relieved pressure on the optimum resource zones. This strategy of partitioning resources thus allowed for conservation of resources that were more intensively exploited during the time of population coalescence and reduced mobility. However, this practice demanded that groups make substantial seasonal adjustments in their settlement-procurement structure, residential mobility levels, residential populations, and provisioning strategies.

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Risking Everything? Risk Behavior, Behavior Change, and AIDS

Peter Aggleton, Kevin O'Reilly, Gary Slutkin, Peter Davies

Inquiry into the determinants of risk-related sexual behavior is important for the development of interventions to reduce the incidence of new cases of human immunodeficiency virus infection. Recent social and behavioral research has revealed much about the individual and social factors influencing risk-taking. Findings from these studies have been important in the development of new educational and community-based interventions for communities at risk in the developed and developing worlds.

The long slow tragedy of acquired immunodeficiency syndrome (AIDS) continues to unfold. The most recent figures from the World Health Organization (WHO) estimate that, worldwide, at least 3 million people have developed AIDS and that, cumulatively, at least 15 million people have been infected by the human immunodeficiency virus (HIV) (*1*). By the year 2000, it is estimated that, cumulatively, 30 to 40 million people will have been infected since the start of the epidemic. The scale of this tragedy is immense, but because the epidemic's effects are insidious rather than instantaneous, localized rather than universal, the response has been uneven. Since the discovery of HIV in 1983, vast sums of money and the best scientific expertise have been directed toward a better understanding of the virus and its effects. Considerable advances have been made in these fields, and a number of candidate vaccines are now under development, although major obstacles remain to be overcome (*2*). Although there have only been limited advances in anti-retroviral treatment for those already infected, care for some of the more common opportunistic infections has greatly improved (*3*). The estimated distribution of total adult cases of HIV infection at the end of 1993 is shown in Fig. 1.

Although an effective vaccine or the definitive cure currently evades biomedicine, behavior change has been demonstrated to be a potentially effective means of slowing the spread of the virus and the human suffering it brings in its wake (*4*). Peter Lamptey, director of the AIDS Control and Prevention Project, and colleagues from the WHO Global Programme on AIDS pointed out at the IXth International Conference on AIDS in Berlin in June 1993 that the need for sustained behavior change is not only important now but will always be. Efforts to facilitate safer behavior should not cease if and when effective vaccines become available (*5*, p. 18).

The ideal HIV vaccine has to be safe, orally administered, single dose, stable, inexpensive, confer permanent life-time immunity and be effective against all HIV "strains". This is obviously an unrealistic expectation, at least in the next 10 to 20 years. Even if there were a major technological breakthrough and a cure or a vaccine tomorrow, the current behavioural and biomedical interventions would still be needed.

Behavioral science has already identified the main determinants of risk behavior and has contributed substantially to the design of programs that reduce personal risk, thereby limiting the spread of the virus. The appearance of the virus in populations as yet unaffected, however, and its continuing spread elsewhere require intensified efforts to ensure an expansion of existing education and communication programs. Because HIV and AIDS affect communities worldwide, with differing practices, cultural expectations, and beliefs, the social and behavioral research agenda is broad and urgent, as is the need to apply what has been learned in interventions for prevention. Yet, the U.S. National Commission on AIDS recently estimated that only about 12% of U.S. federal spending on AIDS went to behavioral research (*6*). The picture is little different in other developed nations, whereas, in general, the situation in the developing world is even less favorable (*7*).

In 1987, WHO declared HIV a global pandemic and initiated an accelerated global response that resulted in the creation of National AIDS Programmes in all developing countries. This initiative has provided financial, scientific, and technical support for National AIDS Programmes in their efforts to limit the spread of the virus and to ensure adequate care for those already infected. The basis of an infrastructure is therefore in place for the implementation of social and behavioral research findings in practical interventions.

Patterns of Spread

The incidence of AIDS varies widely among neighboring populations and countries, even those with apparently similar

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demographic profiles. For example, in Honduras in 1992, 13.4 cases of AIDS were reported per 100,000 population, whereas in that same year in neighboring Guatemala, 0.96 cases of AIDS were reported per 100,000 population (*1*). Even within countries, cities differ considerably in terms of the reported incidence of AIDS. In the United Kingdom, for example, Glasgow and Edinburgh, cities less than 100 miles apart and with fast and efficient transport links between them, have quite different rates of disease among especially vulnerable groups (*8*). Not only that, within cities, neighborhoods as well as noncontiguous communities have reported very different rates. In San Francisco between 1980 and 1989, for example, the predominantly gay Castro–Upper Market area recorded an average annual incidence of AIDS of 10% among males aged 15 years and over, whereas the rate in the neighboring Twin Peaks area was just 0.5% per year among men of this same age group (9). Although some of this variation can be accounted for by variations in reporting procedures for AIDS (*10*), similar findings emerge from HIV sentinel surveillance studies that show the highly uneven distribution and spread of the virus among populations and groups. Not only do the incidence and prevalence of AIDS and HIV differ among populations, so too does the pattern of impact. In Western Europe, Australasia, and North America, the ratio of men to women infected is nearly 6:1, whereas in parts of sub-Saharan Africa, at least as many women as men are infected. This overall unevenness arises not so much from the inherent biological susceptibility of some individuals or groups to infection, but from differences in patterns of behavior, in the time at which HIV was first introduced into the community, in the prevalence of other sexually acquired infections, and in access to information and services.

It is most accurate, therefore, to consider the global pandemic as the aggregate effect of a number of relatively small but overlapping epidemics. At every level—neighborhood, city, region, country, continent—the shape of the epidemic once HIV has been introduced will depend primarily on the relative preponderance of different behaviors. Usually, each of these microepidemics is at a different stage of development and requires different intervention strategies. For example, in most of Northern Europe, the epidemics among gay men are more than a decade old, whereas substantial heterosexual epidemics have yet to become established (*11*). Among the former, the prime need is to sustain the behavioral changes of the mid- and late 1980s; among the latter, programs that enable individuals to change their behavior remain crucial. There is no place for simplistic or supposedly universal solutions. It is inappropriate, for example, to assert that a sufficient response to the epidemic is the adoption of any single behavior or the elimination of practices such as drug injection. As Willard Cates and Alan Hinman of the Centers for Disease Control in Atlanta have argued, such absolutism hinders achievable but imperfect measures. They write: "[T]he insistence on only the 'best' solution to a given health problem may interfere with the incremental, partially effective steps that are collectively necessary in mounting effective (but not perfect) prevention programs" (*12*).

Foundations for Prevention

There are three ways in which HIV is transmitted: through unprotected sexual intercourse, through the sharing of blood and blood products, and perinatally from mother to child. Epidemiological inquiry tells us that, in general terms, the spread of any infection depends on the number of people infected, the infectivity of different modes of transmission, the number of contacts between infected and noninfected people, and the duration of the infection (*13*). However, epidemiological inquiry detailing rates of HIV infection or reported cases of AIDS rarely yields timely information for the development of intervention programs and activities. Instead, study of the epidemiology of risk behaviors allows prevention efforts to be started in circumstances in which they are likely to have the greatest effect. The role of the behavioral sciences is to assist in the promotion of changes in behavior that most effectively reduce the rate of spread of infection and thus reduce the scale of the pandemic. Perhaps the most difficult challenge is that of changing sexual behavior—the route responsible for the vast majority of infections worldwide.

Although sex has a biological function, it is one of the most socially diverse of human activities; and although sexual behavior has a certain biological similarity across the globe, the meaning of sex differs profoundly between cultures and even within societies. This means that the role and purpose of the "same" physical act may be seen quite differently from culture to culture. For example, in a classic anthropological text, Gilbert Herdt showed how, among the Sambia people of Papua New Guinea up until the 1970s, ritual homosexual behavior was believed to be an intrinsic part of the process of reproduction, in that the ingestion of semen by young men was thought to be necessary to create their reproductive potency (*14*). In other cultures, the meaning of this kind of male homosexual behavior is of course quite different. Similarly, in some contexts, selling sex may carry with it connotations of financial security, status, and relative independence without social stigma, whereas in others it may signify deviance and social marginality. In each case, the sexual acts may be the same but their meanings differ (*15*).

High-quality social and behavioral research, and the risk reduction approaches and options that derive from it, must take cultural variability into account. The physical processes of infection may differ only minimally between Africa and Europe, but the same cannot be said of the different cultural norms, expectations, and behaviors that generate different patterns of spread and within which programs for behavioral change must operate. Social and behavioral scientists have therefore been at the forefront of attempts to resist the naïve transplantation of approaches that have been successful in one cultural setting into other, quite different contexts. Some general principles of success apply across cultures, but

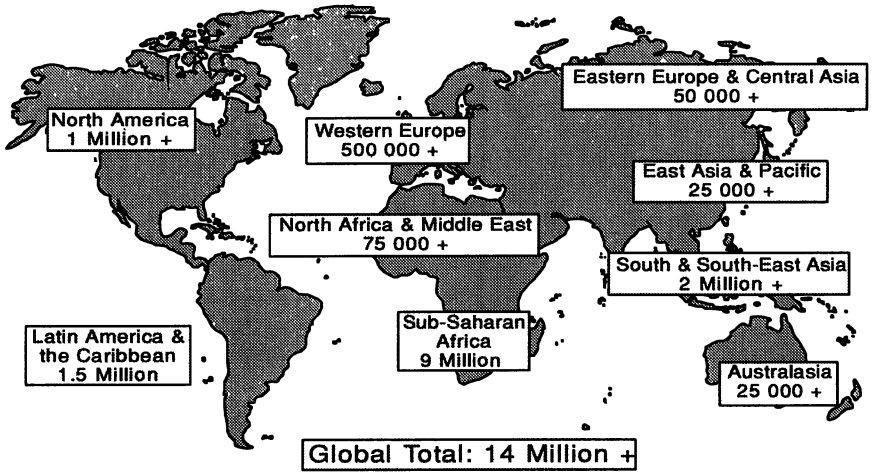

Fig. 1. Estimated distribution of total adult HIV infections at the end of 1993. [Source: Global Programme on AIDS, World Health Organization]

key elements of assessment, design, adaptation, and application must be based firmly in the social context in which the behaviors occur. It is not the case that interventions that have been effective among gay men in Europe and North America will have any relevance to, or effect on, women selling sex in the developed world, much less in developing countries.

Risk Behavior Change

In the context of HIV, risk behavior is behavior that carries the risk of transmitting the virus. A number of factors are now known to influence risk behavior. These can be divided into two main types: those that are linked to attributes of the individual (including risk perception, outcome expectations, and self-efficacy) and those that derive from the community or society of which the individual is a part.

Individual factors. In the past four decades, stimulated by challenges in the fields of public health and communications, three principal models of health behavior have emerged which consider how individuals interpret information about a behavior, how they assess or value that information, and how capable they feel of acting or of acting differently. These models are the Health Belief Model (*16*), the Theory of Reasoned Action (*17*), and Social Learning Theory (*18*). These models take as their basic premise the assumption that individuals make decisions about, and potentially have control over, their behavior. Although each of these approaches has given rise to a series of derivative models and to a series of intervention trials based on them, they are more similar than different (*19*). Together, they have enabled the identification of a clear set of determinants of risk behavior.

Much research has focused on the ways in which individuals make risk assessments using different heuristics, or cognitive 'rules of thumb.' For example, it is known that individuals underestimate the likelihood of unfamiliar risks. In some cases, this is an effective cognitive strategy. Things that are unfamiliar are often unlikely, but in the case of HIV infection, unfamiliarity with AIDS can be a poor guide to the risk of HIV because of the long time that elapses between infection and the appearance of the signs and symptoms of disease. It is also well known that people in general overestimate the probability of dangerous and particularly dreaded outside threats, such as a nuclear accident, but underestimate the probability of dangers posed by personal behavior such as cigarette smoking or alcohol consumption (*20*). Thus, it is common for many individuals and groups to regard themselves as being not at risk or at very low risk of HIV infection, denying its personal relevance against the objective evidence (*21*).

A number of factors other than risk perception influence the extent to which an individual will consistently take steps to protect against infection. These include outcome expectations (the belief a person holds about the good or bad things that will happen as a result of adopting a new behavior), perceived social and community norms (a person's perception that a behavior is what is expected by his or her community or by people influential in his or her life), and self-efficacy (a person's perceptions of his or her own ability to undertake a certain behavior). Each is a key variable in the various models of health behavior described above. Interventions need to bring about changes in one or more of these factors if they are to be effective in promoting change in risk behavior. The challenge presented by these models and their concepts is to discover their usefulness in the development of interventions to bring about change, as dictated by the constraints or needs of particular populations in particular settings.

The usefulness of such approaches is, however, limited by two recurrent findings. First, the communication of facts (about transmission and risk behavior, for example) in and of itself has a very limited effect on behavior (*19*). The difficulty of changing risk behavior is compounded if the information presented generates fear in the audience (*22*), a finding that has led to increased emphasis on more positive approaches to health promotion, such as an emphasis on the development of individual skills to put change into practice (*23*). Second, information campaigns may be more successful in initiating behavior change than in securing the maintenance of changes in behavior. The Stages of Change model (*24*), for example, which has been influential in much recent intervention research, suggests that an individual may move through stages of decision formation and action attempts before changing behavior. These stages are: "no intention to change," "long-range intentions to change," "immediate intentions to change, with attempts at new behavior," and "long-term behavior change." Experience has shown that most individuals who are at risk because of their behavior are in the first stage of the model, whereas most information-based public health interventions are best suited for people at the third stage—those with immediate intentions to change. As this model is refined for application to HIV/AIDS, its use to guide intervention development and evaluation of intervention effects is becoming better appreciated (*25*).

The individual models of health behavior described here have developed in Western contexts, and their relevance to other traditions in which the scope for independent volitional changes may be seriously limited by culture and tradition is still being assessed (*26*). More germanely, and in many contexts, the scope for individual decision-making is limited by the greatly underrecognized fact that behavioral change is not solely dependent on individual volition. The relevance of social factors that contribute to risk behavior and the importance of modifying these social factors to enable HIV risk reduction are greater than in almost all other fields of health behavior change.

Social and community factors. A range of influences in addition to those specified in the models of health behavior change described so far are critical in defining the context in which risk behavior occurs, in determining the risks individuals face, and in determining their likely success in reducing these risks. Such factors include: (i) social pressures; (ii) cultural expectations; (iii) usual or expected cultural scripts or conventions influencing sexual negotiation; (iv) cultures of drug and alcohol use; (v) economic factors and other influences affecting resources needed for safer behavior, such as the availability of condoms and clean needles and syringes; (vi) laws and regulations that marginalize certain social groups and thereby limit their access to information, services, and options for safer behavior; (vii) political and religious ideologies that seek to artificially restrict information about the full range of safer behaviors in favor of promoting those that may be considered morally or politically acceptable to vocal minorities; and (viii) limitation of public and private resources that impairs the quality and adequacy of AIDS intervention programs, including sexually transmitted disease (STD) services and condom programs. In some settings, these factors may set absolute limits on the extent to which an individual can adopt or maintain safer behavior, or both.

Central to the understanding of risk behavior are the usual or expected patterns of sexual negotiation that take place between individuals. In the past decade, a great deal of research has been done on the nature and outcomes of sexual negotiation (*27*). Much additional work has been undertaken in order to understand and influence the sexual negotiation process so as to promote safer sexual practices. We have noted above the cultural specificity of sexual behavior, but even within cultures, sexual behavior results from a range of influences. Apart from reproduction, sex may involve considerations of physical gratification, the creation and maintenance of intimacy or of relationships, and the facilitation of economic exchange (*28*). The negotiation of safer sex is not, therefore, a

simple skill but involves a variety of considerations as well as contextual acuity. Interventions designed to facilitate safer behaviors should enable those involved to anticipate the negotiation and to develop the skills necessary to assess, reduce, or eliminate the risk involved.

The context in which negotiation of safer sex occurs is also highly variable and is absolutely central to intervention design. Information derived from studies of Western gay communities, in which there are highly developed norms of individual responsibility and sexual freedom, has sometimes encouraged the development of individual and overly rational models of safer sex negotiation (*29*). These models see safer sex as something to be decided by nominally free individuals in the context of broadly consensual sexual encounters (*30*). Such approaches may be substantially less appropriate when it comes to enabling safer encounters in circumstances in which sexual expectations tend to be more rigidly defined (*31*) or in which gender roles not only restrict the form of sex expected but may seriously inhibit women's demands for safer sex (*32*). For example, in many cultures where sexual pleasure is provided by adults or children who are destitute or subject to control by others, such as brothel owners or pimps, negotiability may be nonexistent (*33*).

Intervention Implications

It is now clear that effective interventions can be developed to modify these individual and social factors. HIV infection can be prevented when interventions are based on a few key principles and when social and behavioral research findings are applied locally. Programs that develop community networks and individual skills (*4*) have been shown to have some efficacy in bringing about changes in risk behavior, as have attempts to create contexts in which safer sex is normative. These programs have been quite diverse, varying from "safer sex parties," an early response in some gay communities whereby gay men came together to learn about safer sex (*34*), to the recent establishment of "condom-only" brothels in Thailand and the Philippines. In Samut Sakhon in Thailand, for example, there was a reported decline in the prevalence of STDs from 13% to less than 0.5% when the number of condoms distributed in brothels increased almost fourfold within a number of months of the campaign's introduction (*4*). In many cases, however, more far-reaching structural changes are necessary in order to promote and sustain risk reduction. These involve a consideration of community and socioeconomic determinants.

Individuals exist, and negotiations take place, within a complex interpersonal matrix of community and cultural understandings. Successful interventions seek to influence community norms and establish appropriate risk reduction strategies at a number of levels: the interpersonal level, the local or community level, and the subcultural level. Some of the earliest successful health promotion efforts with respect to HIV were community-based programs initiated from within the gay communities of the United States (*35*), Europe (*36*), and Australia (*37*), where self-confident and articulate gay communities existed. In those cases, health promotion initiatives often predated national efforts by a substantial period (*11*). In other cases, health promotion efforts have not only stimulated awareness of the threat posed by HIV but have also encouraged community mobilization so as to create conditions in which risk reduction becomes normative (*38*). This process is not helped by the fact that those most central to these efforts are often highly stigmatized and marginal groups, such as sex workers, injecting drug users, and homosexual or bisexual men.

The impetus for successful community change must come from within the community, and the role of national or international initiatives frequently is to foster and encourage such change (*39*). Such support benefits from the finding that changes in personal behavior are enhanced if endorsed by influential figures in the normative peer group, or "gatekeepers" (*40*). Peer education projects have taken place with demonstrated success among young people in developing countries (*41*) and in the United States (*42*), as well as among sex workers in countries such as Ghana (*43*) and Mexico (*44*). In La Mariscal, an area in Ciudad Juarez, Mexico, for example, a peer-led intervention project among female sex workers succeeded in reducing the number of sex workers reporting that they had not used condoms during their previous 10 acts of sexual intercourse from 17% to 1%. Women reporting condom use in all of the previous 10 acts of intercourse increased by over 20%, to 78% (*4*). Successful peer-led interventions have been documented using religious and political leaders in Zambia (*45*) and employers in Zimbabwe (*46*). Also in Africa, existing informal associations of women have been encouraged to organize collective responses to HIV and AIDS (*26*).

The first and most obvious reason for the effectiveness of such approaches derives from the fact that because peer educators are from the community, they are most likely to be cognizant of its needs and are most able to access already existing communication channels. Because of their likeness to others in the group (or, in the case of natural leaders, their possible status), peers can also be effective in influencing individual perceptions of risk, in conveying a stronger and more direct sense of desired social norms, in motivating a personal sense of self-efficacy, in exerting influence over cultural expectations and pressures, and in influencing decisions about appropriate ideologies or local policies.

At the national level, economic or legal constraints (or both) are powerful factors that influence risk behavior, and they have the potential to either encourage or impede effective risk reduction. Some interventions thus seek to influence national or local policy or both, so as to minimize risk behavior and the consequent sociodemographic and economic impact of HIV. It is a consistent finding in health research that the poor are also the least healthy (*47*), and in this respect, AIDS is little exception (*48*). The poor suffer partly because, in general, their access to information, services, and the means to reduce risk is restricted; and, in particular, because the restricted range of lifestyle choices available to them often results in their disproportionate exposure to risk. Economic necessity is, for example, one of the main reasons why individuals engage in sex work, and the greater that economic burden, the less able the individual is to insist on safer sex (*49*). Economic migration also leads to patterns of sexual behavior that encourage the geographic spread of HIV (*50*).

Although the elimination of poverty is a worthy aim, it remains beyond the scope of most immediate interventions. Some measures can be taken, however, to enhance

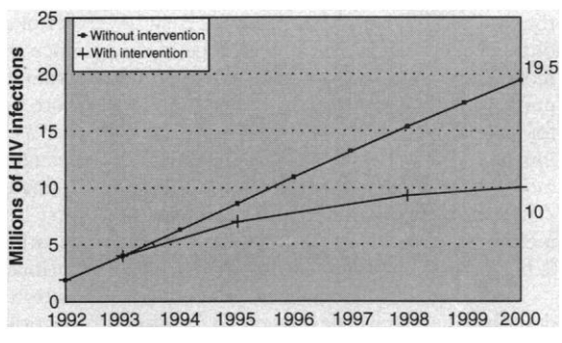

Fig. 2. Projected impact of prevention interventions on cumulative adult HIV incidence from 1992 to 2000. [Source: Global Programme on AIDS, World Health Organization]

the adoption of safer behavior. Making the means of risk-reducing behavior more widely available through the social marketing of condoms (*51*) or through needle exchange programs (*52*), for example, is a relatively simple and cost-effective strategy. In many countries, however, these measures tread a fine line between the need to reduce mortality and the fear of being seen to condone illegal practices. The removal of legal barriers to some HIV risk-related behaviors, such as injecting drug use, is an even more contentious area, and although no country has removed legal constraints on male homosexual behavior from the statute book in direct response to HIV, some have taken administrative steps to restrict the enforcement of existing laws.

HIV prevention work takes place in widely differing contexts around the globe. In the industrialized world, AIDS is the only infectious condition causing high mortality rates, whereas in the developing world, it takes its place among other conditions of comparable lethality. Nevertheless, here too AIDS has become a leading cause of death among young adults. However, many developing countries lack the will and the resources to commit the large expenditure to HIV prevention that the scale of the problem warrants. Although some policy-makers and physicians may question the value of communication and behavioral interventions in bringing about behavior change, demonstrated proof of their effectiveness is now at hand, and more efforts need to be expended to implement and expand these effective approaches.

The Challenge for the Future

In the mid-1990s, there is a growing sense in some developed countries that the AIDS emergency has passed. In countries in the developing world, emergency funds are being cut back, and AIDS is becoming normalized within existing public health programs (*53*). But the global pandemic is in fact an ongoing emergency, to which funds and other resources need to be applied rapidly. The World Bank's recent World Development Report for 1993, *Investing in Health*, lists interventions against AIDS as some of the most cost-effective interventions in health behavior today (*54*). Further studies conducted by WHO in cooperation with the London School of Hygiene and Tropical Medicine have estimated that only $2.5 billion per year (in U.S. dollars), if applied now to AIDS prevention, could decrease the number of new HIV infections in the next 7 years by up to 50%. This would prevent at least 9.5 million premature deaths and the suffering of the relatives and others involved (*55*). The projected impact of prevention interventions on the cumulative adult HIV incidence between 1992 and 2000 is shown in Fig. 2. The overall benefits of such an investment in the successful application of behavioral interventions would undoubtedly have an even greater effect in the years to come. Unfortunately, commitment and resources are not increasing despite the fact that the pandemic and its effects are intensifying (*56*). This is a very dangerous situation, for without additional efforts to act on the basis of what we now know about risk behavior, its determinants, and the intervention options that are available to reduce risk, there is every possibility that many more people will die young.

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