors associated with sexual orientation and gender identity are increasingly recognized as important to consider in public health practice and research.

In light of the increasing recognition of the health disparities of the lesbian, gay, bisexual, and transgender population, we conducted a survey to examine the extent to which US schools of public health focus on lesbian, gay, bisexual, and transgender health through research and planned curricula. Our 3 primary objectives were (1) to assess overall climate indicators (e.g., sexual orientation nondiscrimination policy, same-sex domestic partner health insurance benefits) for lesbian, gay, bisexual, and transgender people affiliated with public health schools; (2) to measure the prevalence of lesbian, gay, bisexual, and transgender research and curricula; and (3) to establish a baseline to gauge the efforts of health needs of the lesbian, gay, bisexual, and transgender community.

METHODS

We designed and piloted a self-administered questionnaire that was mailed (May 2002) to department or division chairpersons (N=184) of 35 schools of public health in the United States and Puerto Rico. The questionnaire covered 3 main domains: (1) overall climate for lesbian, gay, bisexual, and transgender faculty, staff, and students; (2) lesbian, gay, bisexual, and transgender faculty and student research activities; and (3) planned lesbian, gay, bisexual, and transgender health curricula. Schools and chairpersons were identified through Web sites of the Association of Schools of Public Health and the individual schools.

The mission of public health is to ensure societal conditions in which people can be healthy. Health services and programs tailored to the cultural characteristics of diverse populations (e.g., racial/ethnic minorities and elderly, lesbian, gay, bisexual, and transgender people) are more effective in addressing health disparities. Thus, the establishment of culturally competent health care systems (i.e., the integration of knowledge, attitudes, behaviors, practices, and policies that enable effective, quality health services in cross-cultural situations) has been identified as fundamental for achieving the public health mission.
Indicators of Health Research and Curricula

Overall, 41% of the departments of US schools of public health reported the presence of a faculty member who was conducting any lesbian, gay, bisexual, or transgender health research. However, most of this research was related to HIV and AIDS (Table 2). Few respondents (10%) reported that a student in their department had ever completed a doctoral dissertation on lesbian, gay, bisexual, or transgender health. Fewer than 9% of the departments had offered a course in the past 2 years that covered lesbian, gay, bisexual, or transgender health topics extending beyond HIV and AIDS.

### TABLE 1—School- and Department-Level Lesbian, Gay, Bisexual, and Transgender Climate Indicators: US Schools of Public Health, 2002–2003

<table>
<thead>
<tr>
<th>Climate Indicator</th>
<th>No. (%)</th>
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<tbody>
<tr>
<td>School-level indicator (n = 35)</td>
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<tr>
<td>School has nondiscrimination policy that covers sexual orientation in employment and education</td>
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</tr>
<tr>
<td>Yes</td>
<td>25 (71.4)</td>
</tr>
<tr>
<td>No</td>
<td>10 (28.6)</td>
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<tr>
<td>School offers same-sex domestic partner health insurance benefits to faculty</td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>17 (48.6)</td>
</tr>
<tr>
<td>No</td>
<td>18 (51.4)</td>
</tr>
<tr>
<td>Staff</td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>17 (48.6)</td>
</tr>
<tr>
<td>No</td>
<td>18 (51.4)</td>
</tr>
<tr>
<td>Students</td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>4 (11.4)</td>
</tr>
<tr>
<td>No</td>
<td>31 (88.6)</td>
</tr>
<tr>
<td>Department-level indicator (n = 102)</td>
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</tr>
<tr>
<td>Department has a faculty member who is known to be lesbian, gay, bisexual, or transgender (&quot;out&quot;)</td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>11 (31.4)</td>
</tr>
<tr>
<td>No</td>
<td>24 (68.6)</td>
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</table>

### TABLE 2—Prevalence of Faculty and Student Lesbian, Gay, Bisexual, and Transgender Research and Health Curricula in Departments: US Schools of Public Health, 2002–2003

<table>
<thead>
<tr>
<th>Department Characteristic</th>
<th>No. (%)</th>
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<tbody>
<tr>
<td>Faculty research</td>
<td></td>
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<tr>
<td>Are any faculty members currently conducting HIV- or AIDS-related lesbian, gay, bisexual, or transgender health research?</td>
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</tr>
<tr>
<td>Yes</td>
<td>37 (36.3)</td>
</tr>
<tr>
<td>No</td>
<td>56 (54.3)</td>
</tr>
<tr>
<td>Do not know</td>
<td>9 (8.8)</td>
</tr>
<tr>
<td>Are any faculty members currently conducting lesbian, gay, bisexual, or transgender health research other than HIV and AIDS?</td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>18 (17.6)</td>
</tr>
<tr>
<td>No</td>
<td>67 (65.7)</td>
</tr>
<tr>
<td>Do not know</td>
<td>17 (16.7)</td>
</tr>
<tr>
<td>Have any faculty members ever chaired a doctoral committee on lesbian, gay, bisexual, or transgender health?</td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>8 (7.8)</td>
</tr>
<tr>
<td>No</td>
<td>52 (51.0)</td>
</tr>
<tr>
<td>Do not know</td>
<td>42 (41.2)</td>
</tr>
<tr>
<td>Student research</td>
<td></td>
</tr>
<tr>
<td>Are any students currently conducting lesbian, gay, bisexual, or transgender health research?</td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>22 (21.6)</td>
</tr>
<tr>
<td>No</td>
<td>44 (43.1)</td>
</tr>
<tr>
<td>Do not know</td>
<td>36 (35.3)</td>
</tr>
<tr>
<td>Have any students ever completed a doctoral dissertation on lesbian, gay, bisexual, or transgender health?</td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>10 (9.9)</td>
</tr>
<tr>
<td>No</td>
<td>72 (71.3)</td>
</tr>
<tr>
<td>Do not know</td>
<td>19 (18.8)</td>
</tr>
<tr>
<td>Health curricula</td>
<td></td>
</tr>
<tr>
<td>Did your department offer a course in the past 2 years that covered lesbian, gay, bisexual, or transgender health topics extending beyond HIV and AIDS?</td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>9 (8.8)</td>
</tr>
<tr>
<td>No</td>
<td>93 (91.2)</td>
</tr>
</tbody>
</table>

### TABLE 2—Continued

| Does your department plan to offer a course in the next 3 years that will cover lesbian, gay, bisexual, or transgender health topics extending beyond HIV and AIDS? |
|---|---|
| Yes | 11 (10.8) |
| No | 86 (84.3) |
| Do not know/refused to answer | 5 (4.9) |
| How adequate is your department’s coverage of lesbian, gay, bisexual, or transgender health topics? |
| Very adequate | 11 (10.8) |
| Somewhat adequate | 27 (26.5) |
| Somewhat inadequate | 29 (28.4) |
| Very inadequate | 16 (15.7) |
| Do not know/refused to answer | 19 (18.6) |

*Total sums to 102 except for student lesbian, gay, bisexual, or transgender doctoral dissertation because 1 department did not award doctoral degrees.

### DISCUSSION

The Institute of Medicine recommends that educational opportunities be expanded to increase public health practitioners’ knowledge of minority health issues.70 The American Public Health Association has adopted policy statements (9819 and 9933) urging educational, research, and funding institutions to improve their capacity to respond to the health disparities of the lesbian, gay, bisexual, and transgender population. Similarly, other health professional organizations formally recognize lesbian, gay, bisexual, and transgender health disparities.71–73 For example, in 2005, the American Medical Association adopted a policy statement (H-295.878) aimed at eliminating lesbian, gay, bisexual, and transgender health disparities through promoting lesbian, gay, bisexual, and transgender health topics in medical education.

The results of this study indicate that, contrary to official American Public Health Association policy, public health schools seldom offer planned curricula that address comprehensive lesbian, gay, bisexual, and transgender health. The unique and varied concerns of the lesbian, gay, bisexual, and transgender population may not be fully recognized within public health educational programs. Lack of knowledge of the full range of lesbian, gay, bisexual, and
transgender health needs can lead to suboptimal health services and programs for this population. Although HIV continues to be an important concern for the lesbian, gay, bisexual, and transgender community, the public health landscape for lesbian, gay, bisexual, and transgender people is much broader and more complex than matters related solely to sexually transmitted infections. Achieving optimal health will require the public health community to move beyond standard practice and knowledge and to incorporate a perspective that considers the full range of health disparities as well as the multiple dimensions that influence the lesbian, gay, bisexual, and transgender community and its health.  

Limitations of this study included a moderate response rate (although similar to that in other analogous surveys) and possible changes in departmental characteristics over the 1-year data collection period that may have limited the generalizability of the findings. A lack of detailed information on the nature of reported research and planned curricula also precluded our ability to assess the quality, quantity, and perceived adequacy of lesbian-, gay-, bisexual-, and transgender-related activities within responding departments. The research has, however, established a baseline for future assessment of lesbian, gay, bisexual, and transgender school policies and activities. Schools of public health may be able to improve their response to the health disparities of the lesbian, gay, bisexual, and transgender population by

- Establishing a supportive environment for lesbian, gay, bisexual, and transgender individuals through adopting and promoting nondiscrimination policies; hiring and supporting openly lesbian, gay, bisexual, and transgender faculty and staff; offering same-sex domestic partner benefits; and supporting lesbian, gay, bisexual, and transgender student groups
- Supporting lesbian, gay, bisexual, and transgender health research by adopting research protocols that include demographic data related to sexual orientation and gender identity and by supporting faculty and students who conduct lesbian, gay, bisexual, and transgender health research
- Expanding the availability of lesbian, gay, bisexual, and transgender health curricula by implementing core curricula and sponsoring school-wide professional development sessions that cover lesbian, gay, bisexual, and transgender health.

These actions may have the potential to improve public health strategies to address the specific health concerns of lesbian, gay, bisexual, and transgender people. Public health schools are strategically positioned to become leaders in the fight to eliminate health disparities in this population. Future investigation to determine whether additional research and training of public health practitioners will contribute to improving the health of this population is warranted.

About the Authors

At the time of the study, Heather L. Corliss was with the Department of Epidemiology, School of Public Health, University of California, Los Angeles. Michael D. Shambur and Matthew B. Meyer were with the Department of Infectious Diseases and Microbiology, University of Pittsburgh, Graduate School of Public Health, Pittsburgh, Pa. Requests for reprints should be sent to Heather L. Corliss, PhD, MPH, Division of Adolescent/Young Adult Medicine, Children’s Hospital Boston, 300 Longwood Ave, Boston, MA 02115 (e-mail: heather.corliss@tch.harvard.edu).

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Contributors

Each author contributed to all aspects of the study, including survey design and administration, questionnaire development, participant recruitment, data management and analysis, interpretation of findings, and article preparation.

Acknowledgments

We extend our deepest gratitude to Susan D. Cochran at the University of California, Los Angeles, and Anthony J. Silvestre at the University of Pittsburgh for their unwavering support of this project and their assistance with the design of the study and the questionnaire. We also thank the Lesbian, Gay, Bisexual, and Transgender Caucus of Public Health Workers, in official relations with the American Public Health Association, for their dedication to their members and continued support to lesbian, gay, bisexual, and transgender student researchers and professionals.

Human Participant Protection

The study was approved by the institutional review boards of the University of Pittsburgh and the University of California, Los Angeles.

References


Prevalence of non-medical drug use and dependence


We tested the hypothesis that a computerized intervention would be as efficacious as an in-person, small-group intervention in reducing sexual risk behaviors. The sexual behavior of high-risk adolescents in 3 intervention conditions was examined: (1) computer based, (2) small groups, and (3) control. Adolescents in the computerized intervention were significantly less likely to engage in sexual activity and reported significantly fewer partners. For some youths, computers are a viable way to deliver prevention information and promote skill development. (Am J Public Health. 2007;97:1027–1030. doi:10.2105/AJPH.2005.072652)
TABLE 1—Sexual Behavior of High-Risk Adolescents in 3 Intervention Conditions: Demographic Variables at Baseline

<table>
<thead>
<tr>
<th></th>
<th>Control Group (n = 38), %</th>
<th>Computer Group (n = 38), %</th>
<th>Small Group (n = 31), %</th>
<th>Overall (N = 107), %</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean age (SD)</td>
<td>15.6 (1.3)</td>
<td>16.4 (1.0)</td>
<td>16.2 (1.5)</td>
<td>16.0 (1.3)</td>
<td>.03</td>
</tr>
<tr>
<td>Gender</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>.36</td>
</tr>
<tr>
<td>Female</td>
<td>53</td>
<td>45</td>
<td>36</td>
<td>45</td>
<td>.07</td>
</tr>
<tr>
<td>Male</td>
<td>47</td>
<td>55</td>
<td>65</td>
<td>55</td>
<td>.01</td>
</tr>
<tr>
<td>Race/Ethnicity</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Black</td>
<td>61</td>
<td>34</td>
<td>52</td>
<td>49</td>
<td>.24</td>
</tr>
<tr>
<td>Latino</td>
<td>32</td>
<td>63</td>
<td>45</td>
<td>47</td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td>8</td>
<td>3</td>
<td>3</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Financial situation</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Very poor or poor</td>
<td>0</td>
<td>11</td>
<td>10</td>
<td>7</td>
<td>.01</td>
</tr>
<tr>
<td>Have necessities</td>
<td>5</td>
<td>5</td>
<td>26</td>
<td>11</td>
<td></td>
</tr>
<tr>
<td>Comfortable</td>
<td>95</td>
<td>84</td>
<td>84</td>
<td>79</td>
<td></td>
</tr>
<tr>
<td>Living situation</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>With parents</td>
<td>71</td>
<td>84</td>
<td>84</td>
<td>79</td>
<td>.24</td>
</tr>
<tr>
<td>With other relatives</td>
<td>13</td>
<td>13</td>
<td>13</td>
<td>13</td>
<td></td>
</tr>
<tr>
<td>In a group home</td>
<td>11</td>
<td>0</td>
<td>0</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td>15</td>
<td>3</td>
<td>3</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Lifetime criminal behavior</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Arrested</td>
<td>39</td>
<td>42</td>
<td>84</td>
<td>52</td>
<td>&lt;.01</td>
</tr>
<tr>
<td>Time in jail</td>
<td>16</td>
<td>26</td>
<td>23</td>
<td>22</td>
<td>.53</td>
</tr>
<tr>
<td>Time in juvenile hall</td>
<td>26</td>
<td>26</td>
<td>77</td>
<td>42</td>
<td>&lt;.01</td>
</tr>
<tr>
<td>Currently on probation</td>
<td>26</td>
<td>29</td>
<td>74</td>
<td>41</td>
<td>&lt;.01</td>
</tr>
<tr>
<td>Substance use</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Alcohol</td>
<td>61</td>
<td>71</td>
<td>74</td>
<td>68</td>
<td>.83</td>
</tr>
<tr>
<td>Marijuana</td>
<td>50</td>
<td>47</td>
<td>55</td>
<td>51</td>
<td>.88</td>
</tr>
<tr>
<td>Hard drugs</td>
<td>21</td>
<td>29</td>
<td>19</td>
<td>23</td>
<td>.63</td>
</tr>
</tbody>
</table>

computer-based condition were less likely to engage in sexual activity ($t_{104} = 2.43; P = .02$) compared with those in the small-group condition over time (Figure 1). Adolescents in the computer-based ($t_{104} = 2.67; P < .01$) and small-group ($t_{104} = 2.15; P = .03$) conditions had fewer sexual partners than did those in the control condition over time. Although the results were not significant, the computer-based condition reported reductions in the percentage of unprotected sexual intercourse, whereas the control and small-group conditions reported increases in unprotected sexual intercourse.

CONCLUSIONS

Some youths may require the traditional in-person, therapist-led format to reduce sexual risk behaviors successfully. However, this study suggested that for youths who are outside mainstream schools and who may respond poorly to didactic instruction, computers are a viable way to deliver prevention information and promote skill development. Computer-assisted instruction has been used to treat phobias, depression, obesity, eating disorders, and diabetes yet is rarely used in HIV prevention. Our results support the use of computers as a tool for HIV prevention. Youths receiving the computerized intervention were successful in reducing their sexual risk behaviors.

A limitation of the current study was the use of self-report data. To ensure veracity of reports, assessments used audio computer-assisted interviewing. Previous research indicates that risky behaviors are more likely to be reported by adolescents when this technique is used. This research was limited by the small sample size and short follow-up period. Randomized controlled trials with larger sample sizes that follow students longitudinally for a longer time are needed to explore fully the potential of using technology for engaging youths in prevention activities.

Several interventions have successfully reduced the HIV transmission risk behaviors of adolescents. However, these interventions face challenges in implementation in real-world settings. The design of future interventions must acknowledge the need for accessible and sustainable programs. Computerized interventions, which are relatively easy to implement and sustain, appear to be a potentially effective means of promoting reductions in HIV-related sexual risk behaviors. This program was implemented in schools, increasing the likelihood of access for youths who are often difficult to reach, particularly minorities. Furthermore, interactive computer programs may help youths learn skills to prevent HIV infection and in-still in these youths the self-efficacy to apply these new skills. This is particularly important given the probable cost-effectiveness and ease in dissemination and use of computerized programs.

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This brief was accepted December 20, 2005.

Contributors

M. Lightfoot supervised all aspects of the intervention study and served as lead writer. W. Scott Comulada performed the statistical analyses for the study. G. Stover was project director for the intervention study and assisted with writing.

Acknowledgments

This research was supported by the National Institute of Mental Health to M. Lightfoot (grant R21 MH062272).
The authors would like to thank the students and teachers for their generous participation in this research.

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The authors would like to thank the students and teachers for their generous participation in this research.
FIGURE 1—Sexual behavior outcomes: baseline and follow-up comparisons of (a) percentage of students who had sexual intercourse, (b) percentage of the students who had unprotected sexual intercourse, and (c) number of sexual partners.

*Small group vs computer group difference.
*Computer group vs control group difference.
*Small group vs control group difference.


Male-to-Female Transgender and Transsexual Clients of HIV Service Programs in Los Angeles County, California

Jordan W. Edwards, MA, Dennis G. Fisher, PhD, and Grace L. Reynolds, DPA

Data on HIV risk were collected with the Countywide Risk Assessment Survey from 2126 participants; 92 were male-to-female transgender persons (i.e., cross-dressers, and those who identify with the opposite sex), and 9 were male-to-female transsexual individuals (i.e., those who have undergone gender-reassignment surgery or other procedures). Transgender-identified individuals were more likely than the rest of the sample to have received hormone injections, offensive comments, and HIV testing; injected hormones with a used needle; been Asian or American Indian; been paid for sexual intercourse; and lived in unstable housing but less likely to have used heroin. Transgender-identified individuals are at high risk for HIV infection because of reuse of needles and being paid for sexual intercourse. (Am J Public Health. 2007;97:1030–1033. doi:10.2105/AJPH.2006.097717)

Research studies have consistently reported that transgender persons (i.e., cross-dressers, and those who identify with the opposite sex) are at high risk for HIV infection. However, despite these findings, very little prevention education has targeted this population. Transgender persons are one of the highest HIV prevalence groups, with a prevalence rate of 35% found in male-to-female transgender-identified persons in San Francisco, Calif. In a Los Angeles, Calif, study, the HIV seroprevalence of transgender persons was found to be 22%, higher than that for all other groups except for gay and bisexual men in selected high-risk groups. Within this at-risk group, transgender commercial sex workers have been reported to be at an even greater HIV infection risk.

Some studies also have reported transgender persons to be at a heightened risk for substance abuse. One particular concern was that heroin use was shown to be a risk factor for transgender persons in San Francisco, which increased HIV risk through use of used needles. In addition to illicit injection drug use, transgender persons have poor access to intramuscular needles needed for hormone injections.

 Ethnicity also has been associated with HIV prevalence in transgender persons. In fact, 63% of Black male-to-female transgender persons were HIV positive in a San Francisco study. Because a large proportion of the transgender research has been conducted in San Francisco, similar studies need to be conducted in other US cities to assess the HIV risk of transgender individuals.

The following research was conducted in Los Angeles to describe transgender individuals who access HIV prevention programs funded by Los Angeles County as well as to assess their HIV risk. The unique sampling in the current research allowed for a comparison group of nontransgender clients. Obtaining respondents from all 51 prevention agencies funded by Los Angeles County added to the strength of this study.

METHODS

The Los Angeles County Department of Health Services, Office of AIDS Programs and Policy (OAPP), conducts an annual risk assessment survey. Information gathered from the Countywide Risk Assessment Survey is used to identify populations at risk, prioritize funding for HIV prevention in Los Angeles County, and find better ways to provide HIV prevention services. Data were collected in May and June 2004 by 220 HIV prevention service provider staff from 51 OAPP-funded agencies.

Of the 2514 surveys issued, interviewers returned 2126 surveys (84.6% survey return rate).
Stratified sampling was chosen because we believed that program characteristics differed among the various agencies. Systematic sampling was used in that interviewers were given a number (n) and were asked to interview every nth client participating within the agency.

Complete data from 2126 responses were used in the analysis. The mean age of the participants was 32.7 (SD = 10.99) years and ranged from 12 to 69 years. The racial/ethnic mix was 44% Latino, 27% Black, 17% White, 5% Asian/Pacific Islander, 2% American Indian, and 5% other. Of the participants older than 18 years, approximately 28% reported that they had not received at least a high school diploma (Table 1).

## RESULTS

Of the 2126 participants who completed the interview, 96 (4.5%) self-identified as male-to-female transgender and 11 (0.5%) self-identified as a male-to-female transsexual (i.e., someone who has undergone gender-reassignment surgery or some other procedure). These 2 categories were collapsed into 1 transgender-identified group for analysis purposes. The mean age of the transgender-identified group participants was 34.4 years (SD = 9.91) and ranged from 19 to 63. The racial/ethnic mix of the transgender-identified group was 41% Latino, 24% Black, 16% Asian/Pacific Islander, 7% American Indian, 7% White, and 5% other.

Of those who reported an HIV test result, 43 of 82 (52.44%; 95% confidence interval [CI] = 40.67, 62.92) of the transgender-identified group reported that they were HIV positive compared with 324 of 1458 (22.2%; 95% CI = 20.11, 24.45) of the nontransgender-identified group. An important note is that the transgender-identified group participants were more likely than the nontransgender-identified group participants to be HIV positive ($\chi^2 = 13.4; P < .001$; odds ratio [OR] = 3.76; 95% CI = 2.40, 5.89). However, HIV status did not enter the logistic regression model (described in the following paragraph). Black transgender-identified individuals were less likely than the rest of the transgendered sample to report that they were HIV positive (Fisher exact test = .0270). Asian transgender-identified individuals were more likely than the rest of the transgendered sample to report that they were HIV positive (Fisher exact test = .0369).

All of the Countywide Risk Assessment Survey items were considered for possible inclusion in building the logistic regression model predicting the transgender-identified group. As shown in Table 2, factors positively associated with transgender identification include using a needle to inject steroids or hormones in the past 6 months; having ever received offensive comments because of gender identity; using a needle after someone else in the past 6 months; being Asian; having ever been paid for sexual intercourse; living in a hotel, motel, or rooming house; living on the streets; and having ever received HIV

### TABLE 1—Transgender and Nontransgender Group Demographics (N = 2126): Countywide Risk Assessment Survey, Los Angeles County, May and June 2004

<table>
<thead>
<tr>
<th>Demographic</th>
<th>Transgender-Identified Group (n = 107), No. (%)</th>
<th>Nontransgender-Identified Group (n = 2019), No. (%)</th>
<th>Statistic</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age group, y</td>
<td></td>
<td></td>
<td>$z = 2.07^a$</td>
<td>.04</td>
</tr>
<tr>
<td>&lt; 18</td>
<td>0 (0)</td>
<td>89 (4)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>18–30</td>
<td>43 (40)</td>
<td>882 (44)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>31–40</td>
<td>30 (28)</td>
<td>534 (26)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>41–60</td>
<td>33 (31)</td>
<td>501 (25)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt; 60</td>
<td>1 (1)</td>
<td>10 (0.5)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gender identity</td>
<td></td>
<td></td>
<td>$\chi^2 = 94.3$</td>
<td>.001</td>
</tr>
<tr>
<td>Male</td>
<td>NA</td>
<td>1334 (66)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>NA</td>
<td>682 (34)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Transgender</td>
<td>96 (90)</td>
<td>NA</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Transsexual</td>
<td>11 (10)</td>
<td>NA</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sexual orientation</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Heterosexual</td>
<td>38 (36)</td>
<td>1103 (55)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Homosexual</td>
<td>41 (38)</td>
<td>589 (29)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bisexual</td>
<td>11 (10)</td>
<td>291 (14)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td>17 (16)</td>
<td>33 (2)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Completed education</td>
<td></td>
<td></td>
<td>$z = 0.81^a$</td>
<td>.42</td>
</tr>
<tr>
<td>&lt; High school/GED</td>
<td>36 (34)</td>
<td>553 (27)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>High school/GED</td>
<td>34 (32)</td>
<td>772 (38)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Some college</td>
<td>29 (27)</td>
<td>484 (24)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4-year college</td>
<td>6 (6)</td>
<td>150 (7)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Graduate school</td>
<td>2 (2)</td>
<td>55 (3)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>HIV-positive status</td>
<td>43 (52)$d$</td>
<td>324 (22)$d$</td>
<td>$\chi^2 = 39.1$</td>
<td>.001</td>
</tr>
<tr>
<td>Born outside the United States</td>
<td>40 (37)</td>
<td>446 (22)</td>
<td>$\chi^2 = 13.4$</td>
<td>.003</td>
</tr>
</tbody>
</table>

Note: NA = not applicable; GED = general equivalency diploma.

*a*Wilcoxon rank sum test.

*b*Male-to-female. Individuals in this category included cross-dressers and those who identified with the opposite sex.

*c*Male-to-female. Individuals in this category included those who had undergone gender-reassignment surgery or other procedures.

*d*HIV test data not obtained for all participants and some data are missing, so number of participants for this category is 82.

*e*Number of participants for this category is 1458 because of missing data.
testing or counseling. One inverse relation for transgender-identified group membership was use of heroin in the past 6 months.

DISCUSSION

Transgender-identified group clients in this study were significantly more likely than the rest of the sample to experience verbal stigmatization, to engage in commercial sex work, to share needles, and to have unstable housing than were other clients. Transgender-identified group clients were less likely to have used heroin. Stigma and stigmatization, to engage in commercial sex work better.7 However, use of new needles is equally effective use of oral hormones can help reduce infection in one of the groups with the highest rate of HIV infection.11 transgender-identified group answering "other." More choices should be added to future questionnaires.

Conclusions

Future HIV interventions targeting transgender individuals should educate clients about the risk of infection through hormone injection. In addition, educating individuals on the equally effective use of oral hormones can help to reduce HIV and other bloodborne pathogen infection risk. Transgender clients should have counseling services available to assist in dealing with stigmatization. Tailoring an intervention for transgender-identified groups could help reduce infection in one of the groups with the highest rate of HIV infection.11

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Contributors
J W. Edwards completed most of the analysis and writing. D. G. Fisher directed and designed the analysis, supervised and edited the writing, and made most of the revisions. G. L. Reynolds edited the article, assisted with the syntax and data analysis, and helped write the “Results” section and make revisions.

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Human Participant Protection
The Los Angeles County Department of Health Services institutional review board approved all forms and procedures.

References
There is growing concern about morbidity and mortality associated with sexually transmitted diseases (STDs) among African American women. Although STDs are widespread across racial and ethnic groups in the United States, reported rates of chlamydia are 10 times higher, and reported rates of gonorrhea and syphilis 25 times higher, among African Americans than among Whites. African American women are also disproportionately affected by HIV/AIDS, which is commonly transmitted through sexual behavior. Although only 12% of women in the United States are African Americans, 67% of US women diagnosed with AIDS in 2004 were African Americans, and AIDS is the leading cause of death among African American women aged 25 to 34 years.

Interventions are needed in a variety of venues to comprehensively address African American women’s risk of STDs, including HIV. One important venue for such interventions is the primary health care setting. Nurses and other health care providers may be especially effective agents of behavior change. Because health care providers are generally unable to devote a great deal of time to primary prevention, brief single-session interventions may be especially practical in primary health care settings. Unfortunately, there is a paucity of evidence on the efficacy of such interventions.

Although there is considerable evidence of the efficacy of behavioral interventions in reducing self-reported HIV/STD sexual-risk behavior, few trials have demonstrated significant reductions in the rate of biologically confirmed STDs among women, and none have examined brief single-session interventions implemented by health care providers with African American women in a primary care setting. Moreover, in some of these studies, participants were selected on the basis of recent STD or HIV test results. Whether the findings of these trials would generalize to a less restricted population of African American women is unclear.

There is a growing consensus that merely providing information is not enough to induce sexual behavior change and that it is also necessary to instill behavioral skills, including condom use and condom-use negotiation skills. Both one-on-one counseling and small-group interventions are appropriate in primary care settings. Small-group interventions can allow participants to learn from each other, whereas one-on-one interventions can be shorter and more tailored to the individual.

Our randomized controlled trial was designed to identify effective single-session HIV/STD risk-reduction interventions for inner-city African American women that can be implemented by nurses and other health care providers in clinics and other primary care facilities. We tested 4 culture-sensitive, HIV/STD risk-reduction interventions involving 2 kinds of intervention content—information versus behavioral skills—and 2 methods of intervention delivery—group versus individual.

We randomly assigned African American women from an inner-city women’s health clinic to 1 of these 4 HIV/STD risk-reduction interventions or a general health-promotion intervention, which served as the control group. We hypothesized that the skill-building interventions would reduce self-reported sexual-risk behavior and the rate of STDs among inner-city African American women in primary care settings.
Project,” were 564 African American women (mean age=27.2 years) seeking care at the outpatient women’s health clinic of a large hospital in Newark, NJ. The participants were told that the study was designed to empower women to reduce their risk of developing devastating health problems, including cardiovascular diseases, cancer, and AIDS. The women were recruited during their initial or semiannual appointment. Women were offered a total of $130 for participating: $25 immediately after the intervention and $30, $35, and $40 for the 3-, 6-, and 12-month follow-ups, respectively.

Procedures
Sexually experienced African American women aged 18 to 45 years who were not pregnant were eligible to participate. The study was conducted between March 1993 and November 1996. The women were stratified by age and randomly assigned to interventions on the basis of computer-generated random number sequences. One researcher conducted the computer-generated random assignments; others executed the assignments. In year 1 of the study, women (n=168) were randomly assigned to a one-on-one HIV/STD information intervention, a one-on-one HIV/STD behavioral skill-building intervention, a small-group HIV/STD information intervention, or a small-group HIV/STD skill-building intervention. In years 2 and 3, women (n=396) were randomly assigned to 1 of the 4 HIV/STD interventions or a small-group health promotion intervention that served as the control group. (The results based on all women enrolled in the study compared with those enrolled in years 2 and 3 did not differ statistically.) Figure 1 shows the number of women randomized to each group.

Intervention Methods
The interventions were based on social cognitive theory,10 which we adapted for this study using preliminary research, including quantitative surveys, elicitation surveys, and focus groups, with women from the study population. In addition, each intervention was pilot tested on women from the study population.

Designed to be educational but entertaining, culture sensitive, and gender appropriate, each intervention incorporated the “Sister to Sister! Respect Yourself! Protect Yourself! Because You Are Worth It!” theme that encouraged the participants to respect and protect themselves, not only for their own sake, but also for their family and community.

The one-on-one interventions involved a 20-minute session that the facilitator tailored to the specific needs of each participant after conducting an HIV/STD risk assessment interview. The one-on-one HIV/STD skill-building intervention was designed to increase skills regarding condom use. It involved a review of the “Sister to Sister” HIV/STD prevention behavioral skill brochure, video clips, condom demonstration, practice with an anatomical model, and role playing to increase self-efficacy and skills related to correct use of condoms and negotiation of condom use with a sexual partner.

The one-on-one HIV/STD information intervention was designed to increase knowledge about HIV/STD transmission and prevention and personal vulnerability to HIV/STDs. It involved a review of the “Sister to Sister” HIV/STD prevention information brochure and a discussion of basic HIV/STD risk-reduction information. It did not provide behavioral skill demonstrations or practice.

The group interventions consisted of a 200-minute session with 3 to 5 participants. The group HIV/STD behavioral skill-building intervention was designed to increase skills regarding condom use and to allay participants’ concerns about the adverse effects of condom use on sexual enjoyment. Group discussions, brainstorming, videos, interactive exercises, games, condom demonstrations, practice with anatomical models, and role playing were used to increase self-efficacy and skills related to correct use of condoms and negotiation of condom use with a sexual partner.

The group HIV/STD information intervention was designed to increase the perception of vulnerability to HIV/STDs and increase knowledge about HIV/STD transmission and prevention. Similar to the group skill-building intervention, this intervention involved group discussions, brainstorming, videos, interactive exercises, and games. However, it did not provide behavioral skill demonstrations or practice or address participants’ beliefs about the adverse effects of condom use on sexual enjoyment.

To reduce the likelihood that effects of the HIV/STD interventions could be attributed to nonspecific features,11 the control group received a general health promotion intervention. It focused not on HIV/STD risk behavior but on behaviors (diet, physical exercise, alcohol and tobacco use) associated with risk of heart disease, stroke, and cancer.

Facilitators and Facilitator Training
The facilitators who implemented the interventions were 28 African American female nurses (mean age=38.0 years) from the Newark, NJ, area. Their median education was an undergraduate degree. They had a median of 14 years of experience as a nurse and 10 years of experience working with African American women. They all had the skills to implement any of the interventions. After stratifying them by age, we randomly assigned them to receive 8 hours of training to implement 1 of the 5 interventions. The training stressed the importance of implementing the intervention strictly according to the intervention manual.

Primary Outcome Measures
The primary outcomes were self-reported sexual behaviors in the previous 3 months, including proportion of protected sexual intercourse, frequency of unprotected sexual intercourse, and condom use during most recent intercourse. Participants completed confidential self-administered measures of these behaviors at baseline and 3, 6, and 12 months after the intervention. Proportion of protected sexual intercourse was the number of days on which the participants had sexual intercourse using a condom divided by the number of days on which they had sexual intercourse. Frequency of unprotected sexual intercourse was the number of days on which the participants had sexual intercourse without using a condom.

We took several steps to increase the validity of self-reported sexual behavior. To reduce potential memory problems, we asked women to report their behaviors over a brief period (i.e., 3 months),12 wrote the dates comprising the period on a chalkboard, and gave participants calendars clearly highlighting the period. To reduce the likelihood that demand characteristics would influence participants’ responses, proctors blind to the participants’
null
matrix\textsuperscript{19} were used to fit repeated measures models to test hypotheses regarding sexual behaviors and STD rate. We analyzed binary data, including condom use during last intercourse and STD rate, using binomial-error models with log-link functions. We analyzed count data—frequency of unprotected sexual intercourse—using Poisson error models with log-link functions.

The statistical significance of 3 orthogonal planned contrasts\textsuperscript{20} of prespecified hypotheses adjusted for baseline scores was evaluated using the Wald \(\chi^2\) test. Contrast 1 compared the one-on-one and group skill-building interventions with the control group. Contrast 2 compared the one-on-one and group skill-building interventions with the one-on-one and group information interventions. Contrast 3 compared the one-on-one skill-building intervention with the group skill-building intervention. With \(\alpha=.05\) (2-tailed), a total sample size of 470 participants completing the trial provided power of 80\% to detect an estimated effect of \(d=0.32\) standard deviation units in self-reported sexual behavior for contrast 1, power of 80\% to detect an estimated effect of \(d=0.28\) for contrast 2, and power of 80\% to detect an estimated effect of \(d=0.40\) for contrast 3. We tested interactions hierarchically; that is, we controlled for the main effects of all variables involved in the interaction.

The estimated effect size in standard deviation units (Cohen’s \(d\)) is presented for each significant contrast. Models evaluating intervention effects included the baseline measure of the outcome measures, intervention groups, time effects, and the intervention-by-time interaction. Tests of the effects of the interventions used an intention-to-treat approach in which data from all participants were analyzed regardless of the number of follow-up sessions they attended.

RESULTS

Participants

Of the participants, 12.1\% were married, 76.4\% had never married, and 11.5\% were separated, divorced, or widowed. About 30.5\% were employed. At baseline, 20.3\% tested positive for \textit{N} \textit{gonorrhoeae}, \textit{C} \textit{trachomatis}, or \textit{T} \textit{vaginalis}. More specifically, 8.9\% had \textit{C} \textit{trachomatis}, 11.3\% had \textit{T} \textit{vaginalis}, and 2.6\% had \textit{N} \textit{gonorrhoeae}. About 88.9\% reported sexual intercourse during the previous 3 months. Only 23.5\% of respondents who had intercourse in the previous 3 months reported always using condoms on those occasions. Few reported ever using injection drugs (2.4\%) or having same-gender sexual relationships (1.3\%).

As shown in Figure 1, 51.7\% of the eligible women patients (i.e., 564 of 1099) participated in the study. Inspection of data culled from charts at the time of recruitment revealed that participants and eligible nonparticipants did not differ significantly in history of pregnancy, history of STDs, education, or type of payment for health care services. Three differences were significant: compared with nonparticipants, participants were more likely to be married (14.2\% vs 9.6\%, \(P=.02\)) and unemployed (66.1\% vs 57.5\%, \(P=.004\)) and were older (mean age=27.06 [SD=6.71] vs mean age=25.60 [SD=6.00], \(P<.001\)).

Baseline Comparability and Attrition

As shown in Table 1, analyses revealed no significant differences among the intervention groups on the baseline measures of demographic characteristics, self-reported sexual behavior, or STD prevalence.

The return rates were 91.8\%, 90.2\%, and 86.9\% at the 3-, 6-, and 12-month follow-ups, respectively, with 96.3\% of participants attending at least 1 follow-up. Baseline measures of outcome variables were the same for women who attended at least 1 follow-up and for those who did not. Figure 1 presents the follow-up return rates by intervention group. None of the differences were statistically significant.

Effects of Behavioral Interventions on Sexual Behaviors and STD Rate

As shown in Table 2, at the 3-month follow-up, women who received the skill-building interventions reported using condoms a greater proportion of the time during sexual intercourse in the previous 3 months than women who received the information interventions \((d=0.24, P=.03)\). At the 12-month follow-up, women in the skill-building interventions reported higher rates of condom use than women who received either the information interventions \((d=0.21, P=.051)\) or the control group \((d=0.24, P=.03)\). In addition, the group skill-building intervention participants reported a greater proportion of protected sexual intercourse at the 12-month follow-up than did the one-on-one skill-building intervention participants \((d=0.21, P=.049)\).

When asked specifically about the last time they had sexual intercourse, women who received the skill-building interventions were more likely to report using a condom than those who received the health control intervention \((d=0.18, P=.050)\) at the 3-month follow-up and than those receiving either the health control intervention \((d=0.20, P=.034)\) or the information intervention \((d=0.23, P=.014)\) at the 12-month follow-up.

Skill-building intervention participants also reported less unprotected sexual intercourse than did information intervention participants \((d=0.25, P=.012)\) or control group participants \((d=0.23, P=.019)\) at the 3-month follow-up and information intervention participants at 12-month follow-up \((d=0.23, P=.024)\). None of the contrasts was statistically significant at the 6-month follow-up.

GEE analyses revealed that although there were no differences at 6-month follow-up \((P=.353)\), women who had received the skill-building interventions were significantly less likely to test positive for a new STD at the 12-month follow-up than were those in the control group \((d=0.20, P=.032)\).

Social Desirability Response Bias

Multiple regression analyses revealed that Marlowe-Crowne Social Desirability Scale scores did not interact with intervention group to influence sexual behavior reported at any of the follow-ups. Analyses restricted to women in the 4 HIV/STD interventions also revealed that social desirability scores were unrelated to self-reported sexual behavior at the follow-ups.

DISCUSSION

The results of this study suggest that brief culture-sensitive, cognitive-behavioral, skill-building interventions can reduce self-reported HIV/STD risk behavior among African American women and that the intervention effects can be sustained at relatively long-term follow-up, 12 months after the
intervention's implementation. These findings are consonant with a few other randomized controlled trials in supporting the view that cognitive behavioral skill-building interventions can reduce sexual-risk behavior among women.21–24

We also found that the skill-building interventions modestly reduced the rate of STD at the 12-month follow-up compared with the control group. Although other randomized controlled trials have demonstrated that sexual-risk reduction interventions can reduce the biologically confirmed STD rate among women, our trial differed from those studies in important respects. For instance, the one-on-one intervention employed here involved one 20-minute session, whereas the interventions in the study by Kamb et al. involved two 40-min sessions.7 Moreover, the small-group intervention employed in this study involved only 1 session and was much shorter than the multisession interventions used in the other studies.6,8

This trial is the first to compare the efficacy of one-on-one and small-group skill-building interventions to increase knowledge about HIV/STD transmission and prevention and personal vulnerability to HIV/STDs. The control group received a general health promotion intervention focused not on HIV/STD risk behavior but on behaviors (diet, physical exercise, alcohol and tobacco use) associated with risk of heart disease, stroke, and cancer.1

A limitation of this study is that the primary outcome, sexual behavior, was measured with self-reports, which might have been unintentionally or intentionally inaccurate.26

Several aspects of our methods and findings weaken the plausibility of inaccurate self-reports as an explanation for our results. We have described the strategies that we employed to increase participants’ ability to recall their behavior accurately and to motivate patients to report accurately.

### Limitations

A limitation of this study is that the primary outcome, sexual behavior, was measured with self-reports, which might have been unintentionally or intentionally inaccurate.26

Several aspects of our methods and findings weaken the plausibility of inaccurate self-reports as an explanation for our results. We have described the strategies that we employed to increase participants’ ability to recall their behavior accurately and to motivate patients to report accurately.

### Table 1

<table>
<thead>
<tr>
<th>Demographic Characteristic</th>
<th>Group Skill Intervention (n = 118)</th>
<th>One-on-One Skill Intervention (n = 123)</th>
<th>Group Information Intervention (n = 124)</th>
<th>Information One-on-One Intervention (n = 118)</th>
<th>Group Health Intervention (n = 81)</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age, y, mean (SE)</td>
<td>27.0 (0.59)</td>
<td>27.0 (0.59)</td>
<td>27.3 (0.60)</td>
<td>27.3 (0.63)</td>
<td>27.3 (0.82)</td>
<td>.99</td>
</tr>
<tr>
<td>Never married, %</td>
<td>79.3</td>
<td>71.9</td>
<td>80.2</td>
<td>77.8</td>
<td>71.2</td>
<td>.39</td>
</tr>
<tr>
<td>Employed, %</td>
<td>28.7</td>
<td>27.7</td>
<td>33.6</td>
<td>30.5</td>
<td>32.5</td>
<td>.66</td>
</tr>
<tr>
<td>Sexually active in past 3 mo, %</td>
<td>91.3</td>
<td>90.0</td>
<td>86.1</td>
<td>89.6</td>
<td>87.5</td>
<td>.73</td>
</tr>
<tr>
<td>Proportion of protected sexual intercourse occasions in past 3 mo, mean (SE)</td>
<td>0.51 (0.04)</td>
<td>0.55 (0.04)</td>
<td>0.52 (0.05)</td>
<td>0.58 (0.04)</td>
<td>0.51 (0.05)</td>
<td>.80</td>
</tr>
<tr>
<td>Used condom during last sexual intercourse, %</td>
<td>43.0</td>
<td>38.3</td>
<td>34.2</td>
<td>40.7</td>
<td>37.3</td>
<td>.70</td>
</tr>
<tr>
<td>No. days of unprotected sexual intercourse in past 3 mo, mean (SE)</td>
<td>9.67 (1.90)</td>
<td>7.52 (1.59)</td>
<td>8.00 (1.42)</td>
<td>6.36 (1.08)</td>
<td>11.15 (2.35)</td>
<td>.94</td>
</tr>
<tr>
<td>No. sexual partners in past 3 mo, mean (SE)</td>
<td>1.32 (0.11)</td>
<td>1.26 (0.09)</td>
<td>1.07 (0.07)</td>
<td>1.28 (0.18)</td>
<td>1.05 (0.06)</td>
<td>.55</td>
</tr>
<tr>
<td>STD positive, %</td>
<td>20.4</td>
<td>21.6</td>
<td>21.1</td>
<td>16.5</td>
<td>22.7</td>
<td>.85</td>
</tr>
</tbody>
</table>

Note. The group health intervention was the control group. All group interventions lasted 200 minutes; all one-on-one interventions lasted 20 minutes.

aSkill-building interventions were aimed at increasing skill related to the correct use of condoms and the negotiation of condom use with a sexual partner; information interventions were designed to increase knowledge about HIV/STD transmission and prevention and personal vulnerability to HIV/STDs. The control group received a general health promotion intervention focused not on HIV/STD risk behavior but on behaviors (diet, physical exercise, alcohol and tobacco use) associated with risk of heart disease, stroke, and cancer.

bUsing analysis of variance (ANOVA).

cUsing the χ² test.

dUsing the Kruskal–Wallis test.

ePercentage STD positive is the percentage that tested positive for Neisseria gonorrhoeae, Chlamydia trachomatis, or Trichomonas vaginalis.
them to respond honestly. The results also revealed that self-reported sexual behavior and changes in sexual behavior were unrelated to a standard measure of social desirability response bias. Moreover, the results for STD rate, a biological outcome measure that was not based on self-reports, dovetailed with those for self-reported behavior. There were fewer significant effects of the skill-building interventions on self-reported behavior at the 6-month follow-up than at the 12-month follow-up. Similarly, at the 6-month follow-up, there were no significant intervention effects on STDs, but at the 12-month follow-up, skill-building intervention participants were less likely to have an STD than were control group participants.

The delayed effect of the intervention observed in this trial has been observed in other studies. One possible explanation for such a delayed effect is that women have difficulty introducing safer-sex practices into existing relationships. As they become involved with new sexual partners over time, they are able to implement those practices; hence, intervention effects are larger at longer-term follow-up.

Conclusions

The results of our study support several tentative conclusions. They suggest that brief, culture-sensitive, cognitive-behavioral, skill-building interventions can reduce the HIV/STD risk behavior of African American women and that intervention-induced changes in such behavior can be sustained at relatively long-term follow-up, 12 months after implementation. The finding that the effects of the skill-building interventions in modestly reducing the rate of STDs paralleled the interventions’ effects on self-reported behavior increases confidence in the results. This study, with its excellent retention rates, lends credence to the notion that, to achieve desired outcomes, HIV/STD behavioral interventions may not have to be long in duration and implemented over multiple sessions—characteristics that diminish their practicality in primary health care settings. The single-session interventions in this study are feasible in primary health care.
settings. Nurses and other primary care providers can implement them.

The current results must be replicated with other populations of women in other settings, particularly women at higher risk. Research along these lines may contribute to efforts to reduce the spread of sexually transmitted HIV infection, which has already killed too many African American women and orphaned too many children.

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Contributors
L. S. Jemmott oversaw all aspects of the study, led the development of the intervention procedures and training of facilitators, and was the lead author. J. B. Jemmott III assisted in all aspects of the study and led development of the design, measures, and data analysis. A. O’Leary assisted in the development of the intervention procedures and measures and the application of social cognitive theory. All authors helped to secure funding, conceptualize ideas, interpret findings, and review drafts of the article.

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Note. The findings and conclusions in this article are those of the authors and do not necessarily represent the views of the Centers for Disease Control and Prevention.

Human Participant Protection
The institutional review boards of the University of Pennsylvania and Rutgers University approved the study.

References
Perinatal HIV transmission accounts for 85% of pediatric HIV cases and more than 90% of pediatric AIDS cases in the United States.\(^1,2\)

In 1994, the US Public Health Service (USPHS) issued guidelines stipulating that HIV-infected pregnant women and their newborns be offered a 3-part zidovudine regimen,\(^3\) based on the Pediatric AIDS Clinical Trials Group Protocol 076 (hereafter referred to as “076 Protocol”) finding that this regimen reduces perinatal transmission by 67%.\(^4\)

Because a barrier to HIV treatment may be unknown HIV status, the USPHS recommended, in 1995, all pregnant women be offered voluntary HIV testing. Since these recommendations were implemented, US perinatal HIV has decreased significantly.\(^5,6\)

Nonetheless, 390 new perinatal infections were reported from 36 states in 2001.\(^1\)

In California, Senate Bill 889 became effective January 1, 1996. The bill mandates that prenatal care providers offer and document the offer of, an HIV test to every pregnant woman.\(^7\) The law also requires that HIV-infected women be offered treatment for themselves and their newborns. However, 2 California studies performed in or after 1996 found that only 47.3% to 56.2% of populations of pregnant or recently delivered women reported HIV counseling, and 74.3% to 79.9% reported a test offer.\(^8,9\)

Furthermore, the 1998 California Survey of Childbearing Women, in which newborn heel-stick blood specimens were tested for HIV antibodies and zidovudine, found that 23.4% of infants with HIV-infected mothers did not have evidence of zidovudine. This suggests that HIV-infected mothers may not have had zidovudine during pregnancy or at labor.\(^10\)

These results raise questions about the impact of policies like the 1996 California law and illustrate the importance of evaluating the effectiveness of such policies. In addition, to increase interventions aimed at HIV-infected women and their prenatal care providers, it is crucial to determine whether subpopulations of HIV-infected women are not being tested and treated.

In California, active population-based surveillance data on HIV-infected mothers and their infants has been collected since 1989.\(^11,12\) We used these data both to evaluate the association of the 1994 and 1995 USPHS guidelines and the 1995 California law with HIV testing and treatment in California and to define characteristics of HIV-infected pregnant women who do not receive appropriate care as defined by the policies. Specifically, we assessed which HIV-infected mothers are not offered HIV testing in prenatal care despite having unknown HIV status or are not offered preventative therapy despite being known to be HIV infected.

**METHODS**

The data for this study came from the Maternal–Infant Care Evaluation, Pediatric Spectrum of Disease,\(^13\) and Enhanced Perinatal Surveillance\(^14\) studies, all based at Stanford University, Stanford, Calif. In 1989, the Centers for Disease Control and Prevention, in collaboration with the California Department of Health Services and Stanford University, initiated the Pediatric Spectrum of Disease study, consisting of the surveillance of infants born to HIV-infected women living in California. In 1996, the Maternal–Infant Care Evaluation study began retrospectively collecting data on testing, care, and treatment of HIV-infected pregnant women. In 1999, the Maternal–Infant Care Evaluation study expanded to become the Enhanced Perinatal Surveillance study, which collected maternal and infant data on demographics, prenatal care, HIV testing, antiretrovirals in pregnancy, and other variables.

For all 3 studies, HIV-infected mothers and exposed children were identified for follow-up by obstetricians or pediatricians at collaborating facilities. Data were collected through medical chart reviews, with patient records classified only by alphanumeric codes (the Soundex phonetic algorithm) and birthdates to ensure confidentiality. Collaborating countries included San Mateo, Santa Clara, Alameda, Contra Costa, San Francisco, San Diego, Sacramento, and Fresno. Because the

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**Objectives.** The 1994 and 1995 US Public Health Service Guidelines regarding HIV testing and treatment for pregnant women and the resulting 1995 California law mandating an HIV test and treatment offer to every pregnant woman aim to reduce perinatal HIV transmission. However, the effectiveness of such policies after implementation is often unclear. We analyzed the association between these policies and offers of HIV tests and treatment to HIV-infected women in California.

**Methods.** Data from active, population-based surveillance of 496 HIV-infected women and their infants, collected from 1987 to 2002, were analyzed to compare rates of offers of HIV tests and treatment before and after 1996.

**Results.** We found significant increases in offers of HIV tests (\(P<.001\)) and offers of treatment (\(P<.001\)) when we compared women who delivered between 1987 and 1995 with those who delivered between 1996 and 2002. Receipt of prenatal care was the major predictor of both test and treatment offer. A significant shift in reported HIV risk factors was also evident between the 2 groups.

**Conclusions.** Our findings of increased offers of HIV tests and treatment to HIV-infected pregnant women suggest that the national guidelines and the 1996 California law improved health care for these women, which may lessen the risk of perinatal HIV transmission. (Am J Public Health. 2007;97:1041–1046. doi:10.2105/AJPH.2005.072371)
hospitals in these counties are regional referral centers for HIV-infected women and infants, a larger geographic region is represented. This representation was demonstrated in a study showing that capture rates in the Pediatric Spectrum of Disease study were similar to those in the statewide, population-based Survey of Childbearing Women.14,15

For this study, Maternal–Infant Care Evaluation and Enhanced Perinatal Surveillance study data were merged. For 113 maternal records missing infant treatment data, maternal records in the merged database were matched with infant records in the Pediatric Spectrum of Disease study. Twins births were counted as 1 pregnancy, with the data collected on the second-born twin excluded from the analysis. HIV-infected mothers with multiple children were included for each pregnancy. Four records with years of delivery 1985 through 1986 were excluded because the Food and Drug Administration did not approve zidovudine until 1987.16 In total, 496 records were included for each pregnancy. Four records missing infant treatment data, maternal records in the merged database were matched with infant records in the Pediatric Spectrum of Disease study. Twins births were counted as 1 pregnancy, with the data collected on the second-born twin excluded from the analysis. HIV-infected mothers with multiple children were included for each pregnancy. Four records with years of delivery 1985 through 1986 were excluded because the Food and Drug Administration did not approve zidovudine until 1987.16 In total, 496 records were analyzed. Data were divided into 2 cohorts: delivery years 1987 through 1995 and 1996 through 2002. This allowed analysis of combined effects of the 1994 and 1995 USPHS guidelines and 1996 California law.

Summary statistics are presented for the whole population. Subsequent analyses examined offers of HIV tests and acceptance excluding women diagnosed before pregnancy, offers of treatment excluding those diagnosed after the prenatal period, and opportunities to complete treatment excluding women who gave birth between 1987 and 1995 and those diagnosed after the prenatal period. Because it is important that women in prenatal care with unknown HIV status be offered an HIV test and those with HIV be offered treatment, separate analyses were conducted among women who received prenatal care. For all outcomes, if the test or zidovudine offer was not documented in the chart, it was assumed that it was not offered. The 076 Protocol consists of giving zidovudine to women during pregnancy and then at labor or delivery, and to the infant at birth. All 3 parts of the 076 Protocol had to be documented to be considered complete.

Maternal variables included year of delivery, timing of HIV diagnosis, age, race, prenatal care, drug use, homelessness, mental illness, and sexual history. “Prenatal care” reflected whether women received 2 or more prenatal care visits. “Drug use” reflected whether women ever used intravenous or noninvasive illicit drugs. “Homelessness” reflected whether women reported ever being homeless. “Mental illness” reflected whether women reported current or previous mental illness. “Sexual history” included information on if the woman had ever had “high-risk sex,” defined as sexual contact with someone known to be HIV infected or at high risk of HIV infection. All the behaviors were self-reported except for those that could be clinically verified, for example, by a toxicology screen or sexually transmitted disease test.

Analyses were performed with SAS version 8.2 (SAS Institute Inc, Cary, NC). To test bivariate associations, the 2-sided Fisher exact statistics was used. For multivariate analysis, logistic regression models were used. Correlations between independent variables were explored using the Pearson correlation coefficient. Significance was established at P<.05. For multivariate analysis, odds ratios (ORs) and 95% confidence intervals (CIs) were generated. Missing data reduced the available sample for some analyses; potential differences between pregnancies that were included versus those that were excluded for each analysis because of missing data were assessed.

RESULTS

Study Population

Table 1 provides the sample maternal characteristics for the 496 deliveries. Black women constituted the largest group (48%), followed by White women and Latinas. Most women (77%) were aged 20 to 35 years. In this population, 53% of women were diagnosed with HIV before pregnancy with the remainder diagnosed during pregnancy, at labor, or after pregnancy. The majority (61%) of deliveries took place during 1996 through 2002, largely because of increased capture rates secondary to expansion of surveillance. Receipt of prenatal care was documented in 421 (85%) women’s charts. About half (54.6%) of the women had a history of drug use, 6.3% reported a history of homelessness, 10.1% reported a history of mental illness, and 41.5% had a history of engaging in high-risk sex.

Offer of HIV Test

Among the 231 HIV-infected women not diagnosed before pregnancy, 160 (69.3%) had a documented offer of an HIV test. Between 1987 through 1995 and 1996 through 2002, there was a significant (P<.001) increase in women with unknown HIV status being offered a test. Maternal factors associated with an offer of an HIV test in bivariate analyses included receiving prenatal care, having never used drugs, and having high-risk sex (Table 2).

Separate analyses were performed on the group of HIV-infected women who received prenatal care (n=178; 77.1%). Of those, 150 (84.3%) had an offer of an HIV test documented in their charts. Again, there was a significant association between year of delivery and test offer, with women delivering between 1996 and 2002 more likely to have been offered an HIV test than those delivering between 1987 and 1995 (P=0.002). Among women in prenatal care who gave birth between 1996 and 2002, there were no variables significantly associated with receiving a test offer.

In multivariate analysis, all significant variables from the bivariate analysis were included in a logistic regression model. Only having received prenatal care (OR=27.4; 95% CI=10.7, 79.2) and giving birth between 1996 and 2002 (OR=3.8; 95% CI=1.7, 9.0) remained significantly associated with receiving a test offer. Several predictor variables that were significant in bivariate but not multivariate analysis were significantly correlated with year of delivery. In particular, those giving birth between 1996 and 2002 were less likely to have used drugs (r=-0.27; P<.001), less likely to have been homeless (r=-0.12; P=0.08), and less likely to have a history of mental illness (r=-0.13; P=.003), but more likely to have engaged in high-risk sex (r=0.41; P<.001). In addition, being Black was significantly correlated with drug use (r=0.16; P=.01), but race remained not significant when drug use was removed from the model. There were no significant interaction terms.

Acceptance of HIV Test

Among the 160 women with unknown HIV status who were offered an HIV test, 155 (96.9%) accepted. The only significant variation in acceptance was that women older

<table>
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<tr>
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<td>Year of delivery</td>
<td></td>
<td></td>
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<tr>
<td>1987–1995</td>
<td>192 (38.7)</td>
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<td>NA</td>
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<td>1996–2002</td>
<td>304 (61.3)</td>
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<td>Maternal age, y</td>
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<tr>
<td>&lt;20</td>
<td>19 (3.8)</td>
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<td>20–24</td>
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<td>38 (19.8)</td>
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<td>25–29</td>
<td>145 (29.2)</td>
<td>58 (30.2)</td>
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<td>30–34</td>
<td>133 (26.8)</td>
<td>51 (26.6)</td>
<td>82 (26.9)</td>
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<tr>
<td>≥35</td>
<td>92 (18.6)</td>
<td>38 (19.8)</td>
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<td>123 (24.8)</td>
<td>48 (25.0)</td>
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<td>98 (19.8)</td>
<td>32 (16.7)</td>
<td>66 (21.7)</td>
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<tr>
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<td>9 (4.7)</td>
<td>25 (8.2)</td>
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<td>5 (1)</td>
<td>2 (1.0)</td>
<td>3 (1.0)</td>
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<td></td>
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<td>81 (42.2)</td>
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<td>147 (29.6)</td>
<td>51 (26.6)</td>
<td>96 (31.6)</td>
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<td>At labor</td>
<td>24 (4.8)</td>
<td>17 (8.8)</td>
<td>7 (2.3)</td>
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<td>After this pregnancy</td>
<td>32 (6.5)</td>
<td>22 (11.5)</td>
<td>10 (3.3)</td>
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<td>28 (5.6)</td>
<td>21 (10.9)</td>
<td>7 (2.3)</td>
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<td></td>
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<td>No</td>
<td>68 (13.7)</td>
<td>46 (23.9)</td>
<td>22 (7.2)</td>
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<td>421 (84.9)</td>
<td>141 (73.4)</td>
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<td>271 (54.6)</td>
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<td>165 (85.9)</td>
<td>125 (41.1)</td>
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<td>206 (41.5)</td>
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<td>465 (93.8)</td>
<td>173 (90.1)</td>
<td>292 (96.1)</td>
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<td>163 (84.9)</td>
<td>283 (93.1)</td>
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<td>Yes</td>
<td>50 (10.1)</td>
<td>29 (15.1)</td>
<td>21 (6.9)</td>
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</table>

Note. NA = not applicable.

*High-risk sex was defined as sexual contact with someone known to be HIV infected or at high risk of HIV infection.


<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Offered HIV Test, No. (%)</th>
<th>P</th>
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<tr>
<td>Delivery year</td>
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<tr>
<td>1987–1995</td>
<td>59/111 (53.2)</td>
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<tr>
<td>1996–2002</td>
<td>101/120 (84.2)</td>
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<tr>
<td>Race/ethnicity</td>
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<td>.083</td>
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<tr>
<td>Black</td>
<td>66/105 (62.9)</td>
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<tr>
<td>All others</td>
<td>90/121 (74.4)</td>
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<tr>
<td>Received prenatal care</td>
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<td>&lt;.001</td>
</tr>
<tr>
<td>No</td>
<td>8/48 (16.7)</td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>150/178 (84.3)</td>
<td></td>
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<tr>
<td>History of drug use</td>
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<td>.002</td>
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<tr>
<td>No</td>
<td>74/123 (60.2)</td>
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</tr>
<tr>
<td>Yes</td>
<td>86/108 (79.6)</td>
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<tr>
<td>History of high-risk sexa</td>
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<td>.008</td>
</tr>
<tr>
<td>No</td>
<td>90/143 (62.9)</td>
<td></td>
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<tr>
<td>Yes</td>
<td>70/88 (79.6)</td>
<td></td>
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<tr>
<td>History of homelessness</td>
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<td>.4</td>
</tr>
<tr>
<td>No</td>
<td>151/216 (69.9)</td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>9/15 (60.0)</td>
<td></td>
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<tr>
<td>History of mental illness</td>
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<td>.33</td>
</tr>
<tr>
<td>No</td>
<td>147/209 (70.3)</td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>13/22 (59.1)</td>
<td></td>
</tr>
</tbody>
</table>

Note. NA = not applicable.

*High-risk sex was defined as sexual contact with someone known to be HIV infected or at high risk of HIV infection.

Treatment Offer

Women not diagnosed with HIV until labor (n=24; 4.8%) or after this pregnancy (n=32; 6.5%) were excluded from the analysis. We analyzed zidovudine receipt among women on highly active antiretroviral therapy to ensure that women in this group were not counted as individuals not offered treatment. We found that every woman known to be on highly active antiretroviral therapy was also offered zidovudine. Therefore, these women were included in the larger analysis. Of the 440 pregnant women available for analysis, 328 (74.6%) were offered zidovudine during pregnancy or at labor. Among the 287 births between 1996 and 2002, 86.8% were offered zidovudine, and among those in prenatal care and giving birth between 1996 and 2002 (n=274), 87.6% were offered zidovudine. Zidovudine was significantly more likely to be offered to women giving birth between 1996 and 2002 (P<.001) compared with those giving birth between 1987 and 1995 (Table 3). Other factors significantly associated with offer of zidovudine treatment than 30 years of age were less likely to accept (P=.012). The 5 women who refused testing had the following characteristics: 2 were Hispanic, 1 was Black, 1 was of unknown race/ethnicity, and 1 was of other race/ethnicity; 2 gave birth before 1996; 3 received prenatal care; and all were older than 30 years of age.
The likelihood of clinicians offering effective HIV testing and treatment to HIV-infected pregnant women has improved. Among women who received prenatal care, only year of delivery was associated with test and treatment. Among women in prenatal care, only year of delivery was associated with test and treatment. Among the 234 eligible women, 10 (4.1%) were excluded because of missing data for 1 or more of the 076 Protocol components. However, there were no significant differences between women who were included versus those who were excluded.

Of the 234 remaining mother–infant pairs, 219 (93.6%) were offered all 3 components (zidovudine for the mother during pregnancy and then at labor and to the infant at birth) of the 076 Protocol. Among the 232 mother–infant pairs in which the woman received prenatal care, 218 (94.0%) were offered all 3 components of the 076 Protocol. There were no significant predictors for whether a mother–infant pair was offered the 076 Protocol. Among those not offered the full course of therapy, all mother–infant pairs were missing the dose given to the mother during labor.

**DISCUSSION**

### Temporal Changes

In this study, the likelihood of clinicians offering effective HIV testing and treatment to HIV-infected pregnant women has increased. Among HIV-infected pregnant women in prenatal care, there was a significant difference between 1996 and 2002 than it was between 1987 and 1995. This finding suggests that the 1994 and 1995 USPHS guidelines and resulting California law had the desired effect of improving health care for HIV-infected pregnant women. This improvement in turn may decrease perinatal HIV infection. It is, however, not possible to distinguish between the individual contributions of the guidelines versus the law. Data from the California Department of Health Services suggest that the goal of decreasing perinatal HIV infection might also have been met, because perinatal AIDS decreased from an average of 46 cases per year from 1987 to 1995 to about 21 cases per year from 1996 through 2002.17,18

Nonetheless, some HIV-infected pregnant women are being missed, likely leading to preventable HIV infections in infants. In particular, receiving prenatal care and giving birth in the latter cohort were consistently associated with receiving an offer for an HIV test and treatment. Among women in prenatal care, only year of delivery was associated with test and treatment offer. Among women diagnosed before or during pregnancy who were offered treatment during pregnancy, most mother–infant pairs (93.6%) had an opportunity to complete the 076 Protocol.

The USPHS guidelines' effectiveness in improving the rate of offers for HIV tests and treatment has been demonstrated in other studies. A 4-state study (not including California) found that HIV-infected women identified before delivery increased from 68% in 1993 to 81% in 1996, and the proportion offered various portions of the 076 Protocol increased from between 5% and 27% to between 75% and 85% during the same period.17,18 A 7-state study (not including California) found that the proportion of pregnant HIV-infected women diagnosed before delivery increased from 68% in 1993 to 81% in 1996, and the proportion offered various portions of the 076 Protocol increased from between 5% and 27% to between 75% and 85% during the same period.17,18
70% to 80% between 1993 and 1996.6,39 Over the same period, those offered prenatal zidovudine increased from 27% to 83% and those offered intrapartum zidovudine from 6% to 75%. A Michigan study found that prenatal or intrapartum zidovudine use increased from 27% in 1993 to 85% in 2000.20 A North Carolina study found that from 1995 to 1997, offers of HIV tests increased from 87% to 96%, and offers of any zidovudine increased from 21% in 1993 to 95% in 1997.21 North Carolina changed its public health regulations in 1995 to require that prenatal care providers offer HIV counseling and a voluntary HIV test to every pregnant client. This suggests that policies similar to the California law have been effective in increasing prenatal HIV testing across states that differ in size and demographics. As previously mentioned, the California Survey of Childbearing Women found that, in 1998, 76.6% of infants of HIV-infected women had evidence of maternal receipt of zidovudine in their blood.10 Finally, 2 recent Centers for Disease Control and Prevention surveys showed that, nationwide, approximately 48.4% to 54.0% of pregnant women reported having had an HIV test in the preceding 12 months.22

The aforementioned findings are similar to our study with a few notable exceptions. First, these studies were largely based on the entire population of pregnant women in a region, whereas our study focused specifically on HIV-infected women to understand the effects of these policies in the target population. Second, our study covers a broader time period than the other studies, allowing for a more complete analysis of the change over time. It also should be noted that the California Survey of Childbearing Women treatment proportion was lower than the treatment-offer proportion for 1996 though 2002 found in our study, probably primarily because of an increase in offers of treatment each year but also possibly because of the discrepancy between offer of treatment and compliance. Third, all of the smaller studies previously mentioned and our study found higher rates of HIV testing than did the national study.22 This may be because most of the smaller studies relied on chart review and laboratory data whereas the national study relied on surveys of women, introducing recall bias, or because the states studied individually have systematically higher rates of testing than did the nation as a whole.

Test and Treatment Offer Predictors

In our analysis, year of delivery and prenatal care were the only factors that were independently associated with test and treatment offer. Women giving birth between 1987 and 1995 were also significantly more likely to have used drugs, to have been homeless, or to have had a mental illness, as well as to have been less likely to engage in high-risk sex. This finding is supported by other data that suggest that the HIV epidemic in US women is increasingly associated with heterosexual sex and decreasingly associated with other risk factors.23–26 Thus, it should be impressed upon health care providers that the lack of obvious risk factors should not be used as a guide to offering women prenatal HIV counseling and testing.

Our finding that prenatal care was the most significant predictor of test and treatment offer was consistent with other studies.6,27,28 Prenatal care is the primary opportunity for clinicians to offer HIV testing and treatment. To maximally decrease perinatal HIV transmission, it is essential to bring women into prenatal care, ideally early enough that those who are HIV-infected can be treated during pregnancy. Myriad barriers to prenatal care access have been previously described, including cultural and language misunderstandings, lack of insurance, and lack of transportation.29–31 Thus, these barriers must be addressed to ensure that the potential benefits from policy change can be realized.

It is also important to note that year of delivery remains significant among women in prenatal care. This finding suggests that the policy, which was aimed at prenatal care providers, may have had an effect on this group’s behavior. Furthermore, although no variables were significantly associated with having received prenatal care, it is encouraging that the Food and Drug Administration recently approved rapid HIV testing. Rapid tests should simplify the testing of women without prenatal care because they can be tested, and treatment can be initiated, at labor and delivery. Nonetheless, the timely receipt of prenatal care and testing is preferable.

Limitations

This study has several limitations. First, the data were collected through medical chart reviews; thus, the quality of the data is dependent upon provider’s documentation practices. In particular, since the 1996 California law mandated not only a test offer, but also the documentation of that offer, the increases found here may be because of increased documentation. Second, most of the risk behaviors are self-reported, so all the issues around self-report of sensitive behaviors are present. Third, testing and treatment offer, not uptake, are the main variables of analysis, and test offer, rather than infant infections, is the major outcome. The ultimate goal of the law and guidelines discussed in this article is to prevent perinatal HIV transmission. However, we did not have the data to show if this goal was met, but rather focused on the intermediate outcomes—offer of HIV testing and treatment. Furthermore, we do not have data about treatment uptake and adherence, so although the guidelines and law seemed to have had the desired effect of increasing offer to women known to be HIV-infected, we cannot make conclusions about whether women offered treatment in prenatal care received the recommended regimen.

Conclusions

Despite these limitations, the evaluation of previous policies is timely because a second California law, Assembly Bill 1676, passed in September 2003. This law specifies that women in prenatal care be notified that HIV testing is routine but that they can refuse. Furthermore, a test must be offered at labor and delivery if no previous result is available.32 To justify advocacy around such new laws, the effects of existing policies must be evaluated to ensure they are working.

In conclusion, rates of offers of HIV testing and treatment among pregnant California women significantly improved after the release of federal guidelines and a state law regarding HIV testing and treatment in pregnancy. Despite this improvement, offers of test and treatment are not universal. Receipt of prenatal care was the most important predictor of test and treatment offer, suggesting that removing barriers to prenatal care may be important to maximally reduce perinatal HIV transmission.
Nonetheless, this study suggests that continuing to allocate resources to affect HIV testing and treatment policy is an effective way to both prevent new perinatal HIV infections in infants and to identify initiators for HIV-infected women.

About the Authors
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This article was accepted May 21, 2006.

Contributions
C. C. Sarnquist and S. D. Cunningham were responsible for the analysis and writing. B. Sullivan implemented the project, which included performing all data collection, managing study sites, and assisting with data interpretation. Y. Malandon originated the study and supervised all aspects of implementation and data analysis. All of the authors helped to conceptualize ideas, interpret findings, and review drafts of the article.

Human Participant Protection
Institutional review board approval for the study was granted at each site and at Stanford University; approval for data analysis was also granted by the University of California at Berkeley. Informed consent was waived by all institutional review boards as no personal identifiers were recorded.

Acknowledgments
This work was supported by Centers for Disease Control and Prevention and the California Department of Health Services, Office of AIDS (grant 04-53573).

We would like to thank Janpreet Loyal and David Hill for their help with data management. We would also like to thank all the collaborating facilities in the 9 participating counties for their assistance.

A preliminary portion of this work was presented at the July 2004 XV International AIDS Conference in Bangkok, Thailand.

References


Reproductive Health of Adolescent Girls Perinatally Infected With HIV

Susan B. Brogly, PhD, D. Heather Watts, MD, Nathalie Ylitalo, MD, Eduardo L. Franco, PhD, George R. Seage III, ScD, James Oleske, MD, Michelle Eagle, PA-C, and Russell Van Dyke, MD

Some girls infected perinatally with HIV early in the HIV/AIDS epidemic now have reached adolescence and become sexually active. The rate of pregnancy in these adolescent girls and the effectiveness of antiretroviral therapy (ART) in preventing second-generation mother-to-child transmission of HIV are not known. Two case reports have described the pregnancy outcomes of a small number of perinatally infected adolescents in the United States,1,2 and pregnancy outcomes in 28 perinatally infected adolescents in India have been reported.3

Although reproductive health outcomes for adolescent girls with behaviorally acquired HIV infection have been studied extensively, little data exist on the reproductive health of girls with perinatal HIV infection. A high risk of genital human papillomavirus infection and its sequelae, cervical squamous intraepithelial lesions (SIL),4–6 as well as other genital infections,7 has been documented in women and adolescents infected with HIV through sexual activity and drug use. Adolescent girls perinatally infected with HIV are often cared for in pediatric infectious disease clinics, where reproductive health issues may not be routinely addressed.

In this study, we estimated rates of pregnancy and pregnancy outcomes, genital infections, and cervical cytological abnormalities in a cohort of perinatally HIV-infected adolescents in the United States.

METHODS

Study Population

The source population for this study was children enrolled in the Pediatric AIDS Clinical Trials Group (PACTG) protocol 219C. The PACTG was the pediatric counterpart of the AIDS Clinic Trial Group (ACTG), a US multisite clinical HIV/AIDS research organization that has a major role in setting standards of care for HIV infection in the United States and the developed world. Protocol 219C has enrolled and followed HIV-infected and non–HIV-infected children at clinical centers—primarily university-affiliated pediatric infectious disease clinics—across the United States since September 2000 to study the long-term effects of in utero, neonatal, and pediatric ART exposure and the complications of pediatric HIV infection.

Protocol 219C was a revised version of PACTG protocol 219, which began in 1993; the primary change was to remove the restriction by which protocol 219 enrolled only children who were currently or previously enrolled in an ACTG clinical trial or whose mother was enrolled in an ACTG clinical trial during pregnancy. HIV-infected children enrolled in 219C if they were aged 21 years or younger, able to adhere to protocol visits, and receive medical care at a PACTG clinical site. Children were followed until loss of contact, protocol withdrawal, death, or their 25th birthday. The clinical centers involved in protocol 219C obtained approval from their respective review boards for human research, and the child or the child's parent or guardian provided written informed consent.

The study population for our investigation was restricted to perinatally HIV-infected girls aged 13 years or older who participated in protocol 219C. A girl was considered to have perinatally acquired HIV infection if her mother was HIV infected during pregnancy, labor, or delivery according to clinical records; according to HIV DNA polymerase chain reaction or RNA assays, most girls were shown to be HIV positive during infancy or early childhood. Because of the paucity of data on rates of pregnancy and pregnancy outcomes, including mother-to-child transmission of HIV, we sought to include all pregnancies that occurred in the cohort and so used the minimum age of occurrence of pregnancy—13 years—in defining the study base.

Abstract

Objectives. We sought to describe the reproductive health of adolescent girls perinatally infected with HIV.

Methods. We estimated the incidence of first pregnancy, genital infections, and abnormal cervical cytology for 638 girls aged 13 years and older in the Pediatric AIDS Clinical Trials Group protocol 219C.

Results. Thirty-eight girls became pregnant, for a first pregnancy rate of 18.8/1000 person-years; 7 of these girls had additional pregnancies (95% confidence interval [CI]=13.3, 25.7). Thirty-two pregnancies resulted in live births. All girls received antiretroviral therapy during pregnancy. One infant was HIV infected, 29 were uninfected, and 2 had unknown infection status, for a rate of mother-to-child transmission of HIV in infants with known infection status of 3.3% (95% CI=0.1, 18.6). Condylomata and trichomoniasis were the most frequent genital infections. Forty-eight (47.5%) of 101 girls with Papanicolaou test examinations had abnormal cervical cytology, including atypical cells of undetermined significance (n=18), low-grade squamous intraepithelial lesions (SIL; n=27), and high-grade SIL (n=3). Many abnormalities persisted despite intervention.

Conclusions. Pregnancy rates were lower and cervical abnormalities were higher than among non–HIV-infected adolescents. These findings underscore the importance of Papanicolaou tests and promotion of safer sexual practices in this population. (Am J Public Health. 2007;97:1047–1052. doi:10.2105/AJPH.2005.071910)
PACTG site's standard diagnostic procedures for genital infections were based on the Bethesda system for cervical cytology, all of which were accredited by the Colleges of American Pathology. Girls were identified as sexually active through disclosure or occurrence of pregnancy or genital infection.

### Statistical Methods

We estimated the cumulative incidence of first pregnancy and the incidence rate per 1000 person-years from the girl's 13th birthday to the date of the conception of the first pregnancy or the last cohort visit, whichever occurred first. The date of conception was determined by subtracting the gestational age of the fetus or infant from the date of the pregnancy outcome. In estimating the rate of mother-to-child transmission of HIV, pregnancies that yielded multiple births were assessed as a single transmission if any infants were HIV infected and as a single nontransmission if none were infected. The cumulative incidence of first genital condylomata, trichomoniasis, chlamydial infection, gonorrhea, and syphilis also were estimated; girls with a diagnosis of the genital infection before age 13 years were excluded from analyses for that particular outcome. Incidence rates of pregnancy and cumulative incidence of genital infections were estimated for all girls and for girls known to be sexually active.

Analysis of abnormal cervical cytology was restricted to 101 girls for whom Pap tests were given. The cumulative incidence of low- or high-grade SIL was estimated for 40 girls whose first Pap test was indicative of normal cervical cytology and who then received at least 1 subsequent Pap test (with normal or abnormal result). The treatment and persistence of cervical abnormalities were described. Differences in CDC disease classification, CD4+ percentage, HIV RNA copy number, in utero ART exposure, and ART use according to sexual activity, pregnancy, and cervical cytology were assessed using the Kruskal–Wallis, \( \chi^2 \), and Fisher exact tests as appropriate.

### RESULTS

Of 1317 perinatally HIV-infected girls enrolled in PACTG protocol 219C from September 2000 to December 2005, 638 were aged 13 years or older and were included in the study population. These 638 girls were from 75 pediatric infectious disease clinics in 24 states and districts across the United States. A total of 174 (27.3%) were known to be sexually active on the basis of disclosure, pregnancy, or genital infection. Sexually active girls were significantly older and significantly more likely to be Hispanic, to live on their own, and to have a higher HIV RNA copy number and a lower CD4+ percentage than were girls who were not known to be sexually active (Table 1). Sexually active girls were less likely to be on ART than non–sexually active girls; however, among girls on ART, there was no significant difference in the proportions on the 3 highly active antiretroviral therapies described in Table 1.

#### Pregnancy

Thirty-eight girls experienced a first pregnancy between the age of 13 years and their last cohort visit (2026.2 person-years of follow-up). The overall incidence rate of first pregnancy was 18.8 per 1000 person-years (95% confidence interval [CI]=13.3, 25.7), and the incidence among girls aged 15 to 19 years was 33.5 per 1000 person-years (95% CI=22.8, 47.6). At the 19th birthday, the cumulative incidence of first pregnancy was 17.2% (95% CI=11.1, 23.2) among all 638 girls in the study population and 24.2% (95% CI=16.6, 31.8) among 174 girls known to be sexually active (Figure 1). Girls who became pregnant were significantly older than those who did not, and in general, the differences in characteristics between the 2 groups paralleled the differences between sexually active and non–sexually active girls shown in Table 1. In addition, among girls known to be sexually active, those who became pregnant were more likely to have abnormal cervical cytology during follow-up than those who did not become pregnant.

In addition to the 38 first pregnancies, 6 girls had a second pregnancy, and 1 had a third pregnancy. Twenty-eight of the first pregnancies resulted in live births (including one set of twins), 2 spontaneously aborted, and 8 were therapeutically aborted. Three of the second pregnancies were therapeutically aborted, and 3 resulted in live births; the single third pregnancy resulted in a live birth. Of the 32 pregnancies that resulted in live births, 30 resulted in a live birth.

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Sexually Active (n = 174)</th>
<th>Not Sexually Active (n = 464)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean age (range), y</td>
<td>19.0 (13.0–24.7)</td>
<td>15.3 (13.0–22.6)</td>
</tr>
<tr>
<td>Race/ethnicity, no. (%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Black</td>
<td>92 (52.9)</td>
<td>262 (56.5)</td>
</tr>
<tr>
<td>Hispanic</td>
<td>62 (35.6)</td>
<td>120 (25.9)</td>
</tr>
<tr>
<td>White</td>
<td>17 (9.8)</td>
<td>76 (16.4)</td>
</tr>
<tr>
<td>Other/unknown</td>
<td>3 (1.8)</td>
<td>6 (1.3)</td>
</tr>
<tr>
<td>Living conditions, no. (%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>With biological parent(s)</td>
<td>49 (28.2)</td>
<td>153 (33.0)</td>
</tr>
<tr>
<td>With other adult(s)</td>
<td>54 (31.0)</td>
<td>165 (35.6)</td>
</tr>
<tr>
<td>With adoptive parent(s)</td>
<td>22 (12.6)</td>
<td>113 (24.4)</td>
</tr>
<tr>
<td>Foster care or residential facility</td>
<td>9 (5.2)</td>
<td>28 (6.0)</td>
</tr>
<tr>
<td>On own</td>
<td>40 (23.0)</td>
<td>5 (1.1)</td>
</tr>
<tr>
<td>CDC disease classification, no. (%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>A or N</td>
<td>50 (28.7)</td>
<td>159 (34.3)</td>
</tr>
<tr>
<td>B</td>
<td>63 (36.2)</td>
<td>185 (39.9)</td>
</tr>
<tr>
<td>C</td>
<td>61 (35.1)</td>
<td>118 (25.4)</td>
</tr>
<tr>
<td>Unknown</td>
<td>0 (0.0)</td>
<td>2 (0.4)</td>
</tr>
<tr>
<td>HIV RNA, copies/mL, no. (%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;1000</td>
<td>41 (23.6)</td>
<td>212 (45.7)</td>
</tr>
<tr>
<td>1000 to &lt;10 000</td>
<td>33 (19.0)</td>
<td>70 (15.1)</td>
</tr>
<tr>
<td>≥10 000</td>
<td>44 (25.3)</td>
<td>82 (17.7)</td>
</tr>
<tr>
<td>Unknown</td>
<td>56 (32.2)</td>
<td>100 (21.6)</td>
</tr>
<tr>
<td>CD4+, no. (%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;15</td>
<td>28 (16.1)</td>
<td>41 (8.8)</td>
</tr>
<tr>
<td>15–24</td>
<td>41 (23.6)</td>
<td>78 (16.8)</td>
</tr>
<tr>
<td>≥25</td>
<td>58 (33.3)</td>
<td>267 (57.5)</td>
</tr>
<tr>
<td>Unknown</td>
<td>47 (27.0)</td>
<td>78 (16.8)</td>
</tr>
<tr>
<td>In utero ART exposure, no. (%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>0 (0.0)</td>
<td>9 (1.9)</td>
</tr>
<tr>
<td>No</td>
<td>149 (85.6)</td>
<td>399 (86.0)</td>
</tr>
<tr>
<td>Unknown</td>
<td>25 (14.4)</td>
<td>56 (12.1)</td>
</tr>
<tr>
<td>Received ART as a neonate, no. (%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>0 (0.0)</td>
<td>2 (0.4)</td>
</tr>
<tr>
<td>No</td>
<td>174 (100.0)</td>
<td>462 (99.6)</td>
</tr>
<tr>
<td>Currently on ART, no. (%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>134 (77.0)</td>
<td>405 (87.3)</td>
</tr>
<tr>
<td>No</td>
<td>40 (23.0)</td>
<td>59 (12.7)</td>
</tr>
<tr>
<td>Current ART regimen (girls on ART only), no. (%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>HAART with PI and NNRTI</td>
<td>18 (13.4)</td>
<td>51 (12.6)</td>
</tr>
<tr>
<td>HAART with PI</td>
<td>82 (61.2)</td>
<td>226 (55.8)</td>
</tr>
<tr>
<td>HAART with NNRTI</td>
<td>14 (10.5)</td>
<td>57 (14.1)</td>
</tr>
<tr>
<td>≥3 NRTIs</td>
<td>9 (6.7)</td>
<td>17 (4.2)</td>
</tr>
<tr>
<td>Other ART</td>
<td>11 (8.2)</td>
<td>54 (13.3)</td>
</tr>
</tbody>
</table>

**Note.** PACTG = Pediatric AIDS Clinical Trials Group; RNA = ribonucleic acid; CDC = Centers for Disease Control and Prevention; ART = antiretroviral therapy; HAART = highly active antiretroviral therapy (combination ART regimen of 3 or more drugs); PI = protease inhibitor; NNRTI = nonnucleoside reverse transcriptase inhibitor; NRTI = nucleoside reverse transcriptase inhibitor. *Characteristics at or within 1 month of the last clinical visit.  
*Girls with missing data were not included in statistical test (Fisher exact test or χ²).  
*Significantly different between the 2 groups (P < .05).  
*For explanation of CDC disease classification, see reference 8.  
*Refers to the exposure of the adolescents themselves.
low-grade SIL for 27 girls, and high-grade SIL for 3 girls. The 12-month cumulative incidence of low- or high-grade SIL in 40 girls with a first normal Pap test and at least 1 subsequent Pap test was 17.5% (95% CI = 4.7, 30.2; Figure 2). There were no significant differences in demographic characteristics, ART use, or HIV clinical, immunologic, or virologic status between girls with normal cervical cytology and those with abnormal cervical cytology; however, girls with abnormal cervical cytology were significantly more likely to have a genital infection during follow-up than girls with normal cervical cytology.

Of the girls with a diagnosis of abnormal cervical cytology, 7 of the 18 first diagnosed with ASCUS, 13 of the 27 first diagnosed with low-grade SIL, and 1 of the 3 girls first diagnosed with high-grade SIL underwent colposcopy, cryotherapy, excision, or a combination of these procedures. Among these 21 girls with intervention, 9 cervical abnormalities cleared, 2 regressed to less-severe SIL, 4 persisted, and 6 progressed to more-severe SIL. Among the 14 girls with cervical abnormalities and no documented intervention, 6 abnormalities cleared, 1 regressed to less-severe SIL, 6 persisted, and 1 progressed to more-severe SIL. There was no further information following the abnormal cervical diagnosis for 13 girls.

**DISCUSSION**

To our knowledge, this is the first study to evaluate the reproductive health of a large cohort of perinatally HIV-infected adolescent girls. Although the outcomes of pregnancy, genital infections, and abnormal cervical cytology may be considered distinct, collectively they describe the reproductive health of this population. The need for enhanced provision of reproductive health services such as contraceptive counseling and cervical cytological screening is evident: 17% of girls experienced a first pregnancy by 19 years of age and nearly half had abnormal cervical cytology. Further, only half of the girls known to be sexually active had Pap tests.

The pregnancy incidence rate of 33.5 per 1000 person-years among girls aged 15 to 19 years in our study was lower than that documented for predominantly non–HIV-infected girls of similar age in the United States in 1999 (86.7 per 1000),10 which is consistent with the findings of lower pregnancy rates in HIV-infected versus non–HIV-infected women.11 Because of the small numbers, the 219C pregnancy incidence rates were not standardized according to racial distributions in the United States; race/ethnicity has been associated with pregnancy and pregnancy outcomes.52 Very few non–HIV-infected children participated in protocol 219C until adolescence, which precluded use of reference rates in this population for the present study. In addition, some spontaneously or therapeutically aborted pregnancies may not have been documented, which could have underestimated the pregnancy rate in this population.

All adolescents who delivered a live birth were on ART—mainly a combination of 3

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**FIGURE 1**—Cumulative incidence of first pregnancy in 174 perinatally HIV-infected girls aged 13 years and older who were known to be sexually active and were enrolled in Pediatric AIDS Clinical Trials Group (PACTG) protocol 219C.


<table>
<thead>
<tr>
<th>Infection</th>
<th>Incident Cases by Age 19 Years, %</th>
<th>All Girls (n = 638)</th>
<th>Sexually Active Girls (n = 174)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Condyloma</td>
<td>12</td>
<td>4.6 (1.7, 7.4)</td>
<td>8.2 (3.7, 12.7)</td>
</tr>
<tr>
<td>Trichomoniasis</td>
<td>9</td>
<td>4.8 (1.4, 8.3)</td>
<td>6.9 (2.4, 11.5)</td>
</tr>
<tr>
<td>Chlamydia</td>
<td>9</td>
<td>2.7 (0.9, 4.6)</td>
<td>5.5 (2.0, 9.1)</td>
</tr>
<tr>
<td>Gonorrhea</td>
<td>6</td>
<td>2.2 (0.3, 4.1)</td>
<td>3.9 (0.8, 7.0)</td>
</tr>
<tr>
<td>Syphilis</td>
<td>2</td>
<td>1.1 (0.0, 2.6)</td>
<td>1.6 (0.0, 3.7)</td>
</tr>
</tbody>
</table>

Note. PACTG = Pediatric AIDS Clinical Trials Group; CI = confidence interval.

*Excluded from the estimated incidence of condyloma are 23 girls in the “all girls” group and 5 girls in the “sexually active girls” group with a diagnosis of genital condyloma before age 13 years.
or more drugs. 1 of which was a protease inhibitor or NNRTI—at some point during pregnancy, and only 1 infant was HIV infected. The estimated rate of mother-to-child transmission of HIV of 3.3% (95% CI=0.1, 18.6) is similar to rates observed in the Women and Infants Transmission Study for transmission of HIV of 3.3% (95% CI=0.1, 6.5), and for women receiv-

ing combination ART of 3 or more drugs, 1 of which was a protease inhibitor, NNRTI, or both (1.2% [95% CI=0.0, 2.5]).12 How-

ever, there were a small number of live births in our study, and the CI is wide and also includes higher rates. In a case study of 8 perinatally HIV-infected adolescents and young adults in Puerto Rico, 5 first pregnancies resulted in live births, 4 of the 5 mothers were on ART, and none of the infants were HIV infected.1 Similarly, no mother-to-child transmission of HIV occurred among 26 infants born to perinatally HIV-infected adolescents in India.3 Further study is needed to ascertain the effectiveness of ART in preventing second-generation perinatal HIV transmission given the potential for transmission of a virus resistant to 1 or more classes of ART. Of note, none of the pregnant girls in our study were themselves exposed to ART in utero.

Rates of genital infections—including trichomoni
sis, chlamydial infection, and gonorrhea—documented in our study population were lower than those found in the Reaching for Excellence in Adolescent Care and Health (REACH) cohort,13 which was expected because the REACH cohort comprised girls infected with HIV during adolescence, presumably through sexual transmission. Although screening for genital infections was not performed routinely as part of the 219C protocol, girls frequently were assessed at the time of the pelvic examination, and symptomatic cases were independently diagnosed through primary care. Thus, the reported rates represent the minimum rate of genital infections. Nevertheless, the observation that 23 of 638 girls had genital condylomata at a young age is troubling. We were unable to determine whether these young condylomata cases were related to recent exposure through sexual abuse, voluntary sexual activity, or acquisition of human papilloma virus (HPV) during delivery. However, the localization of the condylomata suggests that sexual abuse or activity was more likely to have been the source of infection.

The prevalence of abnormal cervical cytology was 29.7%, which is higher than the prevalence of 11.5% documented among 375 women aged 18 to 24 years attending a university health clinic in Montreal16 and lower than the 56.4% among 133 girls infected with HIV in adolescence in the REACH cohort.8 Further, although based on small numbers, the 36-month cumulative incidence of SIL among girls in protocol 219C (32.8%; 95% CI=15.5, 50.0) was higher than that observed in high-risk non–HIV-infected adolescents in San Francisco (15.0%; 95% CI=13.0, 17.0).16 The high proportion of abnormal cervical cytology in our population compared with university students also could be because of increased susceptibility to and persistence of HPV and other genital infections in these girls, as has been demonstrated in HIV-infected women.10 Although we had no virologic information on HPV infection, many cervical abnormalities persisted in affected girls, even with intervention. No associations between clinical, immunologic, or virologic profiles and cervical cytology were identified, but the analysis had limited power. In addition, the estimated cumulative incidence of SIL was based on a small number of participants, only half of whom participated in protocol 219C past age 19 years.

It is unsettling that only 58% of 174 girls known to be sexually active had documented Pap tests. The PACTG site provided the girls’ primary medical care, and testing and diagnoses from routine clinical care supplemented the data collected through the 219C protocol. The estimated rates of cervical cytological abnormalities could be misleading if girls for whom Pap tests were given had different profiles of abnormal cervical cytology than those who did not. Likewise, we may have overestimated the incidence of pregnancy and genital infection because sexual activity was identified through disclosure or the occurrence of the outcome of pregnancy or a genital infection. Nonetheless, this study provides preliminary data on a unique cohort of girls infected early in the HIV epidemic and who survived to reproductive age.
A considerable proportion of adolescents in our cohort engaged in unprotected sexual intercourse despite close and frequent contact with HIV clinics. Sexual activity in perinatally HIV-infected adolescent girls is probably more common than many pediatricians assume. Indeed, 45 pregnancies occurred, and almost 48% of the girls who had a Pap test had cytological abnormalities detected. In addition, few diagnosed cervical abnormalities cleared, even with intervention. These findings underscore the importance of obtaining sexual histories, providing counseling to prevent unintended pregnancies, screening for genital infections, administering routine Pap tests, and closely managing cervical lesions. Education on safer sexual practices is needed in this population.

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Note. The National Institute of Child Health and Human Development was involved in the design, data collection, and conduct of protocol 219C but was not involved in the present analysis, the interpretation of the data, the writing of the manuscript, or the decision to submit for publication.

Contributors
S.B. Brogly conducted the statistical analysis and drafted the article. D.H. Watts assisted with the writing of the article. S.B. Brogly, D.H. Watts, N. Ylitalo, E.L. Franco, and G.R. Seage designed the present study. G.R. Seage, J. Oleske, and R. Van Dyke developed the PACTG 219C protocol and obtained funding. J. Oleske, M. Eagle, and R. Van Dyke recruited patients and provided data. All authors helped to form ideas, interpret findings, and provide critical input to the article.

Acknowledgments
This work was supported by the Center for Biostatistics in AIDS Research at the Harvard School of Public Health (the statistical and data analysis center of the PACTG) under National Institute of Allergy and Infectious Diseases cooperative agreement (S U01 AI41110). The US National Institute of Allergy and Infectious Diseases and the National Institute of Child Health and Human Development funded protocol 219C (under cooperative agreement U01 AI41089).

We thank the adolescents and families for their participation in PACTG protocol 219C and the individuals and institutions involved in the conduct of 219C.

Human Participant Protection
The clinical centers involved in PACTG protocol 219C obtained approval from their institutional review boards for human research, and the child or the child’s guardian provided written informed consent.

References
Managing Medicare’s HIV Caseload in the Era of Suppressive Therapy

David E. Gilden, BS, Joanna M. Kubisiak, MPH, and Daniel M. Gilden, MS

Between 1995 and 2004, the number of Americans living with AIDS grew from 217,000 to 415,000. Death rates from AIDS among US residents fell by two thirds over the same period, but AIDS incidence rates dropped by only one third. These changes are primarily attributable to the introduction of highly active antiretroviral therapy (HAART) in 1996. HAART has reduced disease progression and prolonged life, leaving patients in need of ongoing disease management.

This transformation has been especially significant for HIV-positive individuals enrolled in Medicare, which covers persons with disabilities in addition to the elderly. Among those reaching the clinical (i.e., physically disabling) stage of AIDS, median survival rates were 20 months or less through the early 1990s, and this low life expectancy greatly restricted the number of individuals who qualified for Medicare coverage. HAART induced a sudden change in this picture, even among patients with the most advanced disease. The death rates of people with advanced HIV disease fell 62% after starting the new antiretroviral therapy. Not only was the number of people with AIDS increasing, but they were surviving longer. As a result, there was the potential for significant increases in numbers of HIV-positive Medicare beneficiaries as well as increases in the expenditures associated with their care.

From 1991 to 1996, Medicare spent $3.8 billion on approximately 95,000 individuals with HIV. Half of this population was still alive at the end of 1996. Medicare’s claim records document the experiences of these patients between 1997 and 2003 as well as the experiences of patients new to the system. In the United States, with its multitude of separate health care systems, the extensive Medicare data available allowed a rare opportunity for us to make a detailed national analysis of trends in HIV prevalence rates, comorbidities, mortality rates, and expenditures in the HAART era.

Objectives. The 1996 introduction of antiretroviral medications changed Medicare’s role in providing HIV care. We analyzed Medicare’s patient database in an effort to document the new HIV therapies’ effects on expenditures and outcomes.

Methods. We examined the medical billing records of a 5% national Medicare sample from 1997 through 2003. The cohort was stratified by year and categorized by age, race/ethnicity, gender, and Medicare status. Population summaries were categorized according to presence of major chronic diseases and HIV-related conditions.

Results. The number of Medicare beneficiaries with HIV increased from 42,520 in 1997 to 76,500 in 2003, whereas mortality among this group fell by 35%. HIV-associated infections declined by as much as 43% (mycoses). Heart and liver disease and diabetes increased by more than 50%. Adjusted annual per person Medicare expenditures fell 28%; expenditures were 49% higher for Blacks than for Whites.

Conclusions. Improved HIV medical management has led to fewer deaths and has shifted treatment toward chronic care. However, successful management is complicated by conditions that have not been historically linked to HIV and whose effects vary according to race/ethnicity. (Am J Public Health. 2007;97:1053–1059. doi:10.2105/AJPH.2005.063636)

METHODS

Study Population

There are several different categories of Medicare beneficiaries with HIV. One group is composed of people disabled as a result of HIV, that is, individuals who advanced to AIDS before or despite the availability of HAART. Five months after being classified as having a long-term disability, qualified individuals can apply for Social Security disability benefits. Twenty-four months later, they are eligible for Medicare. Another group is made up of Medicare beneficiaries who are disabled as a result of a condition other than HIV and who are coincidentally HIV positive. Yet another group is elderly individuals with HIV who may or may not have advanced to AIDS. A 1996 study showed that, overall, only 56% of Medicare’s HIV-positive beneficiaries (about 44,000 patients) had progressed to AIDS as of that year.

Data Collection

Our source data were derived from Medicare’s yearly nationwide sample containing claims records for 5% of the program’s beneficiaries. We used the records for the years 1997 through 2003 to evaluate expenditures and disease frequencies among Medicare beneficiaries receiving treatment for HIV and its associated conditions. We based our inclusion of patients on the repeated appearance in their claim history of International Classification of Diseases, Ninth Revision (ICD-9), treatment diagnosis code 042, which covers symptomatic HIV infection. (A treatment diagnosis, as represented by the appropriate ICD-9 code, is the diagnosis entered by a service provider to justify a line-item charge for treatment.) Only diagnoses linked directly to a hospital or physician service were used in identifying patients.

In the case of each annual Medicare 5% sample, we isolated patients with HIV (ICD-9 code 042) diagnoses on their claim forms. These annual records were then integrated into longitudinal diagnosis and treatment records for each patient. (There is a loss of about 0.5% each year from the panel sample as a result of changes in beneficiaries’ account numbers, which are based on heads of households’ Social Security numbers.) The cohort was stratified by year and...
categorized according to age, race/ethnicity, gender, and Medicare status. Population summaries were further stratified by major chronic disease status and presence of HIV-related conditions. We multiplied our results by a factor of 20 so that we could present estimates for the overall Medicare population from the 5% sample.

We focused on patients who received at least 2 HIV-related hospital or physician services in a given calendar year, designating them in our data with a “confirmed HIV” flag. We chose this moderately restrictive case definition to minimize the number of unidentified cases while achieving a high degree of year-to-year continuity in our study population. At least some level of error is involved in using diagnosis codes derived from claims data to identify study populations, because of the inclusion of erroneous or misreported diagnoses. Algorithms stringently designed to filter these false positives also lead to the exclusion of potentially true cases. Along with these technical considerations, there are clinical ones as well. A patient’s care may vary from year to year, sometimes falling to a level considered negative according to the case definition algorithm. We wanted to ensure that most patients with confirmed HIV cases maintained that designation even in years when their care was sporadic.

We did not divide the HIV-diagnosed Medicare population according to AIDS status. Conceptually, such distinctions between disease stages are now difficult to make given HAART’s impact on immune recovery. The Medicare program continues to include a wide range of beneficiaries with long-term, disabling HIV. Although still suffering from a chronic, serious illness, many of these people have now recovered their health at least to the extent that they no longer meet the Centers for Disease Control and Prevention’s criteria for officially reportable “AIDS” (these criteria include CD4+ T-cell counts below 200 cells/mm³, which would not appear in Medicare claims records, and such recordable diagnoses as pneumocystis and cytomegalovirus infections). We considered as equivalent all Medicare beneficiaries meeting our “confirmed HIV” definition. We did not distinguish between those who had been officially diagnosed with AIDS and those who had originally qualified for Medicare for reasons unrelated to HIV.

We did not have records of outpatient pharmacy drug payments because Medicare did not cover these expenditures during our study period. However, patients are required to visit physicians to obtain prescriptions and to monitor drug effects. Patients who had undergone successful antiretroviral therapy appeared in our records because they had visited physicians or outpatient clinics for reasons related to HIV even though they did not have serious HIV-associated conditions.

Most patients were enrolled in the standard fee-for-service Medicare system in which care providers seek payment for the specific services they performed. During part or all of the study period, however, some patients were enrolled in Medicare health maintenance organizations (HMOs) or had only partial Medicare coverage (Medicare part A or part B only). We excluded data on months of HMO or partial enrollment because we could not obtain complete diagnosis or payment records for those periods. These months amounted to only 7.7% of our population’s total Medicare enrollment time.

Statistical Analysis

To analyze the evolution of Medicare expenditures, we examined annual per person payments among disabled beneficiaries younger than 65 years after adjusting for inflation. Medicare payments are regulated by government fee schedules and do not follow typical health care inflation patterns. In fact, the Balanced Budget Act of 1997 (HR 2015) imposed Medicare fee reductions: in 1998, limitations were imposed on home health benefits; in 1999, limitations on skilled nursing facility expenditures were introduced; and, in 2000, limitations on outpatient expenditures were implemented and new home health payment rules were formalized. Between 1997 and 2000, increases in hospital reimbursements were limited to levels at or below the overall consumer price index.

To compensate for changes in Medicare expenditures, we calculated the percentage difference between 1997 and each subsequent study year in average annual payments disbursed to all disabled Medicare beneficiaries. By applying the resulting adjustment factors to annual payments within the Medicare HIV cohort, we were able to convert payments to constant 1997 dollars.

We then developed a multivariate regression model using a log + 1 transformation of adjusted annual payments. The model controlled for gender, age, race/ethnicity, county of residence (urban vs rural), US region of residence, partial year eligibility status, mortality, and the interaction between mortality rate and months of eligibility within a given year. We used the parameter estimates associated with each year to estimate the underlying proportional change in payments for that year in comparison with 1997.

In addition, we constructed a classification system sensitive to both disease and Medicare administrative status to track trends by HIV subpopulations. This taxonomy included 3 categories. The first was “preexisting HIV.” Included here were individuals who were enrolled in Medicare and had confirmed HIV in the study year in question and the 1 preceding it. The second category was “incident HIV.” These beneficiaries had Medicare eligibility in the year in question and the preceding year but confirmed HIV status only in the former. The third category was made up of “newly eligible” beneficiaries. These individuals were in their first year of Medicare coverage and also met the confirmed HIV definition. We were not able to ascertain their HIV history because data on their status over the preceding years were not included in the Medicare records.

This approach allowed us to distinguish between established Medicare beneficiaries with newly identified HIV and beneficiaries who were already receiving treatment for HIV during the year they entered Medicare. The latter status is a strong indication that disability among these beneficiaries was attributable to AIDS. Our taxonomy supported categorizations from 1998 onward. We could not categorize beneficiaries in 1997, because we did not have the necessary 1996 records.

Finally, we analyzed ICD-9 diagnostic codes to identify HIV-related conditions, including conditions for which the HIV-diagnosed Medicare population had an odds ratio at least 3 times higher than the general Medicare disabled population (after adjustment for age and gender) and
TABLE 1—Demographic Characteristics of Medicare Beneficiaries With HIV and Comparisons With Medicare Disabled Beneficiaries and Elderly Populations: United States, 2003

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Beneficiaries</th>
<th>Disabled Beneficiaries</th>
<th>Elderly Beneficiaries</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>With HIV</td>
<td>HIV</td>
<td>Non-HIV</td>
</tr>
<tr>
<td>Male, %</td>
<td>80.2</td>
<td>80.6</td>
<td>54.1</td>
</tr>
<tr>
<td>Age, y, %</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;45</td>
<td>49.1</td>
<td>53.0</td>
<td>30.4</td>
</tr>
<tr>
<td>45–64</td>
<td>43.9</td>
<td>47.0</td>
<td>69.6</td>
</tr>
<tr>
<td>65–74</td>
<td>5.9</td>
<td>79.8</td>
<td>51.9</td>
</tr>
<tr>
<td>≥75</td>
<td>1.1</td>
<td>14.9</td>
<td>47.3</td>
</tr>
<tr>
<td>Race/ethnicity, %</td>
<td>947.7</td>
<td>&lt;.001</td>
<td>539.3</td>
</tr>
<tr>
<td>Black</td>
<td>38.0</td>
<td>37.6</td>
<td>19.4</td>
</tr>
<tr>
<td>Hispanic</td>
<td>7.1</td>
<td>7.1</td>
<td>3.4</td>
</tr>
<tr>
<td>White</td>
<td>52.1</td>
<td>52.5</td>
<td>73.5</td>
</tr>
<tr>
<td>Other/Unknown</td>
<td>2.7</td>
<td>2.8</td>
<td>3.7</td>
</tr>
<tr>
<td>Urban county of residence, %</td>
<td>86.3</td>
<td>86.3</td>
<td>68.7</td>
</tr>
<tr>
<td>Mortality by age group, %</td>
<td>164.5</td>
<td>&lt;.001</td>
<td>5.1</td>
</tr>
<tr>
<td>&lt;45</td>
<td>5.3</td>
<td>5.3</td>
<td>1.1</td>
</tr>
<tr>
<td>45–64</td>
<td>6.1</td>
<td>6.1</td>
<td>2.9</td>
</tr>
<tr>
<td>65–74</td>
<td>7.6</td>
<td>7.6</td>
<td>2.3</td>
</tr>
<tr>
<td>≥75</td>
<td>11.9</td>
<td>11.9</td>
<td>8.4</td>
</tr>
<tr>
<td>Overall</td>
<td>5.9</td>
<td>5.7</td>
<td>2.4</td>
</tr>
</tbody>
</table>

*Elderly individuals can obtain Medicare coverage at 62 years of age.

New Enrollments

A total of 5.4 million disabled individuals had complete Medicare coverage (parts A and B) in 2003, up 26% from 4.3 million in 1997. From 1997 through 2003, the HIV prevalence rate among disabled beneficiaries increased 40% as a result of the accumulating number of preexisting HIV cases (Table 2). There was a 47% decline in the percentage of HIV cases among disabled individuals newly eligible for coverage (the category including individuals entering Medicare with an HIV-related disability).

Medicare’s overall HIV caseload grew 80% over the study period, with the increase much more pronounced among women (129%) than among men (71%). The HIV prevalence rate among elderly beneficiaries initially was extremely low. It more than doubled from 1997 to 2003.

The percentage of new cases was higher among Blacks than among Whites. In 2003, rates of preexisting HIV were 73% among disabled Black beneficiaries and 81% among disabled White beneficiaries. Also in 2003, 8.4% and 5.0% of Black and White beneficiaries with HIV, respectively, were newly eligible for Medicare coverage.

Annual Expenditures

Table 3 shows how the size of and expenditures associated with the HIV-diagnosed

conditions historically associated with HIV, such as opportunistic infections and wasting. We consolidated these codes into the following broad categories: immunological (including HIV and lymphoma), diverse infections, liver, renal, heart and vascular, gynecological, pregnancy, metabolic, adverse effects, and substance abuse. We also used specific filters for patients with diabetic, renal, hepatic, and cardiovascular conditions, which allowed us to analyze these patients as separate subgroups. Presence of a condition was determined annually on the basis of at least 1 physician or hospital treatment diagnosis not linked to a laboratory or other diagnostic test.

RESULTS

Demographic Characteristics

The calendar year 2003 demographic characteristics of the study population are shown in Table 1. Most notably, men were predominant, and Blacks were overrepresented relative to the disabled Medicare population as a whole. Over the 7-year study period, HIV-treated beneficiaries entitled to Medicare as a result of disability (including end-stage renal disease) accounted for 94% of the total number of months of Medicare eligibility. The elderly made up only a small portion of the confirmed HIV population (5580 in 2003, or 7.3% of all HIV-treated beneficiaries).

Despite the fact that HAART had been in existence for 7 years, mortality in 2003 remained significantly higher among beneficiaries with confirmed HIV than among the non-HIV population for virtually every major age category. Mortality among disabled beneficiaries with confirmed HIV was 2.4 times higher than in the overall disabled Medicare population (P≤.001) (Table 1).


<table>
<thead>
<tr>
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<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Disabled</td>
<td>939</td>
<td>1121</td>
<td>1206</td>
<td>1236</td>
<td>1251</td>
<td>1284</td>
<td>1312</td>
</tr>
<tr>
<td>Preexisting HIV</td>
<td>…</td>
<td>763</td>
<td>924</td>
<td>985</td>
<td>1009</td>
<td>1037</td>
<td>1080</td>
</tr>
<tr>
<td>Incident HIV</td>
<td>…</td>
<td>191</td>
<td>177</td>
<td>161</td>
<td>152</td>
<td>156</td>
<td>148</td>
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<tr>
<td>Newly eligible</td>
<td>1530</td>
<td>1675</td>
<td>1122</td>
<td>948</td>
<td>933</td>
<td>916</td>
<td>814</td>
</tr>
<tr>
<td>Elderly</td>
<td>8.8</td>
<td>9.2</td>
<td>10.3</td>
<td>13.0</td>
<td>15.9</td>
<td>17.8</td>
<td>18.8</td>
</tr>
</tbody>
</table>

Note. Beneficiary records for the HIV population contained 2 or more HIV-related physician or hospital nondiagnostic interventions in a given year.

*Preceding year data required for classification.
Medicare population grew over the 7-year study period. Mortality rates declined continually over this period, whereas numbers of hospitalizations declined and then leveled off during 2000 through 2002. Total 7-year Medicare expenditures amounted to $5.97 billion for the study population. Payments for acute hospitalizations amounted to $2.93 billion for the complete Medicare disabled population.

In terms of 1997 dollars, annual Medicare expenditures were still an average of 31% higher for Blacks than for Whites. (whose numbers were lower) were 14.9% higher than those for Whites ($P=.002). Unlike Hispanics, Blacks also had consistently higher mortality than Whites: 2003 rates were 5.9% and 4.8% among disabled Black and White beneficiaries, respectively.

In a separate model that excluded 1997 observations and included our taxonomic diagnosis categories identified as significantly correlated or of special concern. Rates for many HIV-related conditions declined through 2000, after which they subsequently slowed or halted. However, heart disease, diabetes, and liver disease prevalence rates all rose substantially (by more than 50%) during the 7-year period. (Including both treatment and secondary diagnoses in this analysis increased the reported prevalence rates considerably but did not change the trend patterns.)

The rate of renal disease increased 19% over the 7 years. Renal impairments, up to and including end-stage renal disease, were associated with extremely high expenditures. In terms of 1997 dollars, annual Medicare payments for those with renal conditions averaged $46,912 during the 1997 through 2003 period. Significant portions of these expenditures were because of the high cost of dialysis during end-stage renal disease. When beneficiaries who qualified for Medicare as a result of end-stage renal disease were omitted, the mean annual Medicare expenditure still amounted to $42,853 per renal patient.

Renal disease and its attendant expenses were concentrated among Blacks. An average of 14.2% of Black beneficiaries with confirmed HIV had renal disease, compared with only 2.8% of White beneficiaries and 4.4% of Hispanic beneficiaries. Again excluding those who entered Medicare as a consequence of end-stage renal disease, expenses associated with renal disease were 2.3 times higher among Black patients than among White patients during 1997 through 2003 (data not shown).

On average, diabetes and heart disease were 2.4 times and 3.2 times more common, respectively, among those for whom renal disease was not their initial Medicare qualification. Mortality averaged 5.5 times higher in Blacks than in Whites ($P<.001). Expenditures for Hispanics (whose numbers were lower) were 14.9% higher than those for Whites ($P=.002). Unlike Hispanics, Blacks also had consistently higher mortality than Whites: 2003 rates were 6.9% and 4.8% among disabled Black and White beneficiaries, respectively.


<table>
<thead>
<tr>
<th></th>
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<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Overall HIV population</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Months of enrollment × 10^3</td>
<td>443.3</td>
<td>555.0</td>
<td>625.6</td>
<td>674.7</td>
<td>730.8</td>
<td>795.2</td>
<td>863.6</td>
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<tr>
<td>Beneficiary count</td>
<td>42,520</td>
<td>51,400</td>
<td>56,500</td>
<td>60,440</td>
<td>64,960</td>
<td>70,800</td>
<td>76,500</td>
</tr>
<tr>
<td>Hospitalizations per 1000 beneficiaries</td>
<td>801</td>
<td>759</td>
<td>725</td>
<td>684</td>
<td>692</td>
<td>669</td>
<td>631</td>
</tr>
<tr>
<td>Mortality rate per 1000 beneficiaries</td>
<td>90.3</td>
<td>87.9</td>
<td>83.5</td>
<td>78.8</td>
<td>69.0</td>
<td>65.5</td>
<td>58.8</td>
</tr>
<tr>
<td>Total payments, $ × 10^6</td>
<td>608.0</td>
<td>706.0</td>
<td>761.4</td>
<td>787.6</td>
<td>909.3</td>
<td>984.0</td>
<td>1,218</td>
</tr>
<tr>
<td>Annual per beneficiary expenditure, 1997 $</td>
<td>14,299</td>
<td>13,835</td>
<td>13,535</td>
<td>12,646</td>
<td>12,501</td>
<td>11,718</td>
<td>12,725</td>
</tr>
<tr>
<td><strong>Disabled HIV population &lt; 65 y</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Months of enrollment × 10^3</td>
<td>427.0</td>
<td>527.4</td>
<td>594.9</td>
<td>636.0</td>
<td>680.2</td>
<td>738.8</td>
<td>801.5</td>
</tr>
<tr>
<td>Beneficiary count</td>
<td>40,000</td>
<td>48,840</td>
<td>53,640</td>
<td>56,820</td>
<td>60,420</td>
<td>65,580</td>
<td>70,860</td>
</tr>
<tr>
<td>Total payments, $ × 10^6</td>
<td>569.9</td>
<td>657.1</td>
<td>718.0</td>
<td>736.5</td>
<td>841</td>
<td>891</td>
<td>1,125</td>
</tr>
<tr>
<td>Annual per beneficiary expenditure, 1997 $</td>
<td>14,247</td>
<td>13,551</td>
<td>13,445</td>
<td>12,575</td>
<td>12,435</td>
<td>11,456</td>
<td>12,697</td>
</tr>
<tr>
<td><strong>Blacks</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Beneficiary count</td>
<td>18,811</td>
<td>18,002</td>
<td>17,797</td>
<td>17,436</td>
<td>16,904</td>
<td>15,785</td>
<td>17,690</td>
</tr>
</tbody>
</table>

**Note:** Beneficiary records for the HIV population contained 2 or more HIV-related physician or hospital nondiagnostic interventions in a given year.

The adjustment to 1997 dollars was based on the yearly change in average annual per beneficiary payments observed in the complete Medicare disabled population.

**HIV-Related Comorbidity Rates**

Table 5 presents 7-year trends for the diagnosis categories identified as significantly correlated or of special concern. Rates for many HIV-related conditions declined through 2000, after which they subsequently slowed or halted. However, heart disease, diabetes, and liver disease prevalence rates all rose substantially (by more than 50%) during the 7-year period. (Including both treatment and secondary diagnoses in this analysis increased the reported prevalence rates considerably but did not change the trend patterns.)
**DISCUSSION**

The population of Medicare beneficiaries with confirmed HIV increased 80% from 1997 through 2003, driven by high annual incidence rates and reduced mortality. Our findings illustrate how expenditures for Medicare's HIV population are changing as the preexisting cases increases. These effects may be the result of better disease management in general and the introduction of potent antiretroviral agents in particular.

If disease management is to be improved further, it is vital to establish the extent to which antiretroviral medications have been successful in altering the clinical and payment characteristics of those who were previously seriously ill. The Medicare cohort presents a unique opportunity to do so, because members of Medicare’s disabled population by definition have had disabling disease for at least 29 months. In addition to allowing assessments of racial differences, the size and detail of Medicare’s patient database allow analyses of the current status and payment histories of HIV-treated individuals to an extent not before possible. Other studies of patient status and expenditures have been limited by a focus on narrow geographic areas or time periods. They also have lacked exact data on expenditures, relying instead on imputed or estimated values. A recent international review of 543 potentially useful cost studies revealed only 9 with sufficient data to make meaningful statements about post-HAART expenditures.

We found that mortality greatly decreased after the introduction of HAART, by 35% during our 7-year study period. A previous study reported that about 20% of Medicare’s symptomatic HIV beneficiaries died in 1995. This figure was only 5.9% in 2003. The apparent 70% decrease parallels the 65% decline in the overall HIV-diagnosed population after HAART became available. Yet, death rates among Medicare beneficiaries with HIV or HIV-related conditions remained high relative to rates in the overall US population with HIV and in the Medicare population as a whole.

In 2003, according to the Centers for Disease Control and Prevention, the death rate among people with AIDS (i.e., those with the most advanced HIV disease) was 45.9 per 1000, in contrast to the Medicare figure of 58.8 found in the present study. Also in 2003, disabled patients receiving treatment for HIV died at a rate 2.4 times higher than that of disabled beneficiaries without HIV. Mortality increases Medicare expenditures by a large magnitude (Table 4).

Rates of diabetes, heart disease, and liver disease are increasing among HIV-treated Medicare beneficiaries. Single-organ disease, cardiovascular disease, and diabetes have received new attention in the era of HAART. Antiretroviral drugs clearly have effects on lipid and glucose processing, as do chronic HIV infection, comorbidities, aging, and environmental factors. Rapidly progressing nephropathy associated with advanced HIV has been a concern since the beginning of the epidemic, but recent studies have highlighted more indolent renal conditions even among patients whose HIV has been suppressed. Notably, these renal conditions are seen predominantly in Blacks.

In the absence of a drug benefit that covers HAART, hospitalization accounts for half of Medicare expenditures for HIV patients. Other reports as well as our data indicate that the introduction of HAART quickly led to a general reduction in hospitalizations.


<table>
<thead>
<tr>
<th>Variable</th>
<th>Parameter Estimate (SE)</th>
<th>t</th>
<th>Prob(t)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>6.43383 (0.09099)</td>
<td>70.71</td>
<td>&lt;.0001</td>
</tr>
<tr>
<td>Male (female)</td>
<td>-0.05258 (0.03001)</td>
<td>-1.75</td>
<td>.0798</td>
</tr>
<tr>
<td>Age, y (&lt;35)</td>
<td>0.03717 (0.03289)</td>
<td>1.13</td>
<td>.2585</td>
</tr>
<tr>
<td>35–44</td>
<td>0.07643 (0.03661)</td>
<td>2.15</td>
<td>.0318</td>
</tr>
<tr>
<td>55–64</td>
<td>0.19429 (0.04900)</td>
<td>3.96</td>
<td>&lt;.0001</td>
</tr>
<tr>
<td>Race/ethnicity (White)</td>
<td>0.40077 (0.02501)</td>
<td>16.02</td>
<td>&lt;.0001</td>
</tr>
<tr>
<td>Hispanic</td>
<td>0.13844 (0.04562)</td>
<td>3.03</td>
<td>.0024</td>
</tr>
<tr>
<td>Other/unknown</td>
<td>0.02818 (0.06187)</td>
<td>0.46</td>
<td>.6488</td>
</tr>
<tr>
<td>Urban county of residence (rural/unknown)</td>
<td>-0.05893 (0.03468)</td>
<td>-1.70</td>
<td>.0892</td>
</tr>
<tr>
<td>Region (Northeast)</td>
<td>-0.27929 (0.03865)</td>
<td>-7.23</td>
<td>&lt;.0001</td>
</tr>
<tr>
<td>South</td>
<td>-0.15842 (0.02920)</td>
<td>-5.42</td>
<td>&lt;.0001</td>
</tr>
<tr>
<td>West</td>
<td>-0.15549 (0.03357)</td>
<td>-4.63</td>
<td>&lt;.0001</td>
</tr>
<tr>
<td>Outlying area/unknown</td>
<td>-0.70765 (0.15039)</td>
<td>-4.71</td>
<td>&lt;.0001</td>
</tr>
<tr>
<td>Partial year eligibility adjustment factor</td>
<td>0.18004 (0.00654)</td>
<td>27.54</td>
<td>&lt;.0001</td>
</tr>
<tr>
<td>Died during year (did not die during year)</td>
<td>3.00619 (0.10562)</td>
<td>28.46</td>
<td>&lt;.0001</td>
</tr>
<tr>
<td>Mortality rate × months of eligibility interaction</td>
<td>-0.06795 (0.01399)</td>
<td>-4.86</td>
<td>&lt;.0001</td>
</tr>
<tr>
<td>Year of expenditures (1997)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1998</td>
<td>-0.12763 (0.04714)</td>
<td>-2.71</td>
<td>.0068</td>
</tr>
<tr>
<td>1999</td>
<td>-0.15066 (0.04631)</td>
<td>-3.25</td>
<td>.0011</td>
</tr>
<tr>
<td>2000</td>
<td>-0.28409 (0.04585)</td>
<td>-6.22</td>
<td>&lt;.0001</td>
</tr>
<tr>
<td>2001</td>
<td>-0.29990 (0.04542)</td>
<td>-6.60</td>
<td>&lt;.0001</td>
</tr>
<tr>
<td>2002</td>
<td>-0.33083 (0.04483)</td>
<td>-7.38</td>
<td>&lt;.0001</td>
</tr>
<tr>
<td>2003</td>
<td>-0.32346 (0.04435)</td>
<td>-7.29</td>
<td>&lt;.0001</td>
</tr>
</tbody>
</table>

Note. Analyses were based on log + 1 transformed annual Medicare expenditures adjusted to 1997 dollars. The reference category for each variable is in parentheses.

*Among beneficiaries with fewer than 12 months of eligibility in a given year, the change in annual expenditures for each additional Medicare month.

Additional adjustment factor per added month of eligibility for beneficiaries who died in a given year.
This trend, initially much sharper outside of Medicare, evened out after 1998 in the general population. According to our data, the plateau occurred 2 years later in the case of Medicare. Another study focusing on the period between 2000 and 2002 period showed that the adjusted hospital admission rate was 1.7 times higher among HIV-treated Medicare patients than among patients with private insurance. The inability to further reduce hospital stays among Medicare beneficiaries has contributed to the stability of expenditures associated with this group in recent years even as rates of HIV-related diseases have continued to decline.

When expenditures related to self-administered drugs are considered ($10,000–$15,000 per year for antiretroviral drugs alone), it is quite possible that total health care expenditures for the HIV-treated Medicare population increased after HAART’s introduction, along with life expectancies. This is what occurred in Canada according to 2 studies that included data on pharmacy payments. These studies showed that per-patient expenditures for antiretroviral drugs tripled during the transition to HAART, more than outweighing reductions in expenditures associated with care and other drugs.

The clear benefits of HAART in terms of increased life expectancy, reductions in permanent disability, and decreased demand for medical care argue for the value of ensuring that Medicare beneficiaries with HIV have access to drug therapies. The new Medicare part D pharmacy benefit promises to coordinate financing of Medicare-covered health care and currently noncovered pharmaceuticals. However, Medicaid was already supporting drug expenses for two thirds of the Medicare beneficiaries with HIV in our study, and these individuals now face a more challenging drug payment system managed by a multitude of private entities with varying formularies.

The part D patient copayment and the gaps in drug coverage may lead to increases in personal expenditures among beneficiaries who previously had private pharmacy insurance. At both population and personal levels, barriers to expensive but beneficial therapies such as HAART may broaden as patients live longer and total expenditures further increase. Taking advantage of these drugs’ demonstrable ability to extend survival and limit the use of nondrug medical services requires sound financial planning of the type this study supports.

**References**

Highly active antiretroviral therapy (HAART) has been effective in reducing morbidity and mortality from HIV infection. The substantial reductions in the incidence of AIDS and deaths among HIV-infected persons in the United States during the 1990s were in part attributable to the widespread availability of HAART since 1996. HAART can also reduce transmission of HIV by lowering the viral load in HIV-infected persons, which, coupled with HIV prevention behaviors, may explain the reductions in new HIV diagnoses observed in the 1990s. However, since 1999, the downward trend in new HIV and AIDS diagnoses has leveled off, primarily because of increases in the number of HIV diagnoses among men and in particular among men who have sex with men (MSM).

The benefits of HAART in reducing HIV transmission are counteracted if accompanied by increases in high-risk behaviors; even small increases in risky behaviors can counterbalance the benefits of a high proportion of persons receiving treatment. Increases in risky sexual behaviors among MSM are suggested by increases in rates of primary and secondary syphilis among men and by other study reports suggesting increases in risky sexual behaviors among MSM and may explain the resurgence of new HIV diagnoses among MSM.

It is generally believed that a large part of the recent increases in HIV diagnoses occurred among MSM who were younger than 30 years old. However, a 2004 study from the United Kingdom reported that the highest HIV incidence was observed for MSM aged 25 to 44 years. Given that the HIV epidemic has disproportionately affected Blacks and Hispanics with HIV diagnoses rates about 10 and 3 times higher than for Whites, respectively, of particular concern has been the possibility of increased transmission among young Black and Hispanic MSM. The interaction between age and race/ethnicity has not been investigated for MSM in the United States.

The US Preventive Services Task Force recommends HIV screening of adolescent and adult MSM. However, a recent study of convenience samples of MSM in 5 US cities found that nearly half of newly diagnosed HIV-infected MSM (48%) were not aware of having been infected with HIV and that more than one third of all MSM in the study had not had an HIV test within the preceding year. Unrecognized HIV infection may lead to diagnosis at a more advanced stage of disease, reducing the ability of HAART to slow disease progression and reduce infectivity.

The high proportion of unrecognized HIV infections among Black (67%) and Hispanic (48%) MSM compared with White MSM (18%) in the 5-city study is particularly worrisome. Unrecognized HIV infection, coupled with lower use of and adherence to HAART among persons of color compared with Whites once they know their HIV status, puts Black and Hispanic MSM at increased risk for poor outcomes such as progression to AIDS or death.

We examined data from the Center for Disease Control and Prevention’s (CDC’s) national HIV/AIDS surveillance system to determine the interaction between race/ethnicity and age. We also examined differences in late HIV diagnosis and progression from HIV to AIDS or death among racial/ethnic groups of MSM diagnosed with HIV. This information may be useful in better targeting HIV prevention efforts.
To determine trends and to test interactions, we used Poisson regression methods to model the rates of HIV diagnoses (with or without a concurrent diagnosis of AIDS), including year of HIV diagnosis, age, and race/ethnicity in the models. If we define an indicator function $I(s)$ to be equal to 1 when $s$ is true and zero when $s$ is false, then the model (for 2001–2004) can be written as

$$
1 \cdot \log(hiv) = offset(\log(pop_{yrij})) + b_1 + b_2(yr - 2001) + b_3(year > 2002) + b_4(\text{age_i}) + b_5(\text{race_j}) + \epsilon,
$$

where $hiv$ is the HIV count, $pop_{yrij}$ is the number of men in the population of the states for year $yr$, age $i$, and race $j$. $yr$ is the year of HIV diagnosis; $age_i$ is a categorical variable for age at HIV diagnosis; $race_j$ is a categorical variable; and $\epsilon$ is an error term. The categories for age were 13–19, 20–24, 25–29, 30–34, 35–39, 40–44, 45–49, 50–54, 55–59, 60–65, and 65 years and older. The categories for race were White, Black, and Hispanic. The numbers of Asian/Pacific Islander or American Indian/Alaska Native MSM were too small in some stratifications (e.g., by age) to have their data included. The lack of the "I( )" function on the first term is not an error. The model assumes that the baseline effect is multiplied by itself for each succeeding year.

The strategy for finding a final model was to first enter all the marginal variables (i.e., to fit the above model). Then we refit the model using only the variables significant at the .05 level. Then we added 2-way interaction terms and deleted those that were not significant. The resulting model was

$$
2 \cdot \log(hiv) = offset(\log(pop_{yrij})) + b_1 + b_2(year - 2001) + b_3(\text{age_i}) + b_4(\text{race_j}) + b_5(year > 2001) \times \text{age_i} + b_6(\text{age_i}) \times \text{race_j} + \epsilon; i = 1, \ldots, 11; j = 1, 2, 3.
$$

To examine patterns in disease progression, we examined the time from HIV diagnosis to AIDS diagnosis among cases diagnosed after 1995, when HAART became widely available. We used information for actual reported cases diagnosed during 1996 through 2002 and followed up through 2004. We determined disease progression by race/ethnicity, age, and year of diagnosis. Cox regression analyses were not appropriate for these data, because the assumption of proportional hazards generally did not hold. We therefore used a directly standardized Kaplan–Meier technique to calculate the proportion of MSM with HIV whose disease did not progress to AIDS. Estimates were adjusted for all other factors included in our analyses. MSM for whom diagnoses of HIV and AIDS were made within the same month were excluded from the analyses. Of a total 44,832 MSM with HIV, 838 (1.9%) did not have complete information on date of diagnosis and were excluded from the analyses.

Using data from the 33 states for MSM for whom a diagnosis of AIDS was made during 1996 through 2002, we used a standardized Kaplan–Meier survival method to determine survival by race/ethnicity, age, disease severity, and diagnosis year; cases were followed-up through 2004. Disease severity was measured by CD4+ T-cell count at AIDS diagnosis (first CD4+ T-cell count reported within 6 months of diagnosis; <50, 50–99, 100–199, ≥200 cells/µL categories used in earlier prognostic models); information missing for 14% of cases). Cases with AIDS diagnosis and death within the same month were assigned a follow-up time of 15 days.

### RESULTS

#### Trends in HIV Diagnosis Rates

During 1994 through 1999, the annual number of HIV diagnoses per 100,000 men decreased in the 25 states (from 20.9 in 1994 to 14.2 in 1999); since 1999, the rates of diagnosis have increased significantly, by 4.1% to 4.5% per year (to 17.7 per 100,000 men in 2004). HIV diagnosis rates were higher in the 33 states reporting data from 2001 through 2004 (23.1 and 24.3 per 100,000 population in 2001 and 2004, respectively), but rates did not increase significantly during that time (increases were 1.3% to 1.8% per year). The differences in rates indicated that data from states that implemented HIV reporting after 1994 could not be combined with the data from the 25 states that implemented data reporting in 1994 (i.e., addition of states with higher rates distorts trend).

To determine differences by race and age, we used the most current and complete information (i.e., data shown from the 33 states...
Hall et al.

Note. Lines are modeled rates; symbols are actual rates. Additional information regarding estimated rates of HIV diagnoses is available as a supplement to the online version of this article.

FIGURE 1—Estimated rates of HIV diagnoses (per 100 000 male population), by race/ethnicity, among men who have sex with men aged (a) 13–19 years, (b) 20–24, (c) 25–29, (d) 30–34, and (e) 35–39: 33 US states, 2001–2004.

TABLE 1—Percentage Change in HIV Diagnosis Rates Among Men Who Have Sex With Men, by Age Group: 33 US States, 2001–2004

<table>
<thead>
<tr>
<th>Age Group, y</th>
<th>% Increase per Year</th>
<th>P*</th>
</tr>
</thead>
<tbody>
<tr>
<td>13–19</td>
<td>14.1</td>
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<tr>
<td>20–24</td>
<td>13.3</td>
<td>&lt;.01</td>
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<tr>
<td>25–29</td>
<td>4.6</td>
<td>&lt;.01</td>
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<td>30–34</td>
<td>3.2</td>
<td>&lt;.01</td>
</tr>
<tr>
<td>35–39</td>
<td>2.4</td>
<td>&lt;.01</td>
</tr>
<tr>
<td>40–44</td>
<td>4.8</td>
<td>&lt;.01</td>
</tr>
<tr>
<td>45–49</td>
<td>3.1</td>
<td>.01</td>
</tr>
<tr>
<td>50–54</td>
<td>6.2</td>
<td>&lt;.01</td>
</tr>
<tr>
<td>55–59</td>
<td>3.4</td>
<td>.06</td>
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<tr>
<td>60–64</td>
<td>3.2</td>
<td>.24</td>
</tr>
<tr>
<td>≥65</td>
<td>1.6</td>
<td>.59</td>
</tr>
</tbody>
</table>

*From Poisson regression model.

for 2001–2004). Among all age groups, HIV diagnosis rates were higher for Black and Hispanic MSM than for White MSM (Figure 1). In 2004, the rate of HIV diagnosis per 100 000 for Black MSM (70.8) was about 5 times higher than that for White MSM (14.6); for Hispanic MSM (39.0), it was about 3 times higher than that for White MSM. However, differences in rates varied by age. In 2004, the HIV diagnosis rate for MSM aged 13 through 19 years was about 19 times higher than that for White MSM (14.6); for Hispanic MSM (1.2) and about 5 times higher for Hispanic MSM (6.1) than for White MSM. From 2001 to 2004, there were no differences by race/ethnicity in trends within age groups. By age group alone, for MSM aged 13 to 19 years, HIV diagnosis rates increased about 14% per year (P<.01); for those aged 20 to 24 years, they increased about 13% per year (P<.01; Table 1). HIV diagnoses also increased among MSM aged 25 to 29 years and those aged 40 to 54 years by 3% to 6% per year. Small decreases in HIV diagnosis rates were observed for MSM aged 30 to 39 years.

Progression From HIV to AIDS

Of 43 994 MSM with an HIV diagnosis during 1996 through 2002, 15 174 (34.5%) had a diagnosis of AIDS by 2004. HIV was significantly more likely to progress to AIDS within 3 years of HIV diagnosis among Black and Hispanic MSM than among White MSM; that is, AIDS did not develop within 3 years for 66.8% of Black MSM and 68.1% of Hispanic MSM compared with 74.7% of White MSM (Table 2). AIDS was significantly more likely to develop within 3 years among older MSM than among younger MSM. In later years of diagnosis (2000 or 2001), the proportion of MSM in which HIV did not progress to AIDS was slightly (but significantly) higher than in 1996.

Survival After AIDS Diagnosis

Of 62 045 MSM with a diagnosis of AIDS during 1996 through 2002, 13 962 (22.5%) had died by the end of 2004. Overall, the percentage of MSM with very low CD4+ T-cell counts (<50 cells/µL) at AIDS diagnosis was 28.1% (Table 3); among White, Black, and Hispanic MSM, it was 24.1%, 34.4%, and 27.8%, respectively (data not shown). Black MSM were significantly less likely to be alive 3 years after AIDS diagnosis (80.6%) than were Hispanic (85.2%) or White (84.5%) MSM. Survival at 1 and 3 years was significantly less likely among older than among younger MSM and among those who had lower CD4+ T-cell counts within 6 months of diagnosis. By contrast to the small improvement in the proportion of persons whose disease did not progress from HIV to AIDS, survival after AIDS diagnosis improved substantially with later years of AIDS diagnosis (e.g., for those whose diagnosis was made in 1996, 78.6% [95% confidence interval (CI)=78.0, 79.1] had survived after 3 years versus 86.0% [95% CI=85.6, 86.3] of those whose diagnosis was made in 2001).
TABLE 2—Percentage of Men Who Have Sex With Men Who Had an HIV Diagnosis During 1996–2002 in Whom AIDS Had Not Developed as of 2004: 33 US States

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>HIV Diagnosis, %</th>
<th>% Without AIDS 1 Year After HIV Diagnosis,* (95% CI)</th>
<th>% Without AIDS 3 Years After HIV Diagnosis,* (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Race/ethnicity</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>White</td>
<td>49.8</td>
<td>81.6 (81.1, 82.1)</td>
<td>74.7 (74.2, 75.1)</td>
</tr>
<tr>
<td>Black</td>
<td>34.9</td>
<td>76.9 (76.3, 77.6)</td>
<td>66.8 (66.1, 67.4)</td>
</tr>
<tr>
<td>Hispanic</td>
<td>14.1</td>
<td>76.3 (75.3, 77.4)</td>
<td>68.1 (67.5, 68.8)</td>
</tr>
<tr>
<td>Age, y</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>13–19</td>
<td>2.7</td>
<td>91.4 (90.7, 92.2)</td>
<td>84.4 (83.7, 85.0)</td>
</tr>
<tr>
<td>20–29</td>
<td>27.0</td>
<td>86.2 (85.5, 86.8)</td>
<td>78.2 (77.6, 78.8)</td>
</tr>
<tr>
<td>30–39</td>
<td>42.2</td>
<td>78.6 (78.0, 79.2)</td>
<td>70.0 (69.5, 70.6)</td>
</tr>
<tr>
<td>40–49</td>
<td>20.9</td>
<td>73.2 (72.4, 74.1)</td>
<td>64.8 (64.0, 65.6)</td>
</tr>
<tr>
<td>50–59</td>
<td>5.6</td>
<td>69.4 (68.1, 70.7)</td>
<td>61.1 (60.2, 62.0)</td>
</tr>
<tr>
<td>≥60</td>
<td>1.6</td>
<td>69.4 (68.4, 70.3)</td>
<td>60.8 (59.6, 62.0)</td>
</tr>
<tr>
<td>Diagnosis year</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1996</td>
<td>10.1</td>
<td>76.1 (74.9, 77.4)</td>
<td>68.2 (67.4, 69.0)</td>
</tr>
<tr>
<td>1997</td>
<td>9.7</td>
<td>78.3 (77.1, 79.5)</td>
<td>71.4 (70.2, 72.6)</td>
</tr>
<tr>
<td>1998</td>
<td>9.1</td>
<td>75.8 (74.7, 76.9)</td>
<td>69.4 (68.3, 70.6)</td>
</tr>
<tr>
<td>1999</td>
<td>12.1</td>
<td>78.1 (77.1, 79.1)</td>
<td>69.9 (68.8, 71.1)</td>
</tr>
<tr>
<td>2000</td>
<td>16.4</td>
<td>79.1 (78.2, 80.0)</td>
<td>70.6 (69.6, 71.6)</td>
</tr>
<tr>
<td>2001</td>
<td>21.1</td>
<td>81.0 (80.3, 81.8)</td>
<td>72.1 (71.2, 72.9)</td>
</tr>
<tr>
<td>Total</td>
<td>100.0</td>
<td>79.2 (78.9, 79.6)</td>
<td>70.9 (70.6, 71.2)</td>
</tr>
</tbody>
</table>

Note. CI = confidence interval.
*Adjusted for all other variables shown in the table.
†About 1% of men who have sex with men were of other races; data not shown because of small numbers.

DISCUSSION

Our results show that Black and Hispanic MSM were disproportionately affected by HIV. Compared with White MSM, rates of HIV diagnosis for Black and Hispanic MSM were substantially higher, as was the proportion in which AIDS had developed within 3 years. Black MSM were less likely than White MSM to be alive 3 years after AIDS diagnosis. Over the time period of our analysis (2001–2004), rates of HIV diagnosis among MSM in general remained stable in the United States and did not follow the trend of decreasing transmission rates observed among intravenous drug users and persons exposed through heterosexual contact. Rates increased for young MSM, confirming concerns raised by earlier reports about HIV diagnoses among young men in the United States and increasing HIV incidence among young MSM in Canada. We also found that HIV diagnosis rates increased for MSM aged 40 to 54 years. However, within age groups, the trend in HIV diagnosis rates from 2001 through 2004 did not differ by race/ethnicity.

It is difficult to interpret whether increases in HIV diagnosis rates are attributable to increased detection of HIV infection through increased testing or to increased HIV transmission. The long latency period of HIV infection, which can extend 8 to 10 years, requires implementation of new testing technologies that distinguish between recent and long-term infections to enable better characterization of recent HIV transmission patterns. Increased detection may occur through efforts to expand HIV testing services into traditional and nontraditional venues and by integrating testing into routine medical services. Stable rates of diagnosis could also be attributable to increased detection concurrent with decreasing transmission rates.

Data from other sources suggest that diagnosis trends may not be a result of increased testing. In the general population, a recent study concluded that the percentage of adults who had ever been tested for HIV did not increase significantly from 2001 (33.2%; 95% CI=32.5, 34.0) through 2004 (34.6%; 95% CI=33.9, 35.3). HIV testing rates specifically for MSM were not available from national surveys. Generally, HIV testing rates are lower for persons younger than 25 years and those older than 64 years and highest for persons aged 25 to 44 years. Even at low testing rates, however, rates of HIV diagnosis for young MSM reflect relatively recent infections, because less time is likely to have passed since the young men’s exposure. Additionally, although HIV diagnoses among middle-aged MSM may include recent as well as longer-term infections, a large proportion of infections in this age group is likely to be recent, given that this age group is more likely to engage in testing and repeat testing. Studies in the United States and the United Kingdom have also found that HIV incidence was highest among men in their 30s and 40s. Other evidence points to the possibility of continued high transmission rates as well. HIV incidence remained stable among MSM in a few areas in the United States, according to data available for the early years of our study period.

The goals for the health of the nation set by the Department of Health and Human Services include the elimination of health disparities by race/ethnicity and the prevention of HIV infection and its related illness and death. We found not only that rates of HIV diagnoses continue to be higher for Black and Hispanic MSM but also that HIV progressed to AIDS earlier in MSM of color than in White MSM and that chances of survival 3 years after AIDS diagnosis was lower for Black than for White or Hispanic MSM. Poor outcomes (progression to AIDS or death) may...
be related to late diagnosis in the disease process or lack of adequate access to treatment.

Data showing lower CD4+ T-cell counts at AIDS diagnosis among Black and Hispanic MSM compared with White MSM suggest that HIV diagnoses for Black and Hispanic MSM tend to be made at a later stage of disease. Black and Hispanic MSM are more likely than White MSM to be unaware of being HIV infected, indicating lower testing rates among Blacks and Hispanics and, therefore, a higher potential for late diagnosis. There is also evidence that people of color have lower rates of treatment utilization and less knowledge about treatment compared with Whites, which may explain the poorer disease outcomes for Black and Hispanic MSM.

**Limitations**

Our analyses are subject to several limitations. The data from 33 states may not be representative of the whole United States, because these states reported only 63% of all AIDS cases diagnosed during 2001 through 2004. For the first time, data for 2001 through 2004 include New York, and this substantial addition with previous reports. However, data were not available for some states with high rates of HIV infection, such as California, Maryland, and Pennsylvania. Further, the accuracy of Hispanic classification is unknown. We also did not have sufficient data on Asian/Pacific Islander or American Indian/Alaska Native MSM to present their results. Because

**Conclusions**

In summary, interventions are needed to stem continued HIV transmission to meet the federal government’s Healthy People 2010 goals of decreases in HIV infections, decreases in AIDS diagnoses among MSM, and decreases in racial/ethnic health disparities. Studies have shown that increasing the proportion of people who know their HIV status can lead to changes in behavior and may lead to decreases in HIV transmission. Integrating HIV screening into routine medical care would serve to detect HIV in the large number of MSM who are unaware of their HIV status and to detect HIV infection early for timely treatment utilizations.


<table>
<thead>
<tr>
<th>Characteristic</th>
<th>AIDS Diagnosis, %</th>
<th>% Surviving 1 Year After AIDS Diagnosis,* (95% CI)</th>
<th>% Surviving 3 Years After AIDS Diagnosis,* (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Race/ethnicity</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>White</td>
<td>50.4</td>
<td>89.6 (89.3, 89.9)</td>
<td>84.5 (84.2, 84.8)</td>
</tr>
<tr>
<td>Black</td>
<td>32.5</td>
<td>88.3 (87.9, 88.6)</td>
<td>80.6 (80.2, 81.0)</td>
</tr>
<tr>
<td>Hispanic</td>
<td>16.2</td>
<td>89.7 (89.5, 90.0)</td>
<td>85.2 (84.9, 85.4)</td>
</tr>
<tr>
<td>Age, y</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>13-19</td>
<td>0.5</td>
<td>97.8 (97.2, 98.3)</td>
<td>86.7 (86.1, 87.4)</td>
</tr>
<tr>
<td>20-29</td>
<td>14.7</td>
<td>92.9 (92.6, 93.2)</td>
<td>87.7 (87.4, 88.0)</td>
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<tr>
<td>30-39</td>
<td>46.8</td>
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<td>85.7 (85.5, 86.0)</td>
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<td>40-49</td>
<td>27.0</td>
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<td>81.3 (80.9, 81.7)</td>
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<td>50-59</td>
<td>8.7</td>
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<tr>
<td>≥60</td>
<td>2.4</td>
<td>70.1 (69.4, 70.8)</td>
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<tr>
<td>Diagnosis year</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>1996</td>
<td>21.1</td>
<td>86.2 (85.7, 86.7)</td>
<td>78.6 (78.0, 79.1)</td>
</tr>
<tr>
<td>1997</td>
<td>16.4</td>
<td>89.0 (88.5, 89.4)</td>
<td>82.5 (81.9, 83.0)</td>
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<tr>
<td>1998</td>
<td>13.4</td>
<td>88.9 (88.5, 89.4)</td>
<td>82.6 (82.1, 83.2)</td>
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<tr>
<td>1999</td>
<td>12.3</td>
<td>89.7 (89.2, 90.2)</td>
<td>84.3 (83.8, 84.8)</td>
</tr>
<tr>
<td>2000</td>
<td>12.3</td>
<td>90.1 (89.6, 90.6)</td>
<td>85.1 (84.6, 85.6)</td>
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<tr>
<td>2001</td>
<td>12.2</td>
<td>91.0 (90.5, 91.4)</td>
<td>86.0 (85.6, 86.3)</td>
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<tr>
<td>CD4+ T-cell count, cells/µL</td>
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<tr>
<td>&lt;50</td>
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<td>93.7 (93.4, 94.0)</td>
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<td>81.9 (81.4, 82.5)</td>
<td>76.9 (76.4, 77.4)</td>
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<tr>
<td>Total</td>
<td>100.0</td>
<td>89.1 (89.0, 89.3)</td>
<td>83.3 (83.1, 83.4)</td>
</tr>
</tbody>
</table>

Note. CI = confidence interval.

*Adjusted for all other variables shown in the table.

About 1% of men who have sex with men were of other races; data not shown because of small numbers.

Within 6 months of diagnosis.
intervention to slow disease progression. Prevention efforts will require reassessment of ongoing activities to ensure that resources target those at highest risk. In particular, interventions need to be tailored to the needs and behavioral context of Black and Hispanic youth for effective prevention, and to address stigma, distrust, and health literacy to improve access to HIV prevention and care.47,48

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Note. The findings and conclusions in this article are those of the authors and do not necessarily represent the views of the Centers for Disease Control and Prevention.

Contributors
H.I. Hall originated the study, contributed to study design, analysis, and interpretation, and led the writing. R.H. Byers designed and conducted the data modeling and contributed to the writing. Q Ling prepared the data for analysis and conducted the disease progression analyses. L. Espinoza contributed to data interpretation and discussion.

Human Participant Protection
No protocol approval was needed for this study.

References


Prevalence of HIV Infection and Predictors of High-Transmission Sexual Risk Behaviors Among Men Who Have Sex With Men

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Twenty-five years after the start of the HIV epidemic in the United States, HIV infection rates remain high and the majority of newly diagnosed HIV infections in 2004 occurred among men who have sex with men (MSM).1 Several recent studies of MSM living in urban areas have reported increased levels of unsafe sexual behaviors and HIV infection2–10 and have identified novel cofactors likely to be associated with increased HIV transmission, including use of methamphetamine,11–14 and Viagra,15 meeting sexual partners on the Internet,16–18 and treatment optimism (feeling less concern about acquiring HIV because of medications that can reduce HIV-related morbidity and mortality).19–22 However, these studies have not used probability designs, resulting in uncertainty in how to incorporate this information into programs to reduce HIV transmission. Therefore, we conducted a household telephone probability survey between June 2002 and January 2003 of 1976 adult MSM living in San Francisco, Calif. We collected information on sexual and drug-using behaviors and tested men for HIV, gonorrhea, and chlamydia infections.

METHODS

Survey Methods

The MSM were sampled with a random-digit-dial telephone survey of households in San Francisco. The sampling frame consisted of 50 telephone exchanges from a set of 198 exchanges that covered 13 zip codes where an estimated majority of MSM resided in 1996.23 An adaptive strategy was used to increase the efficiency of sampling.24 Once a telephone number was found to correspond to a household, the household was screened to identify eligible subjects. A household was eligible for sampling only once. Eligible households must have been in San Francisco and had at least 1 adult male who self-identified as homosexual or bisexual or had sex with another man at least once since age 14. Previously validated methods to increase the likelihood that a respondent would acknowledge same-gender sexual behaviors were employed.23,25 The respondent was asked how many eligible MSM resided in the household. If there was only 1 eligible man in the household, he was selected. If there were 2 eligible MSM, then the computer randomly selected 1 of the men to participate. If more than 2 men were eligible, then the respondent was asked to identify the housemate with the most recent birthday (excluding himself) and this man was asked to participate. If the respondent did not know the roommates’ birthdays, then the respondent was asked to choose any 1 of the eligible roommates (excluding himself).

Once an eligible respondent was selected, the purpose and procedures of the study were explained to the respondent and verbal consent was obtained. Interviews were conducted in English and Spanish with computer-assisted telephone interview technology by the Westat Corporation (Rockville, Md). Respondents were provided with $25 as compensation for the approximately 45-minute interview. At the end of the interview, respondents were asked to participate in testing for gonorrhea and chlamydia. Men who did not self-report being HIV infected were also asked to participate in HIV testing. All testing was done with urine-based tests. Those who consented to testing were mailed a home specimen collection kit along with instructions for obtaining and returning the specimen by mail to the local public health laboratory for testing. Participants in the testing portion of the study were provided with a unique study number and a telephone number to call to receive the results of their tests. Respondents who returned the test kits were compensated $30.

Objectives. We sought to determine the prevalence of HIV and novel cofactors of high-transmission-risk behavior in a probability sample of men who have sex with men (MSM).

Methods. We performed a cross-sectional telephone survey of 1976 adult MSM in San Francisco.

Results. We found an HIV prevalence of 25.2%. Predictors of unprotected insertive anal intercourse with a serodiscordant (not having the same HIV/AIDS serostatus) partner among HIV-infected men included use of Viagra and a greater number of partners in the past 12 months. Unprotected receptive anal intercourse with a serodiscordant partner among men not known to be HIV infected was independently associated with having lived in San Francisco for less than 1 year, use of crystal methamphetamine and amyl nitrites, a greater number of partners, and agreement with the statement, “You are less careful about being safe with sex or drugs than you were several years ago because there are better treatments for HIV now.”

call for their test results within 1 month of submitting their specimen were sent reminder letters with $5 cash enclosed as an incentive to call for test results. Treatments for gonorrhea and chlamydia infections were mailed to participants who tested positive for these agents and who called for test results. The HIV-infected participants were provided with referrals for HIV-related care when they called for their test results.

**Interview Measures**

The interview collected demographic and socioeconomic data, HIV-related sexual and drug-using risk behaviors data, history of HIV and other sexually transmitted diseases, and use of HIV-related health services (for those who self-reported being HIV infected). Participants were asked if they agreed with the statements, “HIV-positive men on HAART [highly active antiretroviral therapy] or combination drug therapy are less infectious than HIV-positive men not on such drugs” and “You are less careful about being safe with sex or drugs than you were several years ago because there are better treatments for HIV now.”

**Laboratory Methods**

Urine was tested for HIV antibody with the Calypte HIV-1 urine enzyme-linked immunosassay (Calypte Biomedical Corporation, Alameda, Calif) and confirmed with the Cambridge Biotech HIV-1 urine Western blot kit (Calypte Biomedical Corporation, Alameda, Calif). Testing for gonorrhea and chlamydia was done using the Gen-Probe APTIMA combo 2 assay (Gen-Probe Inc, San Diego, Calif).

**Statistical Methods**

Comparisons between HIV infection and demographic and risk characteristics were made using the Wilcoxon rank sum test for differences in medians and the chi² test for differences in proportions. To identify the cofactors independently associated with the behaviors likely to lead to HIV transmission, we used multiple logistic regression models in which we entered all variables that were associated with the outcome in the bivariate analysis at a P value less than 0.1. For HIV-infected men, HIV-transmission–risk behaviors were defined as unprotected insertive anal intercourse with serodiscordant (not having the same HIV/AIDS serostatus), non-primary sexual partners. For non–HIV-infected men, HIV-transmission–risk behaviors were defined as unprotected receptive anal intercourse with serodiscordant, nonprimary partners. Because we were assessing risk behaviors that were based upon the participants’ known serostatus, we used self-report of HIV infection for analysis of high-transmission-risk behaviors. The differences in point estimates and 95% confidence intervals (CI) were calculated with weights that were constructed from the sampling probabilities and the nonresponse proportions and standardized to the size of the completed sample. Sampling weights were developed by the Westat Corporation (Rockville, Md). Crude analyses were conducted with SAS version 8.2 (SAS Institute Inc, Cary, NC) and weighted analyses were conducted with Stata SE 8.2 (Stata Corp, College Station, Tex).

**RESULTS**

A total of 733787 telephone numbers were called to identify 15272 households, of which 2676 held eligible MSM. Of the eligible MSM, 1976 (74%) participated in the interview. Ninety-four percent (n=1862) of the participating MSM had been tested for HIV in the past, and 492 of these reported that they were HIV infected. Of the remaining 1484 respondents, 1049 (71%) completed the urine-based HIV and sexually transmitted disease testing, and of the 492 respondents who reported being HIV infected, 347 (71%) completed the sexually transmitted disease testing. Urine-based testing identified 8 previously unknown HIV infections, 1 case of gonorrhea, and 8 cases of chlamydia. None of the individuals with these infections had more than 1 infection identified.

The men ranged in age from 18 to 92 years with a median age of 42 years (interquartile range, 35 to 52 years). The sample was predominately White (75%) and well educated (87%) had completed at least some college; Table 1). More than half of the men had lived in San Francisco for more than 10 years.

Weighted HIV prevalence (based upon both self-report of HIV infection and results from HIV testing in this study) was 25.2% (95% CI=23.3, 27.2) and differed little from the crude prevalence (Table 1). Prevalence of HIV was highest among men aged 45 to 54 years. There were no HIV infections among men aged younger than 25 years. African Americans had the highest HIV prevalence (40%), whereas prevalence was lowest among Asians and Pacific Islanders (17%). Prevalence of HIV was higher among those with less education and lower income levels. Prevalence increased with the number of years the individual had lived in San Francisco.

Eighty-five percent of the men were sexually active in the previous 12 months, and 81% reported having sex with a man in that time period (Table 2). Unprotected anal intercourse with a partner of the same serostatus was more frequent among men with primary partners than among men with nonprimary partners, and unprotected anal intercourse with serodiscordant partners was more frequent among men with nonprimary partners than among men with primary partners. HIV-infected persons (based upon self-report of HIV infection as well as results from testing in this study) were more likely to report high-risk sexual behaviors, diagnosis of a sexually transmitted disease, and use of Viagra in the past 12 months than were non–HIV-infected men.

Men who were infected with HIV were more likely to use amyl nitrites (poppers) and crystal methamphetamine than were non–HIV-infected men (Table 2). Amyl nitrites were the most frequently used illicit drug among the men who were HIV infected; 36.5% used amyl nitrites in the past 12 months, and 7.4% reported using them on a weekly or daily basis. Crystal methamphetamine was used by 26% of HIV-infected men compared with 13.6% of non–HIV-infected men, and 7% of the infected men reported daily or weekly crystal methamphetamine use compared with 2% of the uninfected men. Although substantial proportions of the men reported using cocaine and “club drugs” (such as ketamine), the proportion of men using these drugs did not differ by HIV serostatus.

Of those men who knew that they were HIV infected at the time of the survey (those who tested HIV positive during this study were considered HIV negative or unknown for this analysis), 16.5% reported unprotected insertive anal intercourse with a
table 1—sample sociodemographic characteristics and HIV prevalence among MSM: San Francisco, 2002–2003

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Total</th>
<th>Crude Prevalence, No. (%)</th>
<th>Weighted Prevalence, *</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>1976</td>
<td>500 (25.3)</td>
<td>25.2 (23.3, 27.2)</td>
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<tr>
<td>Age, y</td>
<td>&lt; .001</td>
<td>&lt; .001</td>
<td></td>
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<tr>
<td>18–24</td>
<td>52</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>25–34</td>
<td>375</td>
<td>50 (13.3)</td>
<td>13.6 (10.3, 17.9)</td>
<td>.37</td>
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<tr>
<td>35–44</td>
<td>706</td>
<td>209 (29.6)</td>
<td>30.0 (26.5, 33.7)</td>
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<tr>
<td>45–54</td>
<td>485</td>
<td>168 (34.6)</td>
<td>34.1 (29.4, 38.7)</td>
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<tr>
<td>≥55</td>
<td>358</td>
<td>73 (20.4)</td>
<td>20.5 (16.5, 25.2)</td>
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</tr>
<tr>
<td>Race/ethnicity</td>
<td>.019</td>
<td>.036</td>
<td></td>
<td></td>
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<tr>
<td>White</td>
<td>1490</td>
<td>370 (24.8)</td>
<td>24.7 (22.5, 27.1)</td>
<td>.02</td>
</tr>
<tr>
<td>African American</td>
<td>63</td>
<td>24 (38.1)</td>
<td>40.1 (28.2, 53.4)</td>
<td>.03</td>
</tr>
<tr>
<td>Asian/Pacific Islander</td>
<td>67</td>
<td>11 (16.4)</td>
<td>17.1 (8.5, 28.9)</td>
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<tr>
<td>Latino</td>
<td>193</td>
<td>60 (31.1)</td>
<td>29.3 (23.0, 36.4)</td>
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<tr>
<td>Mixed race</td>
<td>53</td>
<td>13 (24.5)</td>
<td>21.6 (12.4, 35.1)</td>
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<tr>
<td>Other</td>
<td>120</td>
<td>22 (20.0)</td>
<td>21.9 (14.7, 31.4)</td>
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<td>Education</td>
<td>&lt; .001</td>
<td>&lt; .001</td>
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<tr>
<td>Some high school</td>
<td>44</td>
<td>18 (40.9)</td>
<td>40.9 (26.7, 56.9)</td>
<td>.08</td>
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<tr>
<td>High-school graduate</td>
<td>180</td>
<td>55 (30.6)</td>
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<tr>
<td>Some college</td>
<td>486</td>
<td>175 (36.0)</td>
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<td>College graduate</td>
<td>720</td>
<td>147 (20.4)</td>
<td>20.1 (17.2, 23.4)</td>
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<tr>
<td>Graduate degree</td>
<td>508</td>
<td>95 (18.7)</td>
<td>18.0 (14.8, 21.7)</td>
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<tr>
<td>No. years living in San Francisco</td>
<td>&lt; .001</td>
<td>&lt; .001</td>
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</tr>
<tr>
<td>&lt; 1</td>
<td>60</td>
<td>7 (11.7)</td>
<td>13.5 (6.4, 26.2)</td>
<td>.04</td>
</tr>
<tr>
<td>1–5</td>
<td>368</td>
<td>52 (14.1)</td>
<td>14.1 (10.6, 18.5)</td>
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<tr>
<td>6–10</td>
<td>421</td>
<td>89 (21.1)</td>
<td>20.9 (17.1, 25.4)</td>
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<tr>
<td>&gt; 10</td>
<td>1095</td>
<td>342 (31.2)</td>
<td>31.4 (28.6, 34.4)</td>
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<tr>
<td>Personal annual income, $</td>
<td>&lt; .001</td>
<td>&lt; .001</td>
<td></td>
<td></td>
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<td>&lt; 24,001</td>
<td>470</td>
<td>183 (38.9)</td>
<td>38.6 (34.1, 43.3)</td>
<td>.001</td>
</tr>
<tr>
<td>24,001–48,000</td>
<td>524</td>
<td>123 (23.5)</td>
<td>22.0 (18.5, 25.9)</td>
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<tr>
<td>48,001–72,000</td>
<td>389</td>
<td>82 (21.1)</td>
<td>21.1 (17.1, 25.8)</td>
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</tr>
<tr>
<td>72,001–96,000</td>
<td>225</td>
<td>47 (20.9)</td>
<td>21.4 (16.2, 27.7)</td>
<td></td>
</tr>
<tr>
<td>≥96,001</td>
<td>299</td>
<td>48 (16.1)</td>
<td>15.9 (12.0, 20.9)</td>
<td></td>
</tr>
</tbody>
</table>

Notes. MSM = men who have sex with men; CI = confidence intervals.
*Prevalence based upon self-report and results from HIV testing in this study.
χ2 test for associations between all variable categories.

Discussion

The findings from this population-based study—a high prevalence of HIV infection and evidence of high-transmission–risk behaviors among both infected and uninfected MSM—demonstrate that conditions for continued HIV transmission persist among MSM in San Francisco. Our prevalence rate of 25% is similar to the prevalence among MSM in San Francisco surveyed 2 years later (24%).

Prevalence of HIV was higher among African American and Latino men compared with White men. Increased prevalence among African American and Latino men was found in a large survey of young MSM conducted in 7 large metropolitan areas of the United States in the mid- to late 1990s and in a more recent multicity study. Rates of AIDS nationally are also higher among African American and Latino men; for example, in 2004, 50% of new HIV/AIDS diagnoses occurred among African American and Latino men. This behavior was associated with younger age, fewer years living in San Francisco, use of illicit drugs and Viagra, having met their sex partner on the Internet, having received money or drugs in exchange for sex, a greater number of partners, and agreeing with the statement of being less careful with sexual intercourse and drug use now than several years ago because of the availability of more effective therapies for HIV infection (Table 4).

In multivariate analysis, independent predictors of unprotected insertive intercourse with a serodiscordant partner among the HIV-infected men included use of crystal methamphetamine and amyl nitrites, a greater number of partners, and agreeing with the statement that they are less careful about being safe with sex or drugs because of the availability of HAART (Table 3).

In multivariate analysis, independent predictors of unprotected receptive anal intercourse with a serodiscordant partner among HIV-negative men included living in San Francisco for less than 1 year, use of crystal methamphetamine and amyl nitrites, a greater number of partners, and agreeing with the statement of being less careful with sexual intercourse and drug use now than several years ago because of the availability of more effective therapies for HIV infection (Table 4).

HAART itself was not predictive of this risk behavior.

Unprotected receptive anal intercourse with a serodiscordant partner occurred among 5.4% of the men who reported being HIV negative or having an unknown serostatus. This behavior was associated with younger age, fewer years living in San Francisco, use of illicit drugs and Viagra, having met their sex partner on the Internet, having received money or drugs in exchange for sex, a greater number of partners, and agreeing with the statement that they are less careful about being safe with sex or drugs because of the availability of HAART (Table 4).

After we controlled for confounding, independent predictors that were statistically significant of unprotected receptive anal intercourse with a serodiscordant partner among HIV-negative men included living in San Francisco for less than 1 year, use of crystal methamphetamine and amyl nitrites, a greater number of partners, and agreeing with the statement of being less careful with sexual intercourse and drug use now than several years ago because of the availability of more effective therapies for HIV infection (Table 4).

<table>
<thead>
<tr>
<th>Sexual Risk Behaviors</th>
<th>Percentage Reporting Behavior (n = 500)</th>
<th>Percentage HIV-positive (n = 1476)</th>
<th>Percentage HIV-negative (n = 1476)</th>
<th>Bivariate P</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sexual behaviors</td>
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<td></td>
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</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sexually active</td>
<td>85.1</td>
<td>87.7</td>
<td>84.2</td>
<td>.065</td>
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<tr>
<td>Sexual intercourse with a man</td>
<td>81.0</td>
<td>87.2</td>
<td>78.9</td>
<td>.001</td>
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<tr>
<td>Primary male partner</td>
<td>44.5</td>
<td>46.3</td>
<td>43.9</td>
<td>.369</td>
</tr>
<tr>
<td>Nonprimary male partner</td>
<td>62.4</td>
<td>71.7</td>
<td>59.2</td>
<td>&lt; .001</td>
</tr>
<tr>
<td>Sexual intercourse with a woman</td>
<td>7.8</td>
<td>2.3</td>
<td>9.6</td>
<td>&lt; .001</td>
</tr>
<tr>
<td>Sexual intercourse with a partner from Internet</td>
<td>26.9</td>
<td>30.9</td>
<td>25.6</td>
<td>.030</td>
</tr>
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<td>No. male partners, median</td>
<td>5</td>
<td>3</td>
<td>3</td>
<td>&lt; .001</td>
</tr>
<tr>
<td>Received money or drugs for sex</td>
<td>2.3</td>
<td>3.8</td>
<td>1.8</td>
<td>.011</td>
</tr>
<tr>
<td>Gave money or drugs for sex</td>
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<td>6.2</td>
<td>4.7</td>
<td>.206</td>
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<tr>
<td>Sexual behaviors with primary male partners</td>
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<tr>
<td>Unprotected receptive anal intercourse</td>
<td>17.2</td>
<td>19.7</td>
<td>16.4</td>
<td>.114</td>
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<td>Unprotected receptive anal intercourse with partner of unknown or different HIV serostatus</td>
<td>3.1</td>
<td>6.1</td>
<td>2.1</td>
<td>&lt; .001</td>
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<tr>
<td>Unprotected receptive anal intercourse with partner of same HIV serostatus</td>
<td>14.2</td>
<td>14.0</td>
<td>14.2</td>
<td>.900</td>
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<tr>
<td>Unprotected insertive anal intercourse</td>
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<td>18.0</td>
<td>19.1</td>
<td>.607</td>
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<td>Unprotected insertive anal intercourse with partner of unknown or different HIV serostatus</td>
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<td>3.1</td>
<td>3.6</td>
<td>.616</td>
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<td>15.6</td>
<td>14.8</td>
<td>15.9</td>
<td>.551</td>
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<tr>
<td>Sexual behaviors with nonprimary male partners</td>
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<td></td>
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<tr>
<td>Unprotected receptive anal intercourse</td>
<td>14.0</td>
<td>30.5</td>
<td>8.4</td>
<td>&lt; .001</td>
</tr>
<tr>
<td>Unprotected receptive anal intercourse with partner of unknown or different HIV serostatus</td>
<td>8.7</td>
<td>18.7</td>
<td>5.3</td>
<td>&lt; .001</td>
</tr>
<tr>
<td>Unprotected receptive anal intercourse with partner of same HIV serostatus</td>
<td>5.5</td>
<td>11.6</td>
<td>3.3</td>
<td>&lt; .001</td>
</tr>
<tr>
<td>Unprotected insertive anal intercourse</td>
<td>18.9</td>
<td>31.5</td>
<td>14.6</td>
<td>&lt; .001</td>
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<tr>
<td>Unprotected insertive anal intercourse with partner of unknown or different HIV serostatus</td>
<td>12.2</td>
<td>16.5</td>
<td>10.8</td>
<td>.002</td>
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<tr>
<td>Unprotected insertive anal intercourse with partner of same HIV serostatus</td>
<td>6.9</td>
<td>15.2</td>
<td>4.1</td>
<td>&lt; .001</td>
</tr>
<tr>
<td>Diagnosed with STD</td>
<td>10.9</td>
<td>17.9</td>
<td>8.6</td>
<td>&lt; .001</td>
</tr>
<tr>
<td>Drug usea</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Used Viagra</td>
<td>27.8</td>
<td>44.2</td>
<td>22.4</td>
<td>&lt; .001</td>
</tr>
<tr>
<td>Amyl nitrite use</td>
<td></td>
<td></td>
<td></td>
<td>&lt; .001</td>
</tr>
<tr>
<td>Did not use at all</td>
<td>74.5</td>
<td>63.4</td>
<td>78.4</td>
<td></td>
</tr>
<tr>
<td>Used ≤ 3 days per month</td>
<td>21.4</td>
<td>29.1</td>
<td>18.7</td>
<td></td>
</tr>
<tr>
<td>Used weekly or daily</td>
<td>4.1</td>
<td>7.4</td>
<td>3.0</td>
<td></td>
</tr>
<tr>
<td>Crystal methamphetamine use</td>
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<td></td>
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<td>Did not use at all</td>
<td>83.2</td>
<td>74.0</td>
<td>86.4</td>
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<td>Used ≤ 3 days per month</td>
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<td>18.9</td>
<td>11.6</td>
<td></td>
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<td>7.1</td>
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<tr>
<td>Cocaine use</td>
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<td>.547</td>
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<td>Did not use at all</td>
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<td>83.5</td>
<td>85.8</td>
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<td>Used ≤ 3 days per month</td>
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<td>15.7</td>
<td>13.6</td>
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</tr>
<tr>
<td>Used weekly or daily</td>
<td>0.7</td>
<td>0.8</td>
<td>0.6</td>
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<tr>
<td>Club drugd use</td>
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<td>.725</td>
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<tr>
<td>Did not use at all</td>
<td>79.4</td>
<td>78.7</td>
<td>79.7</td>
<td></td>
</tr>
<tr>
<td>Used ≤ 3 days per month</td>
<td>20.0</td>
<td>20.5</td>
<td>19.9</td>
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</tr>
<tr>
<td>Used weekly or daily</td>
<td>0.5</td>
<td>0.8</td>
<td>0.5</td>
<td></td>
</tr>
</tbody>
</table>

Notes. MSM = men who have sex with men; STD = sexually transmitted disease.

*aPercentages are weighted for survey design.

*bHIV status determined on the basis of self-report and results from HIV testing in this study.

*cIn past 12 months.

*dSuch as ketamine hydrochloride (K or special K), methylenedioxyamphetamine (ecstasy), gamma butyrolactone (G or GBH), or gamma hydroxybutyrate (G or GBH).

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>% Reporting UIAI (n = 81)</th>
<th>Adjusted OR (95% CI)</th>
<th>Bivariate P</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Age, y</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>18–24</td>
<td>0.93 (0.9, 1.0)</td>
<td>.93 (0.6, 1.3)</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>25–34</td>
<td>29.7</td>
<td></td>
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</tr>
<tr>
<td>35–44</td>
<td>21.7</td>
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</tr>
<tr>
<td>45–54</td>
<td>11.8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>≥55</td>
<td>2.8</td>
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</tr>
<tr>
<td><strong>Race/ethnicity</strong></td>
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<td>.699</td>
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<td>White</td>
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</tr>
<tr>
<td>African American</td>
<td>16.2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Asian/Pacific Islander</td>
<td>0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Latino</td>
<td>18.7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mixed race</td>
<td>7.4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td>17.6</td>
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<td></td>
</tr>
<tr>
<td><strong>Education</strong></td>
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<td></td>
<td>.460</td>
</tr>
<tr>
<td>Some high school</td>
<td>6.1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>High school graduate</td>
<td>17.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Some college</td>
<td>14.0</td>
<td></td>
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</tr>
<tr>
<td>College graduate</td>
<td>20.6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Graduate degree</td>
<td>18.8</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>No. years living in San Francisco</strong></td>
<td></td>
<td></td>
<td>.007</td>
</tr>
<tr>
<td>&lt;1</td>
<td>53.2</td>
<td>2.48 (0.6, 11.1)</td>
<td></td>
</tr>
<tr>
<td>1–5</td>
<td>27.7</td>
<td>1.93 (0.7, 5.3)</td>
<td></td>
</tr>
<tr>
<td>6–10</td>
<td>15.3</td>
<td>0.58 (0.2, 1.56)</td>
<td></td>
</tr>
<tr>
<td>≥10</td>
<td>14.0</td>
<td>Referent</td>
<td></td>
</tr>
<tr>
<td><strong>Personal annual income, $</strong></td>
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<td></td>
<td>.286</td>
</tr>
<tr>
<td>&lt;24 001</td>
<td>19.8</td>
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<tr>
<td>24 001–48 000</td>
<td>16.8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>48 001–72 000</td>
<td>9.6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>72 001–96 000</td>
<td>20.8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>≥96 001</td>
<td>11.8</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Risk behaviors</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Crystal methamphetamine use</td>
<td>29.9</td>
<td>0.89 (0.4, 1.9)</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Amyl nitrite (popper) use</td>
<td>28.1</td>
<td>1.22 (0.6, 2.5)</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Club drug use&lt;sup&gt;a&lt;/sup&gt;</td>
<td>33.6</td>
<td>1.14 (0.5, 2.5)</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Cocaine use&lt;sup&gt;a&lt;/sup&gt;</td>
<td>24.1</td>
<td>0.99 (0.5, 2.1)</td>
<td>.079</td>
</tr>
<tr>
<td>Viagra use&lt;sup&gt;a&lt;/sup&gt;</td>
<td>27.5</td>
<td>2.34 (1.1, 5.0)</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Sexual intercourse with partner from Internet&lt;sup&gt;a&lt;/sup&gt;</td>
<td>29.3</td>
<td>0.82 (0.4, 1.6)</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Received money/drugs for sex&lt;sup&gt;a&lt;/sup&gt;</td>
<td>42.6</td>
<td>2.07 (0.7, 6.0)</td>
<td>.004</td>
</tr>
<tr>
<td>Gave money/drugs for sex&lt;sup&gt;a&lt;/sup&gt;</td>
<td>28.3</td>
<td>Referent</td>
<td>.101</td>
</tr>
<tr>
<td><strong>No. of male sexual partners in past 12 months</strong></td>
<td></td>
<td></td>
<td>.001</td>
</tr>
<tr>
<td>1</td>
<td>14.0</td>
<td>0.04 (0.01, 0.3)</td>
<td></td>
</tr>
<tr>
<td>2–5</td>
<td>62.8</td>
<td>0.14 (0.05, 0.4)</td>
<td></td>
</tr>
<tr>
<td>≥6</td>
<td>30.3</td>
<td>Referent</td>
<td></td>
</tr>
</tbody>
</table>

Continued

Americans. These findings are consistent with a shift in the HIV epidemic to minority populations and highlight the need for culturally relevant and effective prevention and care programs.

We found evidence of high-transmission sexual risk behavior especially among the HIV-positive MSM, with lower rates among the HIV-negative men. Unprotected anal intercourse between serodiscordant partners has been occurring despite specific prevention efforts designed to encourage men to disclose their HIV status to partners and to use condoms during anal intercourse.

Crystal methamphetamine use was high overall and was independently and strongly predictive of high-transmission sexual risk behavior among the non–HIV-infected men. Although crystal methamphetamine use was significantly associated with unprotected insertive anal intercourse among HIV-infected men with their uninfected or unknown serostatus partners in the bivariate analysis, it was not retained in the final multivariate model. One reason that crystal methamphetamine may not have been retained in the final model is that there was significant colinearity between methamphetamine use and club drugs ($r=0.47$), amyl nitrites ($r=0.39$), and cocaine ($r=0.29$) among men who were HIV infected.

Although on the basis of these data we cannot determine which illicit drug is actually resulting in high-transmission-risk sexual intercourse, we believe that it is likely that it is crystal methamphetamine for several reasons. First, we found a significant association between crystal methamphetamine use and high-transmission–risk sexual intercourse in the much larger group of non–HIV-infected men. Second, crystal methamphetamine use has been associated with high-risk sex in other studies of MSM. In addition, we conducted an additional logistic regression analysis in which we excluded all drugs except crystal methamphetamine from the model, and we found that use of methamphetamine was independently predictive of high-transmission–risk sexual intercourse among the men who were HIV infected (odds ratio = 1.9; 95% CI = 1.1, 3.3).

Anecdotal reports have suggested that crystal methamphetamine is used by MSM in...
TABLE 3—Continued

HIV transmission attitudes
Ages with the statement "HIV-positive men on HAART or combination drug therapy are less infectious than HIV-positive men not on such drugs." 1

Agrees with the statement "You are less careful about being safe with sex or drugs than you were several years ago because there are better treatments for HIV now." 2

Medical care for HIV
Has received HIV-specific medical care
Receiving HAART

Duration known to be HIV positive, y
< 1
1–2
3–4
5–6
7–8
9–10
>10

25.1
26.5
21.6
17.1
13.6
21.2
14.1

21.77 (0.9, 3.4)
1.28 (0.6, 2.7)

.003
.005

Notes. MSM = men who have sex with men; OR = odds ratio; CI = confidence intervals; NA = not applicable; HAART = highly active antiretroviral therapy.

* Only men who self-reported being HIV infected were included.

† Results were weighted for survey design.

‡ All variables found to be statistically significant (P < .1) in bivariate analysis were entered into the logistic regression model.

§ Odds of infection per year of age (with 18 years as the reference).

∥ Risk behaviors in the past 12 months.

¶ Reference group was not having participated in the risk behavior or not agreeing with the statements.

The availability of effective antiretroviral therapies appears to have had the unfortunate effect of increasing risk behavior among non–HIV-infected men. High-transmission–risk sexual intercourse among the uninfected men was more likely among those who agreed with a statement that they were less careful with sexual intercourse and drug use now than in the past because of the availability of HAART. This is consistent with findings from studies exploring attitudes and high-risk behavior shortly after protease inhibitors became widely available. 3, 19–22 Prevention efforts must take into account current attitudes because of the effect they have on behavior.

In addition to the recently identified cofactors for HIV transmission, long-standing risk factors for high-risk behavior continue to be important. Use of amyl nitrate, long associated with high-risk sexual behavior among MSM, was associated with high-transmission–risk sexual intercourse. In addition, illicit drug use was a common finding among both infected and uninfected men. The association between the use of these drugs and HIV risk behaviors and infection among MSM identified in this and other studies 11–14 highlights the need to develop drug treatment programs specifically tailored for MSM who use these drugs.

Limitations
Although a key strength of our study is that we used a probability sample of MSM, there are limitations to consider. There has been an increase in the use of cell phones in recent years, and our sample only included residential phones. However, this is not likely to be a source of substantial bias. In a survey during the first 6 months of 2003 only 3% of households were found to rely exclusively on cell phones. 23

We selected telephone exchanges that corresponded to the MSM-dense areas of the city, and thus we were less likely to have included households outside these areas; risk...
### TABLE 4—Unprotected Receptive Anal Intercourse (URAI) Among HIV-Negative* MSM With Nonprimary Partners Whose HIV Serostatus Was Positive or Unknown (n = 1485), San Francisco, 2002–2003

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>% Reporting URAI (n = 72)</th>
<th>Adjusted OR (95% CI)</th>
<th>Bivariate P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age group, y</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>18–24</td>
<td>6.8</td>
<td>1.0 (0.9, 1.0)</td>
<td>.20</td>
</tr>
<tr>
<td>25–34</td>
<td>6.2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>35–44</td>
<td>7.4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>45–54</td>
<td>4.7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>≥55</td>
<td>1.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Race/ethnicity</td>
<td></td>
<td></td>
<td>.632</td>
</tr>
<tr>
<td>White</td>
<td>5.1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>African American</td>
<td>6.9</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Asian/Pacific Islander</td>
<td>7.2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Latino</td>
<td>5.5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mixed race</td>
<td>0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td>7.9</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Education</td>
<td></td>
<td></td>
<td>.799</td>
</tr>
<tr>
<td>Some high school</td>
<td>7.2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>High school graduate</td>
<td>4.4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Some college</td>
<td>6.2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>College graduate</td>
<td>5.9</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Graduate degree</td>
<td>4.3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No. years living in San Francisco</td>
<td></td>
<td></td>
<td>.001</td>
</tr>
<tr>
<td>&lt;1</td>
<td>15.8</td>
<td>5.45 (1.6, 19.1)</td>
<td></td>
</tr>
<tr>
<td>1–5</td>
<td>6.0</td>
<td>1.37 (0.5, 3.4)</td>
<td></td>
</tr>
<tr>
<td>6–10</td>
<td>7.5</td>
<td>1.34 (0.6, 3.1)</td>
<td></td>
</tr>
<tr>
<td>&gt;10</td>
<td>3.5</td>
<td>Referent</td>
<td></td>
</tr>
<tr>
<td>Personal annual income, $</td>
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<td>&lt;24 001</td>
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<tr>
<td>24 001–48 000</td>
<td>6.0</td>
<td></td>
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<tr>
<td>48 001–72 000</td>
<td>4.6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>72 001–96 000</td>
<td>3.7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>≥96 001</td>
<td>4.1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Risk behaviors*</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Crystal methamphetamine use</td>
<td>36.6</td>
<td>2.76 (1.3, 5.7)</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Amyl nitrite (popper) use</td>
<td>16.0</td>
<td>2.63 (1.3, 5.16)</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Club drug use*</td>
<td>11.0</td>
<td>1.03 (0.5, 2.1)</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Cocaine use*</td>
<td>10.6</td>
<td>1.12 (0.5, 2.5)</td>
<td>.002</td>
</tr>
<tr>
<td>Viagra use*</td>
<td>8.9</td>
<td>0.84 (0.4, 1.6)</td>
<td>.003</td>
</tr>
<tr>
<td>Sexual intercourse with partner from Internet*</td>
<td>12.1</td>
<td>1.07 (0.6, 1.9)</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Received money or drugs for sex*</td>
<td>18.2</td>
<td>1.21 (0.4, 3.8)</td>
<td>.007</td>
</tr>
<tr>
<td>Gave money or drugs for sex*</td>
<td>7.6</td>
<td>Referent</td>
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</tr>
<tr>
<td>No. of male sexual partners in past 12 months</td>
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<td></td>
<td>&lt;.001</td>
</tr>
<tr>
<td>1</td>
<td>0.4</td>
<td>0.05 (0.01, 0.4)</td>
<td></td>
</tr>
<tr>
<td>2–5</td>
<td>2.6</td>
<td>0.28 (0.1, 0.6)</td>
<td></td>
</tr>
<tr>
<td>≥6</td>
<td>13.6</td>
<td>Referent</td>
<td></td>
</tr>
</tbody>
</table>

Continued
MSM in other cities. Shortly after HAART became widely available, we noted an increase in sexual risk behavior followed by increases in HIV incidence. Similar trends were later documented in the United States and elsewhere. In addition, in a multisite interview project of HIV-infected men conducted between 2000 and 2002, 6.3% of subjects reported high-transmission-risk sexual intercourse in the past 6 months, comparable to our finding of 5.4% reporting this behavior in the past 12 months.

Conclusions

Our findings suggest several areas for novel and improved interventions to reduce HIV transmission among MSM in the face of a mature epidemic. Specific drug treatment and prevention programs aimed at use of amyl nitrite and crystal methamphetamine appear necessary. In addition, expanding the types of counseling services for MSM may also be helpful. For example, cognitive therapy has been found to be effective in risk reduction among both HIV-infected and non—HIV-infected men.

We found that men with primary partners had lower rates of HIV infection, and with the exception of unprotected receptive anal intercourse with a serodiscordant partner, sexual behaviors with primary partners were not associated with HIV infection. Methods to promote developing and sustaining respectful, committed relationships such as laws permitting civil unions and marriage between MSM may contribute to decreased HIV transmission.

In the third decade of the HIV epidemic, it is clear that MSM remain severely impacted by HIV/AIDS and that risk behaviors in this group are resulting in ongoing HIV transmission. Research to identify models that understand and predict high-risk behavior may help in developing effective prevention programs. Efforts to conduct high-quality studies of HIV incidence, prevalence, attitudes, and detailed sexual and drug use behaviors should be a priority to keep prevention efforts relevant.

**TABLE 4—Continued**

<table>
<thead>
<tr>
<th>HIV transmission attitudes</th>
<th>OR (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agrees with the statement “HIV-positive men on HAART or combination drug therapy are less infectious than HIV-positive men not on such drugs.”</td>
<td>5.6 (2.3, 9.7)</td>
</tr>
</tbody>
</table>

Notes. MSM = men who have sex with men; OR = odds ratio; CI = confidence intervals; HAART = highly active antiretroviral therapy.

*Only men who self-reported being non—HIV-infected were included.

Results were weighted for survey design.

All variables found to be statistically significant (P < .1) in bivariate analysis were entered into the logistic regression model.

The reference group was not having participated in the risk behavior or not agreeing with the statements.

Such as ketamine hydrochloride (K or special K), methylenedioxymethamphetamine (ecstasy), gamma butyrolactone (G or GBH), or gamma hydroxybutyrate (G or GBH).

**Contributions**

S. Schwarzw, W. McFarland, L. Valleroy, and J. Catania contributed to study concept, design, and questionnaire development. Acquisition of data was performed by S. Schwarzw, W. McFarland, S. Scheer, and J. Catania. Data were analyzed and interpreted by S. Schwarzw, W. McFarland, S. Scheer, S. Chen, and M. Katz. S. Schwarzw drafted the article, and S. Scheer, W. McFarland, M. Katz, and L. Valleroy provided critical revision of the article for important intellectual content.

**Human Participant Protection**

Approval for this study was obtained from institutional review boards at Westat Inc, the Centers for Disease Control and Prevention, and the University of California, San Francisco. Informed consent was obtained from all participants.

**Acknowledgments**

This study was supported through the Centers for Disease Control and Prevention (cooperative agreement U62/CCU906255).

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**References**


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Trends in Primary and Secondary Syphilis Among Men Who Have Sex with Men in the United States

James D. Heffelfinger, MD, MPH, Emmett B. Swint, MS, Stuart M. Berman, MD, ScM, and Hillard S. Weinstock, MD, MPH

Syphilis is an ulcerative genital disease that facilitates transmission and acquisition of HIV infection and provides a marker of behaviors associated with HIV infection. Although syphilis is uncommon in much of the US population, several groups are disproportionately affected, including African Americans, Hispanics, and men who have sex with men (MSM). During the 1980s, the incidence of primary and secondary syphilis increased 54%, and racial/ethnic and regional disparities became more pronounced.

However, the rapid decline in the rate of syphilis infection and the increasing concentration of cases in a small proportion of US counties during the early to mid-1990s led to optimism that syphilis could be eliminated in the United States. The National Plan to Eliminate Syphilis was announced in October 1999, with elimination defined as the absence of sustained transmission of syphilis. Healthy People 2010 objectives calling for decreases in rates and disparities in occurrence of disease among racial and ethnic groups were developed along with the syphilis elimination plan.

During the 1990s, the overall incidence of syphilis and racial/ethnic disparities in the occurrence of disease declined; however, the rate of primary and secondary syphilis has increased each year since 2001. Although syphilis cases among MSM accounted for a small proportion of cases between the mid-1980s and the late 1990s, cases among MSM have been increasing in recent years. Increases in high-risk sexual behavior among MSM have been documented since the mid-1990s, and there have been reports of syphilis outbreaks among MSM in a number of US cities, Europe, and the United Kingdom since the late 1990s. We examined gender, racial/ethnic, and geographic trends in the incidence of primary syphilis and secondary syphilis (hereafter combined as “syphilis”) in the United States during 1990 through 2003, with particular attention to the reemergence of syphilis among MSM since the late 1990s.

Objectives. We assessed the epidemiology of primary and secondary syphilis in the United States and estimated the percentages of cases occurring among men who have sex with men (MSM).

Methods. We reviewed US syphilis surveillance data from 1990 through 2003. We estimated the number of cases occurring among MSM by modeling changes in the ratio of syphilis cases among men to cases among women.

Results. During 1990 through 2000, the rate of primary and secondary syphilis decreased 90% overall, declining 90% among men and 89% among women. The overall rate increased 19% between 2000 and 2003, reflecting a 62% increase among men and a 53% decrease among women. In 2003, an estimated 62% of reported cases occurred among MSM.

Conclusions. Increasing syphilis cases among MSM account for most of the recent overall increase in rates and may be a harbinger of increasing rates of HIV infection among MSM. National efforts are under way to improve monitoring of syphilis trends, better understand factors associated with the observed increases, and improve efforts to prevent syphilis transmission. (Am J Public Health. 2007;97:1076–1083. doi:10.2105/AJPH.2005.070417)
each year during 2000 through 2003 using a model based on changes in the syphilis MFCR during 1998 through 2003. We estimated numbers of syphilis cases occurring annually among MSM during 2000 through 2003 using the following formula: MSM cases = (annual MFCR – 1998 MFCR)/annual MFCR × (annual number of cases among men). In this estimate, we assumed that (1) no cases of syphilis occurred among MSM when the MFCR was at or below the 1998 level of 1.26 and (2) any increase in the MFCR for nationally reported syphilis cases after 1998 could be attributed to cases occurring among MSM.

We selected the year 1998 as a baseline because surveillance data indicated that MFCRs had remained relatively constant for the previous 5 years. Although cases of syphilis occurred among MSM in 1998 and in other years during which the MFCR was at or below 1.26, we were not able to quantify them, and thus we made the conservative assumption that no cases occurred among MSM during these years. A study conducted to validate the model showed that the number of syphilis cases among MSM estimated using the model was similar to the number of cases among MSM determined with data, including partner gender, collected from 14 states or large cities during 1999 through 2002.37

**RESULTS**

Between 1990 and 2003, the incidence of syphilis in the United States declined 87.7%, reflecting decreases of 82% and 95% among men and women, respectively (Table 1). During these years, rates decreased in all racial/ethnic groups, declining 95% among African Americans, 81% among Hispanics, 53% among American Indians, 42% among Whites, and 38% among Asians. Rates also decreased in all US regions, declining 91% in the Northeast, 91% in the South, 79% in the Midwest, and 76% in the West. In 1990, cases of syphilis were reported by 42% of US counties, and 26 counties accounted for half of all reported cases; in 2003, only 19% of counties reported cases, and 18 counties and 1 independent city accounted for half of all reported cases.

Between 1990 and 2003, the age groups with the highest rates of syphilis changed in the case of men but not women. In 1990, rates were highest among men aged 20 to 24 years (56.3 cases per 100,000 men) and 30 to 34 years (56.2 cases per 100,000 men) and among women aged 20 to 24 years (61.4 cases per 100,000 women). In 2003, rates were highest among men aged 35 to 39 years (12.0 cases per 100,000 men) and women aged 20 to 24 years (2.4 cases per 100,000 women).

Syphilis rates declined consistently during the 1990s. From 1990 to 2000, rates among both men and women declined each year, and the overall rate in 2000 was the lowest at that point since the initiation of national reporting in 1941. Also during that period, overall rates of infection declined in all racial/ethnic groups and all regions of the United States, and rates decreased each year among African Americans and in the South. Over these years, rates decreased in 49 states and the District of Columbia and increased in 1 state. However, between 2000 and 2003, the overall syphilis rate increased 19%, with rates growing among men but continuing to decline among women.

Between 2000 and 2003, the rate among men increased 62%, and rates increased across all racial and ethnic groups with the exception of African Americans. The rate among women declined 53%, and rates declined among all racial and ethnic groups other than Asian women, among whom the rate did not change. Rising cases among White men accounted for most of

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**TABLE 1**—Primary and Secondary Syphilis Cases and Incidence Rates (per 100,000 Population), by Gender, Race/Ethnicity, and Region: United States, 1990, 2000, and 2003

<table>
<thead>
<tr>
<th>Race/ethnicity</th>
<th>Men</th>
<th>Women</th>
<th>Total</th>
<th>1990, No. (Rate)</th>
<th>2000, No. (Rate)</th>
<th>2003, No. (Rate)</th>
</tr>
</thead>
<tbody>
<tr>
<td>White</td>
<td>2 983</td>
<td>1 910</td>
<td>4 893</td>
<td>3.3</td>
<td>2.6</td>
<td>2.6</td>
</tr>
<tr>
<td>African American</td>
<td>22 621</td>
<td>18 791</td>
<td>41 612</td>
<td>165.8</td>
<td>122.0</td>
<td>142.8</td>
</tr>
<tr>
<td>Hispanic</td>
<td>2 366</td>
<td>1 109</td>
<td>3 475</td>
<td>20.8</td>
<td>10.1</td>
<td>15.2</td>
</tr>
<tr>
<td>Asian/Pacific Islander</td>
<td>76</td>
<td>37</td>
<td>113</td>
<td>2.1</td>
<td>1.0</td>
<td>1.6</td>
</tr>
<tr>
<td>American Indian</td>
<td>50</td>
<td>57</td>
<td>107</td>
<td>5.2</td>
<td>5.8</td>
<td>6.0</td>
</tr>
<tr>
<td>Region</td>
<td></td>
<td></td>
<td></td>
<td>Northeast</td>
<td>Midwest</td>
<td>South</td>
</tr>
<tr>
<td>Northeast</td>
<td>6 354</td>
<td>5 014</td>
<td>11 368</td>
<td>25.9</td>
<td>19.0</td>
<td>22.3</td>
</tr>
<tr>
<td>Midwest</td>
<td>2 585</td>
<td>1 875</td>
<td>4 460</td>
<td>8.9</td>
<td>6.1</td>
<td>7.5</td>
</tr>
<tr>
<td>South</td>
<td>15 844</td>
<td>12 944</td>
<td>28 788</td>
<td>38.0</td>
<td>29.3</td>
<td>33.6</td>
</tr>
<tr>
<td>West</td>
<td>3 707</td>
<td>2 255</td>
<td>5 962</td>
<td>14.0</td>
<td>8.5</td>
<td>11.2</td>
</tr>
<tr>
<td>Total</td>
<td>28 490</td>
<td>22 088</td>
<td>50 578</td>
<td>23.4</td>
<td>17.3</td>
<td>20.3</td>
</tr>
</tbody>
</table>

the rate increase among men, whereas declining cases among African American women accounted for most of the rate decrease among women. Over these years, the increase in cases among White men (2085 cases) accounted for 86% of the overall increase among men (2424 cases), and the decrease in cases among African American women (1059 cases) accounted for 86% of the overall decrease among women (1228 cases).

There were substantial geographical changes in syphilis rates during 2000 through 2003. Rates tripled in the Northeast and increased 170% in the West but declined by 20% and 16% in the Midwest and South, respectively. Rates increased in 30 states, declined in 18 states, and remained unchanged in 2 states (Figure 1). Among men, rates increased in all regions and in 36 states, declined in 13 states, and remained unchanged in 1 state. Among women, however, rates increased in the Northeast and 14 states; declined in the Midwest, the South, and 24 states; and remained unchanged in the West and 12 states.

The ratio of syphilis cases reported among men to cases reported among women began to change in the late 1990s. The MFCR was low and relatively stable during the early to mid-1990s but increased more than 4-fold (from 1.2 to 4.9) between 1997 and 2003, growing most sharply after 2000. Between 2000 and 2003, MFCRs increased in all racial and ethnic groups and in all US regions. Ratios increased almost 7-fold among Whites, more than 4-fold among Asians, almost 3-fold among American Indians, almost 3-fold among Hispanics, and almost 2-fold among African Americans. Ratios increased approximately 3-fold (range: 2.7–3.2) in each of the 4 US regions.

Rapid and dramatic changes in syphilis profiles occurred in large US cities, as reflected by the increases in MFCRs that occurred during 2000 through 2003. MFCRs increased in 52 (82%) of the 63 large US cities in which cases and rates have been monitored for the past 6 decades. In these cities, the aggregate MFCR increased from 1.5 to 5.9. In 2000, only 26 cities had MFCRs of 2 or greater, and they accounted for 25% of the 3265 cases reported in large cities that year; only 2 cities had case ratios above 10. By 2003, 48 cities had MFCRs of 2 or greater, accounting for 85% of the 4334 cases reported in large cities; furthermore, 19 cities had case ratios greater than 10.

Nine large cities reported an increase of more than 50 cases between 2000 and 2003; these cities accounted for 11% of all cases reported in 2000 and 32% of all cases reported in 2003. During the same period, there were substantial and approximately simultaneous increases in cases among men in the 9 cities (Figure 2), and the aggregate MFCR in these cities increased from 3.3 to 14.1. Increases in MFCRs were not confined to large urban areas during these years, however. When cases from the 63 large cities were excluded, there was still an increase from 1.3 to 3.8 in the MFCR for the remainder of the nation.
As mentioned, we estimated the number of cases of syphilis occurring among MSM using a model based on changes in the MFCR over time. The model estimated that syphilis cases occurring among MSM increased from 441 in 2000 to 4387 in 2003 (Table 2); the estimated percentage of all reported cases occurring among MSM in 2003 was 62%. During 2000 through 2003, there was an estimated increase of 2298 cases among White MSM (data not shown). The model estimated that cases among heterosexual men and women (total number of cases minus number of cases occurring among MSM) decreased 50% (from 5532 to 2790) between 2000 and 2003.

**DISCUSSION**

Although syphilis rates in the United States declined steeply between 1990 and 2003, syphilis cases among MSM rose sharply after 2000, accounting for the overall increase in syphilis during 2000 through 2003. National case report data do not contain information on partner gender or other behavioral factors; however, according to investigations of syphilis infections conducted in the early to mid-1990s (and consistent with the low MFCRs over that period), heterosexual transmission was responsible for most of the cases that occurred during these years. In contrast, by 2003, it appears that the majority of syphilis cases reported annually were occurring among MSM, as evidenced by declines in rates among women, increasing rates among men, estimates of cases among MSM derived from our study’s modeling of changes in MFCRs, and recent reports of syphilis outbreaks among MSM.

During the syphilis epidemic that occurred between the late 1980s and early 1990s, the rate of syphilis peaked in 1990, with a rate higher than that in any year since 1949. This epidemic, which predominantly involved heterosexual men and women, is thought to have been fueled by the use of crack cocaine and the exchange of sex for drugs or money. The reasons for the rapid decline in the syphilis rate after 1990 are unclear but may reflect a refocusing of prevention efforts to address syphilis and increased resources provided to STD-control programs after recognition of the epidemic. During this period, STD-control programs used a combination of traditional (e.g., partner notification) and new (e.g., counseling and education to promote risk reduction and targeted screening and prevention efforts) approaches. A decrease in the number of people using crack cocaine in the late 1980s and early 1990s may also explain some of the decline in syphilis rates after 1990.
Throughout the 1990s, rates of syphilis declined in all regions of the United States, and cases became concentrated in a small percentage of counties. Although the rate of decline was steepest in the Northeast during these years, the reduction in numbers of cases was largest in the South. Rates of disease declined among all racial and ethnic groups during the 1990s, particularly African Americans and Hispanics, but rates remained substantially higher among members of racial and ethnic minority groups than among Whites at the end of the decade. In the mid-1990s, in part because of the large racial disparity in syphilis rates, initial syphilis elimination efforts focused on syphilis among minority populations and in the South.4

The disparity in rates of syphilis infection between African Americans and Whites has decreased because of the continued decline in the rate of infection among African Americans, particularly African American women, and the increased rate of infection among White men. Rates of syphilis remain higher among African Americans than among Whites; however, in 2003, for the first time since the initiation of race/ethnicity-specific case reporting in 1981, more cases were reported among Whites than among African Americans.3,33,34,50

The geographic pattern of syphilis infection has also shifted. Although the rate of syphilis and the number of cases reported annually have been consistently higher in the South than in other US regions, the South has accounted for a declining proportion of overall annual cases each year since 1997.3,51 During 2000 through 2003, syphilis rates increased substantially in the Northeast and West but declined in the South and Midwest; large increases in cases among men accounted for most of the growth in rates in the Northeast and West, whereas decreasing numbers of cases among African American women accounted for most of the decline in rates in the South and Midwest.

Between 2000 and 2003, the largest increase in cases, by gender and race/ethnicity, occurred among White men. The substantial increases in cases among White men and estimates of MSM based on the steep rise in the MFCR among Whites suggest that cases among White MSM account for most of the recent national increase in syphilis cases among men. However, cases have been increasing among men from all racial/ethnic groups other than African Americans, and MFCRs have been increasing among all racial and ethnic groups, indicating that cases have been increasing among MSM in each of these groups.

The dramatic increases since 2000 among men and MFCRs in US cities, along with evidence that the current syphilis epidemic is not confined to the largest urban centers, indicate that the occurrence of syphilis among MSM is increasing throughout the United States. Since the late 1990s, there have also been widespread outbreaks of syphilis in the United Kingdom and many European countries, and as in the United States, a high proportion of involved men have been coinfected with HIV.21–22 These coincident outbreaks among MSM suggest that substantial and concurrent changes in sexual behavior have facilitated syphilis transmission among MSM in many industrialized nations.

Increases in high-risk sexual behavior among some MSM may be related to (1) diminished concerns about the risk of acquiring and transmitting HIV as a result of optimism regarding highly active antiretroviral therapy (and its recent availability in many industrialized nations), (2) beliefs inferred from partners’ physical appearance that they are unlikely to be infected with HIV, (3) use of nitrate inhalants and other drugs, and (4) an increased inclination to ignore messages promoting safe sex.10,52–59 One study focusing on MSM showed that use of methamphetamine, with and without the concomitant use of sildenafil (Viagra), increased the risk of acquisition of syphilis infection.60

In recent years, the Internet has emerged as an important venue for MSM to meet sexual partners.61,62 The Internet may facilitate MSM meeting sexual partners when they travel, which may in part explain the rapid dissemination of syphilis among MSM both within and outside the United States.63 Several studies have revealed an association among MSM between location of partners through the Internet and acquisition of syphilis.14,60,63,64 Transmission of syphilis from contact with anorectal chancres that are difficult to detect, inadequate medical screening for STDs, and increased susceptibility to infection with syphilis mediated by HIV coinfection may also be contributing to the increased incidence of syphilis among MSM.

Risk of HIV transmission is a particular concern in the current syphilis epidemic because infection with syphilis increases transmission of HIV 3- to 5-fold,1 and a high percentage of MSM who have been involved in recent outbreaks are coinfected with HIV.11,15,17,18,20 The impact of increases in syphilis rates among MSM on the incidence of HIV is unclear. Although the number of new HIV diagnoses among MSM reported from 29 states increased 17% between 1999 and 2002,65 the incidence of HIV (determined with the serologic testing algorithm for recent HIV seroconversion [STAHRS]) did not increase among MSM in 2 cities (Los Angeles and San Francisco) that reported outbreaks of syphilis during those years.56

### TABLE 2—Numbers of Primary and Secondary Syphilis Cases Among Different Groups, Along With Male–Female Case Ratios: United States, 2000–2003

<table>
<thead>
<tr>
<th>Year</th>
<th>Total No. of Cases</th>
<th>Cases Among Men</th>
<th>Cases Among Women</th>
<th>Male–Female Case Ratio</th>
<th>Cases Among MSM</th>
<th>Cases Among Heterosexual Men and Women</th>
</tr>
</thead>
<tbody>
<tr>
<td>2000</td>
<td>5973</td>
<td>3528</td>
<td>2445</td>
<td>1.44</td>
<td>441</td>
<td>5532</td>
</tr>
<tr>
<td>2001</td>
<td>6100</td>
<td>4132</td>
<td>1968</td>
<td>2.10</td>
<td>1653</td>
<td>4447</td>
</tr>
<tr>
<td>2002</td>
<td>6862</td>
<td>5268</td>
<td>1594</td>
<td>3.30</td>
<td>3257</td>
<td>3605</td>
</tr>
<tr>
<td>2003</td>
<td>7177</td>
<td>5959</td>
<td>1218</td>
<td>4.89</td>
<td>4424</td>
<td>2753</td>
</tr>
</tbody>
</table>

Note. MSM = men who have sex with men.

*Estimated by assuming that a male–female case ratio at the 1998 level (1.26) indicates that no primary and secondary syphilis cases occurred among MSM and that the number of cases occurring among MSM can be calculated according to the formula described in the text.

*Calculated by subtracting estimated cases among MSM from the total number of cases.
However, additional research in Los Angeles County involving STAHRS revealed that the annual incidence of HIV infection among MSM with early syphilis (primary and secondary syphilis in combination with early latent syphilis) between January 2002 and April 2004 (26%) was higher than the rate of newly diagnosed HIV infection among MSM tested for HIV at publicly funded clinics in 2002 (4.1%). One possible explanation for why the current syphilis epidemic has not been accompanied by a definitive increase in HIV incidence among MSM is that some MSM, in an attempt to prevent acquisition or transmission of HIV, choose partners who have the same HIV infection status as they do. Another possibility is that risk of HIV transmission is reduced among infected individuals who are on antiretroviral therapy and have low or undetectable viral loads.

Limitations

Limitations of this study include incomplete reporting of syphilis cases, variations in data collection and recording within and between STD control programs, and the absence of information about sexual orientation and gender of partners. In recent years, with the increasing rates of syphilis among MSM, incomplete reporting of cases has been a particular problem. One reason is that the number of cases detected through contact tracing has been low owing to high numbers of anonymous sexual partners, which might result in underreporting of cases among MSM. In addition, some cases occurring among MSM are not identified and reported.

Because syphilis elimination efforts in the United States were not directed toward MSM until increased rates had been identified, it is unlikely that a substantial proportion of the increase in syphilis cases among MSM can be explained by enhanced case detection resulting from syphilis elimination activities. Also, simultaneous outbreaks of syphilis among MSM in many industrialized countries argue against increased case ascertainment being the primary explanation for the increase in cases among MSM in the United States.

Because national case report data do not include information about partner gender, we relied on a model that estimated the annual number of cases occurring among MSM during 2000 through 2003 on the basis of increases in the syphilis MFCR between 1998 and 2003. These estimates must be interpreted with caution because MFCRs may be elevated for a variety of reasons in addition to increases in cases among MSM (e.g., increased case ascertainment among men relative to women and outbreaks involving transmission of syphilis between women who are commercial sex workers and men).

However, the model also underestimated the number of cases occurring among MSM because it conservatively assumed that no cases occurred among MSM in 1998. In 2005, CDC asked STD programs to begin including gender of sexual partners in all STD morbidity data reported through state and local health departments. The magnitude of our model’s underestimations cannot be quantified because CDC did not receive information about gender of partners during the study period with which to compare estimates from the model.

Conclusions

The rate of syphilis declined to a historic low in 2000. However, increasing syphilis cases among MSM have reversed the decade-long trend of declines in overall rates. We estimate that MSM accounted for more than 60% of reported syphilis cases in 2003. The primary challenges for syphilis elimination are to continue to reduce the incidence of syphilis in populations among whom efforts have been successful and to prevent and control syphilis among MSM. Interventions that have been relied on in previous epidemics, such as notification and treatment of partners, have not proved as effective in preventing syphilis among MSM.

Local, state, and federal health officials and other partners are working together to develop, evaluate, and support new intervention strategies directed toward MSM that will be effective in reducing the incidence of syphilis. The updated National Syphilis Elimination Plan, published in 2006, included MSM among affected populations for whom specific interventions should be tailored. Key activities for controlling syphilis in MSM recommended in the 2006 syphilis elimination plan included (1) collecting and reporting data on the gender of sexual partners and the sexual preference of persons diagnosed with syphilis, (2) developing and using Internet-based interventions to engage MSM with syphilis and facilitate partner notification activities, (3) enhancing syphilis education and sexual health promotion with MSM within STD clinics and the community, (4) using provider outreach, education and mobilization to raise awareness of syphilis infection among MSM and improve the quality of clinical management, and (5) expanding access to syphilis screening for MSM at STD care facilities and in outreach settings. Raising awareness about the current syphilis epidemic and its implications for transmission and acquisition of HIV infection, promoting efforts to reduce high-risk sexual behaviors, and educating MSM to recognize symptoms and signs of syphilis and understand the importance of seeking medical care early in the course of infection may help minimize transmission of the disease.

Mobilizing the MSM community to take an active role in these efforts is crucial for their success. Training providers to improve their skills in diagnosing and treating syphilis, to screen sexually active MSM routinely for syphilis and other STDs, and to screen for STDs in conjunction with HIV counseling and testing is also critical for controlling syphilis among MSM.
References


REAL Men: A Group-Randomized Trial of an HIV Prevention Intervention for Adolescent Boys

Colleen DiIorio, PhD, Frances McCarty, PhD, Ken Resnicow, PhD, Sally Lehr, PhD, and Pamela Denzmore, MPH

Sexually active adolescents, particularly those who fail to use condoms every time they have sexual intercourse, are placing themselves at risk for contracting HIV and other sexually transmitted infections (STIs). The sex educational needs of middle and high school students have been recognized for many years, resulting in a number of excellent programs designed specifically for this age group.1–4 One gap in HIV prevention, however, has been the lack of involvement of parents in adolescent programs. Parents are often not aware of the information that is presented to their children and thus fail to reinforce important messages about HIV, STIs, and pregnancy prevention. More important, perhaps, is that parents are not adequately encouraged to talk with their children about sexual health.

Several programs for parents and adolescents, particularly mothers and adolescent daughters, have been developed and tested.5–8 The evaluation of these programs has shown some promising results, including the increased involvement of parents in the sex education of their adolescents.7,9–12 However, effects on key behavioral indices such as initiation of sexual intercourse and the use of birth control or condoms have been less impressive.10–12

Although identified as important, sex education designed specifically for adolescent boys has been lacking. Relatively few programs for adolescent boys are available, and of these, few have been evaluated. We report the results of an HIV prevention program designed to encourage communication between fathers (or father figures) and sons about HIV prevention behaviors. The primary aim of the study, called REAL Men (REAL = Responsible, Empowered, Aware, Living), was to test the efficacy of an intervention to promote delay of sexual intercourse, condom use among those who were sexually active, and communication on sexuality between fathers (or father figures) and sons.

**Objectives.** We tested the efficacy of an intervention among 11- to 14-year-old adolescent boys to promote delay of sexual intercourse, condom use among those who were sexually active, and communication on sexuality between fathers (or father figures) and sons.

**Methods.** Sites were randomly assigned to the intervention and control groups. Assessments were conducted prior to the intervention and at 3-, 6-, and 12-month follow-up interviews.

**Results.** A total of 277 fathers and their sons completed baseline assessments. Most participants were African American, and most fathers lived with their sons. Significantly higher rates of sexual abstinence and condom use and of intent to delay initiation of sexual intercourse were observed among adolescent boys whose fathers participated in the intervention. Fathers in the intervention group reported significantly more discussions about sexuality and greater intentions to discuss sexuality than did control-group fathers.

**Conclusions.** The study demonstrates that fathers can serve as an important educator on HIV prevention and sexuality for their sons. (Am J Public Health. 2007;97:1084–1089. doi:10.2105/AJPH.2005.073411)

**METHODS**

**Procedures**

This study was conducted in collaboration with the Boys & Girls Clubs of Metro Atlanta, a community-based organization that provides after-school and summer programs primarily for disadvantaged children in the Atlanta metropolitan area. Seven sites were selected for participation in the research project. The sites were randomly assigned, with 4 sites assigned to the intervention group and 3 to the control group. The 2 smallest sites, serving similar neighborhoods and located within a 15-minute drive from each other, were combined and randomized as a unit.

**Recruitment**

The population was composed of 11- through 14-year-old adolescent boys who were enrolled as members at the Boys & Girls Clubs and their fathers. To participate, adolescents were required to be aged 11 to 14 at the time of the baseline interview. Because some adolescents might not have regular contact with their fathers, nonbiological father figures were invited to participate.

Father figures (hereafter referred to as fathers) were eligible if they were aged 18 years or older, were identified by the mother as a significant influence in the adolescent’s life, and had at least a 1-year relationship with the adolescent, and the mother and son both agreed that the person chosen would serve as a father figure. Fathers and adolescent participants began the study by completing a baseline questionnaire using an audio computer-assisted format. Fathers were asked to attend 7 program sessions, and sons were asked to attend the final session with their fathers. Both fathers and sons completed 3 follow-up interviews (at 3, 6, and 12 months after the baseline interview). Informed consent was obtained from the legal guardian (legal father or mother) for the son’s participation in the study and from the father for his own participation. Adolescents provided assent to participate in the study.

**Intervention Group**

The REAL Men program was based on social cognitive theory, which proposes that the behaviors a person chooses to perform are because of complex interactions among...
personal, environmental, and behavioral factors. Personal factors include self-efficacy, outcome expectations, and performance goals; environmental factors include encouragement and support from others. In the REAL Men program, fathers were presented with information on communication with adolescents, general topics such as parental monitoring and relationships with peers, general sexual topics important in adolescence, and specific information about transmission and prevention of HIV and AIDS.

The program was structured to include opportunities to view others performing the behavior (i.e., videotapes of fathers talking to sons about sexual topics) and to practice the behavior through role plays. To encourage participation in the sessions, dinner was served and small nonmonetary incentives were given to both fathers and sons. All participants received $25 for completing each of the 4 assessments (i.e., baseline questionnaire and 3 follow-up interviews).

The intervention, which consisted of seven 2-hour sessions for the fathers, was delivered once each week in a group format. Fathers attended the first 6 sessions alone, and fathers and sons attended the final session together. All sessions except the first began with a review of the previous session, a discussion of the take-home activities, and a review of personal goals set by study participants. Session content was delivered through a combination of lectures, discussions, role-plays, games, and videotapes. Participants were given a participant manual to assist with weekly take-home activities and adherence to personal goals set each week. The last session included a celebration of the end of the intervention in which fathers and sons received certificates of completion.

Control Group
The control group participated in a 7-session nutrition and exercise program. The program was held once a week for 2 hours. Fathers attended the first 6 sessions alone and with their sons in the last session. Content and discussion included basic facts about nutrition and exercise, the benefits of maintaining a healthy lifestyle and eating fruits and vegetables, estimation of serving size, how to read and interpret food labels, and the benefits of and barriers to exercise. Session content was delivered through a combination of lectures, discussions, role playing, games, and videotapes.

Measures
The primary outcomes were adolescent sexual abstinence and communication about sex between fathers and sons. Several secondary outcomes were assessed—the adolescents’ participation in intimate behaviors, their condom use, and the fathers’ intention of communicating with their sons. Abstinence rates were computed from the response to a single item: “Have you ever had sexual intercourse (sex)?” Participants were classified as having had sexual intercourse if they responded yes to this item and as being sexually abstinent if they answered no. Eight items excluding sexual intercourse assessed intimate sexual behaviors. These items, which measured the progression of sexual behavior, each began with the stem, “Have you ever . . . ?” The first item in the series was, “Have you ever spent time with a girl in a private place?” The number of “yes” responses was summed to yield an overall score that could range from 0 to 8, with higher scores corresponding to involvement in a greater variety of intimate sexual behaviors. The Cronbach α for the 8 items was 0.89.

Adolescents who reported never having had sexual intercourse were asked which of the following described their intentions regarding sex: not to have sex until married, not to have sex until older, or would probably have sex within the next year. For the analysis, the last 2 categories were combined. Adolescents who reported having had sex were asked about their condom use and their intentions regarding condom use. They were asked to respond yes or no to the following questions: “Have you ever had sex without a condom?” “Have you ever used a condom when you had sex?” “Did you use a condom the last time you had sex?” and “Do you intend to use a condom the next time you have sex?”

A scale composed of a list of sex-specific topics measured sex-based communication between fathers and sons. Fathers responded to 16 items and sons to 13 items. Participants responded on a 0-to-3 rating scale, with 0 indicating they had not discussed the topic at all and 3 indicating that it had been discussed a lot. A sample item for fathers was, “Have you ever talked to your son about how he knows if he is ready to have sexual intercourse?” The automated interview substituted the adolescent’s first name for the term your son so that the information reported was specific to the adolescent enrolled in the study. Positive responses were summed to yield a total score ranging from 0 to 48 for fathers and 0 to 39 for sons. The Cronbach α was 0.97 for the fathers’ responses and 0.96 for the sons’ responses.

Fathers were asked to indicate their intention regarding discussion of specific sexual topics. For each topic, fathers were asked how likely they thought it was that they would talk about the topic in the future. For each of the 16 items, the response categories ranged from 1 (definitely won’t) to 5 (definitely will), for a possible total score ranging from 16 to 80. The Cronbach α for the fathers’ responses to the intent questions was 0.97.

Data Analyses
Because the conceptual design of the study was a nested cohort design19 in which Boys & Girls Clubs sites were randomly allocated to either the HIV prevention (experimental) or nutrition and exercise (control) group, the analytic strategy employed was one that would account for randomization at the site level as opposed to the individual level. Although a number of strategies are available for the analysis of data with a nested structure, the small number of sites randomized to the groups was an important consideration in choosing a method of analysis. When the number of clusters is small (<10), estimation of the intraclass correlation and typical modeling methods (e.g., mixed-model regression) using SAS Proc MIXED (SAS Institute Inc, Cary, NC)15 may be unreliable.16 Therefore, we conducted analyses by using the allocation unit as the unit of analysis. Given the problems related to estimation and power presented when a small number of clusters are randomized to each group, we identified this method as the most reasonable means of analysis. In addition, this method has been shown to be robust with as few as 3 clusters.15,17 After aggregating data by site, we
used independent-sample *t* tests and χ² tests of proportions to test for group differences at each follow-up. Original sample size estimates were based on detecting a difference in abstinence rates between the HIV and control groups (estimated on the basis of data from a previous study to be 84% and 69%, respectively) at the 1-year follow-up (power = 0.80) and α = 0.05 for a 1-tailed hypothesis test. Intent to treat was the primary analytic approach.

**RESULTS**

**Description of Participants**

Of the approximately 2800 potential participants, 1700 were unreachable because of telephone problems (disconnected, wrong number). Initial contact was made with approximately 1100 families; 600 were identified as potentially eligible and approximately 400 agreed to complete the screening questionnaire. Of these families, 6 were determined to be ineligible, 12 actively declined to participate, and the remainder agreed to schedule a baseline interview. Of these, 277 fathers and their sons (total participants = 554) completed the baseline interview and enrolled in the study.

The adolescents ranged in age from 11 to 14 years (mean = 12.8 years, SD = 1.2 years), and fathers ranged in age from 18 to 80 (mean = 40.1 years, SD = 11.8 years). The majority of fathers and sons were African American (97%) and lived together (70%; Table 1). The participating adult male for about 40% of the adolescents was the biological father, 15% were stepfathers, 23% were other male relatives (brother, uncle, grandfather), and 22% were some other male role model. Slightly more than one third (34%) of the fathers had completed high school, another 29% had completed some college or trade school, and 19% had completed college. Over half the fathers (55%) reported a yearly income of between $10000 and $49999.

**Session Attendance**

Session attendance was monitored for fathers in both the intervention and control groups. On average, fathers in the intervention group attended 45% of the sessions while fathers in the control group attended 44% of the sessions. A total of 221 fathers (80%) responded at all 4 assessments. Among those fathers not completing all assessments, 27 (10%) missed 1 follow-up, 12 (4%) missed 2, and 17 (6%) missed 3 of the 4 assessments. The number of participants from the 7 sites ranged from 28 to 72, with 4 being the maximum number of withdrawals from any 1 site. At each assessment period, the 2 study groups were roughly equal in size.

**Primary Outcomes**

Comparison tests that used *t* tests and χ² analyses were conducted to determine the equivalence of the HIV (intervention) and nutrition and exercise (control) groups at baseline testing. Baseline demographic variables for the 2 groups are reported in Table 1. The 2 study groups were similar with respect to education level, income level, percentage of biological fathers participating, percentage of fathers indicating discussion of sex-related topics with sons, and the majority of adolescents had discussed sex-related topics with their fathers.

---

**TABLE 1—Baseline Demographic Characteristics of Father and Son Participants, by Study Group: REAL Men, 2000–2004**

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Intervention Group (n = 141)</th>
<th>Control Group a (n = 132)</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fathers’ characteristics</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean age, y (SD)</td>
<td>39.5 (11.9)</td>
<td>40.8 (11.7)</td>
<td>40.1 (11.8)</td>
</tr>
<tr>
<td>African American, %</td>
<td>96.9</td>
<td>96.8</td>
<td>96.9</td>
</tr>
<tr>
<td>Relationship to adolescent, %</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Biological father</td>
<td>34.6</td>
<td>46.4</td>
<td>40.4</td>
</tr>
<tr>
<td>Stepfather</td>
<td>16.2</td>
<td>13.6</td>
<td>14.9</td>
</tr>
<tr>
<td>Brother</td>
<td>6.9</td>
<td>8.8</td>
<td>7.8</td>
</tr>
<tr>
<td>Uncle</td>
<td>10.8</td>
<td>8.0</td>
<td>9.4</td>
</tr>
<tr>
<td>Grandfather</td>
<td>5.4</td>
<td>5.6</td>
<td>5.5</td>
</tr>
<tr>
<td>Friend/other</td>
<td>21.5</td>
<td>16.0</td>
<td>18.8</td>
</tr>
<tr>
<td>Boyfriend of mother</td>
<td>4.6</td>
<td>1.6</td>
<td>3.1</td>
</tr>
<tr>
<td>Living with son, %</td>
<td>63.1</td>
<td>75.8</td>
<td>69.3</td>
</tr>
<tr>
<td>Education level, %</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Less than high school</td>
<td>18.0</td>
<td>17.6</td>
<td>17.8</td>
</tr>
<tr>
<td>High school</td>
<td>36.7</td>
<td>32.0</td>
<td>34.4</td>
</tr>
<tr>
<td>Trade school or some college</td>
<td>28.9</td>
<td>29.6</td>
<td>29.2</td>
</tr>
<tr>
<td>College degree or higher</td>
<td>16.4</td>
<td>20.8</td>
<td>18.6</td>
</tr>
<tr>
<td>Yearly income ($)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;10 000</td>
<td>14.5</td>
<td>15.7</td>
<td>15.1</td>
</tr>
<tr>
<td>10 000–29 999</td>
<td>28.2</td>
<td>24.3</td>
<td>26.4</td>
</tr>
<tr>
<td>30 000–49 999</td>
<td>33.9</td>
<td>22.6</td>
<td>28.5</td>
</tr>
<tr>
<td>50 000–69 999</td>
<td>12.1</td>
<td>25.2</td>
<td>18.4</td>
</tr>
<tr>
<td>≥70 000</td>
<td>11.3</td>
<td>12.2</td>
<td>11.7</td>
</tr>
<tr>
<td>Ever discussed sex-related topics with son, %</td>
<td>66.4</td>
<td>73.8</td>
<td>70.0</td>
</tr>
<tr>
<td>Sons’ characteristics</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean age, y (SD)</td>
<td>12.8 (1.2)</td>
<td>12.8 (1.2)</td>
<td>12.8 (1.2)</td>
</tr>
<tr>
<td>African American, %</td>
<td>97.7</td>
<td>94.4</td>
<td>96.1</td>
</tr>
<tr>
<td>Sexual abstinence, %</td>
<td>75.6</td>
<td>76.4</td>
<td>76.0</td>
</tr>
<tr>
<td>Ever had sexual intercourse with a condom, %</td>
<td>29.0</td>
<td>24.2</td>
<td>26.6</td>
</tr>
</tbody>
</table>

Note. Fathers included both biological fathers and father figures; see “Methods” section for a further listing of father figures. To determine group differences for means and proportions, *t* and χ² statistics were used, respectively.

*Groups different at *P* < .05.

*The control group was a group that participated in a nutrition and exercise program.

a The control group was a group that participated in a nutrition and exercise program.

P = .05.
topics, and percentage of adolescents indicating that they had never had sexual intercourse. The groups were also similar with respect to age for both fathers and adolescents. However, the HIV and nutrition and exercise groups were different in terms of the percentage of participating fathers living with their sons. In the nutrition and exercise group, age of participating fathers living with their sons were different in terms of the percentage compared to age for both fathers and adolescents. However, the HIV and nutrition and exercise groups were different in terms of the percentage of participating fathers living with their sons. In the nutrition and exercise group, age of participating fathers living with their sons were different in terms of the percentage of participating fathers living with their sons.

As a result, this variable was included as a covariate in the outcome analyses.

The results of the analyses of outcomes for fathers and sons are reported in Tables 2 and 3, respectively, including 1-sided 95% confidence intervals for the mean difference between groups. At the 3-month follow-up, a smaller proportion (P = .06) of sexually active adolescents in the HIV group reported sexual intercourse without a condom than participants in the nutrition and exercise group, and fathers in the HIV group reported significantly more communication about sex-related topics than fathers in the nutrition and exercise group. Although no statistically significant differences were noted for the other outcomes at the 3-month follow-up, the intervention was generally more effective than the control at producing the desired outcomes. At the 6-month assessment, there were statistically significant differences in 3 outcomes for adolescents: compared with those in the control group, adolescents in the HIV group reported higher rates of abstinence and fewer intimate behaviors. A smaller portion of sexually active participants in the HIV group reported sexual intercourse without a condom. At the final assessment, a significantly higher proportion of adolescents in the HIV group than the control group indicated that they would delay sexual intercourse until marriage and a lower proportion of those who were sexually active reported that they had sexual intercourse without a condom. Likewise, fathers in the HIV group reported significantly more discussion and greater intent to discuss sex-related topics with their sons than did fathers in the nutrition and exercise group.

DISCUSSION

Our findings showed that involving fathers could be an effective means of promoting HIV prevention practices among adolescent males. The intervention appeared to have an effect on delay of sexual intercourse, because adolescents whose fathers attended the HIV sessions had higher rates of abstinence throughout the follow-up period. The overwhelming majority of adolescents in the study were African American, and among male high school students, African Americans have the highest rate of sexual intercourse of all racial/ethnic groups.

Although the intervention demonstrated some success in reducing the initiation of sexual intercourse at 6-month follow-up, a more striking finding was the difference between the intervention and control groups in the proportion of sexually active adolescents who failed to use a condom each time they had sexual intercourse. These findings suggest that the program had an impact on promoting HIV prevention practices. The finding regarding condom use was noteworthy, because condom use was introduced and discussed in only 1 session, and no more emphasis was placed on this form of protection than on delaying initiation of sexual intercourse. It may be that abstinence was not an option for older adolescents, who were already engaging in sexual behaviors, but condom use was a viable preventive measure. If this is the case, offering the program to fathers whose sons are younger (aged 9–12 years) and less likely to be engaging in sexual behaviors may result in a higher proportion of adolescent boys who postpone sexual activity.

Previous interventions assessing parent–adolescent interventions have often failed to show an effect on adolescent sexual behaviors. For example, Miller et al.,11 who evaluated a home-based video sex education program, found that participants in the treatment group were no more likely to delay sexual intercourse than those in the control group. School-based studies, such as those by Blake et al.10 and Levy et al.,12 that included a parent component also found no differences.
between treatment and control groups in the delay of sexual involvement. Likewise, a variety of community-based programs designed for parents and adolescents failed to demonstrate differences in the rates of sexual intercourse of adolescent participants.9,19,20 One possible explanation for the difference in outcomes between our study and previous research is the involvement of fathers in the current program. Although many of the previously mentioned programs included both parents, more mothers tended to participate in the programs than fathers, and some were limited to mothers and daughters. The results of the present study suggest that messages on HIV prevention delivered by the father can carry significant weight. The father’s mere attendance at the program may have also impressed on the son the father’s concern for his well-being and the importance of HIV prevention practices. Our findings demonstrate the efficacy of public health interventions in which parents are the primary target in addition to those in which they play a supportive role.

The findings related to abstinence and intimate behaviors suggested that the program had a significant short-term effect in delaying the initiation of sexual intercourse and behaviors that lead to it; however, the long-term efficacy of the program in promoting abstinence was not observed. The program lasted 7 weeks and did not include booster sessions. Booster sessions or follow-up meetings over the course of the year might have been helpful in reminding fathers to talk with their sons; they should be considered for future father–son programs.

Limitations

Limitations to the study included the sample, the use of self-report measures, the length of the intervention, and the use of site as opposed to individual randomization. The participants for the study were recruited from Boys & Girls Clubs of Metro Atlanta. Boys who attend the after-school and summer programs offered by Boys & Girls Clubs, and their fathers, are likely to be different from fathers and sons who are not involved with this or similar community-based organizations and thus not entirely representative of the broader community. A replication of the study with a sample randomly selected from the community would help determine if the program is generalizable to a wider community. Self-report is subject to social desirability response bias (i.e., the tendency of respondents to agree with statements associated with healthier behaviors or attitudes and disagree with statements associated with unhealthy behaviors or attitudes). Fathers in the intervention groups might have reported

### TABLE 3—Reports Regarding Sex-Related Topics Among Adolescent Boys at Follow-Up Interview, by Study Group: REAL Men, 2000–2004

<table>
<thead>
<tr>
<th>Adolescents’ Outcomes</th>
<th>3-Month Follow-Up</th>
<th>6-Month Follow-Up</th>
<th>12-Month Follow-Up</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean (SD)</td>
<td>P</td>
<td>95% CI</td>
</tr>
<tr>
<td>Discussion of sex-related topicsd</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intervention</td>
<td>23.19 (12.57)</td>
<td>.094</td>
<td>-1.07, 6.59</td>
</tr>
<tr>
<td>Control</td>
<td>20.54 (13.51)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intimate behaviorsd</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intervention</td>
<td>3.50 (2.68)</td>
<td>.083</td>
<td>-2.07, 0.24</td>
</tr>
<tr>
<td>Control</td>
<td>4.25 (2.75)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sexual abstinence rate, proportion</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intervention</td>
<td>0.81</td>
<td>.160</td>
<td>-0.06, 0.18</td>
</tr>
<tr>
<td>Control</td>
<td>0.75</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intentions about having sexual intercourse,f</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intervention</td>
<td>0.45</td>
<td>.110</td>
<td>-0.06, 0.29</td>
</tr>
<tr>
<td>Control</td>
<td>0.34</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ever had sexual intercourse without a condom,g</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intervention</td>
<td>0.23</td>
<td>.060</td>
<td>-0.50, 0.02</td>
</tr>
<tr>
<td>Control</td>
<td>0.48</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note. CI = confidence interval. For intervention group, n = 121; for control group, n = 119.

*Adjusted for father–adolescent living status.

1One-tailed probability t statistic for means and χ² statistic for proportions.

2One-sided 95% confidence interval for the difference between the 2 groups.

3For scores, see under “Measures” in “Methods” section.

4The control group participated in a nutrition and exercise program.

5Only those who have not had sexual intercourse are included; value reflects the proportion who will delay sexual intercourse until marriage.

6Only those who have had sexual intercourse are included; value reflects the proportion who responded yes.
more discussions with sons at follow-up because the program expected it. However, the matching reports of the sons whose fathers were in the intervention group seem to verify that the fathers’ reports were accurate.

The intervention was only 7 weeks long. Many fathers recommended that the intervention be lengthened to include several more sessions. Because many fathers have never talked to their sons about sexual issues, fathers may need more time to develop skills for such discussions. On the other hand, despite an excellent retention rate—90% of participants completed 3 or more assessments—on average, fathers participated in fewer than half of the sessions. Given the fact that many fathers did not receive the full intervention, the results of the study are fairly impressive. The low attendance rate suggests that fewer rather than more sessions might be necessary to retain some participants. One strategy could be to decrease the number of sessions while increasing the length of each session. Finally, only 6 sites (3 for each group) were selected for the study. Current thinking on group-randomized trials suggests that more sites should be randomized to each group.  

Conclusions

Our findings show that involving fathers in sex education can be an effective means of promoting HIV prevention practices among adolescent males. Creating public health messages directed at fathers can be a first step to encourage fathers to take an active role in educating their sons about HIV. Community-based organizations and schools that offer programs for parents can include educational sessions such as those delivered in the REAL Men program. Because this is the first program for fathers and sons that has been evaluated in a systematic study, future research should include additional evaluation of the program and the development of variations that might include a self-study booklet and an Internet-based program for fathers whose schedules make it difficult to attend group sessions or who prefer another mode of learning. In addition to different modes of learning, further studies should focus specifically on factors that may enhance participation rates—for example, variations in scheduling and Internet-based delivery.

About the Authors

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Contributors

C. Diloro initiated the study, supervised the conduct of the study, and drafted the article. F. McCarty assisted with the study, conducted the data analyses, and assisted with drafting the article. K. Resnicow assisted with the study, data analysis, interpretation of results, and revision of the article. S. Leewas assisted with the implementation of the intervention, supervision of facilitators, and revision of the article. P. Denzmore supervised the implementation of the study and assisted with the revision of the article.

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Human Participant Protection

This study was approved by the institutional review board of Emory University and by the Boys & Girls Clubs of Metro Atlanta.

References

Rates of sexually transmitted infections (STIs) are higher among adolescents and young adults than among any other age group in the United States, and almost half of all new HIV infections in the United States occur among those younger than 25 years old. Other than abstinence, condom use is one of the few proven effective means available for reducing transmission of STIs. However, there is concern on the part of some that providing comprehensive sexual education, including discussions of condom use, will lead to increased sexual activity and that encouraging early condom use will result in sexual risk taking among adolescents.

Despite the recognized effectiveness of condoms for disease prevention, many sexually active young people use them only sporadically or not at all. Previous studies have examined the factors that influence whether or not sexually active adolescents use condoms. These studies show that condom use among adolescents is influenced both by stable traits, including gender and race/ethnicity, and by time-varying factors, including perceived risk of disease or unintended pregnancy, attitudes toward contraception, self-efficacy in negotiating condom use with sexual partners, and having previously suffered a negative consequence of unprotected intercourse such as an STI or unintentional pregnancy.

In addition to these factors, several studies of condom use among adolescents have shown that early condom use is associated with subsequent condom use. In a previous study in which we used data from wave I of the National Longitudinal Study of Adolescent Health (Add Health), we found that sexually active adolescents who reported using a condom at their sexual debut were more than twice as likely as adolescents who did not use a condom at their sexual debut to report using a condom during their most recent sexual intercourse (average age at debut: 15 years; average interval between first and most recent intercourse: 23 months). This association remained after we controlled for potentially confounding factors.

Building from previous studies, we hypothesized that early condom users would have less risky sexual profiles over time—even after possible selection effects had been controlled—than would their peers who were not early condom users. Our reasoning was that early use of condoms associates sexual activity with condom use, a cognitive linkage that may lead to the development of a persistent habit of condom use and healthier sexual decisionmaking.

We used data from waves I, II, and III of Add Health to compare respondents who did and did not use a condom at their sexual debut on 3 important dimensions of subsequent sexual behavior: condom use at most recent sexual intercourse (average of 6.8 years after debut), total lifetime number of sexual partners, and current infection with a bacterial STI (measured through urine testing at wave III).

**Objectives.** We compared subsequent sexual behaviors and risk of sexually transmitted infections among adolescents who did and did not use a condom at their sexual debut.

**Methods.** We derived data from the National Longitudinal Study of Adolescent Health, which followed a sample of 4018 sexually active adolescents between 1994 and 2002. During waves I, II, and III of the study, data on sexual behavior were gathered, and at wave III urine specimens were collected to test for sexually transmitted infections.

**Results.** Among interviewed adolescents, those who reported condom use at their debut were more likely than those who did not use condoms at their debut to report condom use at their most recent intercourse (on average 6.8 years after sexual debut), and they were only half as likely to test positive for chlamydia or gonorrhea (adjusted odds ratio = 0.50; 95% confidence interval = 0.26, 0.95). Reported lifetime numbers of sexual partners did not differ between the 2 groups.

**Conclusions.** Adolescents who use condoms at their sexual debut do not report more sexual partners, are more likely to engage in subsequent protective behaviors, and experience fewer sexually transmitted infections than do adolescents who do not use condoms at their sexual debut. (Am J Public Health. 2007;97:1090–1095. doi:10.2105/AJPH.2005.068437)
models adjusted for factors known to influence either condom use at debut or subsequent sexual behaviors and outcomes. The adjusted models allowed us to assess whether the observed direct effects were attributable to confounding.

We accounted for Add Health’s complex sampling design by including school and region as clustering variables in the survey estimation routines in Stata version 8 (Stata Corp, College Station, Tex). In addition, we applied poststratification sampling weights to account for loss to follow-up.

Variables
Our predictor of interest was condom use at sexual debut, an indicator variable taken from either wave I or wave II depending on when the respondent’s sexual debut had occurred. To correctly specify our adjusted models, we used data proximate to sexual debut (either wave I or wave II) to measure factors that may have influenced condom use at sexual debut. These factors were risk taking (assessed on a 5-point scale measuring bike helmet and seatbelt use), negative feelings (assessed on a 5-point depressive symptoms scale), self-efficacy (assessed on a 5-point scale measuring birth control negotiation with one’s partner), personal motivation to use birth control (assessed on a 5-point scale), maternal approval of birth control use (assessed on a 5-point scale), use of hormonal contraception at sexual debut (oral contraceptive pill or Depo-Provera; yes or no), and intoxication at sexual debut (yes or no).

Two variables measuring relatively stable factors were drawn from wave I only. The first was family socioeconomic status (assessed on a 10-point scale measuring parental educational achievement and family income), and the second was exposure to some type of sexual education in school (HIV or pregnancy prevention).

We used data from all 3 waves to calculate the time interval between sexual debut and most recent sexual encounter and to ascertain whether respondents had ever been diagnosed with an STI (self-reported by respondents) or had ever regretted a sexual encounter that occurred after alcohol use. We used data from wave III to measure other factors proximate to most recent sexual activity, including demographic characteristics (highest educational level, income, intelligence score, marital status), sexual activity level (frequency of sexual intercourse), and contraception and condom use in the past 12 months.

RESULTS
Sample Descriptive Statistics
Table 1 provides an overview of the study sample. More than half of the respondents were women (52%), and their average age at wave III was 22.2 years. Almost two thirds of the respondents identified themselves as White (64%), and slightly more than one fifth reported being married (22%). Average age at sexual debut was 15.2 years, and the median interval between sexual debut and most recent sexual intercourse was 6.8 years (range: 4.4–15.6 years). Sixty-two percent of the respondents reported having used a condom at their sexual debut, whereas 38% reported having used a condom during their most recent sexual intercourse. Median lifetime number of sexual partners was 5, and 6% of respondents had tested positive for either N gonorrhoeae or C trachomatis.

Differences Between Condom Users and Nonusers
There were differences in the demographic and behavioral characteristics of adolescents who did and did not use a condom at their sexual debut (Table 1). Condom users had somewhat more advantaged socio-demographic and educational profiles than did nonusers, and they engaged in fewer high-risk behaviors and more protective behaviors (including use of hormonal birth control at their sexual debut) than did nonusers. However, at wave III the 2 groups did not differ in terms of number of partners or frequency of sexual intercourse during the past year.

Condom Use at Most Recent Sexual Intercourse
Table 2 presents estimated odds ratios (ORs) derived from simple and multiple logistic regressions of condom use during most recent sexual intercourse on condom use at debut. The odds ratios were not appreciably different in the 2 models, suggesting that control

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for relevant stable straits and time-varying factors did not account for the rate of subsequent condom use among early users. Seven years after their sexual debut, those who had used a condom at their debut were approximately 36% more likely than those who had not used a condom at their debut to have used a condom during their most recent sexual activity.

**Lifetime Number of Sexual Partners**

Table 3 presents estimates from simple and multiple linear regressions of the log of lifetime number of sexual partners on condom use at sexual debut. In both models, the coefficient associated with condom use at debut was statistically indistinguishable from zero, indicating that there was no difference between those who did and did not use a condom at their sexual debut in terms of subsequent number of sexual partners.

**Positive Urine Test for Gonorrhea or Chlamydial Infection**

Table 4 reports ORs from simple and multiple logistic regressions of gonorrhea or chlamydia infection on condom use at debut and selected confounders. The adjusted model showed that respondents who reported using a condom at their sexual debut were half as likely as respondents who did not report using a condom at their debut to test positive for gonorrhea or chlamydia infection.
TABLE 4—Logistic Regression of Gonorrhea or Chlamydial Infection at Wave III on Condom Use at Sexual Debut: National Longitudinal Study of Adolescent Health, 1994–2002 (n = 4018)

<table>
<thead>
<tr>
<th></th>
<th>Odds Ratio (95% Confidence Interval)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unadjusted model</td>
<td>0.67* (0.45, 1.00)</td>
</tr>
<tr>
<td>Adjusted model*</td>
<td>0.50* (0.26, 0.95)</td>
</tr>
</tbody>
</table>

*Adjusted for gender, age, race/ethnicity, marital status, family socioeconomic status, IQ score, educational level, exposure to sex education, age at sexual debut, lifetime number of sexual partners, hormonal contraception use at sexual debut, intoxication at sexual debut, self-efficacy, motivation to use birth control, maternal approval of birth control, risk taking, and negative feelings.

P < .05.

Table object detected:
- **gonorrhea or chlamydial infection at wave III**
- **condom use at sexual debut**
- **National Longitudinal Study of Adolescent Health, 1994–2002**

**DISCUSSION**

Adolescents who used condoms at their sexual debut later used condoms at substantially higher rates than did adolescents who did not use condoms at their debut, and this was the case even after 7 years. It might be argued that this association stemmed from the influence of other factors associated with both early and later condom use; for example, those who use condoms at their sexual debut typically take fewer risks than those who do not. However, 2 findings from this study counter this line of reasoning.

First, adjusting for both stable and time-varying characteristics did little to influence the estimated effect of early condom use on subsequent condom use. Second, those who used condoms at their sexual debut had the same number of sexual partners (and a similar frequency of sexual intercourse) as their counterparts who did not use a condom at their sexual debut. Although there were demographic and behavioral differences between the 2 groups, these differences do not explain the interesting pattern of subsequent sexual behavior observed in our study.

Therefore, the most important finding of our study is that despite similarities in self-reported sexual activity, those who used a condom at their sexual debut were half as likely as those who did not to have a positive urine LCR test for gonorrhea or chlamydial infection at the time of the wave III interview. Few condom use studies involving adolescents have included STI biomarkers to validate self-reported behaviors, and we found no longitudinal studies with biomarkers that followed adolescents over a long period of time. Our findings that the association between early condom use and condom use during subsequent sexual activity persisted many years after debut and that, despite relatively active sexual lives, early condom users were less likely to have an STI at follow-up were consistent with our hypothesis that early condom use per se may help establish healthy and protective sexual habits among adolescents.

In the wake of the substantial increases over the past decade in government funding for abstinence-only education, some have raised the question of whether these programs follow the basic principle of medical ethics: do no harm. No randomized trials have convincingly shown that these programs are effective in delaying sexual debut, decreasing unintended pregnancies, or reducing the incidence or prevalence of STIs among adolescents.

We know of no prospective cohort studies showing that individuals exposed to abstinence-only education are at lower subsequent risk of STIs than those not exposed to abstinence-only education. In fact, a recent study involving Add Health data showed that STI frequencies (measured at wave III) were similar among adolescents who had previously signed a virginity pledge and adolescents who had not made such a pledge. Together with our findings, this result suggests that failing to provide adolescents with information about contraception and disease prevention may be deleterious to their health: if young people choose to engage in sexual intercourse despite abstinence-only messages and are not familiar with safe-sex practices, they may be at increased risk for negative health outcomes. Our findings demonstrate the importance of early experiences with condoms as an independent factor associated with healthier outcomes even 7 years after adolescents’ sexual debut.

This study involved both limitations and strengths. Our measures of condom use and sexual activity relied on respondents’ self-reports, although bias was reduced by the use of audio–computer-assisted self-interview techniques during all 3 waves of the study. The use of STI biomarkers from wave III provided an objective measurement of sexual risk taking. The Add Health study design is longitudinal, but many items were retrospective in nature, potentially introducing recall bias and measurement error. Although every effort was made to contact participants for follow-up waves, there was 20% loss to follow-up by wave III. Poststratification weights were used to adjust for nonresponse among those lost to follow-up and those declining to participate in wave III. However, the possibility remains that the sample was selective.

Furthermore, although Add Health’s unusually rich data set allowed us to include many of the factors that may have influenced the outcomes of interest in our analytic models, variables omitted or not measured here may have played a key role in shaping respondents’ subsequent sexual activity trajectories. For instance, partnership characteristics represent an important determinant of condom use. Although we included marital status, number of partners in the past 12 months, and (in model 1 and model 3) lifetime number of partners in our models, other characteristics—such as duration of relationship, age differential, and type of relationship—may also play a role in sexual decisionmaking, risk, and behavior. Finally, because this was an observational study, we make no claims about causal relationships between factors.

Despite these limitations, this study is important and unusual because we relied on a nationally representative longitudinal investigation of adolescent sexual behavior that included measurements of STI status made using biomarkers. The longitudinal study design offered us a rare opportunity to follow adolescent sexual health and behavior from sexual debut into late adolescence and young adulthood and to relate these characteristics to other events important in the lives of adolescents.
Although abstinence-only messages are being promoted in some parts of the United States today, 62% of high school students report that they have had sexual intercourse by their senior year. Our study demonstrates that adolescents and young adults who used condoms at their sexual debut were no more—or less—sexually active than their peers who did not use a condom at their sexual debut. Rather, early condom users were more likely than nonusers to practice safe sex as young adults and were less likely to have an STI.

Reduced STI prevalence among early condom users improves health at an individual level but also represents a social benefit in terms of a smaller overall disease burden, decreased costs associated with STI care, and reduced transmission of infection to others. Moreover, adolescents and young adults with STIs who do not use condoms put their future sexual partners at risk. Early establishment of a habit of condom use is associated with continuation of this protective behavior long after sexual debut, which will benefit all, even those who abstain from sexual activity until adulthood.

**Human Participation Protection**

This study was approved by the institutional review board of the University of Washington. Participants provided informed consent.

**References**


29. Lugo EL, Klepp KI, Skulte A. Sexual debut and...
33. St. Lawrence JS, Scott CP. Examination of the relationship between African American adolescents’ condom use at sexual onset and later sexual behavior: implications for condom distribution programs. AIDS Educ Prev. 1996;8:258–266.
Growth Trajectories of Sexual Risk Behavior in Adolescence and Young Adulthood

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Adolescent sexual risk behavior may have profound health consequences, which can extend into later life. Adolescents may be susceptible to engagement in sexual risk behaviors such as infrequent use of condoms or having multiple partners because of underdeveloped decisionmaking skills. Young adulthood, defined here as ages 18–25 years, is a time when youths take on new roles and responsibilities and form adult identities, which may include a relationship with a significant other and changes in sexual behavior. Sexual risk behavioral patterns adopted during adolescence and young adulthood may continue throughout adulthood. It is therefore vital to understand sexual risk trajectories during adolescence and young adulthood.

One problem with much of the research on sexual risk behavior in adolescence and young adulthood is that most studies are cross-sectional and consequently focus either on adolescence or adulthood. Most longitudinal studies included only 2 waves of sexual risk behavior data, assessed sexual risk behavior at only 1 time point, did not include data that spanned both of these developmental periods, investigated an overall mean level of sexual risk behavior across study waves, or conducted separate analyses for each wave of data. These study designs are insufficient for capturing trajectories of behavior. In a multivariate study of predominantly White males that spanned adolescence and young adulthood, Capaldi et al. suggested that their pattern of results showed the frequency of sexual intercourse increasing, the number of partners increasing then decreasing, and condom use decreasing, although the researchers did not test these suggestions statistically. Similarly, O’Donnell et al. suggested in their 4-wave study of urban youths that frequency of sexual intercourse increases and condom use decreases during early adolescence, but they did not provide statistical tests. Longitudinal studies that include several waves of data spanning adolescence and young adulthood and that investigate and test trajectories of sexual risk behavior are lacking.

It is further not clear how Capaldi et al.’s suggestions may generalize to non-White or female youths or how O’Donnell et al.’s results generalize to older youths. It is vital that we understand the trajectories of sexual risk behavior for different demographic groups. The consequences of sexual risk behavior, including contracting HIV/AIDS and gonorrhea and syphilis, for example, disproportionately affect African Americans compared with other groups. Also, compared with men, women are more likely to have asymptomatic sexually transmitted diseases, and they make up an increasingly larger share of the incidence of HIV. Understanding the differential trajectories of adolescent and young adult sexual risk behaviors among men and women from various races/ethnicities may help to explain these disparities.

Nationally representative studies have suggested that sexual risk behaviors among youths differ by race/ethnicity and gender. In the 2003 Youth Risk Behavior Surveillance System high school survey, African American students were found to be more likely to have had sexual intercourse and to report a greater number of sexual partners, yet were more likely to have used a condom during last sexual intercourse, compared with White students. In the same survey, boys were found to be equally as likely to have had sexual intercourse, to report a greater number of sexual partners, and to be more likely to have used a condom during last intercourse as girls. Although the Youth Risk Behavior Surveillance System and similar studies are informative in assessing trends in adolescent sexual risk behavior across time, they do not allow us to investigate individual trajectories of behavior, which provide information about the shape of change in the behavior in the same group of individuals over time. The Youth Risk Behavior Surveillance System also does not include young adulthood.

In our study, we addressed some of the shortcomings in the literature. First, we examined data over 8 years that included the period of young adulthood. Second, we employed an analytic approach—hierarchical linear modeling—that permits the study of trajectories of change over time. Finally, we...
investigated how trajectories of sexual risk behavior may differ by race/ethnicity and gender.

**METHODS**

**Sample**

We obtained data from adolescents from 4 public high schools in Flint, Michigan, a medium-sized, high-poverty, majority–African American city located close to Detroit. Participants were interviewed starting in 1994 every year for 4 years (corresponding to participants’ high school years), followed by a 1-year gap, and then every year for 4 additional years, for a total of 8 waves of data. Participants who dropped out of school were retained in the sample. Selection criteria included having a grade-point average of 3.0 or lower at the end of eighth grade and not being diagnosed by the school as emotionally impaired or developmentally disabled. Of the 920 who were eligible to participate, 850 (92%) agreed to participate in wave 1. This analysis included 847 participants with a total of 5203 observations. The 3 participants who were not included were missing sexual risk behavior measures for all waves.

Participants provided a mean of 6.1 waves of data, with 30% providing 8, 22% providing 7, 16% providing 6, 12% providing 5, 10% providing 4, and 10% providing 3 or fewer.

Eighty percent of participants were African American, 17% were White, and 3% were biracial. Half (50%) were girls, and the mean age at wave 1 was 14.6 years (SD = 0.7). Participants reported in wave 1 that the highest education attained by their mothers was as follows: 11% grade school or some high school, 38% high school, 28% vocational school or some college, 13% college, and 3% graduate or professional school. The percentage of participants who reported never having had sexual intercourse at wave 1 was 38%, at wave 2 was 30%, at wave 3 was 27%, and at wave 4 was 17%. The percentage of participants who reported not having had sexual intercourse in the previous 12 months at wave 5 was 12%, at wave 6 was 13%, at wave 7 was 13%, and at wave 8 was 12%.

**Procedure**

Structured, 50- to 60-minute face-to-face interviews were conducted in school or in a community setting. Parental consent was obtained for minors. After the interview, participants completed a self-administered questionnaire about sensitive topics including sexual risk behavior.

**Measures**

The sexual risk behavior measure is a composite measure, calculated by taking the sum of the standardized scores ($\bar{x} = 0$, $SD = 1$) of 3 items. This measure is similar to a measure used in other studies of youth sexual risk behavior. The items are frequency of (unspecified) sexual intercourse in the preceding year ($1 = 1–2$ times, $2 = 3–5$ times, $3 = 6–8$ times, $4 = 9–11$ times, $5 = 12$ or more times), number of sexual partners in the preceding year, and frequency of condom use during sexual intercourse in the preceding year ($1 =$ almost never, $2 =$ not very often, $3 =$ half of the time, $4 =$ most of the time, $5 =$ always). The condom-use frequency item was reverse coded so that higher scores indicated more risk. For participants who reported never having had sexual intercourse, or not having sexual intercourse in the previous year, “1” was assigned for the sexual intercourse and condom-use frequency items and “0” for the number of partners before standardizing. Table 1 presents descriptive statistics for the items and composite scores for each wave.

**Statistical Analyses**

We developed piecewise growth models of sexual risk behavior during adolescence (waves 1 through 4) and young adulthood (waves 5 through 8), with 2-level hierarchical
linear modeling with the HLM 5: Hierarchical Linear and Nonlinear Modeling program (Scientific Software Intl, Chicago, Ill). Our general level-1 model was as follows:

\[ Y_i = \pi_0 + \pi_1 t_i + \pi_2 t_i^2 + \pi_3 t_i^3 + a_i, \]

where \( \pi_0 \) is interpreted as in equation 1, \( b_{10} \) is the average value for the intercept or slope, \( X_{it} \) is the person-level variables, \( b_{1i} \) is the change in intercept or slope associated with the person-level variables, and \( r_{1i} \) is the person-level error term. Hierarchical linear modeling determined whether the \( b \) terms were different from zero, using the \( t \) test.

For a quadratic model, we coded \( a \) as shown in Table 2, so that \( Y \) is an individual’s value on a measure at a given time, \( \pi_i \) is the average score at wave 1, \( \pi_1 \) is the average instantaneous linear growth at wave 1, \( \pi_2 \) is the average acceleration of linear growth during adolescence, \( \pi_3 \) is the average instantaneous linear growth at wave 5, and \( \pi_4 \) is the average acceleration during young adulthood, with additional \( \pi \) values corresponding to higher-level polynomial terms. The \( a \) values indicate the data waves, and \( e \) is an error term.

We built the level-1 model using a forward stepwise approach. We first estimated a model with linear terms, and in 2 additional steps we added quadratic and cubic terms. In all models, we allowed the intercept and slopes to vary. We assessed which model best fit the data by comparing the \( \chi^2 \) deviance statistics. In addition to the deviance statistics, we examined (1) whether the \( \pi \) terms differed from zero, using the \( t \) test, (2) whether the variance of each \( \pi \) term differed from zero using the \( \chi^2 \) test, and (3) the average \( \lambda \) reliability for each random term.26

After the level-1 growth model was specified, we developed level-2 models with the intercept and slopes as outcomes. The general equation for these models was

\[ \pi_{ij} = b_{1ij} + \sum_{v=1}^{5} b_{2ij} X_{ijv} + r_{ij}, \]

where \( \pi_{ij} \) is the parameter estimates that model sexual risk behavior in ninth grade (\( \pi_{1j} \)) indicated that those who were older, African American or biracial, and male showed more sexual risk behavior in ninth grade than did those who were younger, White, and female. White girls did not report the lower sexual risk behavior associated with being female evident among African Americans, as indicated by the significant interaction term.

Interpretation of the \( b \) estimates that model parameters of growth and acceleration in sexual risk behavior \( (\pi_1, \pi_2, \pi_3, \text{and } \pi_4) \) required that the predicted values for different groups be plotted (Figure 1). After we controlled for age, African American or biracial boys participated in the highest levels of sexual risk behavior in ninth grade, followed by African American or biracial girls, with White boys and girls participating in the lowest levels of sexual risk behavior in ninth grade. In adolescence, African American or biracial and White girls increased their sexual risk behavior faster than did their boy counterparts. All groups’ sexual risk behaviors peaked, then declined, during young adulthood, although White men and women continued to have higher levels of sexual risk behavior than did their African American or biracial counterparts.

### RESULTS

#### Level-1 Model

The deviance statistics indicated that the model with the linear and quadratic terms specified for both adolescence and young adulthood fit the data better than did the model with only the linear terms (\( \chi^2_{(0)} = 291.4 \), \( P < .001 \)). The cubic model did not improve the fit (\( \chi^2_{(2)} = 20.2 \); \( P \) not significant), so the final level-1 model included only the linear and quadratic terms. The model suggested that acceleration in sexual risk behavior occurred during adolescence (\( \pi_1 = 0.01 \); \( P \) not significant and \( \pi_2 = 0.04 \); \( P < .01 \)) whereas growth decelerated during young adulthood (\( \pi_3 = 0.36 \); \( P < .001 \) and \( \pi_4 = -0.09 \); \( P < .001 \)). Except for linear growth in adolescence, all coefficients differed from zero (\( P < .05 \)). All random effect variances differed from zero (\( P < .05 \)). The \( \lambda \) reliability for the intercept was 0.63, and those for the slopes ranged from 0.23 to 0.33.

#### Level-2 Model

The final level-2 model is presented in Table 3 and Table 4. The \( b \) parameter estimates that modeled sexual risk behavior in ninth grade (\( \pi_{1j} \)) indicated that those who were older, African American or biracial, and male showed more sexual risk behavior in ninth grade than did those who were younger, White, and female. White girls did not report the lower sexual risk behavior associated with being female evident among African Americans, as indicated by the significant interaction term.

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### DISCUSSION

Our study is one of the first to describe trajectories of sexual risk behavior in a sample that is predominantly African American and spans the time from adolescence through young adulthood. The finding that sexual risk behavior increased during adolescence extends the work of Capaldi et al.37 and O’Donnell et al.13 by statistically testing changes in sexual risk behavior over time. The results of our study further suggest that overall sexual risk behaviors decreased during young adulthood, despite the frequency of sexual intercourse increasing and condom use decreasing. The decrease in sexual risk behavior may have been because of the development of better decisionmaking.

### Table 2—Coding Scheme Used for the Piecewise Model Using Quadratic Terms: Study of Growth Trajectories of Sexual Risk Behavior in Adolescence and Young Adulthood, Flint, Mich, 1994–2003

<table>
<thead>
<tr>
<th>Coded Time Variables</th>
<th>Adolescence</th>
<th>Young Adulthood</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Wave 1</td>
<td>Wave 2</td>
</tr>
<tr>
<td>( a_{1} )</td>
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</tr>
<tr>
<td>( a_{2} )</td>
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</tr>
<tr>
<td>( a_{4} )</td>
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</tr>
</tbody>
</table>

Note. Study participants were interviewed starting in 1994 every year for 4 years (corresponding to participants’ high school years), followed by a 1-year gap, and then every year for 4 additional years, for a total of 8 waves of data.

<table>
<thead>
<tr>
<th>Covariates</th>
<th>Coefficient (SE)</th>
<th>Average t ratio</th>
<th>Reliability, ( \lambda )</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean score at wave 1, ( \pi_0 )</td>
<td>Base, ( b_{00} )</td>
<td>(-0.06 (0.06))</td>
<td>-0.95</td>
</tr>
<tr>
<td></td>
<td>Age, ( b_{10} )</td>
<td>(0.30 (0.05))</td>
<td>6.13***</td>
</tr>
<tr>
<td></td>
<td>White, ( b_{20} )</td>
<td>(-0.61 (0.09))</td>
<td>-7.04***</td>
</tr>
<tr>
<td></td>
<td>Female, ( b_{30} )</td>
<td>(-0.44 (0.07))</td>
<td>-6.02***</td>
</tr>
<tr>
<td></td>
<td>Female × White, ( b_{40} )</td>
<td>0.42 (0.12)</td>
<td>3.33***</td>
</tr>
<tr>
<td>Mean growth at wave 1, ( \pi_1 )</td>
<td>Base, ( b_{10} )</td>
<td>(-0.16 (0.07))</td>
<td>-2.49*</td>
</tr>
<tr>
<td></td>
<td>Age, ( b_{11} )</td>
<td>(-0.05 (0.02))</td>
<td>-2.73**</td>
</tr>
<tr>
<td></td>
<td>Female, ( b_{12} )</td>
<td>0.34 (0.08)</td>
<td>4.11***</td>
</tr>
<tr>
<td>Mean acceleration during adolescence, ( \pi_2 )</td>
<td>Base, ( b_{20} )</td>
<td>0.07 (0.02)</td>
<td>3.30**</td>
</tr>
<tr>
<td></td>
<td>White, ( b_{21} )</td>
<td>0.05 (0.01)</td>
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<tr>
<td></td>
<td>Female, ( b_{22} )</td>
<td>(-0.07 (0.03))</td>
<td>-2.65**</td>
</tr>
<tr>
<td>Mean growth at wave 5, ( \pi_5 )</td>
<td>Base, ( b_{50} )</td>
<td>0.24 (0.06)</td>
<td>4.20***</td>
</tr>
<tr>
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<td>Age, ( b_{51} )</td>
<td>(-0.16 (0.05))</td>
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<tr>
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<td>White, ( b_{52} )</td>
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<td>Female, ( b_{53} )</td>
<td>0.15 (0.07)</td>
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<td>Female × White, ( b_{54} )</td>
<td>(-0.42 (0.15))</td>
<td>-2.79**</td>
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<tr>
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<td>White × age, ( b_{55} )</td>
<td>(-0.24 (0.11))</td>
<td>-2.19*</td>
</tr>
<tr>
<td>Mean acceleration during young adulthood, ( \pi_4 )</td>
<td>Base, ( b_{40} )</td>
<td>(-0.06 (0.01))</td>
<td>-4.48***</td>
</tr>
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<tr>
<td></td>
<td>Female, ( b_{43} )</td>
<td>(-0.04 (0.02))</td>
<td>-2.20*</td>
</tr>
<tr>
<td></td>
<td>Female × White, ( b_{44} )</td>
<td>0.09 (0.04)</td>
<td>2.61*</td>
</tr>
<tr>
<td></td>
<td>White × age, ( b_{45} )</td>
<td>0.06 (0.03)</td>
<td>2.23*</td>
</tr>
</tbody>
</table>

*P < .05; **P < .01; ***P < .001.


<table>
<thead>
<tr>
<th></th>
<th>Variance</th>
<th>df</th>
<th>( \chi^2 )</th>
</tr>
</thead>
<tbody>
<tr>
<td>Score at wave 1, ( r_{00} )</td>
<td>0.56</td>
<td>591</td>
<td>1469.2***</td>
</tr>
<tr>
<td>Growth at wave 1, ( r_{10} )</td>
<td>0.35</td>
<td>593</td>
<td>766.7***</td>
</tr>
<tr>
<td>Acceleration during transition to adulthood, ( r_{54} )</td>
<td>0.01</td>
<td>590</td>
<td>740.2***</td>
</tr>
</tbody>
</table>

***P < .001.

skills,\(^5\) which enabled young adults to better understand the consequences of sexual risk behavior, or because of the development of longer-term, monogamous partnerships.

This study further builds on Capaldi et al.,\(^3,50\) and O’Donnell et al.’s\(^3\) studies by extending the results to African American males and females, White females, and older youths. The gender differences found in adolescent sexual risk behavior demonstrate the importance of longitudinal study of sexual risk behavior that incorporates several waves of data and allows for nonlinear change in behavior. In 2 cross-sectional studies,\(^29,30\) for example, researchers formed risk groups of adolescents on the basis of frequency of sexual intercourse, number of partners, and condom-use frequency. In 1 of the studies,\(^30\) boys were found to be more likely to be in the high-risk group, whereas in the other,\(^29\) no difference in the gender distribution was found. The findings of this longitudinal study suggest that the 2 studies may simply have assessed their samples at different points along the adolescent sexual risk behavior trajectory. Newman and Zimmerman\(^30\) assessed only 10th grade students, who had a mean age of 15.6 years. However, Murphy et al.\(^29\) included students from all grades of high school; participants who had a mean age of 17.5 years. The differences in the ages of participants may explain why these studies are contradictory. In our study, we found that boys exhibited more sexual risk behavior in the early years of high school than girls, but girls overtook the boys by the end of high school. Newman and Zimmerman\(^30\) may have captured early gender differences, when boys exhibited more sexual risk behavior. By contrast, by combining all students together across age groups, Murphy et al.\(^29\) may have masked the gender differences across time.

The results of the comparison of African Americans to Whites similarly suggest that differences in sexual risk behaviors between these groups are more complicated than has been found in previous research with adolescents.\(^31–33\) We found that African Americans engaged in more sexual risk behavior in ninth grade compared with Whites, which may reflect the finding by Warren et al.\(^33\) that African Americans had their sexual initiation earlier than Whites. We found, however, that Whites had a faster rate of growth in sexual risk behavior during high school than did African Americans, leading to their eventual surpassing of African Americans by the time they reached young adulthood.

The finding that African Americans engaged in less sexual risk behavior during young adulthood compared with Whites is a unique contribution of this study. These
results raise several issues. Although African Americans may participate in lower rates of sexual risk behavior during young adulthood, their overall risk of experiencing negative outcomes is nonetheless greater, as evidenced by the higher rates of HIV and other sexually transmitted diseases among African Americans compared with Whites.20 It is possible that an African American adolescent engaging in a particular risky behavior with another African American is at greater risk than is a White adolescent engaging in the same behavior with another White adolescent, because of the higher prevalence of HIV or other sexually transmitted diseases among African Americans compared with Whites.20 Another interpretation may be that African Americans are more likely to be infected during adolescence, when their rates of sexual risk behavior are higher than their White counterparts.33 Those at younger ages, especially girls, may be physiologically more vulnerable to HIV and sexually transmitted infection, compared with older youth.34

Several limitations of the study should be noted. These results may not generalize to all populations of adolescents because of several factors. The grade point average exclusion criterion may have excluded less-risk-taking youths from our sample.35 By 12th grade, however, the sample’s average grade point average resembled a more normal distribution.36 Because the sample was drawn from a medium-sized city, it may not generalize to adolescents who live in other contexts. Our results may not generalize to youths who drop out of school before age 16, especially homeless or runaway youths. Our White participants were from a majority African American city and attended majority African American schools, and therefore they may not be representative of all White youths. We did not include sexual orientation in the study so we do not know how the results may generalize to nonheterosexual youths. Few participants (2.0%), however, described themselves as having had sexual intercourse with someone of the same sex.

Another limitation is that we did not specify the type of sexual intercourse in the sexual intercourse questions, so we do not know how participants may have differentially reported specific sexual behaviors. We do not know if participants reported condom use only for vaginal intercourse, for example, or if they also included oral and anal sexual intercourse when responding to the question. Some researchers have found that a majority of youths do not consider oral intercourse to be sex,37 but do consider anal intercourse to be so,37 suggesting that participants may have included anal but not oral sex in their responses. Because youths may be likely to have had oral sex but not other types of sexual intercourse,38,39 our measure of sexual risk may have underestimated the actual sexual risks taken by youths.

Another limitation was the assumption that engaging in certain sexual risk behaviors confers risk. As with much research on sexual risk behavior,40,41 the measure of sexual risk behavior included in this study did not consider participants’ relationship characteristics. Because participants in monogamous relationships were not differentiated from those who were not, we may have overestimated the sexual risk behaviors of the participants. This may be a particular problem during young adulthood, when some participants may have formed stable, monogamous relationships in which neither partner has a sexually transmitted disease, rendering frequency of sexual intercourse and condom use less useful as measures of sexual risk behavior. Therefore, the result concerning a decrease in sexual risk behavior during young adulthood may be an underestimation. Relationships among adolescents and young adults, however, may be particularly unstable, and adolescents’ understanding of sexuality and intimacy particularly may be undeveloped. This may present difficulties in assessing true monogamy status among adolescents and young adults. Thus, the items frequency of sexual intercourse, number of partners, and condom-use frequency likely accurately summarize the sexual risk of adolescents. In addition, few participants reported having been married at wave 8 (9.2%). We therefore likely underestimated the decrease in sexual risk for few participants.

A final limitation is that the measures were based on self-reports. Researchers have found that males tend to overreport and females tend to underreport sexual behavior.42 Because of practical and ethical limitations, however, it is difficult to avoid self-report methods when studying human sexual behavior. The sexual risk behavior items for this study were collected via a self-completed questionnaire, which tends to increase the accuracy of reports.42

These limitations notwithstanding, studies such as ours that focus on trajectories of
sexual risk behavior may provide much-needed information for researchers and practitioners. Because of the developmental nature of adolescence, a snapshot of sexual risk behavior among adolescents at a particular point may be insufficient. Investigating trajectories over time allows for differences in starting points and differences in rates of change in sexual risk behavior. These differences may be vital to consider when developing interventions. An understanding of trajectories of sexual risk behavior, for example, may guide practitioners to intervene earlier with some groups than would a snapshot understanding of sexual risk behavior. Trajectories further suggest that some groups may need enhanced intervention to slow the rate of growth in sexual risk behavior among that group.

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Contributors
S. Fergus conceived the analyses, analyzed the data, and wrote the article. M.A. Zimmerman supervised the analysis and writing and was the principal investigator of the study. C.H. Caldwell helped to interpret findings and review and rewrite drafts of the article.

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Human Participant Protection
This study was approved by the health sciences institutional review board of the University of Michigan, Ann Arbor.

References
Bisexual Latino Men and HIV and Sexually Transmitted Infections Risk: An Exploratory Analysis

Miguel Muñoz-Laboy, DrPH, and Brian Dodge, PhD

Objectives. We sought to determine whether there were differences in sexual risk among behaviorally and self-identified bisexual men, men who reported having sex with both men and women without reporting a bisexual identity and men who self-identified as bisexual but reported only recent homosexual behavior over the past 6 months.

Methods. Through a secondary data analysis, we conducted stepwise linear regression equation modeling to determine which factors were significant predictors of sexual risk among various subgroups of bisexual Latino men.

Results. Having sex with women, regardless of sexual identity, increased the likelihood of insertive unprotected anal intercourse with men. Bisexual identity was not statistically associated with unprotected anal intercourse with men.

Conclusions. Future studies should begin to examine differences within groups rather than focusing on group comparisons that yield limited insights into sexual risk predictors for homosexually and bisexualy active men. Further research that explores risk and protective factors in the sexual lives of Latino bisexual men is also needed. (Am J Public Health. 2007;97:1102–1106. doi:10.2105/AJPH.2005.078345)

Relationships between men’s bisexuality (sexual interactions with both sexes) and HIV and sexually transmitted infection (STI) risk continue to be poorly understood. In most previous studies, bisexual men have been combined with behaviorally and self-identified homosexual men under the rubric of gay men or men who have sex with men without being examined separately in terms of their risk and prevention needs. Simultaneously, a body of literature has emerged that explicitly identifies male bisexuality as a significant psychosocial risk factor for HIV/STI infection. Researchers have recently suggested that behaviorally bisexual men of color and their partners are at particularly high risk for HIV transmission. For example, Brooks et al. found that among African American and Latino men, the odds of being infected with HIV were significantly greater for men who have sex with both men and women than for men who have sex exclusively with men (MSM) and men who have sex exclusively with women (MSW).

Since the onset of the AIDS pandemic, men who have sex with both men and women were considered the bridge between MSM—in whom the HIV/AIDS epidemic was concentrated—and the “general” population. In 1997, Kahn et al. published a national study of the role of bisexuality and HIV infections, analyzing the annual incidence of HIV infections, and found that among the 40,000 infections studied, bisexual transmission accounted for only 3%. Kahn et al. concluded that bisexual men played a minimal role in the overall epidemic. However, in a recent study, Prabhu et al. used a series of cross-sectional samples in San Francisco that included more than 17,000 participants from 1998 to 2003 and found that unprotected anal intercourse between HIV-serodiscordant partners had significantly decreased among MSM but remained stable among men who have sex with both men and women. They also found that rates of vaginal intercourse between HIV-serodiscordant partners peaked in 2001 among men who have sex with both men and women but decreased in recent years. Prabhu et al. concluded that African American and Latino men who have sex with both men and women were at particularly high risk of HIV infection and transmission. Furthermore, from the mid-1980s to the present, the literature has produced one consistent key finding: Latino MSM are at high risk of HIV infection. Although rates of HIV infection have decreased among White MSM over the past 2 decades, the rates among African American and Latino MSM have constantly increased over time. Latino bisexual men are part of this larger group. Therefore, Latino bisexual risk behavior must be considered a central focus for addressing the HIV/AIDS epidemic among Latino communities in the United States.

Overall, “bisexual” individuals are an exceptionally diverse population. A voluminous literature has shown that substantial numbers of men and women report numerous forms of bisexuality across cultures and throughout the life course. Diversity is particularly evident among bisexual individuals. Bisexual is a commonly used sociocultural and sexual identity label, although it has received notably less scientific attention than homosexuality in sexuality and HIV/STI research. Laumann et al. estimated that the percentage of men in the general US population who self-identify as bisexual is approximately 1%. Although there is often overlap, bisexual behavior is more frequently reported than bisexual identity. Interpretation of data on the general prevalence of behavioral bisexuality is complex. Differences exist across studies in terms of the time frame in which the bisexual behavior was measured (i.e., lifetime, past 12 months) and because many individuals who engage in bisexuality hide their behavior. In large-scale empirical studies, bisexual men have been found to be between 0.7% and 5.8% of the general US population and between 0.4% and 3.9% of 10 European nations, depending on the time period in which the behavior took place. In addition, African American and Latino men have been found to be consistently more likely to report bisexuality than have their White counterparts in the United States.
Although bisexual men have generally been noted as being at particularly high risk for HIV and STIs, previous research has not yet explored what elements within bisexuality contribute to or protect them from, risk behavior. This is a major limitation given the diversity of men often subsumed under the category of bisexual. We sought to determine whether there were differences in sexual risk, among men who were behaviorally bisexual (i.e., men who have sex with both men and women) and men who self-identified as bisexual over the past 6 months.

METHODS

We conducted a secondary data analysis of the 2002 self-administered Urban Latino Men’s Health Survey conducted by Gay Men’s Health Crisis. The original research project focused on the impact of knowledge of HIV antiretroviral medications and viral load on sexual risk behavior among Latino MSM in New York City (for details on the research design, see reference 33). The men in the sample represented 15 Latin American and Caribbean countries.

The majority of the sample was employed, bilingual, older than 25 years, HIV negative, single, and had a moderate level of education (high school or general equivalency diploma; Table 1). Most were long-term immigrants (more than 3 years in the United States) and did not live alone at the time of data collection. Because this was an exploratory analysis, we used stepwise linear regression equation modeling to determine which factors were significant predictors of sexual risk within this sample. Because we conducted multiple regressions, we set the α level at 0.05 and used the Bonferroni correction method to reduce the probability of type I error.34

RESULTS

Bisexual Latino men (n=68), encapsulating both those who reported bisexual behavior and those who identified themselves as bisexual, whether practicing or not, presented an overall larger proportion of sexual risk than the nonbisexual men (men who had sex exclusively with men or men who identified as gay). Specifically, 60.3% of the bisexual men reported having at least 1 sexual risk encounter (defined as unprotected insertive anal intercourse) with a man over the past 6 months in comparison with 36.3% of nonbisexual men (χ² = 13.46, P=.001). Bisexual men did not differ from nonbisexual men with regard to receptive unprotected anal intercourse (39.7% vs 33.5%, respectively). This evidence is in line with other research findings that have cited bisexual men as being at relatively high behavioral risk for HIV/STI transmission and infection compared with exclusively homosexual men.1,2,6,8

However, it was not clear whether bisexual identity or bisexual behaviors were associated with the higher levels of sexual risk. Thus, in the next level of analysis, we regressed having insertive unprotected anal intercourse with other men onto bisexual behavior (having sex with both men and women over the past 6 months), bisexual identity, and both bisexual behavior and bisexual identity. Although bisexual identity was independently associated with levels of sexual risk, once the variable of having sex with women was introduced into the equation, bisexual identity was no longer related to sexual risk. We found that having sex with women (regardless of the men’s professed sexual identity) increased the slope

<p>| TABLE 1—Sample Demographic and Behavioral Characteristics (n = 395): Urban Latino Men’s Health Survey, New York, NY, 2002 |</p>
<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age, y¹</td>
<td></td>
</tr>
<tr>
<td>15–21</td>
<td>13.9</td>
</tr>
<tr>
<td>22–39</td>
<td>60.8</td>
</tr>
<tr>
<td>40–59</td>
<td>20.8</td>
</tr>
<tr>
<td>60 and older</td>
<td>2.0</td>
</tr>
<tr>
<td>No answer</td>
<td>2.5</td>
</tr>
<tr>
<td>Annual income, $</td>
<td></td>
</tr>
<tr>
<td>≤5,200</td>
<td>10.1</td>
</tr>
<tr>
<td>5,201–15,600</td>
<td>17.7</td>
</tr>
<tr>
<td>15,601–26,000</td>
<td>28.4</td>
</tr>
<tr>
<td>26,001–39,000</td>
<td>29.9</td>
</tr>
<tr>
<td>&gt;39,000</td>
<td>13.2</td>
</tr>
<tr>
<td>No answer</td>
<td>0.7</td>
</tr>
<tr>
<td>Occupation</td>
<td></td>
</tr>
<tr>
<td>Full time</td>
<td>58.9</td>
</tr>
<tr>
<td>Part time</td>
<td>12.0</td>
</tr>
<tr>
<td>Self-employed</td>
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<tr>
<td>Student</td>
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<tr>
<td>Unemployed</td>
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<tr>
<td>No answer</td>
<td>0.6</td>
</tr>
<tr>
<td>Language spoken most often</td>
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</tr>
<tr>
<td>Spanish</td>
<td>39.7</td>
</tr>
<tr>
<td>English</td>
<td>36.3</td>
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<tr>
<td>Spanish and English</td>
<td>19.7</td>
</tr>
<tr>
<td>Portuguese</td>
<td>2.5</td>
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<tr>
<td>English and Portuguese</td>
<td>1.8</td>
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<tr>
<td>Sexual self-identity</td>
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<tr>
<td>Gay</td>
<td>82.2</td>
</tr>
<tr>
<td>Bisexual</td>
<td>14.4</td>
</tr>
<tr>
<td>Heterosexual</td>
<td>1.7</td>
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<tr>
<td>Transgender</td>
<td>0.25</td>
</tr>
<tr>
<td>Transsexual</td>
<td>0.25</td>
</tr>
<tr>
<td>Gay and Bisexual</td>
<td>0.25</td>
</tr>
<tr>
<td>Gay and Heterosexual</td>
<td>0.25</td>
</tr>
<tr>
<td>Other</td>
<td>0.7</td>
</tr>
<tr>
<td>Education</td>
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<td>Some high school</td>
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<tr>
<td>High school diploma</td>
<td>19.5</td>
</tr>
<tr>
<td>Passed General Educational Development (GED) test</td>
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<tr>
<td>Some college</td>
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<tr>
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<td>21.3</td>
</tr>
<tr>
<td>Graduate school</td>
<td>0</td>
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<tr>
<td>No answer</td>
<td>3.5</td>
</tr>
</tbody>
</table>

Mean age 32.9 ±10.2.
of the number of men with whom they had insertive unprotected anal intercourse \( (t=5.61, P=.001) \).

Next, we regressed the number of partners with whom respondents had receptive unprotected anal intercourse onto the same predictors as in the prior equation. Reporting having sex with women (regardless of the men’s professed sexual identity) increased the slope of the number of partners who engaged in receptive unprotected anal intercourse over the prior 6 months \( (t=2.08, P=.039) \).

The third level of analysis was to examine if the associations between having sex with women and sexual risk with men still existed after adjustment for age differences. After control for age, the effects of having sex with women on sexual risk became slightly stronger; for insertive unprotected anal intercourse, the slope increased \( (t=5.66, P=.001) \), and for receptive unprotected anal intercourse, the slope increased \( (t=2.18, P=.030) \). Having sex with women was a statistically stronger predictor of insertive unprotected anal intercourse \( (R=0.329, F=16.96, P=.001) \) than a predictor of receptive unprotected anal intercourse \( (R=0.149, F=3.10, P=.046) \).

We then compared the frequencies of ejaculating inside the partner and the frequencies of receiving ejaculate for those who reported bisexual behavior. We found that those who reported having sex with women were also more likely to report ejaculating inside a man at least once over the past 6 months (59.1%) than were nonbisexual men (32.6%; \( \chi^2=6.02, P=.01 \)). The insertive unprotected anal intercourse adjusted age slope for having sex with women was \( .462 (t=2.03, P=.044) \). However, having sex with women was not related to receiving ejaculate during receptive unprotected anal intercourse. Because data available on bisexual behavior and identity were limited, no further analyses were conducted.

**DISCUSSION**

Because prior studies have demonstrated that bisexual men are generally more likely to report sexual risk than exclusively homosexual or heterosexual men are, we originally hypothesized that there would be no differences between men who have sex with both men and women and those who self-identified as bisexual. However, we found that having sex with women (more than sexual identity or any combination of identity and behavior) increased the likelihood of sexual risk with other men.

These findings were based on a study that was, as with most HIV/STI research, not intended to measure sexual risk specifically among bisexual men. Our sample was reached through the efforts of large non-profit organization that provides HIV/AIDS prevention and treatment services and was not a random sample of Latino bisexual men. Furthermore, all the men in the original study were recruited because they reported having sex with other men. Questions on sexual risk with women were not asked. The available data simply indicated whether or not each of the men had sex with a woman over the prior 6 months; in hindsight, this represents a limitation of the study. A second concern is that this was a cross-sectional analysis on variables that were asked about retrospectively. Thus, the nature of the causal relationship between predictors and the dependent variables could not be determined with full certainty. Therefore caution should be taken in generalizing the findings from this analysis.

Nonetheless, we found a relation between having sex with women and sexual risk with men that we believe can be explained in at least 2 ways. First, in comprehensive reviews of previous research, heterosexual men have been found to use condoms inconsistently.\(^1,^2\) Thus, men who reported having sex with both men and women might also be less likely to use condoms overall, a reflection of general high-risk sexual behavior patterns found in other samples of behaviorally bisexual men. A second possible explanation is that the connection between having sex with women and sexual risk with men resides in the insertive nature of the sexual interaction. Men’s sexual relations with women are, for the most part, insertive, and our findings indicate that this was a predictor of insertive unprotected anal intercourse with men. The ensuing question then is, is it logical to infer that for bisexual men, having sex with women would lead to unprotected anal intercourse with men?

The literature on bisexuality in Latin America has consistently supported the finding that for bisexual men there is a strong relation between the type of sexual intercourse they have with women and that which they have with men. For bisexual men in multiple Latin American studies, the object of sexual desire (whether man or woman) is less important than the role performed in the sexual interactions with both types of partners.\(^35\text{-}^41\)

From multiple studies, we know that bisexual Latino men engage in both insertive and receptive roles during sexual encounters.\(^42\text{-}^45\) Thus, it is possible that the Latino men who had sex with women in this study were mostly those who engaged in insertive roles during sexual intercourse with other men. Another possibility relies on the transfERENCE of the habitual form of sexual intercourse with women to sexual intercourse with men. For many men, having sex with women does not involve the use of condoms once there is trust in the relationship and other forms of contraceptives are used to avoid unintended pregnancy.\(^46\text{-}^47\)

Additionally, Latin American studies have shown that having sex with women is an important milestone in the development and reinforcement of manhood.\(^48\text{-}^51\) Thus, private symbolic interactions such as having “conquered” and penetrated a woman, or social indicators of heterosexuality such as marriage and impregnating a woman, are powerful representations of heterosexual masculinity.\(^48\text{-}^49\)

However, it is important to highlight that, as several Latin American scholars have pointed out, the linkages between preserving a public heterosexual image are strongly related to social class and structural oppression.\(^48\text{-}^53\) That is, the men who are more socially excluded place higher stakes in maintaining a public image. For this reason, we cannot discount the idea that notions of maintaining power within the sexual encounters may be operating for the men in this study, facilitating engaging in unprotected sex with other men.

Our finding that having sex with women increased the likelihood of unprotected receptive anal intercourse reflects a different path to sexual risk than insertive sexual risk behavior. Men who have sex with men and women in
our sample may seek receptive anal intercourse as a way of not having to perform the expected active role during sex. Thus, the experience of being penetrated may serve as an opportunity to transgress traditional forms of masculinity. The available data do not allow us to examine this hypothesis. However, findings from our own previous research with Latino bisexual men as well as other ethnographic research support this inference.36,42–43

In this study, bisexual identity alone was not related to sexual risk. Nonetheless, it is important to highlight that little is known about self-identified bisexual men’s lives in relation to HIV/STI risk in general. Research has typically focused on increased risk among “non–homosexually identified” men. It is possible that self-identified bisexual men may experience and express their sexuality in different, and potentially less risky, ways than their nonidentified bisexual counterparts. This can only be clarified through more refined research on the relations between sexual behavior and sexual identity among bisexual men.

In summary, studies in the literature on HIV/STI risk among diverse sexual groups have generally focused on comparing “M’s” and “W’s” (MSMs, MSMWs, WSWs, WSWMs). These studies have examined differences between groups without first having a clear understanding of differences within groups. Latino bisexual men are among the least understood, not only in terms of sexual risk but also in other aspects of sexuality, intimacy, and social relations.42–43 We recommend larger quantitative and qualitative studies that can provide more clarity to the determinants and causal relations that produce or protect from HIV/STI risk in the sexual lives of Latino bisexual men, as well as other bisexual men and women in the United States.

**Authors Contribution**

M. Muñoz-Laboy designed the study and led the writing. B. Dodge provided insight during the conceptualization, data analysis, and article preparation. Both authors conceptualized ideas and reviewed drafts of the article.

**Institutional Review Board**

Gay Men’s Health Crisis (GMHC) institutional review board approved the study from which the data analysis was conducted. The secondary data analysis was conducted under the Columbia University institutional review board protocol AAA7371 (Mascuinity, Sexuality and Cultural Production).

**Acknowledgments**

This study was supported by the Institute for Gay Men’s Health at Gay Men’s Health Crisis (GMHC) and the Ford Foundation (grant 1020-148103).

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**References**


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of context and culture.


Associations between childhood sexual abuse and persons who are HIV positive, persons who have experienced sexually transmitted infections (STIs), and adult high-risk sexual behaviors have been identified in studies of adult women1–6 and of gay and bisexual men. Many of the studies of gay and bisexual men, however, have enrolled high-risk convenience samples of men recruited from gay-specific commercial venues (e.g., bars, clubs) and STI, drug, and other medical clinics.7–14 Previous research has highlighted that individuals at risk for HIV/STIs are more likely to have experienced childhood sexual abuse. The reported prevalence of childhood sexual abuse among men who have sex with men (MSM) has ranged from 11% to 37%; the highest prevalence was reported from HIV/STI clinic samples (i.e., 34%–37%).7,8,10 A lower prevalence of childhood sexual abuse (i.e., 15%–28%) has been reported in nonclinic-based samples that were recruited using census data or randomized-digit dialing methods.11,13,15 As well as in festival-based samples.16 Although these studies have been valuable for establishing the association between childhood sexual abuse and HIV/STI risk in these sexual high-risk study groups, it is not clear if similarly high associations of reported frequency of childhood sexual abuse and HIV/STI exist for more demographically diverse gay and bisexual populations of men.

Our cross-sectional study was designed to examine a lower risk gay and bisexual population of men. We identified a randomly selected festival-based sample from the 1997 and 1998 Twin Cities’ Men’s Health and Sexuality Study conducted by the Minnesota AIDS Project. We then assessed the prevalence and frequency of childhood sexual abuse in gay and bisexual men, and identified the factors associated with childhood sexual abuse and HIV/STI transmission. We hypothesized that gay and bisexual men who had experienced childhood sexual abuse would be more likely than those who had no history of childhood sexual abuse to report HIV-positive status and to report behaviors associated with HIV/STI transmission.

**Objectives.** We examined the prevalence and frequency of childhood sexual abuse and their association with sexual risk among a sample of gay and bisexual men.

**Methods.** Cross-sectional data were collected by survey from randomly selected gay and bisexual men who attended the 1997 and 1998 Minneapolis/St. Paul Gay, Lesbian, Bisexual, and Transgender Pride Festivals. Data included demographics, sexual activity, history of childhood sexual abuse, HIV status, history of sexually transmitted infection, use of sex-related drugs (such as crack, cocaine, Ecstasy, amyl nitrate, crystal methamphetamine, and Special K), and history of exchanging sex for payment.

**Results.** Childhood sexual abuse was reported by 15.5% of the survey respondents (n = 134). Those who reported experiencing abuse regularly were more likely to (1) be HIV positive, (2) have exchanged sex for payment, and (3) be a current user of sex-related drugs. Neither unsafe sex nor sexually transmitted infections were associated with childhood sexual abuse.

**Conclusions.** These findings show that more than 1 in 7 gay and bisexual men in a non-clinical, festival-based setting were victims of childhood sexual abuse and that childhood sexual abuse was associated with alarmingly high rates of men who were HIV infected and antecedent risk behaviors. (Am J Public Health. 2007; 97:1107–1112. doi:10.2105/AJPH.2005.071423)
enrollment time was reduced in 1997 by a tornado that struck the festival grounds. The participant response rate for men is unavailable for 1997, but the participation rate for women in a similar study at the same site in 1997 was 54%. This rate of participation is corroborated by data that were collected on participation in 1998: 56% of the men approached agreed to participate.

The dependent variables for analysis were HIV infection status (positive, negative, or unknown); history of a diagnosed STI (yes or no; defined as syphilis, chlamydia, gonorrhea, herpes, hepatitis B, human papillomavirus); self-defined current use of sex-related drugs (yes or no; defined as drugs known to be associated with increased sexual risk-taking behavior, including cocaine, crack, poppers (amyl nitrate), crystal methamphetamine, Ecstasy, Special K (ketamine)); history of ever exchanging sex for payment (yes or no; defined as exchanging sex for money, clothes, food, shelter, drugs); and frequency of unsafe anal intercourse in the past 60 days (defined as receptive or insertive anal intercourse without a condom with a primary sexual partner of HIV serodiscordant or unknown infection status, or receptive or insertive anal intercourse without a condom with any secondary sexual partner).

The key independent variable was reported history of child sexual abuse, which was operationalized in 2 ways. First, childhood sexual abuse was dichotomized to reflect endorsement of a question that asked whether “as a child or adolescent” participants were “ever forced to have unwanted sexual activity with adults.” Second, childhood sexual abuse was described in terms of frequency (i.e., never, once or rarely, sometimes, regularly). Other independent variables included race/ethnicity (i.e., White, African American or Latino, Asian or Pacific Islander, multiracial or other). African American and Latino men were combined because of the small numbers of respondents (4.8% of total sample, when combined) and because these men have reported similarly higher rates of unsafe sexual behavior when compared with White men.43 Other data collected were age, education (i.e., some high school or high school graduate, some college, college graduate, graduate or professional school), acculturation to the LGBT community (i.e., a dichotomous variable reflecting responses to questions about reported comfort level with sexuality, degree of being “out,” relationships with other LGBT community members, patronization of LGBT businesses, activity in the LGBT community), types of sexual partnerships (i.e., exclusively partnered, nonexclusively partnered including having primary and secondary partners, single).

To optimize statistical power for this analysis, we combined data collected from 2 successive years of a study that used identical recruitment procedures and survey items. Although a randomization procedure was used to select participants from over 100000 attendees per year at the festivals, there is a slight possibility that a very few men may have participated in the survey in both years. Differences between study years were detected using the \( \chi^2 \) or Fisher exact test in reported acculturation, age, and sexual orientation. As shown in Table 1, sample characteristics for both years...
TABLE 2—Sample Characteristics (n = 862), by Reported Childhood Sexual Abuse: Twin Cities’ Men’s Health and Sexuality Study, 1997 and 1998

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Childhood Sexual Abuse Reported (n = 134; 15.5%), No. (%)</th>
<th>No Childhood Sexual Abuse Reported (n = 728; 84.5%), No. (%)</th>
<th>Total (n = 862), No. (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age, y (n = 852)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>18–25</td>
<td>18 (13.6)</td>
<td>106 (14.7)</td>
<td>124 (14.6)</td>
</tr>
<tr>
<td>26–35</td>
<td>53 (40.1)</td>
<td>288 (40.0)</td>
<td>341 (40.0)</td>
</tr>
<tr>
<td>36–45</td>
<td>41 (31.1)</td>
<td>217 (30.1)</td>
<td>258 (30.3)</td>
</tr>
<tr>
<td>≥45</td>
<td>20 (15.2)</td>
<td>109 (15.1)</td>
<td>129 (15.1)</td>
</tr>
<tr>
<td>Race/ethnicity (n = 829)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>White</td>
<td>113 (88.3)</td>
<td>630 (89.9)</td>
<td>743 (89.7)</td>
</tr>
<tr>
<td>African American/Latino</td>
<td>7 (5.4)</td>
<td>28 (4.0)</td>
<td>35 (4.2)</td>
</tr>
<tr>
<td>Asian/Pacific Islander</td>
<td>2 (1.6)</td>
<td>19 (2.7)</td>
<td>21 (2.5)</td>
</tr>
<tr>
<td>Multiracial/other</td>
<td>6 (4.7)</td>
<td>24 (3.4)</td>
<td>30 (3.6)</td>
</tr>
<tr>
<td>Educationa (n = 817)*</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Some high school/high school graduate</td>
<td>12 (9.4)</td>
<td>55 (8.0)</td>
<td>67 (8.2)</td>
</tr>
<tr>
<td>Some college</td>
<td>49 (38.3)</td>
<td>190 (27.6)</td>
<td>239 (29.2)</td>
</tr>
<tr>
<td>College graduate</td>
<td>44 (34.4)</td>
<td>262 (38.0)</td>
<td>306 (37.5)</td>
</tr>
<tr>
<td>Graduate/professional school</td>
<td>23 (17.9)</td>
<td>182 (26.4)</td>
<td>205 (25.1)</td>
</tr>
<tr>
<td>Sexual orientation (n = 817)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gay</td>
<td>123 (92.5)</td>
<td>694 (95.7)</td>
<td>817 (95.2)</td>
</tr>
<tr>
<td>Heterosexual</td>
<td>1 (0.7)</td>
<td>4 (0.6)</td>
<td>5 (0.6)</td>
</tr>
<tr>
<td>Bisexual</td>
<td>4 (3.0)</td>
<td>20 (2.8)</td>
<td>24 (2.8)</td>
</tr>
<tr>
<td>No preference/MSM</td>
<td>5 (3.8)</td>
<td>7 (1.0)</td>
<td>12 (1.4)</td>
</tr>
<tr>
<td>Acculturation to LGBT community (n = 790)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>High acculturation</td>
<td>99 (73.9)</td>
<td>530 (72.8)</td>
<td>629 (73.0)</td>
</tr>
<tr>
<td>Moderate acculturation</td>
<td>19 (14.2)</td>
<td>114 (15.7)</td>
<td>133 (15.4)</td>
</tr>
<tr>
<td>Low acculturation</td>
<td>3 (2.2)</td>
<td>25 (3.4)</td>
<td>28 (3.2)</td>
</tr>
<tr>
<td>Sexual relationship status (n = 838)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Exclusively partnered</td>
<td>48 (37.2)</td>
<td>264 (37.2)</td>
<td>312 (37.2)</td>
</tr>
<tr>
<td>Partnered but have sex outside relationship Singleb</td>
<td>33 (25.6)</td>
<td>164 (23.1)</td>
<td>197 (23.5)</td>
</tr>
<tr>
<td>HIV status (n = 753)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Positive</td>
<td>13 (10.6)</td>
<td>54 (8.6)</td>
<td>67 (8.9)</td>
</tr>
<tr>
<td>Negative</td>
<td>110 (89.4)</td>
<td>576 (91.4)</td>
<td>686 (91.1)</td>
</tr>
<tr>
<td>Ever exchanged sex for payment (n = 852)**</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>28 (21.4)</td>
<td>38 (5.3)</td>
<td>66 (7.8)</td>
</tr>
<tr>
<td>No</td>
<td>103 (78.6)</td>
<td>683 (94.7)</td>
<td>786 (92.2)</td>
</tr>
<tr>
<td>Current use of sex-related drugsa (n = 617)**</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>24 (26.1)</td>
<td>61 (11.6)</td>
<td>85 (13.8)</td>
</tr>
<tr>
<td>No</td>
<td>68 (73.9)</td>
<td>464 (88.4)</td>
<td>532 (86.2)</td>
</tr>
<tr>
<td>Ever had an STI (n = 622)**</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>53 (57.0)</td>
<td>220 (41.6)</td>
<td>273 (43.9)</td>
</tr>
<tr>
<td>No</td>
<td>40 (43.0)</td>
<td>309 (58.4)</td>
<td>349 (56.1)</td>
</tr>
<tr>
<td>Unsafe sex in last 60 daysc (n = 795)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>23 (18.9)</td>
<td>117 (17.4)</td>
<td>140 (17.6)</td>
</tr>
<tr>
<td>No</td>
<td>99 (81.1)</td>
<td>556 (82.6)</td>
<td>655 (82.4)</td>
</tr>
</tbody>
</table>

Note. LGBT = lesbian, gay, bisexual, and transgender; MSM = men who have sex with men; STI = sexually transmitted infection. Participant totals by characteristic may vary from total study samples because of incomplete data.

aPercentages are on the basis of the proportion of the number of participants who provided data on each characteristic.

bThose who lacked a college degree were 1.87 times more likely to have reported childhood sexual abuse (P < .001).

1Multiple and one-time partners.

2Such as cocaine, crack, amyl nitrate, crystal methamphetamine, Ecstasy, and Special K.

3Unsafe sex is defined as unprotected anal intercourse with a primary partner whose HIV status is serodiscordant or unknown, or unprotected anal intercourse with any secondary sexual partner.

*P < .05, for χ² analyses; **P < .01, for χ² analyses.
excluded participants who had incomplete information about their (and their partner’s, if appropriate) HIV status, their current relationship status, and childhood sexual abuse history. After exclusions, 862 of the original 936 participants were available for the multivariate analyses. Childhood sexual abuse frequency was the outcome variable for this analysis; those who reported no childhood sexual abuse were the referent group for those who reported that childhood sexual abuse had occurred once, sometimes, or regularly. Response rates for questions about ever having experienced childhood sexual abuse in the univariate analyses, or frequency of childhood sexual abuse in the multivariate analyses, differed because of incomplete data for childhood sexual abuse or the outcome variable. All logistic regression odds ratios (ORs) were reported with 95% confidence intervals (CIs).

**RESULTS**

The median age of our sample was 34 years (interquartile range: 28–41 years). Most participants identified as gay (95.3%), White (88.8%), were well-educated (61.5% had at least a college degree), and were highly to moderately acculturated to the LGBT community (96.4%). Relationship status was divided among men who were exclusively partnered in a relationship (36.7%), partnered but having sexual intercourse outside of the relationship (24.1%), and single (39.2%). Nine percent of the men were HIV positive (Table 1).

In the combined sample of men who reported data for childhood sexual abuse, 15.5% of the participants reported histories of childhood sexual abuse (n = 134): 71 reported having experienced childhood sexual abuse once or rarely, 35 reported sometimes, and 28 reported regular exposure.

The frequency of childhood sexual abuse was associated with HIV-positive status, a history of exchanging sex for payment, and current use of sex-related drugs (Table 3). Compared with those who reported no history of childhood sexual abuse, those who reported regularly experiencing childhood sexual abuse were at significantly greater risk for being HIV-positive (adjusted OR = 2.9; 95% CI = 1.05, 7.85; P = .04). Other factors known to be antecedents to HIV infection were also significantly associated with a history of regular childhood sexual abuse. Compared with men who reported no history of childhood sexual abuse, those who reported experiencing childhood sexual abuse regularly were 7.0 times more likely (95% CI = 2.74, 17.78; P < .001) to have ever exchanged sex for payment, and 6.4 times more likely (95% CI = 2.15, 18.91; P < .001) to be a current user of sex-related drugs. In addition, men who had a history of regular childhood sexual abuse were 3.1 times more likely (95% CI = 0.95, 10.10) to have reported having been diagnosed with an STI (this association approached statistical significance, P = .06).

By contrast, childhood sexual abuse was not associated with reported unsafe sex in the 60 days before the survey.

**DISCUSSION**

In this festival-based sample of gay and bisexual men, more than 1 in 7 participants reported a history of childhood sexual abuse. Frequency of childhood sexual abuse, as well as its prevalence, was related to high-risk sexual behaviors and HIV-positive status. Although higher prevalence has been reported in gay and bisexual men who were sampled from clinics or bars, our data were collected using a randomized selection procedure at a broad community festival where events were not specifically linked with sexual activity. The median age of our

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**TABLE 3—Adjusted Odds Ratios (ORs; With 95% Confidence Intervals [CIs]) for the Association between Frequency of Childhood Sexual Abuse and Outcome Variables: Twin Cities’ Men’s Health and Sexuality Study, 1997 and 1998**

<table>
<thead>
<tr>
<th>Outcome Variable</th>
<th>Unadjusted OR (95% CI)</th>
<th>P</th>
<th>Adjusted OR (95% CI)</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ever had an STI</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Once</td>
<td>1.65 (0.92, 2.95)</td>
<td>.09</td>
<td>1.64 (0.88, 3.07)</td>
<td>.12</td>
</tr>
<tr>
<td>Sometimes</td>
<td>1.92 (0.86, 4.25)</td>
<td>.11</td>
<td>1.69 (0.69, 4.14)</td>
<td>.25</td>
</tr>
<tr>
<td>Regularly</td>
<td>2.58 (0.94, 7.07)</td>
<td>.07</td>
<td>3.10 (0.95, 10.10)</td>
<td>.06</td>
</tr>
<tr>
<td>Unsafe sex</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Once</td>
<td>0.82 (0.41, 1.65)</td>
<td>.58</td>
<td>0.64 (0.28, 1.45)</td>
<td>.28</td>
</tr>
<tr>
<td>Sometimes</td>
<td>1.19 (0.48, 2.97)</td>
<td>.71</td>
<td>1.17 (0.43, 3.23)</td>
<td>.76</td>
</tr>
<tr>
<td>Regularly</td>
<td>1.96 (0.76, 4.83)</td>
<td>.14</td>
<td>1.95 (0.71, 5.32)</td>
<td>.19</td>
</tr>
</tbody>
</table>

Note. STI = sexually transmitted infection. The referent group for analysis was those who reported no history of childhood sexual abuse.

*All outcome variables were adjusted for education level and HIV status except HIV positive, which was adjusted for education level only.

*Number of participants in the adjusted analysis.

*Such as cocaine, crack, amyl nitrate, crystal methamphetamine, Ecstasy, and Special K.

Unsafe sex is defined as unprotected anal intercourse with a primary partner whose HIV status is serodiscordant or unknown or unprotected anal intercourse with any secondary sexual partner.
sample was 34 years, which is similar to other studies of childhood sexual abuse among gay and bisexual men.7,8,10,11,16 Our sample participants were more likely to be partnered than single, and 63% had a college degree. Thus, our sample represented a group of men who were lower risk in terms of demographics and sexual risk-taking when compared with men enrolled at specific gay commercial venues or STI clinics.7,8,20

Previous reports of the prevalence of childhood sexual abuse among gay and bisexual men range from 11% to 37%, childhood sexual abuse in this study was defined as self-reported sexual abuse; this definition may be more subjective when compared with other definitions of childhood sexual abuse that were defined by differences in age of respondents and their sexual partners.8,9,11,20

Research has shown that individuals at risk for HIV and STIs are more likely to have experienced childhood sexual abuse; therefore, it is not surprising that previous research using HIV/STI clinic samples of gay and bisexual men reported the highest prevalences of childhood sexual abuse (i.e., from 34% to 37%).7,8,10 Our prevalence of 15.5% is consistent with reports of 15%–28% from non-clinic-based samples derived from census data, events, or randomized-digit dialing sample frames,11,13,15 which underscores the utility of our festival-based sampling method to identify men representative of the general gay and bisexual male community.

Previous research has identified many risk factors for gay and bisexual men associated with childhood sexual abuse, including a current practice of risky sex,8,11,13,14,16 low levels of education,9,11 and nonconsensual sex in adulthood.11,12,20–22 Our findings were consistent with those that reported associations between childhood sexual abuse and HIV-infection,8,11,14 having ever exchanged sex for money or drugs,16,20,23–25 and current use of sex-related drugs.26–28 Our findings extend earlier reports that identified some high-risk sexual outcomes among men who report childhood sexual abuse, by providing adjusted relative measures of risk by the increasing level of frequency of childhood sexual abuse. Compared with men who reported no abuse, gay and bisexual men who reported regular abuse were significantly more likely to have been HIV-positive, to have reported current use of sex-related drugs, and to have reported histories of having ever exchanged sex for payment. Although not statistically significant, the risks for having ever had an STI and unsafe sexual practices were also higher for gay and bisexual men who reported regularly experiencing childhood sexual abuse compared with those who reported no childhood sexual abuse.

Although other studies have found a direct link between childhood sexual abuse and unsafe anal intercourse,8,9,10,16 we did not find significant associations with either childhood sexual abuse variable (i.e., having ever experienced childhood sexual abuse and frequency of childhood sexual abuse). Our inability to find consistent associations could be related to the limited number of men who reported regular childhood sexual abuse and who engaged in contextualized (by HIV-infection status) unsafe anal intercourse; other studies often report any anal intercourse without condoms as being unsafe, which increases the number of men in this category available for analysis. Further, post hoc power analysis showed that our sample size was insufficient to detect statistically significant associations of regular childhood sexual abuse (n=28) with some outcomes, including ever having had an STI or self-reported unsafe sex in the past 60 days.

Limitations of this study include potential misclassification of both independent and dependent variables, because these were ascertained by self-report. Although this is a possibility and results could be biased toward no association, we were able to detect strong associations between childhood sexual abuse and HIV infection and risk behaviors. Another possible limitation is that our study population, who were residents of the Upper Midwest, may differ from residents in other parts of the United States, although it is not clear what geographic differences could influence the association of childhood sexual abuse and HIV risk. Our findings could have been influenced by nonparticipation bias, but we do not have the data to speculate about the potential effect of such bias.

Despite these limitations, our findings advance the field by offering results for gay and bisexual men who were not enrolled in the study because of their involvement in a high-risk clinic or bar setting. Our sample may be more representative of the diversity of risk behaviors and social contexts of the gay and bisexual population of men. A strength of our study is that we used a randomized selection method to recruit study participants, which reduced some of the potential self-selection bias inherent in using a booth to attract volunteers to participate in behavioral studies. The sampling methods may apply to any public event that has large numbers of participants who may be drawn together by a common interest. Such individuals may, in fact, be more confident about survey anonymity and more likely to participate because data are collected in a public venue rather than a more private venue (e.g., STI clinics, schools, households).

Our findings suggest that almost 1 in 7 gay and bisexual men in a nonclinical, community setting may be victims of childhood sexual abuse; that childhood sexual abuse is associated with HIV infection and antecedent risk behaviors; and that these risks increase with greater frequency of childhood sexual abuse. These findings confirm the importance of taking into account the relevance of childhood sexual abuse frequency and its effect on the delivery of services, prevention interventions, and health care to gay and bisexual men. Given that perhaps 16% of gay and bisexual men have histories of childhood sexual abuse and given that our study, and others, show that childhood sexual abuse is strongly associated with sexual behaviors that increase the risk for HIV infection, we recommend that healthcare providers screen gay and bisexual men for childhood sexual abuse history and be prepared to counsel and refer their clients if a past history is reported. Also, practitioners who work with victims of child sexual assault may want to consider how sexual risk-taking relates to therapeutic approaches and recovery. We also recommend further research to better understand how a history of childhood sexual abuse could contribute to sexual risk-taking in gay and bisexual men and what educational and health promotion interventions to reduce risk-taking may be most effective with such men. We also believe that data such as ours reflect the importance of LGBT voices in
policy development and advocacy to address child sexual abuse.

About the Authors

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Contributors

D.J. Brennan, conceptualized the study, conducted the analysis, and led the writing. W.L. Hellerstedt assisted with the interpretation of the analyses and the writing and revision of the article. M.W. Ross assisted with the interpretation of the analyses and reviewing drafts of the article. S.L. Welles originated and designed the original study, wrote sections of the article, oversaw all aspects of the study’s implementation, including the analysis, and the writing and revision of the article.

Human Participant Protection

All instruments and procedures used in this study were approved by the institutional review board at the University of Minnesota.

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References

Tip of the Iceberg: Young Men Who Have Sex With Men, the Internet, and HIV Risk

Robert Garofalo, MD, MPH, Amy Herrick, MA, Brian S. Mustanski, PhD, and Geri Rachel Donenberg, PhD

Adolescents and young adults are the largest segment of the US population with Internet access: an estimated 90% of youths aged 15 to 24 years have been online.1 Today’s youths have integrated the Internet into many aspects of their daily life, and they use it for everything from online shopping to accessing health-related information.2 It has been suggested that lesbian, gay, bisexual, and transgender (LGBT) youths perceive the Internet to be a lifeline that affords them the ability to contact, communicate, and socialize with individuals who have had similar experiences but are often unavailable in the youths’ day-to-day lives and communities.3

The Internet potentially holds special appeal for LGBT youths who are seeking romantic or sexual partners because its anonymity confers a sense of perceived safety against the stigma that surrounds same-sex activity.3–5 Moreover, its expansive network offers access to a larger social group than is generally available within the context of a predominantly heterosexual culture. Among adult gay men, the Internet has emerged as a popular venue for seeking sexual partners and has been associated with high-risk behaviors that place individuals at risk for HIV and other sexually transmitted infections (STIs).6–14 Several studies in the United States and Europe have found elevated levels of risky sexual behaviors among men who have sex with men (MSM) and who seek and meet sexual partners through the Internet (hereafter Internet partners). These studies were conducted with adult MSM, the majority of whom were aged 30 to 40 years.6–14 Many previous studies have explored use of the Internet by adult MSM and sexual risk behaviors. These studies selectively sampled potentially high-risk participants, including men who were HIV positive, had been diagnosed with an STI, had attended a sex resort, had participated in gay pride festivities, or were recruited to participate in the studies while they were in bars and clubs.6,9,12,14 By contrast, very little is known about Internet use and sexual risk behaviors among adolescent and young MSM, a population known to be at increased risk for acquiring HIV and other STIs.15 Our exploratory study examined Internet use for meeting sexual partners and high-risk sexual and substance use behaviors among a sample of young MSM in Chicago, Ill.

METHODS

Participants and Procedures

A community-based sample of 270 ethnically diverse self-identified young MSM aged 16 to 24 years participated in our study. Youths were recruited consecutively during a 12-month period from August 2004 to September 2005 from multiple sources, including flyers posted in retail locations that were frequented by LGBT individuals (i.e., stores, coffee shops, restaurants), flyers posted in local agencies that served LGBT youths, advertisements posted on high school and college or university e-mail discussion lists, individual advertisements that were distributed in LGBT-identified neighborhoods, and snowball sampling. Trained staff assessed potential participants’ decisional capacity for consent and reviewed study procedures and the risks and benefits of participation.16 Surveys were administered in a private room at a community-based health center that provided primary care, STI and HIV specialty care, and social services to the LGBT community. Youths used self-administered computer-assisted technology to complete a 90-minute confidential survey that assessed sexual and substance use behaviors and Internet use for the purpose of meeting a romantic or sexual partner. Each participant received $30 for participating in the study.

Measures

Demographic measures included age, race/ethnicity, socioeconomic status, and sexual orientation. Participants reported their high-risk sexual activity (i.e., unprotected anal intercourse during the past 12 months and sexual activity with 2 or more anal intercourse partners during the past 3 months), substance use (e.g., methamphetamine, Ecstasy, Viagra) during the past 12 months, and whether they had ever been diagnosed with HIV or other STIs.
Additional questions inquired about lifetime sexual activity at a sex club or a bathhouse and commercial sexual activity, which was defined as sexual relations “in exchange for money or drugs.” Five items assessed Internet use for seeking and meeting sexual partners. The first 2 items asked participants whether or not they had “ever used the Internet to try to find a romantic or sexual partner” or “ever had sex (anal or oral) with someone you met on the Internet.” The third item used a 5-point scale, from never to always, to measure frequency of condom use with Internet partners. High-risk sexual activity was defined as anything other than 100% condom use during anal or oral sexual relations. Youths who reported high-risk sexual activity with Internet partners were asked to cite reasons for not using condoms. Finally, participants reported the age of their Internet partners as “a lot older (>4 years),” “slightly older (2–4 years),” “approximately the same age,” or “younger.”

**Statistical Analyses**

We generated frequencies of the demographic data, Internet items, and sexual and substance use behaviors for descriptive purposes. We used the Pearson $\chi^2$ test statistic for bivariate analyses that assessed factors associated with 2 outcome variables: (1) having had sexual relations with an Internet partner (yes or no) and (2) having engaged in high-risk sexual activity (any sexual activity in which condom use was not 100% of the time) with an Internet partner ($P<.05$). We used the entire study population ($N=270$) for analyses that examined factors associated with having sexual relations with an Internet partner, whereas only participants who reported having had sexual relations with an Internet partner ($n=129$) were used for analyses that examined correlates of high-risk Internet-facilitated sexual encounters. Because of the large number of variables that were significant in the bivariate analyses, we used hierarchical multiple regression to identify the most important predictors of each outcome variable after we adjusted for the effects of the other variables in the model. Correlations between independent variables were initially computed to screen for multicollinearity before inclusion in the regression analyses. The majority of correlations were less than 0.3, and the highest correlation was 0.41 (between HIV serostatus and history of STIs). To minimize the number of predictors in the regression models, we included only those significant predictors from the initial $\chi^2$ tests in the regression analyses. Variables were entered in 2 steps, with demographic variables (race/ethnicity and age) and HIV serostatus entered in step 1, and sexual behavior and substance use entered in step 2. Race/ethnicity was dummy coded, with White as the reference group. We adjusted for multiple testing of our dependent variables using the Bonferroni correction; effects were considered significant if $P<.025$.

**RESULTS**

Table 1 shows the sample’s demographic characteristics and risk behaviors. The young MSM ranged in age from 16 to 24 years ($M=20.3, SD=2.3$); 53% were younger than 21 years. Sixty-eight percent were non-White youths, and 70% characterized the home they “grew up in” as middle class. Participants endorsed a number of high-risk sexual and substance use behaviors: 24% had engaged in commercial sexual activities during their lifetimes, 28% had had sexual relations at a sex club or a bathhouse, 13% had used methamphetamine during the past year, 38% had engaged in either insertive or receptive unprotected anal intercourse during the past 12 months, 40% had had 2 or more anal intercourse partners during the past 3 months, and 13% were HIV positive.

A high number of young MSM (68%) reported Internet use for finding a romantic or sexual partner, and 48% reported having had sexual relations with someone they met using the Internet. Thirty-five percent of the young MSM younger than 21 years reported having had sexual relations with an Internet partner compared with 63% of participants who were aged 21 to 24 years, which was a significant difference ($\chi^2 = 21.08; P<.001$). White young MSM were most likely to meet sexual partners through the Internet (65%) compared with Black youths (20%) or Hispanic (51%) youths. Forty-seven percent of youths who had Internet-facilitated sexual encounters reported partners who were “a lot older (>4 years)” than themselves; an additional 25% reported partners who were “slightly older (2–4 years).” Of particular concern, only 53% of the young MSM reported 100% condom use during sexual encounters with Internet partners. Although our question about Internet partners did not allow us to differentiate between oral and anal sexual activities, of the 61 young MSM who reported inconsistent condom use with Internet partners, more than one third referenced anal intercourse specifically when they cited enjoying sexual activity more.
without a condom as the reason for their risky behavior ("it is more fun to play bare" or "anal sex feels better without condoms"). Other rationales for inconsistent condom use with Internet partners that were offered by 5% to 10% of our young MSM included carelessness ("I was stupid"), knowing a partner’s HIV status ("we both knew our status"), inconvenience ("none around at the time"), vulnerability or partner pressures ("I was too afraid to ask"), and being high on drugs or alcohol ("I was too drunk to care").

Both outcome variables—sexual relations with Internet partners and unprotected sexual relations with Internet partners—were significantly associated with multiple demographic characteristics and sexual and substance use risk behaviors. According to $\chi^2$ analyses, being younger than 21 years; being White; being HIV positive, having a history of an STI; having used methamphetamine, Viagra, or marijuana; having engaged in risky anal intercourse; having multiple anal intercourse partners; having engaged commercial sexual activity; and having engaged in sexual activity at a sex club or in a bathhouse were each associated with having had sexual relations with an Internet partner (all $P \leq .05$). By contrast, among young MSM who had had sexual relations with an Internet partner ($n = 129$), only commercial sexual activity, Viagra, methamphetamine use, and a history of unprotected anal intercourse were associated with unprotected Internet-facilitated sexual encounters (all $P \leq .05$). Unprotected sexual activity with an Internet partner was not associated with the age of online partners ($P = .25$), and socioeconomic status and sexual orientation were not significantly associated with either outcome variable.

Table 2 shows the results of hierarchical logistic regression analyses for both outcome variables. The first regression analysis showed that increased age, identification as White rather Black, history of risky anal intercourse, sexual activity at a sex club or a bathhouse, and multiple anal intercourse partners during the past 3 months were independent correlates of meeting Internet partners after we adjusted for the effects of other variables in the model (all $P \leq .025$). For example, when compared with their peers, young MSM who met a sexual partner online were almost 3 times as likely to also have had sexual relations at a sex club or a bathhouse, more than 3 times as likely to have had multiple anal intercourse partners during the past 3 months, and more than 2 times as likely to have had unprotected anal intercourse during the past 12 months. The model accounted for 48% of the variance in meeting sexual partners using the Internet. The second regression analysis was restricted to young MSM who reported meeting sexual partners on the Internet ($n = 129$). Again, unprotected anal intercourse during the past 12 months was significantly associated with risky anal or oral sexual intercourse with online partners; those who reported unprotected anal intercourse during the past year were more than 3 times as likely to have engaged in risky sexual relations with partners who were met online ($P < .025$). The model accounted for 25% of the variance in having sexual relations with partners who were met using the Internet.

**DISCUSSION**

Consistent with the emerging literature about adult MSM, our results show that many adolescent and young adult MSM use the Internet for both seeking and meeting sexual partners. Sixty-eight percent of the young MSM aged 16 to 24 years reported having used the Internet in an attempt to meet a romantic or sexual partner, and 70% (129 of 184) of those participants reported having had sexual relations with an Internet partner.
Although initiating sexual contact through the Internet is certainly not a new phenomenon, our data are among the first to identify the Internet as an important venue for forming sexual networks among young MSM, an understudied subpopulation of youths at risk for acquiring HIV and other STIs. For youths who identify as gay, lesbian, or bisexual, navigating an adolescence and young adulthood complicated by the stigma that surrounds a nonheterosexual identity, the relative anonymity of the Internet may facilitate same-sex sexual experimentation that may not be available in more traditional social venues. White and Hispanic young MSM in our sample were more likely than young Black MSM to either seek or meet a sexual partner online, which may suggest that there are racial/ethnic populations of youths who have either greater access to computers or greater access to confidential use of the Internet, because locating sexual partners requires both access to computers and an environment conducive to discreet online interaction. Similar rationale may help explain the age differences in seeking and meeting sexual partners online among our study population.

The young MSM in our study reported numerous risk behaviors both online and offline. However, when compared with their peers, the young MSM participants who used the Internet to meet sexual partners reported statistically higher rates of risky sexual behavior across the board (i.e., increased number of sexual partners, less consistent condom use during anal intercourse, history of commercial sexual activity, and sexual activity at a sex club or a bathhouse) and greater use of Viagra and methamphetamine, substances that are well-known to either facilitate sexual activity or be associated with risky sexual behavior. As such, our study extends the current literature on contextual factors associated with Internet-facilitated sexual encounters among adult MSM and young MSM. Contextual factors, including methamphetamine or Viagra use, commercial sexual activity, and sexual activity at a sex club or a bathhouse, are of particular concern because of their clear association with HIV risk among adult MSM. Moreover, having sexual relations at a sex club or a bathhouse, which remained an independent predictor of meeting sexual partners online in our multivariate analyses, may point to a subpopulation of young MSM who are enticed by the relative ease of anonymous sexual activity that both venues offer. The high rate of youths (50%) who met older Internet partners potentially accentuates the risks for these young men. In addition, the association between risky sexual behaviors (i.e., either multiple anal intercourse partners in the past 3 months or history of unprotected anal or oral intercourse in the past year) and meeting Internet partners, and the association between unprotected anal intercourse and risky Internet-facilitated sexual encounters, after we controlled for the effect of other variables in our hierarchical models, suggests an association between general sexual risk behaviors among young MSM and the Internet that needs to be further explored.

Despite the growing body of evidence that associates Internet-facilitated sexual encounters with risky sexual behaviors among MSM, which now includes young MSM, the underlying motivations remain poorly understood for the adolescent and young adult subpopulation. In an exploratory attempt to understand the motivations that underlie risky sexual behaviors with Internet partners, we asked participants to tell us why they did not use condoms during Internet-facilitated sexual encounters. They reported partner pressures or vulnerability, inconvenience, decreased enjoyment, and carelessness, which underscores the importance of future research that identifies risk mechanisms, particularly within the context of adolescent development and an emerging young MSM identity. Because our study is among the first reports of Internet use among young MSM, many questions remain unanswered. For example, is the Internet an independent source of risk, simply a tool for taking risks, or both?

Because of the extent to which the Internet has permeated youth culture, and because of concerns about heightened HIV and STI risk among young MSM, our findings illuminate both the challenges of the Internet and the opportunities that the Internet provides. The challenge posed by the Internet for STI and HIV prevention is the relative ease with which the Internet can facilitate anonymous and potentially risky sexual encounters that are otherwise unavailable in traditional social settings. The Internet holds tremendous appeal as a social and sexual networking tool, particularly among young MSM who are in environments where there are limited options for the exploration of their sexual identity. The opportunity is the Internet’s potential to connect with an often hard-to-reach and vulnerable population that is not easily accessed through clinical and community-based settings. Some Internet-based HIV/STI prevention interventions have been developed and piloted for adult MSM. For example, some programs encourage or facilitate safer-sex discussions in private e-mail conversations and chat rooms, and other programs post prevention messages on MSM-oriented Web sites. However, it remains unclear how to identify, recruit, and retain participants in Internet-based HIV/STI prevention interventions. It also is unclear whether these interventions will ultimately prove effective in changing behavior.

The promise of interventions for young MSM will rely to a great extent on their ability to be tailored to the developmental needs of youths, including a focus on developing sexual health communication and self-efficacy skills and being able to resist a sexual partner’s pressure to engage in risky behaviors.

Limitations

Study limitations warrant cautious interpretation of our findings. First, the data we collected are cross-sectional; therefore, we cannot draw conclusions about causality. For example, we cannot determine if access to the Internet leads to engagement in high-risk behaviors or if young MSM who generally engage in high-risk behaviors use the Internet as another tool for doing so. However, a study of adult MSM found non–HIV-positive gay men were no more likely to meet high-risk sexual partners online rather than offline. Second, sexual behaviors and substance use were measured by self-report and may have been subjected to social desirability (underreporting or overreporting risk behaviors). Empirical evidence suggests that self-reports of sensitive data that are collected using computer-assisted techniques, as was done in our study, reduce bias and increase validity. Third, participants were recruited from 1 urban geographic area, where substance use and sexual activity may have been more prevalent; thus, our findings may not be generalizable to nonurban...
settings. Likewise, the survey was administered at a LGBT-specific community-based site that offered HIV and STI specialty services in addition to primary care and social support services. As such, our findings may not be generalizable to samples of young MSM who would not enter this setting. Finally, the survey items regarding Internet use for seeking and meeting sexual partners were designed specifically for this study and were not previously validated. The questions did not allow us to either quantify the number of sexual partners who were met online or to differentiate between the oral and anal sexual activities partners who were met online or to differentiate between the oral and anal sexual activities among a very young, ethnically diverse, and urban community-based sample of young MSM—an adolescent and young adult group about which relatively little is known.

Conclusions
Similar to adult MSM, adolescent and young adult MSM use the Internet to seek and meet sexual partners. They also engage in a variety of behaviors that place them at great risk for acquiring HIV and other STIs from their Internet partners. Because the Internet continues to play an important role in the socialization patterns and sexual networks of young MSM, additional research about the risk factors associated with meeting sexual partners online and the context in which high-risk sexual and substance use behaviors occur with Internet partners is needed. Such research will provide important information for the development of specialty tailored HIV prevention interventions for young MSM. These interventions will need to be sensitive to the unique developmental, privacy, and confidentiality concerns of young MSM while simultaneously emphasizing the benefits of condom use, regular screening for HIV and STIs, and safer-sex negotiation skills.

About the Authors
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REFERENCES

Mycoplasma genitalium Among Young Adults in the United States: An Emerging Sexually Transmitted Infection

Lisa E. Manhart, PhD, King K. Holmes, MD, PhD, James P Hughes, PhD, Laura S. Houston, MS, and Patricia A. Totten, PhD

Adolescents and young adults are disproportionately affected by sexually transmitted infections (STIs) and have the highest rates of Chlamydia trachomatis and Neisseria gonorrhoeae infections. Urethritis among men and endocervicitis among women are typically attributed to infection with one of these 2 bacterial STIs and sometimes with Trichomonas vaginalis. Infection with these organisms can lead to serious sequelae, such as chronic pelvic pain, ectopic pregnancy, infertility, and increased risk for HIV transmission. In many studies, however, only 30% to 40% of cervicitis cases have been associated with known pathogens and etiology could not be identified in up to 50% of urethritis cases, which suggests the existence of other pathogenic organisms. Mycoplasma genitalium, a recently identified bacterium, is receiving increased attention as a potential cause of both these STI syndromes, yet it is still relatively understudied, and no population-level data on prevalence or risk factors exist.

M. genitalium was first cultured in the early 1980s from the urethral exudates of 2 men with nongonococcal urethritis. Despite this initial isolation, the fastidious nature of M. genitalium makes culture extremely difficult, and it was not until the development of DNA amplification assays that epidemiological studies of the association between M. genitalium and disease syndromes could be undertaken. Since that time, all but 1 of the studies that used polymerase chain reaction (PCR) testing to detect M. genitalium among men have reported a strong and significant association with nongonococcal urethritis. The data available from fewer studies of women suggest that M. genitalium also is associated with cervicitis, endometritis, pelvic inflammatory disease (PID), and tubal factor infertility. Most studies of M. genitalium have been conducted in specialized populations (usually sexually transmitted disease [STD] clinics) and, although these groups are ideal for studying potentially new sexually transmitted organisms, they likely overestimate the prevalence in the general population. Furthermore, the high background level of many risk behaviors among STD clinic patients may mask or diminish the association of such factors with organisms identified in these individuals. Finally, most STD clinic attendees are sexually active, which makes it virtually impossible to determine whether, and to what extent, sexual activity is associated with newly identified potential pathogens. Thus, we tested young adults who participated in Wave III of the National Longitudinal Study of Adolescent Health (Add Health) for M. genitalium to (1) generate population prevalence estimates of M. genitalium among young adults aged 18 to 27 years in the United States, (2) identify sociobehavioral correlates of infection in the general population, and (3) confirm that M. genitalium is sexually transmitted.

METHODS

Add Health Study Design and Sample

Add Health was designed to explore causes of health-related behaviors among adolescents in grades 7 through 12 and the associated outcomes in young adulthood, with a focus on social contextual influences on health and risk behaviors. This school-based study used a stratified random sample of all US high schools and junior high “feeder” schools to identify participants. In 1994, approximately 90000 adolescents participated in the Wave I school-based survey. Subsequently, an in-home sample was drawn that comprised a core sample from each community plus selected special oversamples; 20748 of those respondents completed a more detailed questionnaire. Wave III of Add Health enrolled participants from July 2001 to April 2002. All Wave I in-home respondents who could be located were visited at home by Add Health Study personnel and received a request for informed consent. Respondents who agreed to participate in the probability sample (N=14322) completed a computer-assisted survey instrument that collected extensive data on demographic, social, and behavioral characteristics. Of those, 13192 (92.1%) respondents provided 15 mL to 20 mL of first-void urine for STI testing.
We selected a subsample of Wave III Add Health respondents that would provide 80% power for detecting prevalence ratios of approximately 2.0. We used quota sampling to randomly flag 7000 women in the Wave III Add Health sampling frame for recruitment to human papillomavirus (HPV) or M genitalium testing (to ensure 3500 sexually active women for HPV testing in separate analyses); 2000 men were randomly flagged for recruitment to M genitalium testing. Urine specimens were immediately placed on cold packs and shipped to the University of North Carolina within 96 hours of collection, where they were placed in 5 mL aliquots and frozen at −70°C until shipment on dry ice to the University of Washington. Some unflagged urine specimens also were received, which resulted in 3725 flagged and 353 unflagged urine specimens from women and 1048 flagged and 239 unflagged urine specimens from men. From the respondents with sampling weights, we selected all men with valid questionnaire information (n=1218) and a random sample of women (n=1714) for M genitalium testing.

Statistical Analyses
We performed a stratified weighted analysis, which took into account Add Health’s cluster sampling design, to generate nationally representative estimates. These cross-sectional analyses incorporated the school as the primary sampling unit, region of the United States as the stratification variable, and poststratification sampling weights. The poststratification sampling weights were specially designed for the M genitalium subsample and accounted for the Add Health master sampling design and overall survey nonresponse as well as the quota-sampling method used to select the M genitalium subsample (including the receipt and testing of unflagged specimens). Respondents without sampling weights (n=171) were excluded. We used a design-based Pearson χ2 test for comparisons of categorical characteristics and an adjusted Wald test for comparisons of continuous characteristics (weighted proportions are presented).

We conducted sensitivity analyses with methods described by Brookmeyer and Gail \(^{35}\) to estimate the effect of imperfect test performance characteristics, differential questionnaire nonresponse, and refusal to provide a urine specimen. Although true sensitivity and specificity of the PCR assay in this population are unknown, sensitivity of women’s urine was 68% and specificity was 99.6% compared with an infected patient standard in a separate population. \(^{36}\) As with other STIs, sensitivity was likely higher in men’s urine compared with women’s urine. The sensitivity analyses were performed under 4 assumptions for sensitivity and specificity (sensitivity and specificity = 1.0, sensitivity = 0.7 and specificity = 0.995, sensitivity = 0.85 and specificity = 0.995, and sensitivity = 0.7 and specificity = 0.999) and 3 assumptions for prevalence of M genitalium among nonresponders (missing randomly: prevmiss is half that of responders; prevmiss is twice that of responders). We used weighted multivariate Poisson regression analyses to estimate prevalence ratios and to identify characteristics independently associated with M genitalium infection with Stata software, version 8.0 (Stata Corp, College Station, Tex). Because of the hypothesis-generating nature of these analyses, we did not make adjustments for multiple comparisons.

Laboratory Methods
Upon arrival at the University of Washington, specimens for M genitalium testing were thawed, aliquoted, and refrozen at −80°C. At the time of testing, specimens were thawed and processed using the AMPLICOR® CT/NG specimen preparation kit (Roche Diagnostics Corp, Indianapolis, Ind) in accordance with the manufacturer’s directions. A M genitalium–specific PCR assay with a microwell plate-based detection system was used for specimen testing. \(^{37}\) Initially positive and equivocal specimens were confirmed as positive if repeated duplicate tests resulted in at least 1 positive (n=36) or 2 equivocal results (n=0); 17 initially positive specimens (9 of which were equivocal) did not repeat as positive and were scored as negative. Thirty-nine (89%) of 35 specimens with optical density values greater than 1.0 were repeatable compared with 5 (26%) of 19 specimens with values less than 1.0, which was consistent either with contamination or with lower genome copies in the latter specimens (7 of these had no sampling weights and were excluded from further analyses). Negative specimens were not retested.

Positive and negative controls for the whole procedure, including sample preparation (M genitalium whole cells and sample preparation reagents alone) and the PCR assay (M genitalium genomic DNA and sterile water), were included in every batch. Separate aliquots were assayed at the University of North Carolina for N gonorrhoeae and C trachomatis with Ligase Chain Reaction (Abbott LCx Probe System, Abbott Park, Ill)\(^{38,39}\) and for T vaginalis with a research-only PCR enzyme-linked immunosorbent assay.\(^{40,41}\) A third aliquot of women’s urine was assayed for HPV at the University of Washington with a PCR/dot-blot hybridization assay.\(^{42}\)

RESULTS

Prevalence of M genitalium
M genitalium was detected in 33 of the individuals in our Add Health subsample, which resulted in a weighted prevalence of 1.0% (95% confidence interval [CI]=0.45, 1.46) (Table 1). The prevalence of M genitalium among men (1.1%; 95% CI=0.49, 2.44) and among women (0.8%; 95% CI=0.42, 1.57) was not significantly different (P=.57). Despite some trends, overall there was no significant difference in M genitalium prevalence by age or geographic region, but prevalence varied by race/ethnicity: it was highest among Blacks (4.0%; 95% CI=0.20, 6.63) and was somewhat higher among Latinos (0.8%; 95% CI=0.14, 4.08) compared with Whites (0.4%; 95% CI=0.19, 0.89; P<.001). The organism was not detected in anyone of American Indian or Asian descent.

Demographics, Sexual Behavior, and History Associated With M genitalium
M genitalium prevalence was significantly higher among Blacks compared with Whites (prevalence ratio [PR]=8.9; 95% CI=3.34, 23.81). It also was significantly higher among those who had ever lived with a sexual partner (PR=12.4; 95% CI=3.57, 42.86; Table 1). Among sexually active individuals (those who reported ever having engaged in vaginal intercourse), M genitalium prevalence was 1.1% compared with 0.05% among those who did not report vaginal intercourse (PR=22.5; 95% CI=4.35, 116.59). The few M genitalium–infected persons who did not

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>No. of Participants</th>
<th>Weighted Prevalence&lt;sup&gt;a&lt;/sup&gt; (95% CI)</th>
<th>Prevalence Ratio (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Sociodemographic variables</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tested positive for <em>Mycoplasma genitalium</em></td>
<td>2932</td>
<td>1.00 (0.45, 1.46)</td>
<td>...</td>
</tr>
<tr>
<td>Gender</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Men</td>
<td>1218</td>
<td>1.10 (0.49, 2.44)</td>
<td>1.40 (0.47, 3.99)</td>
</tr>
<tr>
<td>Women</td>
<td>1714</td>
<td>0.80 (0.42, 1.57)</td>
<td>1.0</td>
</tr>
<tr>
<td>Age, y</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>18–19</td>
<td>286</td>
<td>1.50 (0.46, 4.62)</td>
<td>1.30 (0.30, 5.27)</td>
</tr>
<tr>
<td>20–21</td>
<td>858</td>
<td>1.00 (0.29, 3.18)</td>
<td>0.80 (0.18, 3.67)</td>
</tr>
<tr>
<td>22–23</td>
<td>1115</td>
<td>0.60 (0.26, 1.37)</td>
<td>0.50 (0.15, 1.74)</td>
</tr>
<tr>
<td>24–25</td>
<td>655</td>
<td>1.20 (0.50, 2.78)</td>
<td>1.0</td>
</tr>
<tr>
<td>26–27</td>
<td>18</td>
<td>0.00</td>
<td>...</td>
</tr>
<tr>
<td>Race/ethnicity</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>White</td>
<td>1473</td>
<td>0.40 (0.19, 0.89)&lt;sup&gt;*&lt;/sup&gt;</td>
<td>1.0</td>
</tr>
<tr>
<td>Black</td>
<td>671</td>
<td>4.00 (2.0, 6.63)</td>
<td>8.90 (3.34, 23.81)</td>
</tr>
<tr>
<td>Latino</td>
<td>535</td>
<td>0.80 (0.14, 4.08)</td>
<td>1.90 (0.29, 11.94)</td>
</tr>
<tr>
<td>Native American</td>
<td>18</td>
<td>0.00</td>
<td>...</td>
</tr>
<tr>
<td>Asian</td>
<td>229</td>
<td>0.00</td>
<td>...</td>
</tr>
<tr>
<td>Region</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>West</td>
<td>737</td>
<td>0.30 (0.06, 1.49)</td>
<td>1.0</td>
</tr>
<tr>
<td>Midwest</td>
<td>694</td>
<td>1.10 (0.39, 2.99)</td>
<td>3.70 (0.55, 25.14)</td>
</tr>
<tr>
<td>South</td>
<td>1142</td>
<td>1.30 (0.67, 2.41)</td>
<td>4.30 (0.75, 24.71)</td>
</tr>
<tr>
<td>Northeast</td>
<td>359</td>
<td>0.40 (0.05, 2.52)</td>
<td>1.20 (0.09, 15.46)</td>
</tr>
<tr>
<td>Had more than a high school education</td>
<td>1627</td>
<td>0.60 (0.23, 1.36)</td>
<td>0.40 (0.14, 1.20)</td>
</tr>
<tr>
<td>Ever married</td>
<td>571</td>
<td>0.20 (0.02, 1.18)&lt;sup&gt;*&lt;/sup&gt;</td>
<td>0.10 (0.02, 1.13)</td>
</tr>
<tr>
<td>Ever lived with a sexual partner</td>
<td>1183</td>
<td>2.10 (1.16, 3.61)&lt;sup&gt;*&lt;/sup&gt;</td>
<td>12.40 (3.57, 42.86)</td>
</tr>
<tr>
<td>Ever had a job</td>
<td>2839</td>
<td>1.00 (0.58, 1.64)&lt;sup&gt;*&lt;/sup&gt;</td>
<td>7.20 (1.05, 50.04)</td>
</tr>
<tr>
<td>Currently working for pay</td>
<td>1965</td>
<td>0.60 (0.30, 1.13)&lt;sup&gt;*&lt;/sup&gt;</td>
<td>0.30 (0.10, 0.92)</td>
</tr>
<tr>
<td>Ever drunk</td>
<td>1419</td>
<td>0.40 (0.17, 0.95)&lt;sup&gt;*&lt;/sup&gt;</td>
<td>0.30 (0.10, 0.88)</td>
</tr>
<tr>
<td>Drug or alcohol treatment program during past 12 mo</td>
<td>67</td>
<td>7.20 (1.41, 29.54)&lt;sup&gt;*&lt;/sup&gt;</td>
<td>9.30 (1.73, 50.32)</td>
</tr>
<tr>
<td><strong>General sexual behavior</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ever had vaginal intercourse</td>
<td>2561</td>
<td>1.10 (0.65, 1.85)&lt;sup&gt;*&lt;/sup&gt;</td>
<td>22.50 (4.35, 116.59)</td>
</tr>
<tr>
<td>Age at first vaginal intercourse younger than 16 years</td>
<td>805</td>
<td>1.40 (0.53, 3.46)</td>
<td>1.40 (0.45, 4.42)</td>
</tr>
<tr>
<td>Lifetime no. of vaginal intercourse partners</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>None</td>
<td>341</td>
<td>0.05 (0.01, 0.23)&lt;sup&gt;*&lt;/sup&gt;</td>
<td>1.0</td>
</tr>
<tr>
<td>1</td>
<td>561</td>
<td>0.09 (0.01, 0.52)</td>
<td>1.80 (0.17, 18.51)</td>
</tr>
<tr>
<td>≥2</td>
<td>1984</td>
<td>1.30 (0.76, 2.31)</td>
<td>27.40 (5.27, 142.76)</td>
</tr>
<tr>
<td>No. of vaginal intercourse partners during past 12 mo.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>None</td>
<td>590</td>
<td>0.10 (0.03, 0.39)&lt;sup&gt;*&lt;/sup&gt;</td>
<td>1.0</td>
</tr>
<tr>
<td>1</td>
<td>1494</td>
<td>0.60 (0.24, 1.27)</td>
<td>4.90 (1.11, 21.65)</td>
</tr>
<tr>
<td>≥2</td>
<td>813</td>
<td>2.20 (1.1, 4.46)</td>
<td>19.60 (4.50, 85.37)</td>
</tr>
<tr>
<td>Infrequent vaginal intercourse (&lt;once/wk during past y)</td>
<td>1368</td>
<td>1.40 (0.71, 2.81)&lt;sup&gt;*&lt;/sup&gt;</td>
<td>7.90 (1.16, 53.33)</td>
</tr>
<tr>
<td>Contraceptive use</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Condom used during most recent vaginal intercourse</td>
<td>978</td>
<td>2.10 (1.04, 4.02)&lt;sup&gt;*&lt;/sup&gt;</td>
<td>4.00 (1.21, 13.50)</td>
</tr>
<tr>
<td>Correct/consistent condom use during past 12 mo</td>
<td>357</td>
<td>1.20 (0.27, 5.09)</td>
<td>1.40 (0.26, 7.36)</td>
</tr>
<tr>
<td>Depo provera use during past 12 mo</td>
<td>310</td>
<td>2.40 (1.01, 5.68)&lt;sup&gt;*&lt;/sup&gt;</td>
<td>4.50 (1.46, 13.65)</td>
</tr>
</tbody>
</table>

Continued

report vaginal intercourse had either exclusively same-sex partners or provided no data on other types of sexual activity that may have resulted in exposure to *M genitalium*. Although *M genitalium* prevalence rose with increased numbers of sexual partners (lifetime and past year), *M genitalium*-positive respondents reported fewer mean episodes of vaginal intercourse during the past year compared with *M genitalium*-negative respondents (21.9 vs 69.4; *P* < .001). *M genitalium* infection was not significantly associated with age at sexual debut or with correct and consistent condom use (condom use during every episode of vaginal intercourse without any breakage or slippage) within the past 12 months, but it was more often detected among those who had used condoms during their last vaginal intercourse (PR = 4.1; 95% CI = 1.21, 13.50).

**Contraception, Concurrent Infection, and Symptoms**

*M genitalium* prevalence was significantly higher among women who used depo provera during the past year (PR = 4.5; 95% CI = 1.46, 13.65), but prevalence was not associated with use of other hormonal contraceptives in general. Consistent with high-risk sexual activity, *M genitalium* prevalence was significantly higher among respondents who believed they might currently be infected with *N gonorrhoeae* or *C trachomatis* (PR = 3.4; 95% CI = 1.09, 10.42), among respondents who tested positive for *C trachomatis* (PR = 5.4; 95% CI = 1.42, 20.75), and among women infected with HPV (PR = 12.7; 95% CI = 3.29, 48.78). None of the persons infected with *M genitalium* reported symptoms of urethral or vaginal discharge either within the previous 24 hours or during the previous 12 months (including those who were coinfected with other STI pathogens), but 2.2% reported dysuria in the past 24 hours (data not shown). Similarly, none of the *M genitalium*-positive individuals reported diagnoses of nongonococcal urethritis, mucopurulent cervicitis, or vaginitis during the past 12 months.

**Partnership Characteristics**

Of the 2932 respondents with sampling weights, 2303 (79.9%) provided data on their most recent sexual partnership (Table 2).
higher among individuals who had a non-White partner (PR = 11.0–62.4) or a partner whose race/ethnicity was different from their own (PR = 8.4; 95% CI = 2.51, 27.86). Compared to the prevalence of M. genitalium among the respondents who believed their most recent partner had other concurrent partners, the prevalence of M. genitalium among those who believed their partner was faithful was lower (PR = 0.1; 95% CI = 0.03, 0.61). Sexual behaviors such as time between meeting and first vaginal intercourse, frequency of vaginal intercourse, and oral or receptive anal sexual relations were not significantly associated with M. genitalium infection.

Of the 629 individuals who were missing data on partnership characteristics, only 55 (17.5%) reported no vaginal intercourse partners during the previous year. Thus, the majority (82.5%) of individuals who did not answer the detailed questions about romantic and sexual relationships during the previous 6 years reported at least 1 vaginal intercourse partner during the past 12 months. Among those who were missing data on partnership characteristics, M. genitalium prevalence was 1.8%, and among those who provided data, prevalence was only 0.7% (PR = 2.6; 95% CI = 0.79, 8.78).

**Sensitivity Analyses**

Overall, 23.96% of Add Health participants in the Wave I probability sample did not participate in Wave III. Nonresponse was slightly higher in the Northeast (32%) compared with the West (25%), Midwest (21%), and South (24%), and the poststratification sampling weights adjusted for this differential nonresponse. An additional 7.89% of Wave III respondents refused to provide a urine specimen. We performed sensitivity analyses to assess the total effect of nonresponse combined with imperfect sensitivity and specificity of the PCR assay (Table 3). If nonresponse was random, a modest drop in specificity (specificity = 0.995) would lead to a sizeable reduction in prevalence (corrected PR = 0.6%; 95% CI = 0.1, 0.7). When specificity was set at 0.99 or higher, prevalence among all subgroups, except Blacks, was 0% (data not shown). If nonresponders had a lower prevalence of M. genitalium compared with respondents (pr$_{miss}$ = 0.5), overall prevalence would be somewhat lower than the 1.0% we observed. However, if M. genitalium prevalence was higher among nonresponders (pr$_{miss}$ = 2.0), prevalence estimates would be higher than what we observed. These general trends held for subgroup analyses by gender and race/ethnicity.

**Multivariate Analyses**

After adjustment for other factors in the model, the prevalence of M. genitalium was 11 times higher among individuals who had ever lived with a sexual partner (PR = 11.2; 95% CI = 3.17, 39.50) and 7 times higher among Blacks (PR = 7.2; 95% CI = 2.87, 17.92), and prevalence increased by 10% with each additional vaginal intercourse partner during the past year (PR = 1.1 per partner; 95% CI = 1.01, 1.18). Despite no association with correct and consistent condom use during the previous 12 months, M. genitalium prevalence was 4 times higher among those who reported use of a condom during their last vaginal intercourse compared with those who did not (PR = 3.9; 95% CI = 1.33, 11.46). Because of the substantial proportion of missing data for partnership characteristics, and because the data were likely not missing at random (≥30%) among M. genitalium–positive persons compared with 20% among the subsample overall, partnership characteristics were not considered in the multivariate analyses.

**DISCUSSION**

In this first-ever population-based prevalence estimate, M. genitalium was detected among 1.0% of young adults aged 18 to 27 years. This figure was substantially higher than the prevalence of N. gonorrhoeae (0.4%) but somewhat lower than that of C. trachomatis (4.2%) and T. vaginalis (2.2%). Although adjustment for less-than-perfect test performance characteristics in the sensitivity analyses reduced the prevalence estimates among all subgroups except Blacks, the overall prevalence of M. genitalium still remained higher than that of N. gonorrhoeae. Similar to many other sexually transmitted organisms, prevalence of M. genitalium was highest among Blacks, yet unlike other STIs, prevalence was not significantly associated with gender, age, or geographic region. M. genitalium infection was strongly associated with having engaged in vaginal intercourse, yet almost all M. genitalium infection...
infections were asymptomatic. This organism has been presumed to be sexually transmitted,\(^7\) a conclusion made on the basis of studies of sexually active individuals that assessed neither concordant rates of infection among small numbers of sexual partnerships\(^8,^{46}\) nor the association of sexual behaviors with \textit{M genitale}\(^4\). None of these previous studies incorporated comparison groups of nonsexually active persons to show the absence of infection among such people. By contrast, our general population sample included both sexually experienced and inexperienced individuals, which permitted us to show the significant association of sexual activity with \textit{M genitale} detection and further strengthen the case for sexual transmission of this organism.

Although \textit{M genitale} infection was not associated with reported symptoms of vaginal or urethral discharge, these symptoms were not associated with detection of \textit{N gonorrhoeae} or \textit{T vaginalis} either. By contrast, these symptoms were inversely associated with \textit{C trachomatis} (data not shown). This suggests that either the majority of reproductive tract infections in the general population are asymptomatic\(^4\) or that information on such symptoms was not accurately elicited in this survey. The prevalence of \textit{M genitale} detected by urine testing among these asymptomatic young adults (1.0\%) was remarkably similar to the prevalence found by Uno et al. among asymptomatic Japanese men (1.1\%), but it was somewhat lower than the 2.3\% identified by Chandeying et al. among asymptomatic young men who were vocational college students in southern Thailand.\(^50\)

### Implications

The evidence for a pathogenic role of \textit{M genitale} among men is strong; the evidence for pathogenicity among women is suggestive but inconclusive. Detection of \textit{M genitale} in the lower genital tract has been associated with inflammation in the upper genital tract in the form of histologically diagnosed endometritis\(^30\) and clinically diagnosed PID.\(^31\) The organism also has been detected in the fallopian tube of a woman with laparoscopically diagnosed salpingitis.\(^32\) Nevertheless, the proportion of lower–reproductive tract \textit{M genitale} infections (symptomatic or asymptomatic) that may cause upper tract inflammation and tissue damage remains unknown. Further studies of the natural history and pathogenesis of \textit{M genitale} infections among women are required to answer this question. Although several clinical studies have shown a strong association between \textit{M genitale} and urethritis among men,\(^15–24\) no data yet exist on further associations between \textit{M genitale} infection of the urethra and complications of urethritis, such as urethral stricture or epididymitis.\(^2\) However, even asymptomatic infections are important, because they presumably serve as a reservoir for maintaining transmission within a population. Whether \textit{M genitale}–infected persons require or benefit from treatment—and if so, what antimicrobial therapy should be recommended—remains undefined. Open trials suggest that of the 2 antibiotics most commonly prescribed for nongonococcal urethritis or cervicitis—azithromycin and doxycycline—the former may be effective at treating symptomatic \textit{M genitale} infections,\(^47,52–57\) but randomized blinded trials and further experience will be necessary to definitively identify the most appropriate antimicrobial therapy.

Risk factors for \textit{M genitale} infection were consistent with risk factors for other STIs. The strong association with ever having lived

### TABLE 2—Partnership Characteristics for Most Recent Partnership Among Those Tested for \textit{Mycoplasma genitalium} (n = 2303): Wave III of the National Longitudinal Study of Adolescent Health, 2003

<table>
<thead>
<tr>
<th>Characteristic&lt;sup&gt;a&lt;/sup&gt;</th>
<th>Weighted Prevalence&lt;sup&gt;b&lt;/sup&gt;</th>
<th>Prevalence Ratio&lt;sup&gt;b&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No. of Participants&lt;sup&gt;c&lt;/sup&gt;</td>
<td>(95% CI)</td>
</tr>
</tbody>
</table>

**Partner’s race/ethnicity**

| White | 1189 | 0.08 (0.01, 0.54)* | 1.0 |
| Black | 495 | 2.70 (1.18, 6.11) | 32.20 (4.24, 245.06) |
| Latino | 370 | 0.90 (0.27, 3.13) | 11.00 (1.18, 103.43) |
| Asian | 147 | 1.20 (0.23, 5.72) | 14.00 (1.24, 157.70) |
| American Indian | 48 | 0.00 | ... |
| Other | 42 | 5.30 (0.71, 30.19) | 62.47 (4.27, 913.20) |

**Participant’s race/ethnicity different from partner’s race/ethnicity**

| 477 | 2.60 (1.23, 5.36)* | 8.40 (2.51, 27.86) |

**Age difference<sup>c</sup>**

| Respondent younger than MRP by 3 or more years | 78 | 0.07 (0.01, 0.48)* | 0.10 (0.01, 1.09) |
| Respondent older than MRP by 3 or more years | 491 | 1.60 (0.63, 3.95) | 3.10 (0.89, 10.68) |
| Same age (within 3 years) | 1726 | 0.50 (0.23, 1.15) | 1.0 |
| MRP had concurrent partners | 354 | 0.10 (0.03, 0.37)* | 0.10 (0.03, 0.61) |

**Sexual behavior with MRP**

| ≤ 1 month before first vaginal intercourse with MRP | 637 | 0.60 (0.16, 2.27) | 0.80 (0.17, 3.59) |
| Condom used during most recent vaginal intercourse | 926 | 0.90 (0.39, 2.21) | 1.60 (0.43, 5.79) |
| Received oral sexual intercourse from MRP (ever) | 1757 | 0.60 (0.26, 1.28) | 0.50 (0.14, 1.89) |
| Performed oral sexual intercourse on MRP (ever) | 1563 | 0.70 (0.35, 1.53) | 1.20 (0.33, 4.57) |
| Received anal intercourse from MRP (ever)<sup>d</sup> | 270 | 1.10 (0.17, 7.07) | 1.60 (0.20, 12.64) |
| Performed anal intercourse on MRP (ever)<sup>d</sup> | 160 | 0.09 (0.02, 0.43)* | 0.12 (0.02, 0.82) |

Note. CI = confidence interval; MRP = most recent partner. Other partnership characteristics that were assessed but were not significantly associated with \textit{M genitale} infection included exclusively dating most recent partner, different educational level than most recent partner, hormonal contraception during most recent vaginal intercourse, and currently in a relationship with most recent partner.

<sup>a</sup>All characteristics are for the respondent’s most recent partnership.

<sup>b</sup>Respondents who were tested for \textit{Mycoplasma genitalium} and provided data on romantic and sexual partnerships during the previous 6 years.

<sup>c</sup>Excludes same-sex partnerships.

<sup>d</sup>Data missing for 55% of respondents.

<sup>e</sup>Data missing for 70% of respondents.

<sup>f</sup>P < .05, for a design-based Pearson \(\chi^2\) test.

<table>
<thead>
<tr>
<th>Subgroup</th>
<th>Missing at Random Prevalence (95% CI)</th>
<th>Preveq = 0.5 Prevalence (95% CI)</th>
<th>Preveq = 2.0 Prevalence (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall</td>
<td>1.00 (0.45, 1.46)</td>
<td>0.80 (0.38, 1.23)</td>
<td>1.30 (0.59, 1.93)</td>
</tr>
<tr>
<td>Gender</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Men</td>
<td>1.10 (0.40, 2.44)</td>
<td>0.90 (0.40, 2.01)</td>
<td>1.50 (0.66, 3.29)</td>
</tr>
<tr>
<td>Women</td>
<td>0.80 (0.42, 1.57)</td>
<td>0.70 (0.36, 1.34)</td>
<td>1.00 (0.54, 2.03)</td>
</tr>
<tr>
<td>Race/ethnicity</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>White</td>
<td>0.40 (0.19, 0.89)</td>
<td>0.30 (0.16, 0.75)</td>
<td>0.50 (0.25, 1.17)</td>
</tr>
<tr>
<td>Black</td>
<td>4.00 (0.20, 6.63)</td>
<td>3.30 (0.17, 5.48)</td>
<td>5.40 (0.27, 8.92)</td>
</tr>
<tr>
<td>Latino</td>
<td>0.80 (0.14, 4.08)</td>
<td>0.70 (0.12, 3.44)</td>
<td>1.00 (0.18, 5.35)</td>
</tr>
<tr>
<td>Overall</td>
<td>0.70 (0.00, 1.38)</td>
<td>0.50 (0.00, 1.05)</td>
<td>1.20 (0.13, 2.05)</td>
</tr>
<tr>
<td>Gender</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Men</td>
<td>0.90 (0.00, 2.79)</td>
<td>0.60 (0.00, 2.18)</td>
<td>1.40 (0.23, 4.02)</td>
</tr>
<tr>
<td>Women</td>
<td>0.40 (0.00, 1.54)</td>
<td>0.30 (0.00, 1.21)</td>
<td>0.80 (0.06, 2.20)</td>
</tr>
<tr>
<td>Race/ethnicity</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>White</td>
<td>0.00 (0.00, 0.56)</td>
<td>0.00 (0.00, 0.36)</td>
<td>0.00 (0.00, 0.97)</td>
</tr>
<tr>
<td>Black</td>
<td>5.00 (0.00, 8.82)</td>
<td>4.00 (0.00, 7.17)</td>
<td>7.00 (0.00, 12.12)</td>
</tr>
<tr>
<td>Latino</td>
<td>0.40 (0.00, 5.15)</td>
<td>0.30 (0.00, 4.24)</td>
<td>0.80 (0.00, 6.98)</td>
</tr>
<tr>
<td>Overall</td>
<td>0.60 (0.00, 1.14)</td>
<td>0.40 (0.00, 0.86)</td>
<td>1.00 (0.11, 1.69)</td>
</tr>
<tr>
<td>Gender</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Men</td>
<td>0.70 (0.00, 2.30)</td>
<td>0.50 (0.00, 1.79)</td>
<td>1.20 (0.19, 3.31)</td>
</tr>
<tr>
<td>Women</td>
<td>0.40 (0.00, 1.27)</td>
<td>0.20 (0.00, 0.99)</td>
<td>0.60 (0.05, 1.81)</td>
</tr>
<tr>
<td>Race/ethnicity</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>White</td>
<td>0.00 (0.00, 0.46)</td>
<td>0.00 (0.00, 0.29)</td>
<td>0.00 (0.00, 0.80)</td>
</tr>
<tr>
<td>Black</td>
<td>4.10 (0.00, 7.25)</td>
<td>3.30 (0.00, 5.90)</td>
<td>5.80 (0.00, 9.97)</td>
</tr>
<tr>
<td>Latino</td>
<td>0.40 (0.00, 4.24)</td>
<td>0.20 (0.00, 3.48)</td>
<td>0.70 (0.00, 5.74)</td>
</tr>
<tr>
<td>Overall</td>
<td>1.30 (0.50, 1.95)</td>
<td>1.10 (0.40, 1.61)</td>
<td>1.70 (0.71, 2.61)</td>
</tr>
<tr>
<td>Gender</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Men</td>
<td>1.40 (0.56, 3.35)</td>
<td>1.20 (0.44, 2.74)</td>
<td>2.00 (0.80, 4.57)</td>
</tr>
<tr>
<td>Women</td>
<td>1.00 (0.46, 2.10)</td>
<td>0.80 (0.37, 1.77)</td>
<td>1.30 (0.63, 2.76)</td>
</tr>
<tr>
<td>Race/ethnicity</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>White</td>
<td>0.40 (0.13, 1.13)</td>
<td>0.30 (0.09, 0.93)</td>
<td>0.60 (0.22, 1.54)</td>
</tr>
<tr>
<td>Black</td>
<td>5.60 (0.14, 9.34)</td>
<td>4.60 (0.09, 7.70)</td>
<td>7.60 (0.24, 12.62)</td>
</tr>
<tr>
<td>Latino</td>
<td>1.00 (0.06, 5.69)</td>
<td>0.80 (0.03, 4.78)</td>
<td>1.40 (0.12, 7.52)</td>
</tr>
</tbody>
</table>

Note. CI = confidence interval; Preveq = prevalence of M genitalium among nonresponders. The correction for differential nonresponse was calculated with the subgroup-specific questionnaire nonresponse proportions52 plus the subgroup-specific proportion of respondents who completed questionnaires but refused to provide a urine specimen. The subgroup-specific proportion of urine specimens provided but unsuitable for testing was assumed to be missing at random and was not included in the calculation. Overall, the proportion of respondents who were missing questionnaire data and urine specimens (pmiss) was 0.32, pmiss for men = 0.35, pmiss for women = 0.29, pmiss for Whites = 0.32, pmiss for Blacks = 0.35, and pmiss for Latinos = 0.35.

TABLE 4—Factors Independently Associated With Mycoplasma genitalium Infection Among Men and Women Aged 18 to 27 Years: Wave III of the National Longitudinal Study of Adolescent Health, 2003

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Prevalence Ratio (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ever lived with a sexual partner</td>
<td>11.20 (3.17, 39.50)</td>
</tr>
<tr>
<td>Black race/ethnicity</td>
<td>7.20 (2.87, 17.92)</td>
</tr>
<tr>
<td>Condom used during most recent vaginal intercourse</td>
<td>3.90 (1.33, 11.46)</td>
</tr>
<tr>
<td>No. of vaginal intercourse partners during past 12 mo. (per partner)a</td>
<td>1.10 (1.01, 1.18)</td>
</tr>
</tbody>
</table>

Note. CI = confidence interval. Estimates were adjusted for all other variables in the model. Variables that were also tested but were not significantly associated with M genitalium infection included age, gender, correct and consistent condom use, income, any other sexually transmitted infection detected at Wave III, age at first vaginal intercourse, welfare, current working, education, ever drunk, history of sexually transmitted disease, chance that respondent currently had a gonococcal or chlamydial infection at the time of the interview, any chance of acquiring HIV by age 35 years, oral sexual intercourse, methamphetamine use, or hormonal contraceptive use. Ever having had vaginal intercourse could not be entered into the model along with any other variables. Partnership characteristics were not assessed.

aPrevalence ratio represents an increase in risk for each additional partner.

with a sexual partner was likely driven by the association with sexual activity, but it also suggests that transmission may require repeated exposure to an infected partner, which would be facilitated by the longer-term partnerships that are characteristic of individuals who live together. Similarly, the increased risk for M genitalium with increased number of vaginal sexual partners is likely a marker for greater exposure to the organism. The elevated risk among Blacks may be the result of disassortative mixing with respect to sexual activity class (e.g., persons who have had many lifetime partners mixing with persons who have had few lifetime partners) combined with assortative partner choice with respect to race/ethnicity,58 or it may be the result of higher rates of concurrency that are driven by a perceived shortage of Black men.59,60 At first glance, the increased prevalence of M genitalium among those who used condoms during their most recent vaginal...
intercourse seems paradoxical, but others have reported increased odds for STIs among condom users. This may be explained by social desirability bias, preferential (and possibly incorrect) use of condoms with high-risk partners, or lack of information on temporal sequence or infection status of the partner rather than inherent ineffectiveness of condoms.

**Limitations and Conclusions**

Factors that were independently associated with *M. genitalium* infection represent characteristics of individuals. The associations between *M. genitalium* and partnership characteristics were unadjusted and should be interpreted with caution. The substantial number of Add Health participants (22%) who did not provide partnership data for their most recent sexual partner despite having reported sexual activity during the previous year, and the higher prevalence of *M. genitalium* among those who were missing data on these factors, suggests that the bivariate analyses of partnership characteristics may be biased. Because the questions were prefaced by the phrase “The next part of the interview is concerned with any romantic relationships and sexual relationships you have had at any time since the summer of 1995,” those who believed short-term sexual encounters were not relationships may have skipped the questions.

A major strength of our study was the large sample size and the representative sampling of young adults in the US population that was afforded by the Add Health study design. However, results should not be extrapolated to individuals outside the sample age range. The true sensitivity and specificity of the *M. genitalium* PCR assay is unknown, so the sensitivity analysis was intended to provide upper limits of the prevalence estimates for a reasonable range of test performance. Although the use of specimens obtained using noninvasive methods, such as urine, allows us to obtain genital tract specimens in household surveys, detection of *M. genitalium* in women’s urine specimens is less sensitive than detection using swab specimens. The sensitivity of the testing may have been further reduced by the freeze-thaw cycles that the specimens underwent before testing. Decreased sensitivity for detecting *C. trachomatis* and *N. gonorrhoeae* in women’s urine specimens compared with swab specimens has been previously reported, and self-obtained vaginal swabs, which are widely accepted by women in the United States, may provide more sensitive detection of infection among women. *M. genitalium* was more prevalent than *N. gonorrhoeae* in this general population sample, and characteristics associated with the infection strongly suggest that the organism is sexually transmitted. *M. genitalium* infections were not associated with symptoms in these healthy young adults.

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This article was accepted December 13, 2005.

**Contributors**

L.E. Manhart coordinated study activities, completed and synthesized the analyses, and led the writing. K.K. Holmes originated the study and assisted with the writing. P.A. Totten directed the laboratory work and assisted with the writing. J.P. Hughes oversaw the statistical analyses. L.S. Houston performed the *M. genitalium* testing. All authors assisted with originating ideas, interpreting findings, and reviewing drafts of the article.

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**Human Participant Protection**

Study procedures were approved by institutional review boards at the University of North Carolina and the University of Washington.

**References**


Patients with urethritis.


Catherine H. Mercer, PhD, Julia V. Bailey, MD, Anne M. Johnson, MD, Bob Erens, MA, Kaye Wellings, MSc, Kevin A. Fenton, PhD, and Andrew J. Copas, PhD

Sex between women is thought to be low risk for transmission of sexually transmitted infections (STI) such as chlamydia, gonorrhea, or HIV. However, studies from several countries indicate that women who have sex with women (WSW) may in fact be at greater risk than women with exclusively male partners, through behaviors such as risky sex with male sexual partners and activities such as injection drug use (IDU).

Most studies of WSW use convenience sampling in clinic or community settings because WSW are a hard-to-reach, “hidden” population. Convenience samples drawn from selected populations are not generalizable to all WSW, and there are few robust data internationally that measure prevalence, characteristics, and health outcomes in WSW from representative, general population samples. We noted a marked increase in the reported prevalence of sexual intercourse between women in Britain in the 10 years between the 2 National Surveys of Sexual Attitudes and Lifestyles (Natsal). The most recent survey, Natsal 2000, provides contemporary data to explore the prevalence of reported same-sex sexual experience and to make comparisons between women who reported sex exclusively with men, women who reported sex with women and men, and women who reported sex exclusively with women in the past 5 years in terms of sociodemographics and sexual, reproductive, and general health risk behaviors and outcomes.

METHODS

Objectives. We estimated the prevalence of same-sex experience among women and compared women reporting sex with women and men and women reporting sex exclusively with women with women reporting sex exclusively with men, in terms of sociodemographics and sexual, reproductive, and general health risk behaviors and outcomes.

Methods. We used a British probability survey (n=6399 women, aged 16 to 44 years) conducted from 1999 to 2001 with face-to-face interviewing and computer-assisted self-interviewing.

Results. We found that 4.9% of the women reported same-sex partner(s) ever; 2.8% reported sex with women in the past 5 years (n=178); 85.0% of these women also reported male partner(s) in this time. Compared with women who reported sex exclusively with men, women who reported sex with women and men reported significantly greater male partner numbers, unsafe sex, smoking, alcohol consumption, and intravenous drug use and had an increased likelihood of induced abortion and sexually transmitted infection diagnoses (age-adjusted odds ratios=3.07 and 4.41, respectively).

Conclusions. For women, a history of sex with women may be a marker for increased risk of adverse sexual, reproductive, and general health outcomes compared with women who reported sex exclusively with men. A nonjudgmental review of female patients’ sexual history should help practitioners discuss risks that women may face. (Am J Public Health. 2007;97:1126–1133. doi:10.2105/AJPH.2006.086439)
TABLE 1—Sociodemographic Characteristics of Women Who Reported Sex Exclusively With Men (WSEM), Women Who Reported Sex With Women and Men (WSWM), and Women Who Reported Sex Exclusively With Women (WSEW) in Natsal 2000: Great Britain

<table>
<thead>
<tr>
<th>Sociodemographic Characteristic</th>
<th>WSEM, %</th>
<th>WSWM, %</th>
<th>WSEW, %</th>
<th>P*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age, y</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>16–24</td>
<td>22.9</td>
<td>42.4</td>
<td>4.9</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>25–34</td>
<td>39.6</td>
<td>37.6</td>
<td>51.0</td>
<td></td>
</tr>
<tr>
<td>35–44</td>
<td>37.5</td>
<td>20.0</td>
<td>44.2</td>
<td></td>
</tr>
<tr>
<td>Marital or partnership status</td>
<td></td>
<td></td>
<td></td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Married</td>
<td>48.0</td>
<td>14.0</td>
<td>0.0</td>
<td></td>
</tr>
<tr>
<td>Heterosexual cohabitation</td>
<td>19.0</td>
<td>33.8</td>
<td>0.0</td>
<td></td>
</tr>
<tr>
<td>Homosexual cohabitation</td>
<td>0.0</td>
<td>4.2</td>
<td>64.4</td>
<td></td>
</tr>
<tr>
<td>Previously married</td>
<td>7.6</td>
<td>8.2</td>
<td>5.2</td>
<td></td>
</tr>
<tr>
<td>Never married</td>
<td>25.4</td>
<td>39.8</td>
<td>30.4</td>
<td></td>
</tr>
<tr>
<td>Have any natural children</td>
<td>63.2</td>
<td>41.3</td>
<td>9.9</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Race/ethnicity reported as White</td>
<td>92.7</td>
<td>93.5</td>
<td>94.1</td>
<td>.910</td>
</tr>
<tr>
<td>Social classa</td>
<td></td>
<td></td>
<td></td>
<td>.305</td>
</tr>
<tr>
<td>I/II</td>
<td>31.1</td>
<td>30.7</td>
<td>52.2</td>
<td></td>
</tr>
<tr>
<td>IIIIM/IIM</td>
<td>46.4</td>
<td>44.3</td>
<td>32.8</td>
<td></td>
</tr>
<tr>
<td>IV/V</td>
<td>22.5</td>
<td>25.0</td>
<td>15.1</td>
<td></td>
</tr>
<tr>
<td>Highest educational achievementb</td>
<td></td>
<td></td>
<td></td>
<td>.0135</td>
</tr>
<tr>
<td>Having at least a university degree</td>
<td>18.3</td>
<td>21.3</td>
<td>37.9</td>
<td></td>
</tr>
<tr>
<td>A/AS levels</td>
<td>16.1</td>
<td>25.2</td>
<td>14.6</td>
<td></td>
</tr>
<tr>
<td>O levels/GCSE</td>
<td>49.8</td>
<td>43.6</td>
<td>35.7</td>
<td></td>
</tr>
<tr>
<td>None</td>
<td>15.7</td>
<td>10.0</td>
<td>11.8</td>
<td></td>
</tr>
<tr>
<td>Resident of greater London</td>
<td>13.7</td>
<td>20.9</td>
<td>21.3</td>
<td>.011</td>
</tr>
<tr>
<td>Weighted denominator (unweighted)c</td>
<td>4819 (5594)</td>
<td>118 (147)</td>
<td>21 (31)</td>
<td>NA</td>
</tr>
</tbody>
</table>

Notes. Natsal = National Survey of Sexual Attitudes and Lifestyles; NA = not applicable. WSEM are defined as women who reported exclusively male sexual partners in the 5 years prior to the interview for Natsal 2000. WSWM are defined as women who reported female sexual partners and male sexual partners in the 5 years prior to the interview for Natsal 2000. WSEW are defined as women who reported exclusively female sexual partners in the 5 years prior to the interview for Natsal 2000.

aP-value for overall difference in proportions among WSEM, WSWM, and WSEW.

bI/II = professional, managerial, and technical occupations; IIIIM/IIM = skilled nonmanual and skilled manual occupations; IV/V = partly skilled and unskilled occupations.

cA/AS levels = passing school exams around age 18; O levels/GCSEs = passing school exams around age 16; none = having none of these educational qualifications.

dThe data were weighted to correct for unequal selection probabilities, including oversampling in greater London, and to match Britain’s age and gender population profile.

RESULTS

Prevalence of Same-Sex Attraction, Sexual Experience, and Genital Contact

We found that 0.6% of women reported that they “never felt sexually attracted to anyone at all” (95% confidence interval [CI]=0.4%, 0.9%). Approximately 1 in 10 women reported sexual attraction, at least in part, to women (11.2%; 95% CI=10.3%, 12.1%). And 0.2% of women reported they had only ever felt sexually attracted to women (95% CI=0.1%, 0.4%).

Same-sex sexual experiences were reported by 9.7% of the women (95% CI=8.9%, 10.5%). Using survival analysis, we estimated the median age at first same-sex sexual experience to be 19 years (lower and upper quartiles: 14 and 27 years, respectively). As previously reported, 4.9% of all women reported same-sex genital contact (95% CI=4.3%, 5.5%). We estimated the median age at first same-sex genital contact as 22 years (lower and upper quartiles: 16 and 32 years, respectively). Same-sex genital contact before age 16 years was reported by 1.3% of all women.
Comparisons
When we focused on women who reported at least 1 sexual partner in the 5 years prior to interview for Natsal 2000, we found that 2.8% of these women reported sex with women in the past 5 years (n=178; 95% CI=1.1%, 1.7%). Of women reporting same-sex genital contact, 42.9% reported heterosexual intercourse before age 16 (95% CI=37.2%, 48.9%). This is a significantly larger proportion than observed among women who did not report same-sex genital contact (21.2%; 95% CI=19.9%, 22.5%; P<.001).

Sociodemographic Characteristics
Table 1 shows that women who reported sex with women and men were significantly younger than were women who reported sex exclusively with men (mean ages=27.3 years and 31.7 years, respectively; standard deviations (SD)=7.2 and 7.7, respectively; P<.001). However, women who reported sex exclusively with women were significantly older than were women who reported sex exclusively with men (mean age=33.9 years; SD=6.2 years; P<.001). Of the women who reported sex with women and men, 47.8% reported opposite-sex cohabitation or marriage and 4.2% reported living with a woman. In contrast, 67.0% of women who reported sex exclusively with women reported opposite-sex cohabitation or marriage, and 64.4% of women who reported sex exclusively with women reported same-sex cohabitation. The women who reported sex with women and men were significantly less likely to have any natural children than were women who reported sex exclusively with men, even after control for age (age-adjusted OR=0.63; 95% CI=0.40, 0.97; P=.038). There were no statistically significant ethnic or social class differences among the 3 groups of women, but women who reported sex exclusively with women were significantly more likely to be educated at least to university level than were women who reported sex exclusively with men, and women who reported sex with women and men who reported sex exclusively with men resided in the greater London area than did women who reported sex exclusively with men.

Sexual Partners
Approximately half of women who reported sex with women and men (48%; 95% CI=38.8%, 57.3%) reported no female partners in the past year in contrast with 4.8% of women who reported sex exclusively with men who reported sex exclusively with women. Given the relatively small number of women who reported sex exclusively with women (n=31), our main focus is on women who reported sex with women and men compared with women who reported sex exclusively with men in terms of sociodemographics and sexual, reproductive, and general health risk behaviors and outcomes.

Notes.
Natsal = National Survey of Sexual Attitudes and Lifestyles; SD = standard deviation. WSEM are defined as women who reported exclusively male sexual partners in the 5 years prior to interview for Natsal 2000. WSWM are defined as women who reported female sexual partners and male sexual partners in the 5 years prior to interview for Natsal 2000. WSEW are defined as women who reported exclusively female sexual partners in the 5 years prior to interview for Natsal 2000. P<.001 for comparing numbers of male partners reported by WSEM and WSWM for all time frames. P values from linear regression, adjusting for age, where number of partners is considered as a continuous rather than a categorical variable as presented in Table 2.

a The Natsal survey defined sexual partners as people who have had sex together, whether just once or a few times, or as regular or married partners.
b The data were weighted to correct for unequal selection probabilities, including oversampling in greater London, and to match Britain’s age and gender population profile.

TABLE 2—Numbers of Male Sexual Partners Reported by Women Who Reported Sex Exclusively With Men (WSEM), Women Who Reported Sex With Women and Men (WSWM), and Women Who Reported Sex Exclusively With Women (WSEW) in Natsal 2000: Great Britain

<table>
<thead>
<tr>
<th>No. of male sexual partners</th>
<th>WSEM</th>
<th>WSWM</th>
<th>WSEW</th>
<th>WSEM</th>
<th>WSWM</th>
<th>WSEM</th>
<th>WSWM</th>
<th>WSEM</th>
<th>WSWM</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0.0</td>
<td>0.0</td>
<td>15.0</td>
<td>0.0</td>
<td>0.0</td>
<td>3.8</td>
<td>4.9</td>
<td>78.2</td>
<td>41.0</td>
</tr>
<tr>
<td>1</td>
<td>19.6</td>
<td>4.1</td>
<td>29.1</td>
<td>61.0</td>
<td>14.9</td>
<td>82.8</td>
<td>45.7</td>
<td>15.2</td>
<td>26.6</td>
</tr>
<tr>
<td>2</td>
<td>11.6</td>
<td>1.1</td>
<td>22.8</td>
<td>14.9</td>
<td>6.7</td>
<td>8.1</td>
<td>18.6</td>
<td>3.7</td>
<td>14.9</td>
</tr>
<tr>
<td>3-4</td>
<td>20.9</td>
<td>13.7</td>
<td>21.2</td>
<td>12.7</td>
<td>24.2</td>
<td>3.5</td>
<td>23.9</td>
<td>2.1</td>
<td>8.2</td>
</tr>
<tr>
<td>5-9</td>
<td>28.2</td>
<td>18.8</td>
<td>6.2</td>
<td>8.1</td>
<td>25.5</td>
<td>1.4</td>
<td>2.8</td>
<td>0.7</td>
<td>5.7</td>
</tr>
<tr>
<td>10+</td>
<td>19.7</td>
<td>62.3</td>
<td>5.6</td>
<td>3.3</td>
<td>28.7</td>
<td>0.4</td>
<td>4.1</td>
<td>0.2</td>
<td>3.6</td>
</tr>
<tr>
<td>Mean (SD)</td>
<td>6.5</td>
<td>21.2</td>
<td>3.2</td>
<td>2.3</td>
<td>11.0</td>
<td>1.2</td>
<td>2.7</td>
<td>0.4</td>
<td>1.9</td>
</tr>
<tr>
<td>Median</td>
<td>4</td>
<td>15</td>
<td>2</td>
<td>1</td>
<td>5</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Lower, upper quartiles (range)</td>
<td>2,8 (1-250)</td>
<td>8,30 (1-200)</td>
<td>1,4 (1-31)</td>
<td>1,3 (1-50)</td>
<td>3,10 (1-200)</td>
<td>1,1 (1-12)</td>
<td>1,3 (1-41)</td>
<td>0,0 (1-21)</td>
<td>0,2 (1-40)</td>
</tr>
<tr>
<td>Weighted denominator (unweighted)</td>
<td>4810 (5582)</td>
<td>118 (147)</td>
<td>21 (31)</td>
<td>4810 (5582)</td>
<td>118 (147)</td>
<td>4810 (5582)</td>
<td>118 (147)</td>
<td>4810 (5582)</td>
<td>118 (147)</td>
</tr>
</tbody>
</table>

Notes.
WSEM WSWM WSEW WSEM WSWM WSEM WSWM WSEM WSWM

With Women and Men (WSWM), and Women Who Reported Sex Exclusively With Women (WSEW) in Natsal 2000: Great Britain

Mean (SD)
Median
Lower, upper quartiles (range)
Weighted denominator (unweighted)

(95% CI=1.1%, 1.7%). Of women reporting same-sex genital contact, 42.9% reported heterosexual intercourse before age 16 (95% CI=37.2%, 48.9%). This is a significantly larger proportion than observed among women who did not report same-sex genital contact (21.2%; 95% CI=19.9%, 22.5%; P<.001).
Women (95% CI = 1.4%, 15.6%; \( P < .001 \)). A greater proportion of women who reported sex with women and men than women who reported sex exclusively with women reported 1 female partner only in the past 5 years: 70.7% (95% CI = 61.9%, 78.2%) versus 50.8% (95% CI = 32.0%, 69.3%; \( P = .060 \)). A small proportion of both groups reported 5 or more female partners in the past 5 years: 6.0% (95% CI = 3.1%, 11.5%) and 3.5% (95% CI = 0.8%, 14.6%), respectively.

In terms of male partners, women who reported sex with women and men reported significantly higher male partner numbers than did women who reported sex exclusively with men over all time frames (Table 2). For example, the median number of male partners ever was 4 for women who reported sex exclusively with men and 15 for women who reported sex with women and men, and in the past 5 years, 1 and 5 male partners, respectively. Of women who reported sex with women and men, 49.4% reported multiple male partners in the past year compared with 13.4% of women who reported sex exclusively with men. Three in 5 women who reported sex with women and men reported a new male partner in the past year in contrast to approximately 1 in 5 women who reported sex exclusively with men.

**Sexual Practices**

The women who reported sex with women and men who reported male partner(s) in the past year were as likely to report vaginal intercourse as women who reported sex exclusively with women, but significantly more likely to report anal intercourse, oral sex, or other genital contact not leading to intercourse with men than were women reporting exclusively male partners (age-adjusted ORs = 2.89, 2.41, and 3.80, respectively; Table 3). When women who reported sex with women and men were compared with women who reported sex exclusively with women, there were no differences in the reporting of sexual practices with female partners asked about in Natsal 2000, after control for age. Relative to women who reported sex exclusively with men, women who reported sex with women and men and women who reported sex exclusively with women were significantly more likely to report masturbation in the past 4 weeks (age-adjusted ORs = 3.91 and 2.50, respectively).

Relative to women who reported sex exclusively with men, women who reported sex with women and men were significantly more likely to report first sexual intercourse with their most recent partner within 24 hours of meeting and to describe this partner as “not regular” (age-adjusted ORs = 2.44 and 1.76, respectively; no significant differences were detected for women who reported sex exclusively with women). However, after additionally adjusting for partner numbers in the past

### TABLE 3—Prevalence of Selected Sexual Practices and Sexual Risk Behaviors in Women Who Reported Sex Exclusively With Men (WSEM), Women Who Reported Sex With Women and Men (WSWM), and Women Who Reported Sex Exclusively With Women (WSEW), in Natsal 2000: Great Britain

<table>
<thead>
<tr>
<th>Sexual practices, past year</th>
<th>WSEM</th>
<th>WSWM</th>
<th>WSEW</th>
<th>Age-Adjusted OR (95% CI)</th>
<th>Age-Adjusted OR (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vaginal intercourse</td>
<td>98.3</td>
<td>96.2</td>
<td>NA</td>
<td>0.47 (0.13, 1.70)</td>
<td>NA</td>
</tr>
<tr>
<td>Oral intercourse</td>
<td>85.4</td>
<td>94.8</td>
<td>NA</td>
<td>2.89 (1.24, 6.71)</td>
<td>NA</td>
</tr>
<tr>
<td>Anal intercourse</td>
<td>12.1</td>
<td>26.9</td>
<td>NA</td>
<td>2.41 (1.52, 3.81)</td>
<td>NA</td>
</tr>
<tr>
<td>Other genital contact</td>
<td>81.5</td>
<td>95.2</td>
<td>NA</td>
<td>3.80 (1.73, 8.31)</td>
<td>NA</td>
</tr>
<tr>
<td>Sexual practices with women</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Receptive oral intercourse</td>
<td>NA</td>
<td>48.3</td>
<td>71.7</td>
<td>1.00</td>
<td>0.70 (0.23, 2.07)</td>
</tr>
<tr>
<td>Active oral intercourse</td>
<td>NA</td>
<td>51.8</td>
<td>80.3</td>
<td>1.00</td>
<td>0.56 (0.16, 1.93)</td>
</tr>
<tr>
<td>Any oral intercourse</td>
<td>NA</td>
<td>53.5</td>
<td>80.3</td>
<td>1.00</td>
<td>0.58 (0.17, 2.01)</td>
</tr>
<tr>
<td>Other genital contact</td>
<td>NA</td>
<td>60.9</td>
<td>92.7</td>
<td>1.00</td>
<td>0.18 (0.04, 0.86)</td>
</tr>
<tr>
<td>Masturbation, past 4 weeks</td>
<td>36.6</td>
<td>68.9</td>
<td>59.7</td>
<td>3.91 (2.55, 6.00)</td>
<td>2.50 (1.12, 5.58)</td>
</tr>
<tr>
<td>Sexual risk behaviors</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Most recent sexual partner</td>
<td>7.2</td>
<td>11.8</td>
<td>8.6</td>
<td>1.35 (0.72, 2.54)</td>
<td>1.70 (0.36, 8.14)</td>
</tr>
<tr>
<td>Sexual intercourse</td>
<td>4.8</td>
<td>12.0</td>
<td>11.2</td>
<td>2.44 (1.39, 4.28)</td>
<td>2.71 (0.78, 9.40)</td>
</tr>
<tr>
<td>Most recent sexual partner</td>
<td>8.9</td>
<td>17.9</td>
<td>10.3</td>
<td>1.76 (1.04, 2.97)</td>
<td>1.59 (0.51, 4.95)</td>
</tr>
<tr>
<td>Most recent sexual partner</td>
<td>1.5</td>
<td>9.8</td>
<td>NA</td>
<td>7.17 (3.25, 15.8)</td>
<td>NA</td>
</tr>
<tr>
<td>Weighted denominator</td>
<td>4819</td>
<td>(5594)</td>
<td>139 (178)</td>
<td>21 (31)</td>
<td>NA</td>
</tr>
</tbody>
</table>

Notes. Natsal = National Survey of Sexual Attitudes and Lifestyles; OR = odds ratio; CI = confidence interval; NA = not applicable. WSEM are defined as women who reported exclusively male sexual partners in the 5 years prior to interview for Natsal 2000. WSWM are defined as women who reported female sexual partners and male sexual partners in the 5 years prior to interview for Natsal 2000. WSEW are defined as women who reported exclusively female sexual partners in the 5 years prior to interview for Natsal 2000.

*Age-adjusted OR of reporting outcome relative to WSEM, except for sexual practices with women where the reference category is WSWM.

†Among women reporting at least 1 male sexual partner in the past year.

‡Defined as contact with the genital area not leading to intercourse but intending to achieve orgasm, for example, stimulation by hand.

§Among women reporting at least 1 female sexual partner in the past year.

¶Refers to total number of women reporting active or receptive oral intercourse.

‖The Natsal survey defined sexual partners as people who have had sex together, whether just once or a few times, or as regular or married partners.

*Among women reporting at least 1 male sexual partner in the past 4 weeks.

**Unsafe sex” is proxied as reporting at least 2 male sexual partners in the past 4 weeks and as inconsistent condom use in the past 4 weeks.

The data were weighted to correct for unequal selection probabilities, including oversampling in Greater London, and to match Britain’s age and gender population profile.
year, these ORs were no longer statistically significant (1.56 [95% CI=0.79, 3.08; \(P=.201\)) and 0.86 [95% CI=0.45, 1.63; \(P=.637\)], respectively). Among women reporting male partners in the past 4 weeks, women who reported sex with women and men were significantly more likely to have had unsafe heterosexual sex (defined as reporting 2 or more male partners and inconsistent condom use in this time frame)\(^9\) than women who reported sex exclusively with men (age-adjusted OR=7.17). This association remained highly significant after additionally adjusting for numbers of male partners in the past 4 weeks (adjusted OR=6.97; 95% CI=3.12, 15.6; \(P<.001\)).

**Sexual, Reproductive, and General Health Risks and Outcomes**

Relative to women who reported sex exclusively with men, women who reported sex with women and men were significantly less likely to describe their health as “good” or “very good,” were more likely to report illnesses lasting at least 3 months in the past 5 years, and to have been to the hospital as an outpatient in the past year (excluding for ante- or postnatal reasons; Table 4). The women who reported sex with women and men were more likely to have ever smoked, to smoke heavily, to drink more than recommended alcohol limits per week,\(^14\) and to have injected nonprescribed drugs than were women who reported sex exclusively with men. There were no statistically significant differences between women who reported sex exclusively with men and women who reported sex exclusively with women, but numbers of the latter were small.

The women who reported sex with women and men were significantly more likely to perceive themselves as “greatly” or “quite a lot” at risk of HIV relative to women who reported sex exclusively with men and women who reported sex exclusively with women (11.1%, 2.4%, and 0.0%, respectively; \(P<.001\)). In contrast, women who reported sex with women and men were significantly less likely to perceive female homosexuals as “greatly” or “quite a lot” at risk of HIV than were women who reported sex exclusively with men (26.6% vs 50.9%, respectively; \(P<.001\)). Table 4 may reflect the greater self-perceived HIV risk reported by women who reported sex with women and men, because these women were significantly more likely than were women who reported sex exclusively with men to report visiting an STI clinic and testing for HIV in the past 5 years. The women who reported sex with women and men were also significantly more likely to report STI diagnoses, specifically diagnoses of chlamydia, pelvic inflammatory disease, or genital warts, as well as induced abortion, in this time frame. These associations remain after additionally adjusting for the reported number of male partners in the past 5 years. Although relatively small in number, none of the women who reported sex exclusively with women reported any STI diagnoses in the past 5 years.

**DISCUSSION**

**Principal Findings**

Data from this large national probability sample show that women who reported sex with women and men were significantly more likely to report adverse sexual, reproductive, and general health risk behaviors and outcomes than were women who reported sex exclusively with men. Among all WSW, few female partners were reported on average, but the majority reported male partners. The women who reported sex with women and men reported significantly larger average numbers of male partners than women who reported sex exclusively with men and were significantly more likely to report HIV risk behaviors including IDU, unsafe sex,\(^9\) describing their most recent partner as “not regular,” and reporting first sexual intercourse with this partner within 24 hours of meeting. The women who reported sex with women and men reported poorer general health and significantly greater smoking and alcohol consumption, induced abortion, and STI diagnoses than women who reported sex exclusively with men.

Around 10% of women in Natsal 2000 reported sexual attraction to women, with a much smaller percentage reporting same-sex genital contact within the past 5 years (2.8%). However, first same-sex sexual experience tends to occur at older ages than first heterosexual experience, and these unadjusted prevalences do not take into account the cumulative increase in same-sex sexual experience with age. Only 4 of the 178 WSW in Natsal 2000 reported no male sexual partners ever.

**Comparison With Other Studies**

Studies of WSW have generally used convenience samples and study designs that differ in sampling strategies, inclusion criteria and place of recruitment, which makes comparison difficult. Sexual attraction, sexual behavior, and sexual identity are not equivalent,\(^15\) convenience samples tend to capture those who identify as lesbian or bisexual.\(^16\) Our results included a large proportion of women who reported sex with women and men who reported current heterosexual cohabitation or marriage and those who had felt sexually attracted only to males, never to females. Therefore, an important strength of our study is that it utilizes probability survey data that samples all WSW, not just visible communities.\(^17\)

The majority of WSW in Natsal 2000 reported fewer than 5 female partners ever, similar to findings in an Australian probability sample.\(^5\) The majority of WSW in Natsal 2000 also reported male partners within the past year. These findings are in marked contrast to the findings in some UK studies that used convenience sampling, in which most WSW reported sexual activity only with women in the past year,\(^18\) and fewer lifetime male partners but more female partners ever\(^18\) and in the past year,\(^18\) than in this probability survey.

In comparisons with women who reported sex exclusively with men, others have also found that women who reported sex with women and men report greater numbers of male partners ever\(^6\) and in the past year.\(^20\) The women who reported sex with women and men also appear more likely to choose sexual partners who are at a higher risk of STI and blood-borne infection such as bisexual men or injection drug users.\(^6,7,20–22\) Natsal 2000 did not include questions about the risk behaviors of respondents’ partners because of the potential inaccuracy of responses. The women who reported sex with women and men in our data reported earlier onset of heterosexual activity, more unsafe
### TABLE 4—Prevalence of Health-Related Factors and Sexual and Reproductive Health Care Experiences of Women Who Reported Sex Exclusively With Men (WSEM), Women Who Reported Sex With Women and Men (WSWM), and Women Who Reported Sex Exclusively With Women (WSEW), in Natsal 2000: Great Britain

<table>
<thead>
<tr>
<th>Health-related factors</th>
<th>WSEM, %</th>
<th>WSWM, %</th>
<th>WSEW, %</th>
<th>WSMW, Age-Adjusted OR (95% CI)</th>
<th>WSEW, Age-Adjusted OR (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Self-perceived health</strong>&lt;sup&gt;b&lt;/sup&gt;</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Very good</td>
<td>43.6</td>
<td>26.7</td>
<td>43.7</td>
<td>0.48 (0.32, 0.73)</td>
<td>0.96 (0.43, 2.11)</td>
</tr>
<tr>
<td>Good</td>
<td>42.6</td>
<td>55.0</td>
<td>44.1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fair</td>
<td>11.9</td>
<td>14.9</td>
<td>12.2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bad</td>
<td>1.4</td>
<td>1.9</td>
<td>0.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Very bad</td>
<td>0.5</td>
<td>1.5</td>
<td>0.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Reported having an illness lasting ≥3 months in the past 5 years</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>14.9</td>
<td>24.2</td>
<td>31.0</td>
<td>2.01 (1.30, 3.09)</td>
<td>2.42 (1.0, 5.87)</td>
</tr>
<tr>
<td><strong>Reported hospital outpatient visit in the past year</strong>&lt;sup&gt;c&lt;/sup&gt;</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>26.5</td>
<td>35.0</td>
<td>40.8</td>
<td>1.53 (1.03, 2.27)</td>
<td>1.87 (0.83, 4.20)</td>
</tr>
<tr>
<td><strong>Reported hospital inpatient visit in the past year</strong>&lt;sup&gt;d&lt;/sup&gt;</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>8.2</td>
<td>13.0</td>
<td>4.0</td>
<td>1.69 (0.94, 3.01)</td>
<td>0.47 (0.10, 2.18)</td>
</tr>
<tr>
<td><strong>Smoking status</strong>&lt;sup&gt;e&lt;/sup&gt;</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Never smoked</td>
<td>45.0</td>
<td>24.4</td>
<td>48.2</td>
<td>2.60 (1.73, 3.92)</td>
<td>1.23 (0.55, 2.77)</td>
</tr>
<tr>
<td>Former smoker</td>
<td>17.1</td>
<td>11.8</td>
<td>11.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Light smoker</td>
<td>21.4</td>
<td>40.2</td>
<td>24.7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Heavy smoker</td>
<td>16.6</td>
<td>23.7</td>
<td>16.1</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Alcohol consumption</strong>&lt;sup&gt;h&lt;/sup&gt;</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1.98 (1.21, 3.25)</td>
</tr>
<tr>
<td>None</td>
<td>18.2</td>
<td>8.8</td>
<td>25.2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Not more than recommended limit</td>
<td>72.0</td>
<td>71.9</td>
<td>61.1</td>
<td>11.3 (4.05, 31.5)</td>
<td>NA</td>
</tr>
<tr>
<td>More than recommended limit</td>
<td>9.9</td>
<td>19.3</td>
<td>13.4</td>
<td>24.6 (6.79, 88.9)</td>
<td>NA</td>
</tr>
<tr>
<td><strong>Has injected nonprescribed drugs or other substances</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ever</td>
<td>0.5</td>
<td>4.4</td>
<td>0.0</td>
<td>9.97 (4.13, 24.0)</td>
<td>NA</td>
</tr>
<tr>
<td>Past 5 years</td>
<td>0.3</td>
<td>3.6</td>
<td>0.0</td>
<td>11.3 (4.05, 31.5)</td>
<td>NA</td>
</tr>
<tr>
<td>Past year</td>
<td>0.01</td>
<td>2.0</td>
<td>0.0</td>
<td>24.6 (6.79, 88.9)</td>
<td>NA</td>
</tr>
<tr>
<td><strong>Sexual and reproductive health care experiences</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reported STI clinic attendance in the past 5 years</td>
<td>6.2</td>
<td>29.3</td>
<td>8.1</td>
<td>6.31 (4.21, 9.47)</td>
<td>1.35 (0.29, 6.33)</td>
</tr>
<tr>
<td>Has been tested for HIV in the past 5 years</td>
<td>8.3</td>
<td>23.1</td>
<td>14.2</td>
<td>3.09 (1.96, 4.89)</td>
<td>1.84 (0.58, 5.81)</td>
</tr>
<tr>
<td>Has had any STI diagnosis in the past 5 years&lt;sup&gt;i&lt;/sup&gt;</td>
<td>3.8</td>
<td>17.8</td>
<td>0.0</td>
<td>4.41 (2.63, 7.40)</td>
<td>NA</td>
</tr>
<tr>
<td>Has had any bacterial STI&lt;sup&gt;j&lt;/sup&gt;</td>
<td>2.3</td>
<td>11.7</td>
<td>0.0</td>
<td>4.52 (2.51, 8.14)</td>
<td>NA</td>
</tr>
<tr>
<td>Chlamydia</td>
<td>1.3</td>
<td>10.3</td>
<td>0.0</td>
<td>6.17 (3.13, 12.2)</td>
<td>NA</td>
</tr>
<tr>
<td>Gonorrhea</td>
<td>0.01</td>
<td>0.4</td>
<td>0.0</td>
<td>5.33 (0.64, 44.1)</td>
<td>NA</td>
</tr>
<tr>
<td>Trichomonas</td>
<td>0.1</td>
<td>0.0</td>
<td>0.0</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>Syphilis</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>Pelvic inflammatory disease</td>
<td>0.8</td>
<td>2.9</td>
<td>0.0</td>
<td>3.36 (1.10, 10.2)</td>
<td>NA</td>
</tr>
<tr>
<td>Has had any viral STI&lt;sup&gt;k&lt;/sup&gt;</td>
<td>1.7</td>
<td>6.4</td>
<td>0.0</td>
<td>3.14 (1.42, 6.95)</td>
<td>NA</td>
</tr>
<tr>
<td>Genital warts</td>
<td>1.3</td>
<td>4.9</td>
<td>0.0</td>
<td>3.05 (1.17, 7.98)</td>
<td>NA</td>
</tr>
<tr>
<td>Genital herpes</td>
<td>0.5</td>
<td>1.6</td>
<td>0.0</td>
<td>2.82 (0.88, 9.02)</td>
<td>NA</td>
</tr>
<tr>
<td>Had an induced abortion in the past 5 years</td>
<td>6.0</td>
<td>18.8</td>
<td>NA</td>
<td>3.07 (1.88, 5.00)</td>
<td>NA</td>
</tr>
<tr>
<td>Weighted denominator (unweighted)&lt;sup&gt;l&lt;/sup&gt;</td>
<td>4819 (5594)</td>
<td>139 (178)</td>
<td>21 (31)</td>
<td>NA</td>
<td>NA</td>
</tr>
</tbody>
</table>

**Notes.** Natsal = National Survey of Sexual Attitudes and Lifestyles; OR = odds ratio; STI = sexually transmitted infection; NA = not applicable. WSEM are defined as women who reported exclusively male sexual partners in the 5 years prior to interview for Natsal 2000. WSWM are defined as women who reported female sexual partners and male sexual partners in the 5 years prior to interview for Natsal 2000. WSEW are defined as women who reported exclusively female sexual partners in the 5 years prior to interview for Natsal 2000.

<sup>a</sup>Age-adjusted OR of reporting outcome relative to WSEM.

<sup>b</sup>Age-adjusted OR of reporting health as “fair,” “bad,” or “very bad,” rather than “very good” or “good.”

<sup>c</sup>Excluding for ante- or postnatal care.

<sup>d</sup>Excluding for pregnancy visit.

<sup>e</sup>Defined as reporting being a light or heavy smoker, rather than a non- or former smoker.

<sup>f</sup>Defined as reporting smoking less than 15 cigarettes a day.

<sup>g</sup>Defined as reporting smoking at least 15 cigarettes a day.

<sup>h</sup>Age-adjusted OR of reporting consumption of more than the recommended limit (15 or more units of alcohol per week).<sup>14</sup>

<sup>i</sup>STIs included chlamydia, gonorrhea, trichomonas, syphilis, pelvic inflammatory disease, genital warts, and genital herpes.

<sup>j</sup>Bacterial STIs included chlamydia, gonorrhea, trichomonas, syphilis, and pelvic inflammatory disease.

<sup>k</sup>Viral STIs included genital warts and genital herpes.

<sup>l</sup>The data were weighted to correct for unequal selection probabilities, including oversampling in greater London, and to match Britain’s age and gender population profile.
sex, sex with a partner described as not regular, and greater sexual repertoire (i.e., a larger range of sexual practices experienced) compared with women who reported sex exclusively with men. Consistent with these sexual health risks, 19% of women who reported sex with women and men in Natsal 2000 reported termination of pregnancy, and 18% reported a history of STI, predominantly chlamydia. These findings highlight the need for access to contraceptive advice and STI screening and treatment among women who reported sex with women and men. In contrast, there were no STIs reported by the small number of women who reported sex exclusively with women in the study.

Population-based studies from the United States concur with our findings that women who reported sex with women and men smoke more frequently,23,24 drink more alcohol,23,24 and report IDU21 and dependency upon illicit drugs26 more frequently compared with women who reported sex exclusively with men. Other studies describe high proportions of women who reported sex with women and men engaged in sex work,6,7,21 and greater prevalence of hepatitis B and C (but not HIV) in women who reported sex with women and men,27 and greater prevalence of hepatitis B and C (but not HIV) in women who reported sex with women and men.21 Natsal 2000 did not include questions about sex work.

Half of women who reported sex with women and men in Natsal 2000 reported current heterosexual cohabitation or marriage. More than two thirds of women who reported sex with women and men reported only 1 female partner in the past 5 years, in contrast to a median of 5 male sexual partners in the same time frame. A third of women who reported sex with women and men who reported only 1 female partner said that they had felt sexually attracted only to males, never to females. These proportions were surprising; Natsal 2000 used random sampling techniques and behavioral inclusion criteria and therefore included WSW who did not identify as lesbians or bisexual women. Qualitative investigation would help to explore the relationships among sexual attraction, sexual behavior, and sexual identity,85 and help in understanding the sexual networks of WSW.

Limitations
Sensitive sexual behavior such as homosexuality may be underreported in sexual health surveys.29 However, the CASI that was developed for Natsal 2000 was more reliable than face-to-face data collection techniques or pen-and-paper methods.29–31

Although Natsal 2000 was a large national survey, the sample included relatively few WSW (178 women) because of the low reported prevalence of same-sex sexual behavior. Although convenience samples may include larger numbers of WSW, this national probability sample allowed for the estimation of the probability of the size of the population of WSW. Census data estimated the number of women aged 16 to 44 years resident in Great Britain in mid-1999 as 11.5 million,21 so using our prevalence estimate, that suggests that approximately 322,000 of these women are WSW. Our data also allowed for the quantification of risks and outcomes that are generalizable to the British population. Inclusion of data about sexual behavior and partnerships in national statistics such as STI diagnoses and cancer incidence data would help to address gaps in knowledge about health outcomes in WSW.32,33

Natsal 2000 surveyed those aged 16 to 44 years, so findings are not generalizable to other age groups, although other studies indicate that health risks may also be prevalent in WSW (specifically women who reported sex with women and men) at older and younger ages.4,34,35 As a general survey of sexual behavior, Natsal 2000 did not have the scope to ask women detailed questions about specific sexual practices with women.16 However this study and others show that the greatest sexual and reproductive health risks for WSW (again, specifically women who reported sex with women and men) seem to be from heterosexual sexual activity,6,7,21 and behaviors such as smoking,23,24 alcohol use,24,25 and IDU.21

Possible Explanations and Implications for Clinicians and Policymakers
In these data, a history of sex with a woman is, for a woman, a marker for increased risk of adverse sexual, reproductive, and general health outcomes, in particular more risky heterosexual practice and greater substance misuse than women who reported sex exclusively with men. Many WSW fear disclosing sexual identity to health profession- als36,37 and may avoid seeking medical care.19,38 Nearly one third of women who reported sex with men and women in this survey had utilized sexual health services in the past 5 years, but only 11.1% perceived their own HIV risk as “great” or “quite a lot” despite reporting a range of risk behaviors. In addition to health promotion among WSW, there is a need for practitioners to develop skills and attitudes that allow nonjudgmental sexual history-taking from female patients, without making assumptions about sexuality or sexual behavior, to facilitate discussion of risks that WSW may face.36,38–41

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Contributors
C. H. Mercer and A. M. Johnson originated the study. C. H. Mercer led the writing of the article and carried out all analyses with assistance from A. J. Copas. J. V. Bailey led the literature review and contributed extensively to the interpretation of the data and the article’s writing. A. M. Johnson, B. Erens, K. Wellings, and K. A. Fenton were co-investigators and participated in the design and management of the main study. All authors contributed to the preparation of the article.

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Note. The views expressed in this article are that of the authors and do not necessarily reflect the views of the funding institutions.
REFERENCES


17. Malterud K. Health needs of women who have sex with women: methodological assumptions underlying conclusions should be questioned. BMJ. 2004;328:463–464.


Overweight and Obesity in Sexual-Minority Women: Evidence From Population-Based Data

Ulrike Boehmer, PhD, Deborah J. Bowen, PhD, Greta R. Bauer, PhD

Obesity has reached epidemic proportions in the United States. Healthy People 2010 identified obesity and overweight as an important public health concern, and a reduction in the rate of overweight and obesity is 1 of the 10 leading health indicators. The causes of obesity are still not entirely understood. This chronic disease is linked to complex social, behavioral, cultural, physiological, metabolic, and genetic factors. Previous research efforts have not considered sexual orientation as a possible risk factor for obesity, despite evidence that suggests lesbians have higher rates of overweight and obesity.

The reasons for lesbians’ overweight and obesity have not been thoroughly explored. Studies suggest that differences in obesity rates by sexual orientation may be because of the variance in social, behavioral, and cultural norms by sexual orientation groups. It has been suggested that lesbians are less likely to consider themselves overweight compared with women in the general population. A few studies, using convenience samples, explored the unique factors that may contribute to overweight and obesity in lesbians. The results of these studies indicate that lesbian women have a better body image than do heterosexual women and prioritize a body image on the basis of physical function. The evidence is inconclusive regarding lesbians’ exercise behaviors. It has been argued that lesbians are heavier, but more physically fit, because of their level of physical activity. One study has disputed that lesbians’ exercise behavior explains their greater body mass index (BMI). Other studies have emphasized that lesbians’ exercise behavior is not motivated by aesthetic reasons. Although these smaller studies provide possible explanatory factors regarding obesity in lesbians, they do not adequately consider covariates shown in the literature to be risk factors for overweight and obesity.

Objective. We sought to determine whether lesbians have higher rates of overweight and obesity than women of other sexual orientations.

Methods. We compared population estimates of overweight and obesity across sexual orientation groups, using data from the 2002 National Survey of Family Growth.

Results. Adjusted multinomial logistic regression analyses showed lesbians have more than twice the odds of overweight (odds ratio [OR] = 2.69; 95% confidence interval [CI] = 1.40, 5.18) and obesity (OR = 2.47; 95% CI = 1.19, 5.09) as heterosexual women. Bisexuals and women who reported their sexual orientation as “something else” (besides heterosexual, lesbian, or bisexual) showed no such increase in the odds of overweight and obesity.

Conclusions. Lesbian women have a higher prevalence of overweight and obesity than all other female sexual orientation groups. This finding suggests that lesbians are at greater risk for morbidity and mortality linked to overweight and obesity. This finding also highlights the need for interventions within this population. (Am J Public Health. 2007;97:1134–1140. doi:10.2105/AJPH.2006.088419)

METHODS

Data

We used data from Cycle 6 of the National Survey of Family Growth (NSFG). This population-based survey was conducted by the National Center for Health Statistics to estimate fertility, marriage and cohabitation, contraception, pregnancy outcomes, and other factors that influence US families. The NSFG survey sample represents the civilian noninstitutionalized population of the United States between the ages of 15 and 44 years. Cycle 6 of the NSFG was conducted in 2002 and included data from in-home interviews with 76,432 women. Most of the survey was administered using computer-assisted personal interviewing. The most sensitive questions were answered using audio computer-assisted
The US population is complex, with various factors influencing health outcomes. In this study, we focused on BMI, a measure commonly used to determine overweight or obesity in nonpregnant adults. BMI (weight in kilograms divided by height, in meters squared) was calculated using respondents’ self-reported weight and height (kg/m²). BMI is not considered appropriate for adolescents aged 15–19 years or pregnant women, so the measure has only been computed for nonpregnant or younger than 20 years, because in these groups, BMI is not considered to be appropriate to measure obesity and overweight (n = 1585). Another 79 respondents were excluded: 43 refused to answer the question about sexual orientation (0.7%) and 36 reported “don’t know” in response to the sexual orientation question (0.6%).

Measures
Our outcome of interest was BMI, a measure commonly used to determine overweight or obesity in nonpregnant adults. BMI (weight in kilograms divided by height, in meters squared) was calculated using respondents’ self-reported weight and height (kg/m²). BMI is not considered appropriate for adolescents aged 15–19 years or pregnant women, so the measure has only been computed for nonpregnant or younger than 20 years, because in these groups, BMI is not considered to be appropriate to measure obesity and overweight (n = 1585). Another 79 respondents were excluded: 43 refused to answer the question about sexual orientation (0.7%) and 36 reported “don’t know” in response to the sexual orientation question (0.6%).

Analysis
The NSFG was conducted using complex sampling, and thus, analyses must account for stratification, clustering, and unequal weighting. All proportions and means presented were weighted to provide estimates for the US population of noninstitutionalized women aged 20–44 years. The Taylor series approximation technique, which takes into account this complex sampling design, was used to calculate variances for descriptive statistics and in hypothesis testing. We examined differences in sociodemographic characteristics and parity across sexual orientation groups and presented means, frequencies, and 95% confidence intervals (CIs). For hypothesis testing, we used the Rao-Scott χ² test for categorical variables and the F-test for continuous variables. Means of BMIs and frequencies of normal weight, overweight, and obesity among the different sexual orientation groups were similarly compared. We conducted multinomial logistic regression analyses to examine sexual orientation differences in the likelihood of being overweight or obese. Our criterion for retention of variables within the model was statistical significance at α=0.05 for each individual variable or categorical grouping of dummy variables, or a resulting change of 10% or greater in the natural logarithm (odds ratio [OR]) for the associations between sexual orientation groups and overweight or obesity. Significance was assessed using the Wald χ² test. All analyses were conducted using SAS 9.1.3 (SAS Institute Inc, Cary, NC).

RESULTS
Table 1 displays characteristics of the US female population aged 20–44 years by sexual orientation. The sexual orientation groups significantly differ from each other with respect to all demographic characteristics and parity. However, when age is categorized, there were no significant differences between sexual orientation groups. To further explore these differences, we performed a series of pairwise tests and compared each sexual orientation group with the reference group of heterosexual women. Lesbians significantly differ from heterosexual women with respect to parity and their racial and ethnic background. Bisexual women significantly differ from the reference group on age, parity, insurance status, place of residence, and nativity. Women who identified as “something else” differed from heterosexual women on parity and all demographic characteristics with the exception of age.

Table 2 displays population-based prevalence estimates of overweight and obesity in the US population by sexual orientation group and the mean BMI by sexual orientation group. Initially, statistical tests of overweight and obesity indicated that sexual orientation groups were significantly different from each other, but there were no significant differences in the mean BMI by sexual orientation group. We then conducted a series of pairwise tests to compare each sexual orientation group to the reference group of heterosexual women on overweight and obesity prevalence and...
TABLE 1—Sample Characteristics of Nonpregnant US Women (N = 5979) Aged 20–44 Years, by Sexual Orientation:
National Survey of Family Growth, United States, 2002

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Heterosexual (n = 5460; 92.5%), Mean % (95% CI)</th>
<th>Lesbian (n = 87; 1.4%), Mean % (95% CI)</th>
<th>Bisexual (n = 180; 2.5%), Mean % (95% CI)</th>
<th>Other (n = 252; 3.6%), Mean % (95% CI)</th>
<th>P (Pairwise Testings)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean age</td>
<td>32.68 (32.26, 33.10)</td>
<td>33.40 (31.74, 35.05)</td>
<td>30.51 (29.14, 31.87)</td>
<td>32.90 (31.65, 34.14)</td>
<td>.011 (B = .004)</td>
</tr>
<tr>
<td>Age, y</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>.142 (B = .022)</td>
</tr>
<tr>
<td>20–29</td>
<td>35.7 (33.2, 35.1)</td>
<td>31.7 (21.2, 42.2)</td>
<td>46.0 (36.6, 55.2)</td>
<td>33.7 (26.9, 40.5)</td>
<td>&lt;.001 (L = .039; O &lt; .001)</td>
</tr>
<tr>
<td>30–39</td>
<td>40.9 (38.9, 43.0)</td>
<td>48.0 (35.5, 60.6)</td>
<td>39.8 (30.9, 48.8)</td>
<td>39.1 (31.9, 46.3)</td>
<td>&lt;.004 (B = .025; O = .002)</td>
</tr>
<tr>
<td>40–44</td>
<td>23.4 (21.3, 25.6)</td>
<td>20.3 (8.3, 32.4)</td>
<td>14.1 (8.0, 20.3)</td>
<td>27.2 (19.7, 34.7)</td>
<td>&lt;.001 (B = .003; O = .004)</td>
</tr>
<tr>
<td>Parity</td>
<td>&lt;.001 (L&lt;.001; B&lt;.001; O&lt;.001)</td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Nulliparous</td>
<td>31.7 (29.4, 34.0)</td>
<td>64.0 (51.4, 76.7)</td>
<td>51.8 (42.6, 60.9)</td>
<td>20.4 (14.5, 26.4)</td>
<td></td>
</tr>
<tr>
<td>Parous</td>
<td>68.3 (66.0, 70.6)</td>
<td>36.0 (23.3, 48.6)</td>
<td>48.2 (39.1, 57.4)</td>
<td>79.6 (73.6, 85.5)</td>
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<tr>
<td>Race/ethnicity</td>
<td>&lt; .001 (L = .039; O &lt; .001)</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Hispanic</td>
<td>13.8 (12.5, 15.1)</td>
<td>8.5 (2.4, 14.7)</td>
<td>8.1 (4.2, 12.0)</td>
<td>24.9 (18.0, 31.8)</td>
<td></td>
</tr>
<tr>
<td>White, non-Hispanic</td>
<td>68.2 (65.9, 70.4)</td>
<td>62.8 (50.4, 75.3)</td>
<td>67.9 (60.3, 75.5)</td>
<td>42.5 (34.7, 50.4)</td>
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<tr>
<td>Black, non-Hispanic</td>
<td>13.0 (11.5, 14.5)</td>
<td>17.0 (8.1, 25.9)</td>
<td>15.5 (9.3, 21.7)</td>
<td>26.1 (19.7, 32.6)</td>
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</tr>
<tr>
<td>Other</td>
<td>5.1 (4.1, 6.1)</td>
<td>11.6 (3.5, 19.8)</td>
<td>8.5 (3.9, 13.1)</td>
<td>6.4 (3.3, 9.5)</td>
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</tr>
<tr>
<td>Medical insurance status</td>
<td>&lt; .001 (B &lt; .001; O &lt; .001)</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>None</td>
<td>15.6 (14.3, 17.0)</td>
<td>11.4 (5.6, 17.1)</td>
<td>28.2 (19.2, 37.3)</td>
<td>23.5 (16.2, 30.9)</td>
<td></td>
</tr>
<tr>
<td>Private</td>
<td>71.1 (69.5, 72.8)</td>
<td>71.3 (60.5, 82.2)</td>
<td>55.7 (46.1, 65.3)</td>
<td>35.7 (28.0, 43.4)</td>
<td></td>
</tr>
<tr>
<td>Medicaid</td>
<td>7.9 (7.1, 8.7)</td>
<td>7.0 (2.2, 11.8)</td>
<td>9.4 (5.2, 13.7)</td>
<td>26.9 (20.0, 33.7)</td>
<td></td>
</tr>
<tr>
<td>Publicc</td>
<td>5.4 (4.3, 6.5)</td>
<td>10.3 (2.7, 18.0)</td>
<td>6.6 (2.6, 10.6)</td>
<td>13.9 (8.6, 19.2)</td>
<td></td>
</tr>
<tr>
<td>Residence</td>
<td>&lt;.001 (B = .003; O = .004)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MSA City</td>
<td>50.2 (46.3, 54.1)</td>
<td>48.6 (34.9, 62.3)</td>
<td>42.8 (32.3, 53.3)</td>
<td>34.0 (25.6, 42.4)</td>
<td></td>
</tr>
<tr>
<td>Other MSA</td>
<td>32.8 (28.7, 36.8)</td>
<td>41.0 (27.4, 54.6)</td>
<td>47.2 (36.0, 58.4)</td>
<td>42.1 (32.8, 51.4)</td>
<td></td>
</tr>
<tr>
<td>No MSA</td>
<td>17.0 (15.1, 19.0)</td>
<td>10.4 (1.6, 19.3)</td>
<td>9.9 (4.1, 15.8)</td>
<td>23.9 (16.5, 31.3)</td>
<td></td>
</tr>
<tr>
<td>Nativity</td>
<td>&lt;.004 (B = .025; O = .002)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>US-born</td>
<td>85.7 (84.3, 87.1)</td>
<td>83.7 (74.3, 93.2)</td>
<td>90.9 (87.1, 94.7)</td>
<td>77.8 (71.8, 83.9)</td>
<td></td>
</tr>
<tr>
<td>Foreign-born</td>
<td>14.3 (12.9, 15.7)</td>
<td>16.3 (6.8, 25.7)</td>
<td>9.1 (5.3, 12.9)</td>
<td>22.2 (16.1, 28.2)</td>
<td></td>
</tr>
<tr>
<td>Education</td>
<td>&lt;.001 (B &lt; .001)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Some high school</td>
<td>10.5 (9.4, 11.6)</td>
<td>4.8 (0.0, 9.6)</td>
<td>10.7 (4.0, 17.3)</td>
<td>34.5 (26.8, 42.2)</td>
<td></td>
</tr>
<tr>
<td>High school diploma or GED</td>
<td>28.5 (26.8, 30.3)</td>
<td>32.0 (20.8, 43.1)</td>
<td>35.4 (25.7, 45.2)</td>
<td>42.5 (35.0, 50.0)</td>
<td></td>
</tr>
<tr>
<td>Some college</td>
<td>24.5 (22.6, 26.3)</td>
<td>23.9 (12.4, 35.3)</td>
<td>29.1 (20.4, 37.8)</td>
<td>14.7 (10.3, 19.0)</td>
<td></td>
</tr>
<tr>
<td>College degree or graduate school</td>
<td>36.5 (34.2, 38.8)</td>
<td>39.3 (25.3, 53.4)</td>
<td>24.8 (16.6, 33.0)</td>
<td>8.4 (4.7, 12.1)</td>
<td></td>
</tr>
<tr>
<td>Household income, % of the federal poverty level</td>
<td>&lt;.001 (B &lt; .001)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0–99</td>
<td>16.6 (15.0, 18.1)</td>
<td>13.0 (4.2, 21.8)</td>
<td>22.9 (15.6, 30.2)</td>
<td>37.9 (30.9, 44.9)</td>
<td></td>
</tr>
<tr>
<td>100–299</td>
<td>38.0 (36.2, 39.7)</td>
<td>38.9 (27.0, 50.8)</td>
<td>38.6 (29.9, 47.3)</td>
<td>43.6 (36.6, 50.5)</td>
<td></td>
</tr>
<tr>
<td>≥300</td>
<td>45.5 (43.4, 47.5)</td>
<td>48.1 (35.0, 61.1)</td>
<td>38.5 (29.3, 47.7)</td>
<td>18.5 (13.0, 24.1)</td>
<td></td>
</tr>
</tbody>
</table>

Note. B = bisexual; CI = confidence interval; O = other; GED = general equivalency diploma; L = lesbian; MSA = metropolitan statistical area.

*Sample sizes are unweighted. Percentages may add up to more than 100 because of rounding.

P values were determined using the Rao-Scott \( \chi^2 \) test or the F test. Pairwise tests were for comparison of each sexual orientation category to the reference group (heterosexual).

Public medical insurance is defined as state, federal, or military coverage.

mean BMI. Lesbian women were the only sexual orientation group that was found to be significantly different from heterosexual women with respect to overweight and obesity. When we compared the different sexual orientation groups to heterosexual women’s mean BMI, lesbian women’s higher mean BMI approached significance. Table 3 presents the results of the unadjusted and adjusted multinomial logistic regression models. The unadjusted results show that lesbian women were the only...

<table>
<thead>
<tr>
<th>Sexual Orientation</th>
<th>Heterosexual</th>
<th>Lesbian</th>
<th>Bisexual</th>
<th>Other</th>
<th>P (Pairwise Testings)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weighta</td>
<td>Mean (95% CI)</td>
<td>Mean (95% CI)</td>
<td>Mean (95% CI)</td>
<td>Mean (95% CI)</td>
<td></td>
</tr>
<tr>
<td>Normal, no.</td>
<td>49.7 (47.3, 52.1)</td>
<td>30.5 (18.3, 42.7)</td>
<td>48.5 (39.3, 57.7)</td>
<td>41.9 (34.0, 49.8)</td>
<td>.028 (L = .014)</td>
</tr>
<tr>
<td>Overweight, no.</td>
<td>25.6 (24.0, 27.2)</td>
<td>35.3 (23.7, 47.0)</td>
<td>29.6 (20.6, 38.6)</td>
<td>31.1 (23.5, 38.6)</td>
<td></td>
</tr>
<tr>
<td>Obese, no.</td>
<td>24.7 (22.7, 26.7)</td>
<td>34.2 (21.3, 47.2)</td>
<td>21.9 (14.8, 29.0)</td>
<td>27.1 (20.7, 33.4)</td>
<td></td>
</tr>
<tr>
<td>Mean BMI</td>
<td>26.1 (25.8, 26.4)</td>
<td>27.6 (26.1, 29.2)</td>
<td>26.2 (25.4, 27.1)</td>
<td>26.7 (25.8, 27.5)</td>
<td>.160 (L = .065)</td>
</tr>
</tbody>
</table>

Note: BMI = body mass index; CI = confidence interval; L = lesbian.
aNormal weight is defined as BMI < 25 kg/m², overweight as BMI = 25–29 kg/m², and obese as BMI ≥ 30 kg/m².

In additional analyses, we regressed BMI on sexual orientation and conducted multiple regression analyses that adjusted for all demographic variables, parity, and economic characteristics (results not shown). Lesbian identity had a positive association with BMI, but in the full model, only approaches significance after adjusting for all other factors (P = .051).

**DISCUSSION**

To our knowledge, this is the first national population-based study to test the hypothesis that lesbian women have a greater likelihood of being overweight and obese. We have confirmed this hypothesis for the US women aged 20–44 years. Our findings indicate that lesbian sexual identity is linked to a greater prevalence of overweight and obesity, even after adjusting for covariates that are shown in the literature to be risk factors for overweight and obesity. Our study substantiates the evidence generated by earlier nonpopulation-based snowball and cohort studies that brought attention to the prevalence of this health problem in the lesbian population. It is in this way, our study is one more example of sexual minority research, where a methodologically sound probability study echoes the findings of earlier studies that were limited in their methodology.

Earlier studies used the same categorization of BMI into overweight and obese and the mean BMI4,5,6,7 for comparisons of sexual orientation groups. Several previous studies, however, concluded that lesbian women were more likely to be overweight and obese on the basis of a dichotomous classification of BMI that was consistent with the Third National Health and Nutrition Examination Survey, which coded women who had a BMI of 27.3 or above as overweight and obese.5,6,8 When we used this dichotomous classification of BMI and made pairwise comparisons to the reference group of heterosexual women, only those in the lesbian group had marginally significant higher levels of being overweight and obese, similar to our findings for mean BMI in Table 2.

The measurement of sexual orientation used by the NSFG resulted in a comparatively large group of women who reported as “something else.” Because of its size, we questioned whether this group had influenced our findings. When we replicated our analyses after excluding the women in this group, our finding that lesbian sexual orientation significantly increased the likelihood of overweight and obesity was confirmed. Future research is needed to better identify the sexual orientation of women in this group by offering them a choice to self-label. Additional information on how this group describes their sexual orientation will benefit efforts to improve the measurement of sexual orientation in general.

Future studies and intervention research on weight reduction for sexual-minority women might want to consider assessing women’s partner choice. For instance, it has been suggested that bisexual women’s physical appearance is influenced by having a male versus a female partner.45 Limitations of our data prevented us from exploring whether bisexual women and women who reported their identity as “something else” who have a regular female partner are at risk of being overweight and obese. It will be for future studies to determine whether it is sexual identity or choosing a female partner that puts women at risk for overweight and obesity.

We considered many of the factors linked to overweight and obesity in previous studies of women.2 We concluded that lesbian sexual identity remains a significant predictor of overweight and obesity. Because we used secondary data, we were restricted in our ability to explore risk factors that may be especially...
TABLE 3—Associations Between Sexual Orientation Identity and Overweight or Obesity in Sample of Nonpregnant US Women Aged 20–44 Years: National Survey of Family Growth, United States, 2002

<table>
<thead>
<tr>
<th>Sexual orientation</th>
<th>Overweight</th>
<th>Obese</th>
<th>Overweight</th>
<th>Obese</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heterosexual</td>
<td>1.0</td>
<td>1.0</td>
<td>1.0</td>
<td>1.0</td>
</tr>
<tr>
<td>Lesbian</td>
<td>2.25 (1.22, 4.16)</td>
<td>2.25 (1.12, 4.53)</td>
<td>2.69 (1.40, 5.18)</td>
<td>2.47 (1.19, 5.09)</td>
</tr>
<tr>
<td>Bisexual</td>
<td>1.19 (0.76, 1.85)</td>
<td>0.91 (0.59, 1.40)</td>
<td>1.38 (0.85, 2.24)</td>
<td>0.92 (0.58, 1.48)</td>
</tr>
<tr>
<td>Other</td>
<td>1.44 (0.98, 2.13)</td>
<td>1.30 (0.91, 1.86)</td>
<td>1.13 (0.73, 1.73)</td>
<td>0.82 (0.54, 1.23)</td>
</tr>
<tr>
<td>Age, per year</td>
<td>1.03 (1.02, 1.04)</td>
<td>1.05 (1.03, 1.06)</td>
<td>1.34 (1.11, 1.62)</td>
<td>0.99 (0.80, 1.22)</td>
</tr>
<tr>
<td>Parity (parous)</td>
<td>1.0</td>
<td>1.0</td>
<td>1.0</td>
<td>1.0</td>
</tr>
<tr>
<td>Race/ethnicity</td>
<td>1.0</td>
<td>1.0</td>
<td>1.0</td>
<td>1.0</td>
</tr>
<tr>
<td>White, non-Hispanic</td>
<td>1.0</td>
<td>1.0</td>
<td>1.0</td>
<td>1.0</td>
</tr>
<tr>
<td>Hispanic</td>
<td>2.36 (1.85, 3.00)</td>
<td>2.07 (1.55, 2.78)</td>
<td>2.19 (1.79, 2.69)</td>
<td>2.65 (2.08, 3.38)</td>
</tr>
<tr>
<td>Black, non-Hispanic</td>
<td>2.19 (1.79, 2.69)</td>
<td>2.65 (2.08, 3.38)</td>
<td>0.99 (0.60, 1.63)</td>
<td>0.97 (0.59, 1.60)</td>
</tr>
<tr>
<td>Other</td>
<td>0.64 (0.51, 0.81)</td>
<td>0.37 (0.26, 0.51)</td>
<td>1.0</td>
<td>1.0</td>
</tr>
<tr>
<td>Residence</td>
<td>1.0</td>
<td>1.0</td>
<td>1.0</td>
<td>1.0</td>
</tr>
<tr>
<td>MSA city</td>
<td>1.0</td>
<td>1.0</td>
<td>1.0</td>
<td>1.0</td>
</tr>
<tr>
<td>Other MSA</td>
<td>0.95 (0.79, 1.14)</td>
<td>1.03 (0.84, 1.28)</td>
<td>1.15 (0.93, 1.42)</td>
<td>1.61 (1.16, 2.24)</td>
</tr>
<tr>
<td>No MSA</td>
<td>1.15 (0.93, 1.42)</td>
<td>1.61 (1.16, 2.24)</td>
<td>0.99 (0.60, 1.63)</td>
<td>0.97 (0.59, 1.60)</td>
</tr>
<tr>
<td>Foreign nativity</td>
<td>0.64 (0.51, 0.81)</td>
<td>0.37 (0.26, 0.51)</td>
<td>1.0</td>
<td>1.0</td>
</tr>
<tr>
<td>Education</td>
<td>1.0</td>
<td>1.0</td>
<td>1.0</td>
<td>1.0</td>
</tr>
<tr>
<td>Some high school</td>
<td>1.18 (0.89, 1.57)</td>
<td>0.98 (0.72, 1.33)</td>
<td>1.0</td>
<td>1.0</td>
</tr>
<tr>
<td>High school diploma or GED</td>
<td>1.0</td>
<td>1.0</td>
<td>1.0</td>
<td>1.0</td>
</tr>
<tr>
<td>Some college</td>
<td>0.88 (0.68, 1.13)</td>
<td>0.90 (0.69, 1.19)</td>
<td>0.86 (0.68, 1.08)</td>
<td>0.63 (0.48, 0.84)</td>
</tr>
<tr>
<td>College degree or graduate school</td>
<td>0.86 (0.68, 1.08)</td>
<td>0.63 (0.48, 0.84)</td>
<td>1.0</td>
<td>1.0</td>
</tr>
<tr>
<td>Insurance</td>
<td>1.0</td>
<td>1.0</td>
<td>1.0</td>
<td>1.0</td>
</tr>
<tr>
<td>Private</td>
<td>1.0</td>
<td>1.0</td>
<td>1.0</td>
<td>1.0</td>
</tr>
<tr>
<td>Public*</td>
<td>0.90 (0.63, 1.28)</td>
<td>1.05 (0.73, 1.52)</td>
<td>1.12 (0.83, 1.51)</td>
<td>1.60 (1.17, 2.19)</td>
</tr>
<tr>
<td>Medicaid</td>
<td>1.12 (0.83, 1.51)</td>
<td>1.60 (1.17, 2.19)</td>
<td>1.03 (0.81, 1.31)</td>
<td>1.12 (0.86, 1.48)</td>
</tr>
<tr>
<td>None</td>
<td>1.03 (0.81, 1.31)</td>
<td>1.12 (0.86, 1.48)</td>
<td>1.0</td>
<td>1.0</td>
</tr>
<tr>
<td>Household income, % of the federal poverty level</td>
<td>1.0</td>
<td>1.0</td>
<td>1.0</td>
<td>1.0</td>
</tr>
<tr>
<td>0–99</td>
<td>1.0</td>
<td>1.0</td>
<td>1.0</td>
<td>1.0</td>
</tr>
<tr>
<td>100–299</td>
<td>1.29 (1.02, 1.64)</td>
<td>1.10 (0.86, 1.41)</td>
<td>1.20 (0.93, 1.54)</td>
<td>0.77 (0.57, 1.05)</td>
</tr>
</tbody>
</table>

Note: OR = odds ratio; CI = confidence interval; MSA = metropolitan statistical area; GED = general equivalence diploma.

1 signals the reference group for each variable. Reference group is normal or low weight (BMI < 25 kg/m²). Overweight is defined as 25 kg/m² ≤ BMI < 30 kg/m², and obese as BMI ≥ 30 kg/m².

*Public insurance is defined as state, federal, or military coverage.

pertinent to the lesbian population. A review of obesity issues in sexual-minority women identified a number of factors that may be related to obesity in this group of women. These include patterns of eating disorders, body image, reasons for exercising, and perceptions about the value and meaning of weight control.6 Access to information regarding these factors would have increased our ability to potentially explain the differences in overweight and obesity that we observed during this study. In particular, the inclusion of information on physical activity may have also addressed a known limitation of BMI, which can overestimate body fat in persons who are very muscular and underestimate body fat in persons who have lost muscle mass.2 Thus, increased muscularity because of exercise may result in the classification of women with high muscle mass and normal body fat as overweight. However, it is unlikely to result in classification as obese. We reported greater odds of both overweight and obesity in lesbians, and we feel confident in asserting that these differences are a result of increased adiposity and not merely higher levels of physical activity such as those noted in studies that considered lesbians’ exercise behavior.6

Several limitations must be considered when interpreting the results of this study. Our findings apply to a cohort aged 20–44 years. This is a disadvantage because overweight and obesity increases with age until 60 years, after which time a decline in prevalence is observed.2 Some of the earlier non–population-based studies that demonstrated lesbians’ higher rates of overweight and obesity examined an older cohort. In a study by Case et al., 55.8% of the lesbians were 41 years of age and older.4 In a study by Valanis et al., “lifetime lesbians” (women who have only ever had sexual intercourse with other women) had a mean of 59.4 years of age, and “adult lesbians” (women who have had sexual intercourse with women after age 45 years) a mean of 56.7 years of age.6 In our study, the mean age of the self-identified lesbian women was 33.4 years of age. Our insignificant interaction term for a test of whether the association between lesbian identity and overweight or obesity was modified by age was limited by the small sample size of lesbians in the NSFG and the reduction in power that occurs with analysis of interaction. In addition to the limitations of the small sample size, the cross-sectional nature of the data also prevented us from determining unequivocally whether lesbians are more overweight and obese at all ages and if the differences between lesbians’ and other women’s weight increase with age. Future studies including larger numbers of sexual-minority women through oversampling may be useful.

Another limitation of this study was that we were limited in our analytic choices by the small sample size of the lesbian group. In particular, stratified analyses by sexual orientation and age were not possible because of the limited power. Most likely, the absence of
a significant interaction between age and lesbian identity has been influenced by the loss in power. It will be important for future population-based studies that include a bigger sample of lesbian women to improve on the precision of our estimates because the corresponding tests will have better power than we had.

Despite these limitations, our use of these population-based data was of great relevance. We provide rigorous evidence that lesbian women are an at-risk population for overweight and obesity, and thus, for negative health outcomes secondary to obesity. Overweight and obesity are recognized as a cause of preventable deaths, although recent findings link only obesity, not overweight, to excess deaths. Other negative implications of obesity and overweight are the substantially increased risk of morbidity from hypertension; dyslipidemia; type 2 diabetes; coronary heart disease; stroke; gallbladder disease; osteoarthritis; sleep apnea and respiratory problems; and endometrial, breast, prostate, and colon cancers.

We conclude from our findings an urgent need for weight-reduction interventions that target the high-risk group of sexual-minority women. At present, the targets of such interventions should be women who identify as lesbian, rather than bisexual women or women who report identifying as "something else." We prove the need for weight reduction interventions in this population, but do not provide specific information for the development of culturally appropriate interventions for this population. For the time being, one can use published differences between lesbians and other women in social, behavioral, and cultural norms that affect overweight and obesity to develop a culturally appropriate intervention for lesbians.

Contributors
U. Boehmer originated the study, completed the analyses, and led the writing. D.J. Bowen provided conceptual input and helped to interpret the findings. G.R. Baur provided statistical expertise to the analysis and helped to interpret the findings. All authors contributed in significant ways to the final article by reviewing and discussing earlier drafts.

Human Participant Protection
The institutional review board at Boston University determined that this study was exempt because it did not meet the definition of human subject research. U.B. and G.R. entered into a user agreement with the National Center for Health Statistics for access to the data.

References

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The University Of North Texas Health Science Center School Of Public Health is seeking an associate dean for research (ADR). The ADR will report to the Dean of the School of Public Health (SPH) for major research initiatives within the SPH. The position is principally responsible for research within the SPH departments, including Epidemiology, Environmental Health, Biostatistics, Social and Behavioral Sciences, and Health Management and Policy. This position will develop initiatives to promote research centers within the traditional areas of communications and environmental health, as well as community health, hospital, clinic, and individual physician health care performance. New areas of emphasis of principal importance to the University of North Texas Health Science Center are aging and Alzheimer’s disease, health disparities among populations, women’s health, and physical and manipulative medicine.

This position is also responsible for collaboration and coordination with UNTHSC’s Graduate School of Biomedical Sciences, Texas College of Osteopathic Medicine, School of Health Professions, and the Office of the Senior Vice President for Research. This position is charged with stimulating research, the continual oversight of existing research, and the research collaboration efforts outside the Health Science Center. The ADR has logistical and fiscal oversight for the SPH within survey research, clinical epidemiology, clinical trials, scientific articles, abstracts, book chapters, and patents. The most crucial aspect of this position at the SPH will be to further develop the academic and financial infrastructure to promote funded research activity in all of the SPH departments in association with a new University wide strategic plan. This will include the creation of a tracking and database management system of all school wide research endeavors.

Ideal candidates should have a Doctoral degree (PhD, MD, or equivalent level degree) in public health or other closely related field, have significant research experience, record of extramural funding, and a proven track record in research and administrative management. A history of federal funding is highly preferable. Experience in graduate and/or medical education is also desirable. Please apply online at www.unthscjobs.com.

The University of North Texas Health Science Center at Fort Worth enjoys a smoke-free campus and is an EEO/Affirmative Action Institution.
EXECUTIVE OFFICER
Institute of Medicine

The Institute of Medicine of the National Academies (IOM) seeks an Executive Officer. This is an exceptional opportunity for a strong leader and manager who is well versed in health and government and seeks to make a positive impact on the public's health.

The mission of the Institute of Medicine is to serve as adviser to the nation to improve health. Working outside the framework of government, the IOM provides scientific, evidence-based guidance to policy makers, professionals, civic leaders, and the public at large.

The successful candidate will work closely with the IOM President and will oversee the intellectual, managerial, and financial aspects of the IOM programs in accordance with the policy directives of the IOM President.

This position requires a PhD in a related field or equivalent knowledge with 10 years of related professional experience, 5 of which were in a supervisory capacity.

For more information about this challenging career opportunity and to apply, please visit our website at http://national-academies.org — click on EMPLOYMENT view by DEPARTMENT – INSTITUTE OF MEDICINE.

The National Academies are nonprofit organizations that work under an 1863 congressional charter, providing independent advice to the nation on matters of science, technology, and medicine. Headquartered in Washington, DC. EOE/M/F/D/V.

national-academies.org
The Department of Nutrition, School of Public Health at UNC-Chapel Hill

Four Faculty Positions Available

Tenure-Track positions (3 available)

Tenure-track positions are at the rank of Assistant, Associate or Full Professor, depending upon qualifications. Successful candidates will develop and maintain an independent, externally funded research program, mentor students and teach graduate level courses. Desirable areas of expertise include clinical nutrition, public health program development and evaluation, nutrition interventions, policy, nutritional physiology and metabolism, population research and eating behavior. Successful candidates will understand issues pertinent to the delivery of clinical and/or public health nutrition services. Candidates for the positions must have a doctorate degree (Ph.D., Dr. P.H., M.D. or equivalent). R.D. certification is also strongly preferred. Selected candidates will play an active role in the Nutrition Department’s MPH/RD programs and form interdisciplinary collaborations with faculty in the Schools of Public Health and Medicine.

Clinical Fixed Term Position (1 available)

The fixed term faculty position is at the rank of Clinical Assistant, Clinical Associate, or Clinical Professor, depending upon qualifications. Duties will include leadership in the coordinated MPH/RD program, mentoring students and teaching graduate level courses. The successful candidate will have experience in the delivery of clinical or public health nutrition services and knowledge of human nutrition and metabolism. Candidates must have R.D. certification and a doctorate degree (Ph.D., Dr.P.H., M.D. or equivalent). Candidates with an MPH degree and 7 or more years of experience in a relevant setting, including experience in a leadership role will be considered. The selected candidate will play an active role in the Nutrition Department’s MPH/RD programs and form interdisciplinary collaborations with faculty in the Schools of Public Health and Medicine.

The School of Public Health is actively committed to diversity. We strongly encourage applications from women, minorities, and individuals with disabilities. The University of North Carolina at Chapel Hill is an Equal Opportunity Employer.

A complete curriculum vitae, statement of interests and goals and three letters of reference should be sent to: Nutrition Human Resources, c/o Lynne Brody, 2215 McGavran Greenberg Hall, CB# 7461, Dept of Nutrition, UNC-CH, Chapel Hill, NC 27599-7461; or nutritionhr@unc.edu. Please indicate which position(s) for which you are applying.

THE UNIVERSITY
OF NORTH CAROLINA
AT CHAPEL HILL
EXECUTIVE DIRECTOR - MCCONNELL HEART HEALTH CENTER

Riverside Methodist Hospital
OhioHealth

Riverside Methodist Hospital, a member of the OhioHealth system, was ranked as one of “America’s Best Hospitals” in 2006 for heart and heart surgery by U.S. News & World Report and has been a Solucient Top 100 Hospital for five consecutive years. McConnell Heart Health Center was recognized nationally by Press Ganey a 2006 Summit Award winner, and most recently, OhioHealth was ranked in the Fortune 2007 100 Best Companies to Work For. McConnell is seeking a new Executive Director to lead and expand the McConnell Heart Health Center, a regional and national center that provides state-of-the-art outpatient programs in the prevention and treatment of heart disease. The Center offers a number of comprehensive health and wellness programs including cardiac rehabilitation, physical fitness, diabetes and lipid management, weight management and nutrition, smoking cessation and executive health. McConnell Heart Health Center is located on a 52 acre campus in a beautiful, well equipped facility.

Successful candidates for the Executive Director position must bring expertise and experience in cardiac prevention, wellness, and rehabilitation and have a national reputation for clinical leadership and research in this area. The position requires board certification in subspecialty area preferably cardiology. An MBA or equivalent is also preferred. Excellent communication and program development skills are essential.

Deedra Hartung, Vice President, Practice Leader
Cejka Search, Executive Search Division
222 South Central Avenue, Suite 400, St. Louis, MO 63105
800-678-7858 x63518 • 314-863-3631 (FAX) • dhartung@cejkasearch.com

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cejkasearch.com

DIRECTOR
CENTER FOR OUTCOMES RESEARCH AND EVALUATION (CORE)
MAINE MEDICAL CENTER RESEARCH INSTITUTE

Maine Medical Center Research Institute (MMCRI), a highly respected laboratory based and clinical research organization, is seeking a Director for the Center for Outcomes Research and Evaluation (CORE). CORE is a health services research center that performs original grant-funded health services and outcomes research across a number of disease and content areas. It has particular expertise in Medicare claims analyses, practice-based interventions, and studies of variations in health care practice. It assists in research, research design, and statistical consultation throughout Maine Medical Center (MMC) and MaineHealth, and it supports system quality improvement initiatives and provides research training and assistance to residents and fellows. CORE will play a key medical education role with medical students in relation to MMC’s new medical education initiative.

The Director of CORE will be a recognized health services investigator with a demonstrated track record of extramural funding. Successful candidates must evidence strong leadership skills and the ability to effectively communicate and work with a multidisciplinary group of scientists and clinicians. The ability to recruit additional scientists and broaden and build the programs of CORE is required.

Successful candidates will be an MD with advanced training in health services research, public health, health policy, or similar program. PhD and DrPH candidates will be considered.

Qualified candidates should submit their CV or resume to:
Deedra Hartung
Vice President, Practice Leader
Phone 800 678 7858, x63518 • E-mail dhartung@cejkasearch.com

Cejka Search | Executive Search Division | 222 South Central Avenue | Suite 400 | St. Louis, MO 63105

ID#28153WX
EOE
cejkasearch.com
The partnership of Scott & White health care system and Texas A&M Health Science Center College of Medicine seeks a nationally recognized health services researcher as first holder of the Carpenter Endowed Chair for Health Services Research. The successful candidate will play a critical role in expanding scholarly activities in Health Services and Outcomes Research, joining a team of endowed chair research scientists representing a wide variety of disciplines.

Located in Temple, Texas, Scott & White’s environment is defined by interdisciplinary collaboration among clinicians, educators and researchers. Our physicians and scientists are primary teaching faculty for Texas A&M Health Science Center College of Medicine. Our integrated health care system provides services for all specialties of medicine in clinic, hospital, sub-acute, long term, home health, and hospice care settings. The Scott & White HMO has existed for more than 25 years, has more than 200,000 members, and ranks nationally in the top 20 for Medicare recipients. Our Electronic Medical Record system, in use for more than 15 years, provides a data warehouse of all outpatient notes, inpatient history, discharges, operative notes, laboratory, and radiology reports for approximately 1.5 million outpatient visits per year. Our partnership with the Central Texas Veterans Administration Health Care System in the nation, enables participation in an active neuro-psychiatry research program and access to the national VA database.

The Department of Family and Community Medicine has more than 95 faculty at regional clinics surrounding Temple and Scott & White Memorial Hospital. The residency on Temple campus and affiliated programs in Fort Worth, Bryan, and Corpus Christi train more than 140 residents per year. These clinics and residency programs comprise a practice based research network with a full time research director. Preferred candidates will have a Ph.D., Dr.P.H., or M.D. degree with distinction in health services research. A significant track record for successful extramural funding and interest in medical, graduate student and resident education is required. Primary faculty appointment will be with the Department of Family and Community Medicine through the Texas A&M Health Science Center College of Medicine.

Interested candidates, please send your Curriculum Vitae, a letter addressing your qualifications, and a list of three individuals of reference to:

GLEN R. COUCHMAN, M.D. — Chairman, Search Committee
Department of Family and Community Medicine
Texas A&M University — Scott & White
1402 W. Avenue H
Temple, Texas 76504
254-771-8400 FAX: 254-771-8493
EMAIL: grcouchman@swmail.sw.org

Wayne State University is an equal opportunity/affirmative action employer.

Join a newly established international team addressing key health challenges in the global economy.

The Division of Occupational and Environmental Medicine (DOEM), Department of Family Medicine, within the School of Medicine, Wayne State University is dedicated to the promotion of occupational and environmental health and the prevention of disease through research, education and service. The DOEM has secured multi-year funding to expand its research into the areas of:

1: Stress Medicine including basic sciences as well as individual and organizational interventions;
2: Health and productivity and its link to customer perception and quality, and;
3: Wireless technologies and their impact on health and working life

We are looking to fill three positions at the Assistant/Associate Professor level. Tenure track positions may be available for those candidates with appropriate records. Candidates should have a background in occupational and environmental health, physiology, psychology or other relevant area. Commensurate with prior experience, candidates will be expected to secure external funding and to serve as co-investigators on interdisciplinary research teams focusing on DOEM’s prioritized areas. Teaching opportunities will predominantly be at the graduate level. Requirements for all positions include a doctoral degree in a relevant field as well as a track record of publishing original observations in peer-reviewed journals. Candidates should have a proven record and/or a strong promise of obtaining external funding.

All candidates should provide a statement of interest, curriculum vitae (including a list of publications and funded grants, teaching and community service experience) and a list containing the names, addresses, phone numbers and e-mail of three references. Positions open until filled.

Wayne State University is an equal opportunity/affirmative action employer.

Applications should send a letter, curriculum vitae and statement of interest to: Bengt Arnetz, M.D., Ph.D., M.P.H., M.Sci.Epi., Professor and Director—Division of Occupational and Environmental Medicine, C/O Vickie Muhammad, Wayne State University, Department of Family Medicine, 101 E. Alexandrine, Room 223, Detroit, MI 48201; barnetz@med.wayne.edu
Applications are invited for the position of Chair, Department of Public Health Sciences, Faculty of Medicine, University of Toronto, Toronto, Ontario.

The Department of Public Health Sciences is situated in the Faculty of Medicine with faculty and graduate students both on- and off-campus, the latter located in research institutions and in hospitals affiliated with the University of Toronto. The Department of Public Health Sciences is the largest of its kind in Canada, with over 300 graduate students. It has internationally recognized research and education programs in biostatistics, epidemiology, community nutrition, family and community medicine, health promotion, occupational and environmental health, social and behavioural health science and global health. For detailed information on the Department, visit its website at http://www.phs.utoronto.ca/ A plan is underway to create a new School of Public Health at the University of Toronto that will incorporate the Department of Public Health Sciences. It is anticipated that the Chair will also become the inaugural Director of the School.

The incumbent will require outstanding leadership skills and demonstrated expertise in academic administration. S/He must have an established record of scholarship in public health sciences and graduate student supervision. An important attribute is the ability to facilitate partnerships among stakeholders in cognate Departments and Faculties as well as the research institutions, affiliated hospitals and external agencies, e.g., the Public Health Agency of Canada.

Applications, consisting of a letter of interest and accompanying CV, (electronic submission preferred) should be received by Friday, June 8, 2007 to:

Dean Catharine Whiteside, c/o Elizabeth Wardell, Faculty of Medicine, University of Toronto, Room 2109, Medical Sciences Building, 1 King’s College Circle, Toronto, Ontario, M5S 1A8; Fax: 416-978-5568
E-MAIL: elizabeth.wardell@utoronto.ca

The University of Toronto is strongly committed to diversity within its community and especially welcomes applications from visible minority group members, women, Aboriginal persons, persons with disabilities, embers of sexual minority groups, and others who may contribute to the further diversification of ideas. All qualified candidates are encouraged to apply; however, Canadians and permanent residents will be given priority.