# TECHNICAL PAPERS ON
# HEALTH AND BEHAVIOR MEASUREMENT

**TECHNICAL PAPER 3**

## Research on Sexual Behaviors that Transmit HIV: Progress and Problems

Charles F. Turner

**Reference Citation**

Turner, C.F. (1989) Research on sexual behaviors that transmit HIV: Progress and problems. *AIDS* 3 (Suppl. 1):S63-S69.

# Research on sexual behaviors that transmit HIV: progress and problems

Charles F. Turner

AIDS 1989, **3** (suppl 1):S63–S69

**Keywords: Sexual behavior, surveys, evaluation, HIV discordant couples, validity of sex data, national samples.**

## Introduction

Worldwide efforts to understand and control the spread of the AIDS epidemic have generated a widespread consensus about the need for rigorous programs of basic and applied scientific research on human sexual behavior. A report issued earlier this year by the US National Research Council (National Academy of Sciences) [1] described two general uses for such research and the data to be generated from it:

(1) 'Estimating future demands on hospitals and other public health services requires reliable models of HIV transmission dynamics... Data needs are driven by immediately relevant questions of disease transmission, progress, and control. The resulting intellectual strategy is to design new research looking for the 'facts about sex' in order to answer those questions. Such facts, particularly when reliably collected and combined with a sensitive understanding of the cultural boundaries between social groups, may be of considerable use in the medical and social management of the HIV/AIDS epidemic.

(2) [However] 'To understand the motives, development, and varieties of human sexual behavior, it is crucial to understand the systems of meaning and action — the cultural context — in which the 'facts of sex' are embedded. The facts remain the same, but understanding may differ. Different understandings in turn may have important consequences for designing effective educational efforts to encourage self-protective behaviors.'

The following pages highlight research progress and problems in these two general areas. In the first area, we find that scientists have begun to lay the foundations for a scientific understanding of the prevalence and patterns of sexual behavior in many nations around the world. In the second area, we find emerging evidence of the extraordinary complexity of risk perceptions and sexual risk-taking. This complexity will pose a continuing challenge for programs that seek to retard the spread of HIV using educational campaigns and behavioral interventions.

## 'Factual' data from representative samples

Recent reviews [1–3] and policy statements [4–7] have emphasized the fact that, with isolated exceptions (e.g. [8,9]), most nations lack a reliable body of scientific data on patterns of sexual behaviors in their populations. The past year, however, has seen important advances in this area.

Results from a growing number of surveys of sexual behavior that use samples designed to represent well defined segments of national [10–15] and subnational [16–22] populations are being reported, although these surveys have not always met with complete success [23]. Other major surveys are being planned [24,25] or their results are just now being analyzed [26]. Thus, it appears that in the near future, we can expect the publication of baseline data on sexual behaviors for a growing number of nations and subnational areas. It is hoped that such baseline data will be supplemented at regular intervals with repeated and improved measurements to allow reliable monitoring of changes in sexual behavior over time. Because a major goal of national AIDS prevention campaigns is reducing the incidence of risky sexual behaviors, time series of repeated measurements provide important information about whether these goals are being achieved. Data from representative samples provide an invaluable supplement to studies of collections of people who can be conveniently studied because they present themselves at clinics or assemble in schools or other institutions [27–50]. Below, we summarize findings that have been reported so far from some of the major national surveys.

### USA

In the USA, the last year witnessed the publication of survey estimates for restricted, but important, aspects of contemporary sexual behavior [51,52], as well as the exhumation

From the National Research Council (National Academy of Sciences), Washington, DC 20418 USA.

The views expressed in this article are those of the author; they should not be attributed to the Committee or to the National Research Council (National Academy of Sciences). The author also wishes to note that because of an extremely tight deadline and the volume of recent literature and presentations at the Fifth International Conference on AIDS in Montreal, this review could not be comprehensive.

Requests for reprints to: Dr Charles F. Turner, NRC Committee on AIDS Research and Behavioral, Social, and Statistical Sciences, National Academy of Sciences, 2101 Constitution Avenue, NW, Washington, DC 20418, USA.

and publication of findings [53–56] from what has been called 'the long lost survey of sex' in the USA. The latter survey of a national sample of adults was carried out in 1970, but publication was long delayed by disagreements among the investigators. Although the data are 19 years old, this 1970 survey provides a baseline measurement of sexual behavior in the USA before the onset of the AIDS epidemic.

With regard to heterosexual contacts, it appears that the rate of new partner acquisition prior to marriage may not have been low at any time in recent history for American men. (Interpretation of these results is complicated, however, by the fact that the 1970 survey asked about sexual contact to orgasm for either partner and not about sexual intercourse *per se*.) Published tabulations indicate that, for cohorts of ever-married men born after 1909, 10–14% reported having 20 or more sexual partners before their first marriage. Furthermore, 1–2% of these men reported having 50 or more partners before marriage. For females, new partner acquisition rates were considerably lower. For (birth decade) cohorts born before 1940, the proportion reporting five or more premarital partners was in the range 1–3%, and it rose to 5% for ever-married women in the 1940s cohort.

Other analyses of data from this 1970 survey [53] have provided the first estimates from a national sample of the prevalence and patterns of same-gender sexual contact in the US population. These estimates, which might be construed as lower bounds given the presumed direction of reporting biases, suggest that a minimum of 20% of American men aged 21 or over in 1970 had sexual contact to orgasm with another male at some time in their life; at least 6.7% of men had such contact after the age of 19, and a minimum of approximately 2% had such contact within the last year.

There are, however, problems with interpreting these (and similar) data. Most importantly there is no independent validation of the veracity of the self-reports made by respondents. Given the long history of discrimination and oppression of people who have same-gender sexual contacts, it is reasonable to expect that some men with such experience will conceal it in a survey. This expectation motivates treatment of these estimates as lower bounds on the actual prevalence of male–male sexual contact in the US population.

In the last year, analyses have also been published of data collected in two national surveys conducted in 1987–1988 (see Table 2-3 in [1]). Combining data on numbers of sexual partners from these two surveys, it appears that the gender difference in rates of partner acquisition observed in the 1970 survey persists in 1987–1988. However, female rates of new partner acquisition have moved closer to those of males. For example, the 1987–1988 data indicate that approximately 40% of unmarried males versus 15% of unmarried females aged 18–24 years had three or more sexual partners during the preceding 12 months. Of particular interest with regard to partner turnover rates is the finding that 4% of never-married men reported having 10 or more sexual partners during the previous 12 months (see Table 1 in [52]). Furthermore, condom use appears to be infrequent among half of the men who are sexually active with relatively large numbers of partners (see Table 3 in [51]).

#### Switzerland

In Switzerland, national surveys of quota samples of the resident population aged 17–30 have now been conducted [15] three times (February 1987, October 1987 and October 1988). These surveys allow relatively sure inferences about change (or lack of change) in sexual behaviors. These surveys found no change in the percentage of people reporting occasional sexual contacts outside of a monogamous relationship during the previous 6 months; this percentage remained at around 16%. However, significant increases were observed in the reporting of protective behaviors. Thus the percentage of young adults reporting that they consistently used condoms rose from 8% in February 1987 to 17% 8 months later. During this interval the Swiss STOP-AIDS campaign was launched. By October 1988, the percentage reporting consistent use of condoms had increased to 29%. Even more dramatically, the percentage reporting that they never used condoms declined from 67 to 13% over this same period.

#### France

In France, the Committee for Health Education (CFES) has sponsored a national survey of people who reported having more than one heterosexual partner during the previous 6 months [14]. This survey found that 47% of these multipartnered respondents reported some use of condoms and 10% reported consistent condom use. Condom use was most prevalent among single people; it was also more common among people who knew a person who was HIV-seropositive, who had previously taken an HIV test, and who had more formal education.

#### Denmark

In Denmark, a survey of men 16–55 years of age (randomly selected from the population register) has been conducted by the Danish Institute of Clinical Epidemiology [10]. For the nation as a whole, the survey yielded estimates that 22% of men (ages 16–55) had more than one female sexual partner in the preceding year, 11% had three to five partners, and 3% of men had more than five. In addition, it was found that 14% had sex with a prostitute at some time in their lives, and 2% had sex with a prostitute during the last year. Three per cent of men in this survey reported that they had sex with a man (other than mutual masturbation) at some point in their lives. Of the men who reported two or more heterosexual partners during the last year, nearly 50% reported never using condoms.

#### Great Britain

In Great Britain, pilot surveys of the national population were carried out by Johnson and colleagues [23] in 1987 using a commercial polling firm and, more recently, by the Social and Community Planning Research Unit in collaboration with the Health Education Authority. Results of the former survey were published last spring. This survey achieved a relatively low response rate (48%); in addition reporting rates for sensitive behaviors (e.g. same-gender contact) were quite low. For example, only 0.5% of men

in this survey responded affirmatively to the question 'Have you ever had sex with a man?' This surprising result led the authors to question the validity of their measurements and to recommend that further pilot work be conducted before an attempt was made to launch a large-scale survey. Preliminary announcements from a later survey conducted by the Social and Community Planning Research Unit indicate that more promising results have been achieved, although detailed findings have not yet been reported [23].

#### Norway

Two large-scale national surveys have been conducted recently in Norway, and some of their findings were reported at the Fifth International Conference on AIDS in Montreal [12,13]. One study surveyed 3000 adolescents (ages 17–19); it found that 50% of 17-year-olds and 80% of 19-year-olds had begun having intercourse. However, only 26% of females and 37% of males reported using condoms during their last intercourse. Findings on extramarital sex were reported from the second survey which collected data from 10 000 Norwegian adults aged 18–60 years. Interestingly, although the prevalence rate for extramarital sexual contact was not reported, analysis of responses given by people reporting extramarital 'affairs' indicated that they were less likely to use condoms with their spouses than monogamous married persons. Sex with prostitute women, however, appears to be protected in about 50% of encounters for both single and married men.

The limited information presented so far from these two Norwegian surveys [12,13] suggests that the detailed report will have a large readership when it is published. Data from surveys such as these begin to provide the basic information for modeling the dynamics of the HIV epidemic. Indeed, one group of researchers [57] has begun to use the Norwegian data to model the spread of the epidemic within the heterosexual population of Norway. Based on their simulation model, these researchers have concluded that an HIV epidemic could not be sustained within the heterosexual population of Norway if the probability of HIV transmission per act of intercourse is below 0.01 and no new infection is imported from outside this population.

## Risk perception and risky sexual behaviors

At the same time as these promising first steps have been taken in initiating studies of what some [1,2] have termed the 'facts' about sexual behavior, it has also become clear that the social and psychological factors that motivate and shape these behaviors are complex and inadequately understood. This, in turn, poses substantial challenges for the design and implementation of interventions intended to induce changes in risk-associated sexual behaviors.

#### Survey evidence

Some of the clearest evidence of this complexity has emerged from studies of the risk perceptions of sexually active people. For example, one of the American surveys [51] noted above asked respondents to assess their risk of contracting AIDS. It was found that a substantial proportion of people who reported nine or more sexual partners during the preceding 12 months believed they were not at risk of contracting AIDS. Even in those urban areas of the USA that have the greatest numbers of AIDS cases (i.e. New York, Newark, San Francisco, Los Angeles, and Miami), almost one-half of the respondents with nine or more sexual partners assessed their risk of contracting AIDS at the lowest level proffered by the survey. (High levels of condom use did not account for the optimistic risk assessments of many of these respondents.)

#### Behavior of HIV-discordant couples

Parallel evidence is provided by studies of the sexual behavior of HIV-discordant couples in which one partner is known to be HIV-seropositive and the other is known to be seronegative. Although scientific uncertainty remains about the *probability* of HIV transmission in any particular sexual contact with a seropositive person, there is no doubt about the *possibility* of HIV transmission. The situation of the HIV-discordant couple thus contrasts with the case of intercourse with a partner of unknown serostatus, in which (simplifying somewhat) the likelihood of HIV transmission is the product of: (1) the probability of transmission in a single act of intercourse of the type to be engaged in, and (2) the probability that one's partner is seropositive. For the seronegative partner in a discordant couple, the second probability is known to be 1.

In early 1987, Fischl *et al.* [58] reported a study that included 32 discordant couples who were tested, informed of their HIV status, and counseled about the risks of unprotected intercourse. During a 1–3-year follow-up period, one-quarter of these discordant couples discontinued having intercourse and roughly one-third reported continuing vaginal intercourse with 'routine use' of condoms. However, 44% (14 of 32) of these discordant couples reported that they continued to have vaginal intercourse without routinely using condoms; 12 of the 14 seronegative partners in these discordant couples seroconverted within 18 months. For approximately half of the seroconversions, sexual partners tested negative at 6 months but they subsequently tested positive in the 12- or 18-month follow-up.

If one assumes that the window period is typically less than 6 months, Fischl's evidence would support the inference that it was the subjects' behavior after learning their partner's HIV serostatus that was responsible for a substantial fraction of the observed seroconversions. (The study excluded persons reporting an independent risk factor for HIV other than exposure to their seropositive partner. It remains possible, of course, that some people concealed such risk factors and these in turn produced some of the observed seroconversions.)

Fischl's 1987 study provoked considerable discussion in scientific circles. It implicitly raised questions about the likelihood that the spread of HIV could be prevented by educational campaigns and other behavioral interventions that sought to change the sexual behaviors of persons at risk of HIV infection. On the other hand, hypotheses could easily be concocted to explain why Fischl's results were not as ominous as they might otherwise seem. For example, Fischl's discordant couples might have been atypical, or the counseling might have been insufficiently vigorous,

**Table 1.** Sexual behaviors after testing of HIV-discordant couples in selected studies.

| Location | Sample | Sexual behaviors | Reference |
|---|---|---|---|
| USA (Miami) | 32 male-female couples<br>Index case: various risk factors† | 8/32 abstained<br>10/32 sex with routine condom use<br>14/32 sex, no routine condom use | [58] |
| USA (New York City* | 17 male-female couples<br>Index case: majority intravenous drug users | 4/17 abstained<br>40% inconsistent condom use | [64] |
| USA (San Francisco)* | 43 male-female couples<br>Index case: †† | 3/43 abstained<br>30/43 less vaginal sex<br>8/43 vaginal sex, without condom | [63] |
| USA (Baltimore) | 34 male-male couples<br>Index case: homosexual | 9/34 anal insertive sex never using condom‡<br>12/34 anal receptive sex never using condom‡ | [60] |
| France | 31 male-female couples<br>Index case: hemophiliac | 17/31 inconsistent condom use | [71] |
| USA (Minnesota) | 17 male-female couples<br>Index case: hemophiliac | 5/17 'continued' unprotected sex | [61] |
| Italy | 47 male-female couples<br>Index case: intravenous drug user | 35/47 'used condoms'<br>12/47 'no preventive measures'<br>5 pregnancies | [62] |
| Zaire (Kinshasa) | 122 male-female couples§<br>Index case: presumed heterosexual transmission | 8/122 abstained<br>2/122 divorced<br>112/122 consistent condom use | [59] |

*Where location was not specified in the abstract or article but all investigators were from the same area, we have assumed the sample was drawn from that locale. †Four out of 45 index cases (including both discordant and concordant couples) reported some history of male–male sexual contacts but also reported sexual contacts with spouse. Among discordant couples, the most commonly reported risk factor for index cases were: intravenous drug use (n = 8), 'None' with the annotation 'heterosexual Haitian immigrant' (n = 11). ‡Figures cited are those reported by seronegative partner. ††Not indicated in abstract. §Abstract states that 'intensive counseling' was provided.

and so forth. However, work published in the last year and the presentations at the Fifth International Conference on AIDS provide a surfeit of evidence [59–71] that there was nothing particularly unusual about Fischl's 1987 findings concerning risky sexual behaviors among HIV-discordant couples.

Table 1 summarizes the findings of selected studies of discordant couples in which sexual behaviors are reported for the time period after the couples were informed of their serostatus. It will be seen that, although there is some variation in the rates of unprotected intercourse that were observed (and in the definitions used), all of the rates are substantial with the exception of the study of discordant couples identified among employees of two businesses in Kinshasa, Zaire [59]. Rates in the latter study are so markedly different as to suggest that the character of this intervention, its social context, or the measurements that were made may have been qualitatively different from those reported in the other seven studies.

While discordant couples show non-trivial rates of sexual risk-taking, it should be pointed out that the available studies do, nonetheless, report evidence of substantial behavior change among both HIV-discordant couples and seropositive persons in general. Longitudinal studies of a cohort of women in San Francisco [72] for example, indicate that they commonly had a period of sexual abstinence after learning that they were seropositive. Abstinence was followed by a return to sexual activity but with a dramatic decline in behaviors that risk transmitting HIV.

## Discussion

It should be apparent from this brief and selective review that there are reasons for both optimism and concern about the progress that is being made toward improving our understanding of the 'facts' of sexual behavior and of the forces that motivate and shape these behavioral facts.

Survey programs are advancing in many countries, and they will soon provide data on sexual practices that will not depend upon the vagaries of convenience or volunteer samples. These data should provide a more reliable basis for making inferences about the sexual behaviors that transmit HIV and thereby sustain the epidemic. Yet, these data are not without their problems. In addition to problems of technique (e.g. flaws of sample design and execution, high non-response rates, etc.) and the difficulty of comparing results across surveys that employ different measuring instruments, there are pervasive questions of validity. In this regard, survey measurements of sexual behavior have much in common with measurements of subjective phenomena (e.g. attitudes, opinions, intentions, etc.). For both types of measurements, it is usually impossible to obtain direct verification of the respondents' answers by obtaining testimony from an independent observer (or a written record).

Concerns about validity and bias in survey reports of sexual behavior can be particularly troublesome for measurements made in the context of an AIDS prevention campaign [73]. Campaigns that stress the potential dangers

of particular sexual behaviors should, if effective, increase the psychological and social pressures against engaging in those behaviors but they may also lead to distortions in reporting of the same behaviors. As a result, comparisons of self-reports of sexual behavior might reveal apparent differences in behavior over time (or between a control and target group) when, in reality, what had changed was the reporting bias. That is to say, the campaign may have successfully discouraged people from reporting risky behaviors but not from engaging in them.

To assess the validity of reports of sexual behavior, it has recently been suggested [1,73] that consideration be given to a strategy parallel to that used with subjective measurements [74]. It may be possible, for example, to construct a convincing validation by demonstrating that an independent series of measurements of change in the incidence of gonorrhea in a population over time could be predicted from a concurrent time-series monitoring the self-reported incidence of unprotected sexual contacts with new partners in the same population.

There are, however, many potential pitfalls to executing a successful validation in this way. In most countries, for example, national statistics on sexually transmitted diseases are incomplete. Furthermore, for any subgroup in the population, the trends over time in sexually transmitted disease rates will reflect (1) the changes, if any, in the behaviors of group members that expose them to infection, and (2) trends in the rates of sexually transmitted diseases among the population from which the group selects its new sexual contacts. It is thus possible to observe a rise in sexually transmitted disease rates over time in a particular group that occurs concurrently with a true decline in the rates of 'risky' behaviors. (This can occur when the prevalence of infection in the population of 'partners' has increased.)

Although validation studies using sexually transmitted disease rates might provide an attractive option for exploration, there is, at present, no assurance that such a strategy can be made to work. It is thus likely that, for the foreseeable future, validation will remain the most difficult challenge to the interpretation of survey data on sexual behaviors.

With regard to the psychological and social factors that motivate and shape sexual behaviors, the areas of our ignorance are not subtle. Studies of sexual risk-taking and risk-perceptions and research on the sexual practices of discordant couples suggest that these factors may be powerful and complex; and they are not well understood. It should be clear, nonetheless, that improving our understanding of the psychological and social processes that motivate and shape sexual behaviors is a particularly crucial task if we are to retard the spread of HIV with behavioral interventions.

## Note added in proof

In the interval between writing this review and receiving proofs, events overtook the author's forecasts. Actions taken during this past summer by committees of the US Congress [75] and the Prime Minister of the UK [76] have derailed major research projects to gather statistical information on sexual behaviors of representative samples of the populations of the USA and UK. If these actions stand as government policy, it is likely that the USA and UK will enter the second decade of the AIDS epidemic still lacking an adequate scientific understanding of the patterns of sexual behaviors that are transmitting HIV in their populations and theraby sustaining the epidemic of AIDS cases and deaths.

In reflecting on this circumstance, it is important to remember that significant progress has been made in the last decade toward understanding and solving the biological and epidemiological puzzles of HIV and AIDS. This progress has depended in many crucial ways on cooperation among the communities affected by this epidemic, their governments, and the scientific community. Continued progress in understanding and retarding the spread of HIV and AIDS will be more difficult to achieve if shortsighted policies impede that cooperation and delay urgently needed research.

## References


1. Turner CF, Miller HG, Moses LE (eds): AIDS: Sexual Behavior, and Intravenous Drug Use. Washington, DC: National Academy Press, 1989.
2. Gagnon JH: Sex research and sexual conduct in the era of AIDS. J Acquired Immune Deficiency Syndrome 1988, **1**:593–601.
3. Coxon PM, Carballo M: Editorial Review: Research on AIDS: behavioral perspectives. AIDS 1989, **3**:191–197.
4. Presidential Commission on the HIV Epidemic: Final Report. Washington, DC: Government Printing Office 1988.
5. Government Accounting Office: AIDS Forecasting: Undercount of Cases and Lack of Key Data Weaken Existing Estimates. Washington, DC: Government Accounting Office, 1989 (GAO/PEMD-89-13).
6. World Health Organization, Global Program on AIDS: Progress Report No. 4. Geneva: World Health Organization, October 1988, pp 56–59.
7. US Public Health Service: Report of the Second Public Health Service AIDS Prevention and Control Conference. Public Health Rep 1988, **103** (suppl 1).
8. Hayes CD (ed): Risking the Future: Adolescent Sexuality, Pregnancy, and Childbearing. Vol 1. Washington, DC: National Academy Press, 1987.
9. Hofferth SL, Hayes CD (eds): Risking the Future: Adolescent Sexuality, Pregnancy, and Childbearing. Vol 2, Working Papers and Statistical Appendixes. Washington, DC: National Academy Press, 1987.
10. Schmidt KW, Krasnik A, Brendstrup E, Zoffman H, Larsen SO: Occurrence of sexual behaviour related to the risk of HIV-infection. Dan Med Bull 1989, **36**:84–88.
11. Wells JA, Wilensky GR, Valleron AJ, Bond G, Sell RL, DeFilippes P: Population prevalence of AIDS high risk behaviors in France, the United Kingdom and the United States. V International Conference on AIDS, Montreal, June 1989 (abstract M.D.O.1).
12. Sundet JM, Kvalem IL, Magnus P, Gronnesby JK, Stigum H, Bakketeig LS: The relationship between condom use and sexual behaviour. V International Conference on AIDS, Montreal, June 1989 (abstract W.A.P.103).
13. Tramen B, Rise J, Kraft P: Condom behavior in 17, 18 and 19 year-old Norwegians. V International Conference on AIDS, Montreal, June 1989 (abstract T.D.P.5).
14. Moetti JP, Tavares J, Durbec JP, Bajos N, Menard C, Serrand C: Modifications of sexual behaviour due to AIDS in French heterosexual 'at risk' population. V International Conference on AIDS, Montreal, June 1989 (abstract T.D.O.20).

15. Zeugin P, Dubois-Arber F, Hausser D, Lehmann PH: Sexual behaviour of young adults and the effects of AIDS-prevention campaigns in Switzerland. V International Conference on AIDS, Montreal, June 1989 (abstract W.A.P.116).
16. US Department of Health and Human Services Public Health Service: HIV-related beliefs, knowledge and behaviors among high school students. MMWR 1988, **37**:717–721.
17. Kann L, Nelson GD, Jones JT, Kolbe LJ: Establishing a system of complementary school-based surveys to annually assess HIV-related knowledge, beliefs, and behaviors among adolescents. J Sch Health 1989, **59**:55–58.
18. Kann L, Nelson G, Jones J, Kolbe L: HIV-related knowledge, beliefs and behaviors among high school students in the United States. V International Conference on AIDS, Montreal, June 1989 (abstract T.D.P.9).
19. Heckert K, Shultz J, Salem N: The Minnesota general public AIDS survey: a behavioral risk factor survey supplement. V International Conference on AIDS, Montreal, June 1989 (abstract D.538).
20. Keeter S, Bradford JB: Knowledge of AIDS and related behavior change among unmarried adults in a low prevalence city. Am J Prev Med 1988, **4**:146–152.
21. Day N, Houston-Hamilton A, Taylor D, Lemp G, Rutherford G: Tracking survey of AIDS knowledge, attitudes and behaviors in San Francisco's Black communities. V International Conference on AIDS, Montreal, June 1989 (abstract T.E.P.7).
22. Giachello AL, Aguillon O, Probst J: AIDS: knowledge, attitudes and sexual practices among Hispanics in Chicago — results of a 1988 citywide survey. V International Conference on AIDS, Montreal, June 1989 (abstract W.D.P.30).
23. Johnson A, Wadsworth J, Elliot P, *et al.*: A pilot study of sexual lifestyle in a random sample of the population of Great Britain. AIDS 1989, **3**:135–141.
24. Cain VS, Baldwin W: The national study of health and sexual behavior. V International Conference on AIDS, Montreal, June 1989 (abstract T.D.P.14).
25. Cynamon ML: The national survey of health and sexual behavior: the pretest experience. V International Conference on AIDS, Montreal, June 1989 (abstract M.D.O.6).
26. Marasca G, D'Arcangelo E, De Candido D, *et al.*: Sexual behaviour and HIV related knowledge among a random sample of young population of Italy. V International Conference on AIDS, Montreal, June 1989 (abstract M.D.P.37).
27. Curtis HA, Tripp JH, Lawrence C, Clarke WL: Teenage relationships and sex education. Arch Dis Child 1988, **63**:935–941.
28. Landefeld CS, Chren MM, Shega J, Speroff T, McGuire E: Students' sexual behavior, knowledge, and attitudes relating to the acquired immunodeficiency syndrome. J Gen Intern Med 1988, **3**:161–165.
29. Evans BA, McLean KA, Dawson SG, *et al.*: Trends in sexual behavior and risk factors for HIV infection among homosexual men, 1984–1987. Br Med J 1989, **298**:215–218.
30. Day N, Houston-Hamilton A, Taylor D, Lemp G, Rutherford G: Tracking survey of AIDS knowledge, attitudes and behaviors in San Francisco's Black communities. V International Conference on AIDS, Montreal, June 1989 (abstract T.E.P.7).
31. Getts AG: Dating and sexual behavior in military dependent adolescents. Milit Med 1988, **153**:614–617.
32. Adu-Krow W, Barber-Madden R, Stein Z: AIDS knowledge, attitudes and behavior among family planning clients: implications for AIDS education in the Caribbean. V International Conference on AIDS, Montreal, June 1989 (abstract E.653).
33. Houweling H, de Grave A, Smits SP, *et al.*: Sexual behaviour of expatriates in Africa. V International Conference on AIDS, Montreal, June 1989 (abstract T.D.P.34).
34. Catania J, Coates T, Greenblatt R, *et al.*: Predictors of condom use and multiple partnered sex among highly sexually active adolescent women. V International Conference on AIDS, Montreal, June 1989 (abstract M.D.P.4).
35. Kegeles S, Greenblatt R, Catania J, *et al.*: AIDS risk behavior among sexually active Hispanic and Caucasian adolescent females. V International Conference on AIDS, Montreal, June 1989 (abstract M.D.P.3).
36. Zorrilla C, Romaguera J, Torres J, Morales L, Adamsons K: Comparison of lifestyles and high risk sexual behavior between HIV-sero-positive and HIV-sero-negative pregnant women. V International Conference on AIDS, Montreal, June 1989 (abstract M.B.P.28).
37. Eversley RB, Newstetter A: AIDS risk among women with multiple sexual partners: HIV risk screening data from a family planning population. V International Conference on AIDS, Montreal, June 1989 (abstract W.D.P.46).
38. Ishii-Kuntz M: Acquired immune deficiency syndrome and sexual behavior changes in a college student sample. Sociol Soc Res 1988, **73**:13–18.
39. Wilson D, Greenspan R, Wilson C: Knowledge about AIDS and self-reported behaviour among Zimbabwean secondary school pupils. Soc Sci Med 1989, **28**:957–961.
40. Turner C, Anderson P, Fitzpatrick R, Fowler G, Mayon-White R: Sexual behaviour, contraceptive practice and knowledge of AIDS of Oxford University Students. J Biosoc Sci 1988, **20**:445–451.
41. Katzman EM, Mulholland M, Sutherland EM: College students and AIDS: a preliminary survey of knowledge, attitudes, and behavior. J Am Coll Health 1988, **37**:127–130.
42. Diaz MM, Aoki FH, Goodson P, Diaz J, Vera S, Faundes A: Sexual behavior and its change after having knowledge about AIDS among Brazilian university students. V International Conference on AIDS, Montreal, June 1989 (abstract D.547).
43. St Lawrence JS, Betty R: Comparison of the knowledge, attitudes, and AIDS-risk behavior of Black and White college students in the southeastern United States. V International Conference on AIDS, Montreal, June 1989 (abstract W.D.P.29).
44. Diaz MM, Acki FH, Goodson P, Diaz J, Vera S, Pinto e Silva JL: Self perception of the risk of contracting AIDS among university students. V International Conference on AIDS, Montreal, June 1989 (abstract T.D.P.16).
45. Sy F, Richter D, Theorcharis T, Hussey J, Summers D: AIDS and women: changes in sexual behavior. V International Conference on AIDS, Montreal, June 1989 (abstract Th.D.P.25).
46. Ziffer J, Ziffer A, Bywater M, Bywater L: Knowledge of HIV transmission and adolescent sexual behavior. V International Conference on AIDS, Montreal, June 1989 (abstract D.510).
47. DiClemente R, DuNah R: Influence of perceived referent-group normative behavior on adolescents' use of condoms. V International Conference on AIDS, Montreal, June 1989 (abstract D.508).
48. Reinisch JM, Sanders SA, Ziemba-Davis M, Hill CA: Sexual behavior, contraceptive use, and STD history among heterosexual college students. V International Conference on AIDS, Montreal, June 1989 (abstract T.D.P.2).
49. Siegel D, Lazarus N, Durbin M, Kramovsky P, Chesney M, Kakimoto D: AIDS prevention in junior high school students in an AIDS epicenter: results of a baseline survey. V International Conference on AIDS, Montreal, June 1989 (abstract M.D.P.6).
50. Moore M, Doppagne A, Hassig SE, Piripiri L, Bertrand WE, Kashala TD: Sexual behavior and behavior changes in Kinshasa: implications for AIDS counselling. V International Conference on AIDS, Montreal, June 1989 (abstract M.D.O.17).
51. Turner CF, Miller HG, Barker L: AIDS research and the behavioral and social sciences. *In* AIDS, 1988: AAAS Symposia Papers edited by Kulstad R. Washington, DC: American Association for the Advancement of Science 1989, pp 251–267.
52. Michael RT, Laumann EO, Gagnon JH, Smith TW: Number of sex partners and potential risk of sexual exposure to human immunodeficiency virus. MMWR 1988, **37**:565–568.
53. Fay RE, Turner CF, Klassen A, Gagnon JH: Prevalence and patterns of same-gender sexual contact among men. Science 1989, **243**:338–348.
54. Klassen AD, Williams CJ, Levitt EE: Sex and Morality in the US

edited by O'Gorman HJ. Middleton, Connecticut: Wesleyan University Press, 1989.
55. Klassen AD, Williams CJ, Levitt EE, Miniot-Rudkin L, Miller H, Gunjal S: Trends in premarital sexual behaviour. *In* AIDS: Sexual Behavior, and Intravenous Drug Use edited by Turner CF, Miller HG, Moses LE. Washington, DC: National Academy Press 1989.
56. *See* Chapter 2 of the recent report of the National Research Council (National Academy of Sciences) [1].
57. Stigum H, Grennesby JK, Magnus P, Sundet JM, Bakketeig L: The potential for spread of HIV in the heterosexual population in Norway, a simulation model study. V International Conference on AIDS, Montreal, June 1989 (abstract Th.A.P.59).
58. Fischl M, Dickinson G, Scott G, Klimas N, Fletcher M, Parks W: Evaluation of heterosexual partners, children, and household contacts of adults with AIDS. JAMA 1987, **257**:640–644.
59. Kamenga M, Jingu K, Hassig S, *et al.*: Condom use and associated HIV seroconversion following intensive HIV counselling of 122 married couples in Zaire with discordant HIV serology. V International Conference on AIDS, Montreal, June 1989 (abstract T.D.O.35).
60. Pelenicek JG, Fox R, Odaka N, *et al.*: HIV-1 discordant couples in the Baltimore MACS study. V International Conference on AIDS, Montreal, June 1989 (abstract W.A.P.40).
61. Jackson JB, Kwok SY, Hopsicker JS, *et al.*: Absence of HIV-1 infection in antibody-negative sexual partners of HIV-1 infected hemophiliacs. Transfusion 1989, **29**:265–267.
62. Perroni L, Le Foche L, De Stefano G, De Longis P, Albertoni F, Soscia F: Transmission of HIV infection in heterosexual partners of HIV+ drug addicts. V International Conference on AIDS, Montreal, June 1989 (abstract T.A.P.113).
63. Peterson H, Padian N, Glass S, Moreno A, Ajaniku I, Wofsy C: Behavior modification in couples enrolled in a study of heterosexual transmission. V International Conference on AIDS, Montreal, June 1989 (abstract T.A.P.100).
64. Vogler M, Dugan T, Seidlin M: Changes in sexual and reproductive behavior in heterosexual couples after HIV testing. V International Conference on AIDS, Montreal, June 1989 (abstract T.A.P.101).
65. Nichols M, Paroski P, Sampson G, Leibel J, Kennedy MJ: Preliminary analysis of factors associated with compliance with guidelines for prevention of sexual transmission of HIV in heterosexual couples. V International Conference on AIDS, Montreal, June 1989 (abstract T.A.P.104).
66. Saracco A, Italian Multicenter Study Group: HIV heterosexual transmission. V International Conference on AIDS, Montreal, June 1989 (abstract T.A.P.99).
67. Cohen JB, Dorfman LE, Kelly TJ, Rila M, Garcia DR, Wofsy CB: Unsafe sexual behavior and higher risk partners: changes over time in a prospective study of women at risk for AIDS. V International Conference on AIDS, Montreal, June 1989 (abstract W.D.P.51).
68. Poole LE, Cohen JB, Lyons CA, Kelly TJ, Wofsy CB: Behavior changes to reduce HIV transmission risk in a prospective study of seropositive women. V International Conference on AIDS, Montreal, June 1989 (abstract W.D.P.53).
69. Parish KL, Mandel J, Thomas J, Gomperts C: Prediction of safer sex practice and psychosocial distress in adults with hemophilia at risk for AIDS. V International Conference on AIDS, Montreal, June 1989 (abstract Th.B.P.33).
70. Donegan E, Transfusion Safety Study Group: Risk of heterosexual transmission of HIV-1 from recipients of blood and blood products. V International Conference on AIDS, Montreal, June 1989 (abstract T.A.P.106).
71. Laurian Y, Peynet J, Verroust F: HIV infection in sexual partners of HIV-seropositive patients with hemophilia. N Engl J Med 1989, **320**:183.
72. Poole LE, Cohen JB, Lyons CA, Kelly TJ, Wofsy CB: Behavior changes to reduce HIV transmission risk in a prospective study of seropositive women. V International Conference on AIDS, Montreal, June 1989 (abstract W.D.P.53).
73. Coyle SL, Boruch RF, Turner CF (eds): Evaluating AIDS Prevention Programs. Washington, DC: National Academy Press, 1989.
74. Turner CF, Martin E (eds): Surveying Subjective Phenomena. New York: Russell Sage, 1984.
75. Holden C: Sex secrets safe. Science 1989, **245**:599.
76. Maddox J: Sexual behaviour unsurveyed. Nature 1989, **341**:181.