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Changing AIDS-Risk Behavior

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This article contains a comprehensive, critical review of the acquired immunodeficiency syndrome (AIDS)-risk-reduction literature on interventions that have targeted risky sexual behavior and intravenous drug use practices. A conceptually based, highly generalizable model for promoting and evaluating AIDS-risk behavior change in any population of interest is then proposed. The model holds that AIDS-risk reduction is a function of people's information about AIDS transmission and prevention, their motivation to reduce AIDS risk, and their behavioral skills for performing the specific acts involved in risk reduction. Supportive tests of this model, using structural equation modeling techniques, are then reported for populations of university students and gay male affinity group members.

Acquired immunodeficiency syndrome (AIDS) has become one of the major public health threats of the twentieth century. This disease is caused by human immunodeficiency virus (HIV) and is transmitted through sexual contact and blood and body fluid vectors. AIDS has already been diagnosed in over 196,000 Americans (Centers for Disease Control, 1991), and a cumulative 390,000–480,000 AIDS cases are expected in the United States by the end of 1993 (Centers for Disease Control, 1992). An estimated 1.5 million Americans are currently asymptomatic carriers of HIV (U.S. Public Health Service, 1988); these people are both infectious to others and likely to develop AIDS themselves. AIDS has already had devastating effects in populations of gay men (Centers for Disease Control, 1990), minorities[1] (Mays, 1989; Quimby & Friedman, 1989), parenteral drug users and their partners and children (Des Jarlais et al., 1989; McCoy & Khoury, 1990), and hemophiliacs (Stehr-Green, Holman, Jason, & Evatt, 1988); evidence suggests that the general heterosexually active public is increasingly at risk as well (Burke et al., 1990; Gordin, Gilbert, Hawley, & Willoughby, 1990; T. E. Miller, Booraem, Flowers, & Iversen, 1990; St. Louis et al., 1990).

Because HIV is communicated by specific patterns of risky behavior, it can be prevented by appropriate behavioral change.[2] For example, when practiced with HIV-infected partners, anal intercourse, vaginal intercourse, and the sharing of unclean needles have been identified as behaviors that pose very high risk of HIV transmission (R. A. Coates & Schechter, 1988; H. G. Miller, Turner, & Moses, 1990). It is possible for people to avoid these behaviors, or to engage in safer variants of them (e.g., to use condoms when engaging in potentially risky sexual acts, to clean needles with bleach before sharing them), and thus to reduce their risk of HIV infection. However, behavior change in the direction of prevention remains inconsistent among gay men (Hays, Kegeles, & Coates, 1990; Kelly & St. Lawrence, 1990; McCombs & White, 1990; Stall, Coates, & Hoff, 1988), minorities (Mays & Cochran, 1988), hemophiliacs (Centers for Disease Control, 1987; Clemow et al., 1989), and intravenous drug users (Des Jarlais, Friedman, & Casriel, 1990). Behavior change among heterosexually active high school and college students has been small to nonexistent (DiClemente, Forrest, Mickler, & principal site investigators, 1990; J. D. Fisher & Misovich, 1990a; Kegeles, Adler, & Irwin, 1988; McDonald et al., 1990).

In view of the persistence of AIDS-risk behavior, it is evident that research on methods for encouraging widespread behavior change must remain a priority for the behavioral science community and for the global fight against AIDS (Albee, 1989; Coxon & Carballo, 1989; Institute of Medicine, 1986, 1988). To date, there have been numerous attempts by behavioral scientists to formulate interventions to reduce sexual and IV-drug-related AIDS-risk behavior within various populations, and they have been quite variable in the sophistication of their theoretical basis and in their impact on behavior change. Below, we present a review and critique of the published psychological, educational, and medical literature on AIDS-risk-reduction interventions from 1980 to 1990. The review is divided into three

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[1] While minorities are overrepresented among those with HIV in the overall U.S. population, it must be stressed that it is the practice of AIDS risk behaviors among minorities, and not minority status per se, that is the causal basis of these statistics.

[2] Throughout this article, we use terms such as *behavioral change*, *AIDS-risk reduction*, and *AIDS-preventive behavior*. Each of these is meant to refer both to eliminating behaviors that pose significant AIDS risk (e.g., unsafe sexual behaviors) and to instituting behaviors that pose minimal AIDS risk (e.g., safer sexual behaviors).

sections: The first deals with published exhortations to intervene, the second deals with AIDS-risk-reduction intervention research proper, and the third contains a critique and conclusions concerning the AIDS-risk-reduction literature.

AIDS-Risk-Reduction Interventions

Exhortations and Recommendations for Intervention

In reviewing the literature, it becomes clear that exhortations to intervene and recommendations for interventions far outnumber credible interventions that have been subject to statistical evaluation. Exhortations to intervene generally cite AIDS statistics that highlight the need to act and often include recommendations for intervention strategies that are based on clinical wisdom gained from intervention experience or that are based on theory from other research areas (see, for example, Barrick, 1989; T. J. Coates, 1990; R. W. Johnson, Ostrow, & Joseph, 1990; H. G. Miller et al., 1990; Siegel, 1988; L. S. Williams, 1986; Winett, Altman, & King, 1990; Witte, 1989). Many exhortations to intervene focus on the needs of specific populations (see, for example, McKusick, Conant, & Coates, 1985, with respect to gay men; Des Jarlais & Friedman, 1988, and Stone, Morisky, Detels, & Braxton, 1989, with respect to IV drug users [IVDUs]; Mays & Cochran, 1988, and Peterson & Marin, 1988, with respect to minorities; and DiClemente & Houston-Hamilton, 1989, and W. A. Fisher, 1990a, 1990b, with regard to adolescents). Related to the body of exhortations and recommendations for intervention is a literature providing recommendations for the systematic evaluation of AIDS-risk-reduction interventions (Leviton & Valdiserri, 1990; Rugg, O'Reilly, & Galavotti, 1990; Stoller & Rutherford, 1989; Valdiserri, 1989), several papers that have sought to review certain effects of such interventions (T. J. Coates, 1990; Des Jarlais et al., 1990; H. G. Miller et al., 1990; Ross & Rosser, 1989; Sisk, Hewitt, & Metcalf, 1988), and a literature that catalogues AIDS-risk-reduction efforts in public schools and in drug abuse programs (Friedman, Des Jarlais, & Goldsmith, 1989; Kenney, Guardado, & Brown, 1989).

Intervention Research

The AIDS-risk-reduction interventions that were identified in our comprehensive literature review are summarized below.[3] To be included in the discussion that follows, an intervention had to involve psychological and/or educational elements designed to modify an outcome relevant to AIDS-risk reduction and had to be subjected to formal statistical evaluation. Unpublished AIDS-risk-reduction interventions that were available to us that seemed important were included, but the availability of such sources was arbitrary. Interventions that involved principally medical treatment or institutionalization (notably, methadone treatment or residential detoxification for IVDUs) were not included in this review because the main intervention tactics were not strictly psychological or educational in nature (see Des Jarlais et al., 1990).

The AIDS-risk-reduction interventions that were retained for our review are presented in Table 1. This table is organized in terms of the target group of the intervention (e.g., homosexual/bisexual males, IVDUs) and indicates the investigators and the year of each intervention. It also indicates whether the intervention was designed on the basis of a formal theory (e.g., the health belief model) or based on informal conceptual and logical grounds, whether the intervention was based on pretesting to determine group-specific needs and intervention tactics (i.e., elicitation research), the nature of the intervention, and its impact. Regarding these criteria, interventions designed on the basis of formal theory may have a greater potential to be effective and to lead to generalizable outcomes than those based on informal conceptual and logical grounds (T. J. Coates, 1990; Leviton, 1989). In addition, interventions that are based on elicitation research to assess group-specific needs, sensitivities, and intervention tactics are more apt to be successful than those that are based on the investigators' intuition because they are more apt to correspond to the needs and concerns of the target population (J. D. Fisher & Fisher, 1989).

Homosexual/bisexual men. AIDS-risk-reduction research is perhaps best developed for the gay and bisexual male population. As can be seen in Table 1, there are a number of interventions reported that are based on formal theoretical propositions (Honnen & Kleinke, 1990; Kelly, St. Lawrence, Betts, Brasfield, & Hood, 1990; Kelly, St. Lawrence, Hood, & Brasfield, 1989; H. G. Miller, et al., 1990) and at least one that involved elicitation research to determine group-appropriate intervention tactics (Kelly, St. Lawrence, Stevenson, et al., 1990). Given the prevalence of sexually transmitted HIV in this population, most interventions directed at gay and bisexual men focus specifically on the modification of risky sexual behavior, and it appears that some have been effective (e.g., Kelly et al., 1989; Kelly, St. Lawrence, Betts, Brasfield, & Hood, 1990; Kelly, St. Lawrence, Stevenson, et al., 1990; Valdiserri et al., 1989). Overall, the interventions that are broader in scope and that attempt to influence AIDS-risk-reduction information, motivation, and behavioral skills are the ones that appear to produce AIDS-risk-reduction behavior change (e.g., Kelly et al., 1989; Kelly, St. Lawrence, Stevenson, et al., 1990; Valdiserri et al., 1989). Despite the apparent success of these interventions, methodological limitations prevent any of them from being regarded as definitive. Some involve men so highly motivated that they were willing to attend 7 to 13 intervention sessions, no control group to assess the effects of historical trends, and purely self-report measures (e.g., Kelly et al., 1989; Kelly, St. Lawrence, Stevenson, et al., 1990), others fail to measure intervention impact on factors that are presumed to mediate or create the conditions for risk reduction (Valdiserri et al., 1989), and still others are subject to experimenter demand characteristics to an unknown degree (e.g., Kelly, St. Lawrence, Stevenson, et al., 1990; Quadland, Shattls, Schuman, Jacobs, & D'Eramo, 1988).

IVDUs. A number of AIDS-risk-reduction interventions

[3] The articles that were reviewed for the present article were identified in searches of the *Medline* and *PsycLIT* databases from 1980 to 1990. With some minor variation, the keywords used in the searches were *acquired immune deficiency syndrome* combined with each of the following terms: *prevention, behavior, education, evaluation, intervention,* and *knowledge.*

(*text continues on page 462*)

Table 1
Review of AIDS Risk Reduction Intervention Literature

Investigators	Conceptual basis	Elicitation research	Nature of intervention	*N*	Impact
			Homosexual/Bisexual Males: Published Research		
Valdiserri et al. (1987)	Informal	Absent	Single small-group session concerning AIDS information and condom use behavioral skills	464	Pre- to 2-week-posttest increase in favorable attitudes towards AIDS prevention
McCusker et al. (1988)	Informal	Absent	Intervention offered HIV testing, explanation of results, opportunity to learn results, and information on AIDS-risk reduction	270	Men who became aware of seropositive status decreased in unprotected insertive anal contact 6–12-months postintervention; no awareness-linked change in unprotected receptive anal contact was observed
Kelly, St. Lawrence, Hood, & Brasfield (1989)	Formal	Absent	Twelve small-group sessions offering AIDS information, AIDS-risk-reduction behavioral skills training, motivation for change	104	Knowledge increase, behavioral skills increase, risk behavior decrease (less unprotected anal intercourse, more condom use during intercourse) maintained at 8-month follow-up
Valdiserri et al. (1989)	Informal	Absent	Intervention I: single small-group session offering AIDS information (n = 265) Intervention II: single small-group session offering AIDS information, behavioral skills training, and motivation to change behavior (n = 319)	584	Intervention I: knowledge unchanged Intervention II: significantly increased condom use during insertive anal intercourse, relative to Intervention I, at 6-month and 1-year follow-ups
Honnen and Kleinke (1990)	Formal	Absent	Signs placed in gay bars to prompt taking of free condoms, safer sex practices		Signs produced an increase in taking of free condoms during study interval
Kelly, St. Lawrence, Betts, Brasfield, and Hood (1990)	Formal	Absent	Seven small-group sessions, including one booster session, offering AIDS information, behavioral skills training, and motivation to change behavior	15	Intervention resulted in improved AIDS-prevention behavioral skills and lessened AIDS-risk behavior at 4-month follow-up
Leviton et al. (1990)	Informal	Absent	Intervention I: Single small-group session offering AIDS information Intervention II: Single small-group session offering AIDS information, behavioral skills training, and motivation (group support) to change behavior	584	Intervention II resulted in more positive attitudes towards AIDS prevention, relative to Intervention I, at 1-year follow-up.
T. E. Miller, Booraem, Flowers, and Iverson (1990)	Formal	Absent	Single small-group session offering AIDS information and motivation to change behavior	148	Intervention resulted in increased AIDS knowledge, more positive prevention attitudes, and greater AIDS-risk-reduction behavioral intentions, pre- to immediate posttest
			Homosexual/Bisexual Males: Unpublished Research		
Batchelor, LaCharite, Shernoff & Whyte (1987)	Informal	Absent	Workshop on eroticizing safer sex	145	Intervention resulted in pre- to immediate posttest increase in positive attitudes and self-efficacy regarding safer sex and decreased fear of AIDS
Quadland, Shattls, Schuman, Jacobs, and D'Eramo (1988)	Informal	Absent	Four interventions: I: information concerning safer sex guidelines; II: information about safer sex and about AIDS transmission and devastating effects; III: eroticization of low-risk behaviors, no visual presentation; IV: eroticization of low-risk behaviors, visual presentation	619	Intervention II resulted in decreased high-risk behavior; Intervention IV resulted in increased low-risk behavior; all at 2-month posttest

Table 1 (*continued*)

Investigators	Conceptual basis	Elicitation research	Nature of intervention	*N*	Impact
Galavotti, Schnell, and O'Reilly (1990)	Informal	Absent	Intervention offered AIDS information, behavioral skill training, motivation to change behavior, conducted in four U.S. cities	1,947	Intervention resulted in increased sense of self-efficacy, response efficacy, perceived normative support for risk reduction, and behavioral skills, pre- to 6-month posttest
Kelly, St. Lawrence, Stevenson, et al. (1990)	Formal	Present	Intervention trained natural opinion leaders to speak about AIDS-risk-reduction behavior strategies and to communicate motivational messages to 14 gay male acquaintences each	43	Intervention resulted in reduced AIDS-risk behavior and increased AIDS-preventive behavior in test sites versus control sites at 3-month and 6-month posttests
			HIV+ Homosexual Men: Published Research		
Coates, McKusick, Kuno and Stites (1989)	Informal	Absent	HIV+ gay males were randomly assigned to an 8-week stress reduction training program or to a control group	64	Subjects in stress-reduction training program reduced their number of sexual partners but not their level of unsafe practices
			IVDUs: Published Research		
Neaigus et al. (1990)	Informal	Absent	IVDUs received information about AIDS risk and AIDS-risk reduction, condoms, and referral to drug treatment and testing sites	325	Intervention resulted in decline in injection drug use (fewer mean injections, fewer subjects injecting) and a decline in unsafe sexual practices (less sexual contact without condoms, less prostitution, more abstinence) at 4–5-month follow-up, relative to pretest, analyses demonstrate results that are largely not due to historical trends.
Ginzburg et al. (1986)	Informal	Absent	Former IVDUs were trained to dissemenate AIDS-prevention information to present IVDUs at drug use sites		One-sixth of 577 IVDUs questioned postintervention reported receiving information from a 'former' IVDU educator; informal observation that the street demand for and price of new needles and syringes had increased
Gibson, Wermuth, Lovelle-Drache, Ham, and Sorensen (1989)	Formal	Absent	IVDUs (n = 88) and sexual partners of IVDUs (n = 45) were randomly assigned to counseling that stresssed perceived-AIDS-threat, problem-solving, and communication skills regarding safer needle and safer sex practices (one session and one brief follow-up session for IVDUs; three sessions for IVDUs' sex partners) or to a brochure-only control condition.	133	At 10-day follow-up, IVDUs who had received counseling reported increased knowledge, self-efficacy, communication skills and condom use compared with controls; at 90-day follow-up increased self-efficacy and acceptance of safer sex guidelines were observed, compared with controls; no significant effects on sex partners were reported
van den Hoek, van Haastrecht, and Coutinho (1989)	Informal	Absent	IVDUs received counseling, HIV antibody test, and opportunity to exchange needles	233	IVDUs reduced needle borrowing and increased single use of needles and syringes at 4- and 8-month follow-ups relative to pretest
Newcombe and Parry (1989)	Informal	Absent	Intervention offered IVDUs needle exchange, AIDS-risk-reduction information regarding safer needle use and safer sex, as well as agency referrals and condoms and supplies for safer needle use	1,457	Intervention resulted in needle exchange rate of 86%; needle sharing declined, pre- to 4 weeks postintervention

			IVDUs: Unpublished Research		
Calsyn, Saxon, Freeman and Whittaker (1990)	Informal	Absent	IVDUs seeking or in treatment were randomly assigned to single group education session concerning AIDS-risk-reduction information, AIDS-risk-reduction strategies, demonstration and supplies for needle cleaning and condom use, and an emotional video; this education session plus optional HIV testing; or waiting list control	313	No effects of intervention observed on drug or safer sexual practices
MacNair, Elliott, and Yoder (1990)	Formal	Absent	Intervention offered IVDUs information about AIDS risk and AIDS prevention and video concerning personal accounts of AIDS and precautionary behaviors, had participants rate their past risk behavior, and provided free condoms	61	Intervention resulted in improved AIDS knowledge, did not affect condom use behavioral intentions relative to control group
			Female Prostitutes: Published Research		
Papaevangelou et al. (1988)	Informal	Absent	Evaluated effects of AIDS education and testing on Greek prostitutes' practices and incidence of STD/HIV infection from 1985–1987	282–350	Lessened HIV seroconversion, lessened STD rates, and increased condom use reported from 1985 to 1987; difficult to attribute changes to intervention per se
Ngugi et al. (1988)	Informal	Absent	Evaluated effects of group education or individual counseling, together with provision of condoms, compared with controls, on Nairobi female prostitutes' use of condoms in prostitute–client contacts	305	Attendance at group education sessions was associated with increased condom use in prostitute–client contacts at approximately 4 months' postintervention.
			STD Clinic Patients: Published Research		
Solomon and DeJong (1989)	Informal	Absent	Study I: STD clinic patients randomly assigned to view condom videotapes that stressed normativeness of condom use, communication skills, and eroticized condom use or to a control condition Study II: STD clinic patients randomly assigned to condom videotape or control conditions and given coupons redeemable for condoms	103 182	Study I: Intervention subjects reported more condom knowledge, more favorable attitudes towards condom use, and more possible strategies for persuading partner to use condoms at immediate posttest Study II: Intervention subjects redeemed significantly more condom coupons
			Adolescents: Published Research		
J. A. Johnson et al. (1988)	Informal	Absent	High school seniors received two class periods of AIDS education delivered by medical students and including videos and brochures	1,359	Pre- to postincrease in students' AIDS knowledge observed 1 week after intervention
Brown, Fritz, and Barone (1989)	Informal	Absent	Grade 7 and grade 10 students received two class periods of AIDS education, including lecture and video material, concerning AIDS transmission and AIDS prevention	313	Pre- to immediate posttest increase in AIDS information, positive attitudes toward prevention, and tolerance for people with AIDS
DiClemente, Pies, et al. (1989)	Informal	Present	Middle school and high school students received three class periods of instruction on AIDS knowledge (causes, prevention, and treatment) and AIDS-related behavioral skills (e.g., response rehearsal)	639	Pre- to immediate posttest increase in AIDS knowledge and tolerance for people with AIDS
Huszti, Clopton, and Mason (1989)	Informal	Absent	Tenth graders randomly assigned to AIDS-information lecture, video, or control condition	600	Lecture and video conditions showed pre- to immediate posttest increase in AIDS information and acceptance of people with AIDS, maintained at 1-month follow-up; effects of lecture superior to effects of video Lecture and video conditions showed pre- to immediate posttest increase in positive attitudes toward AIDS-preventive behavior, not maintained at 1-month follow-up

(*table continues*)

Table 1 (*continued*)

Investigators	Conceptual basis	Elicitation research	Nature of intervention	*N*	Impact
Lanier and McCarthy (1989)	Informal	Absent	Youth in correctional facilities received 3–5 hr of AIDS education; youth at other correctional facilities did not receive the program	363	Five hours of AIDS education resulted in significant increase in AIDS knowledge, perceived personal risk of AIDS, and willingness to tell partners or friends if infected relative to untreated controls
Ruder, Flam, Flatto, and Curran (1990)	Informal	Absent	Junior and senior high school students received brief (1 1/4 hr) AIDS-information presentation	479	AIDS-information presentation resulted in significant increase in knowledge from pretest (14 days before intervention) to posttest (14 days after intervention)
Rickert, Gottlieb, and Jay (1990)	Informal	Absent	Adolescent female children's hospital clinic attenders were randomly assigned to brief-AIDS-education, enhanced-AIDS-education (brief-AIDS-education-plus-video), or control conditions	77	Increases in AIDS knowledge were observed equally in both education conditions on immediate posttest; increased condom acquisition by enhanced-education subjects who had prior history of condom use
Brown, Barone, Fritz, Cebollero, and Nassau (1991)	Informal	Absent	Grade 7 through 12 students received approximately 5 hr of AIDS education concerning the nature of AIDS and AIDS transmission and prevention, controls (n = 331) were students who were scheduled for intervention later in time.	2,709	Intervention increased high school students' knowledge about AIDS, tolerance for people with AIDS, and intentions to behave safely in the future on immediate posttest, compared with controls
Rotheram-Borus et al. (1991)	Informal	Absent	Male and female, primarily minority, adolescent runaways, at one shelter received a mean of 12.8 intervention sessions that focused on AIDS knowlege, preventive-behavioral-skills training, identification of personal barriers to prevention, social support for prevention, and provision of access to health care resources; a comparison group at another shelter received no systematic intervention		Number of intervention sessions subjects attended was positively associated with increases in consistent condom use and decreases in high-risk sexual behavior at 3- and 6-month follow-ups.
J. B. Jemmott, Jemmott, and Fong (in press)	Informal	Present	African-American male adolescents randomly assigned to AIDS-risk-reduction 5-hour small-group intervention that focused on increasing AIDS information and negative attitudes toward AIDS-risk behavior or to a parallel instructional involvement concerning career opportunities	157	Subjects in AIDS-risk-reduction intervention showed increased AIDS knowledge, less favorable attitudes about risky behaviors, less intention to engage in risky behaviors at immediate and 3-month posttest. Subjects in AIDS-risk-reduction intervention reported less risk behavior at 3-month posttest
			Adolescents: Unpublished Research		
Winett, Anderson, et al. (1990)	Formal	Present	Parents and teenage children 12–14 years of age randomly assigned to view four-part, 120-min video concerning AIDS transmission and prevention, teenage sexuality, and teenage substance use, focusing on parent–teen communication and teen survival skills for avoiding risk or control condition	44	Intervention increased parent and teen AIDS/sexuality knowledge, their family problem-solving skills, and teens' problem-solving skills, pre- to 2-week and 6-month posttest.
			College/University Students: Published Research		
Clift and Stears (1988)	Informal	Absent	Evaluated effects of British governments' nationwide AIDS education on university students	184	Students' worry about casual contaigon declined pre- to 6 months postintervention; moral beliefs about AIDS did not change
Tanner and Pollack (1988)	Informal	Absent	Heteroseuxal couples assigned to use condoms erotically, to simply use condoms, or to control condition, for 2 week period	36	Couples in erotic condom use condition became more positive in attitudes towards condom use; other conditions did not change significantly

Abramson, Sekler, Berk and Cloud (1989)	Informal	Absent	Undergraduates enrolled in university course on AIDS (n = 404) were compared with those in an astronomy course (n = 309) concerning AIDS prevention knowledge, attitudes, and behavior.	713	Undergraduates in AIDS course improved in AIDS knowledge, attitudes, and preventive behavior (carrying, using condoms), pre- to immediate posttest.
Dommeyer, Marquard, Gibson and Taylor (1989)	Informal	Absent	AIDS awareness week saturated campus with information; discussion with people with AIDS and free condoms were featured as well	615	Significant but minor effect of interventions on students' AIDS knowledge (minor increase) and AIDS fear (minor decrease), pre- to immediate posttest; *manipulation* check showed campus was exposed to intervention
Gilliam and Seltzer (1989)	Informal	Absent	Students at predominatly African-American university randomly assigned to AIDS information movie or first-aid movie; those who missed intervention formed quasi-no-treatment control group.	278	Pre- to 6 week posttest, those in intervention showed marginal and inconsistent changes in AIDS information and AIDS attitudes; those in the intervention reported marginally more condom use at 6 week posttest, compared with no-treatment controls
Rhodes and Wolitski (1989)	Informal	Absent	College students assigned to view one of four commercially available AIDS information videotapes or to control condition	584	Significant modest knowledge increase, maintained at 6-week posttest, in videotape conditions; perceived effectiveness of AIDS prevention increased and was maintained in videotape conditions as well
Franzini, Sideman, Dexter, and Elder (1990)	Informal	Absent	Subjects randomly assigned to AIDS prevention small-group behavioral-skills-training sessions and an AIDS information session or to AIDS-information-only condition	113	AIDS-prevention behavioral skills training resulted in increased assertiveness ability rated at 2-week posttest
Gerrard and Reis (1989)	Formal	Absent	Erotophobic and erotophilic men and women in a university course in human reproduction were compared on AIDS and other sexuality knowledge	180	Despite initial differences in AIDS/sexuality knowledge as a function of gender and erotophobia, course exposure produced uniform knowledge gains on course tests in all subject groupings
			General Public: Published Records		
Mills, Campbell, and Waters (1986)	Informal	Absent	Britain's AIDS media campaign to the general public was evaluated (Pretest n = 192, Posttest n = 198)		No effect of AIDS media campaign on AIDS knowledge was observed, pre- to 2-month posttest
Lehmann, Hausser, Somaini, and Gutzwiller (1987)	Informal	Absent	Effects of Switzerland's AIDS education booklet, mailed to each home in the country, were evaluated (Pretest n = 1,056, Posttest n = 1,278)		Reading the AIDS booklet increased readers' AIDS knowledge and lessened their fear of widespread infection, pre- to 2-month posttest
Sherr (1987)	Informal	Absent	Effects of Britain's AIDS media campaign on high-risk people (STD clinic sample) and low-risk people (law students) were evaluated (Pretest n = 239, Posttest n = 186)		No effect of AIDS media campaign on AIDS knowledge or AIDS anxiety was observed
Weber (1988)	Informal	Absent	Effects of viewing British AIDS television programming campaign were evaluated (Pretest n = 1,001, Posttest n = 1,004)		Program viewing lead to significant increase in AIDS knowledge, pre- to 1-week posttest
Rigby, Brown, Anagnostou, Ross, and Rosser (1989)	Informal	Present	Australia's shock tactics AIDS media campaign to the general public was evaluated in terms of concern about AIDS and knowledge about AIDS (Pretest n = 305, Posttest n = 318)		Little effect of shock tactics media campaign on AIDS concern or AIDS knowledge, pre- to 5-month posttest
Bell et al. (1990)	Informal	Absent	Effects of 1-hr AIDS information session on employees' AIDS knowledge and self-confidence in handling AIDS-related situations was evaluated (Pretest n = 5,215, Posttest n = 3,966)		AIDS information session significantly increased employees' AIDS information and self-confidence in handling AIDS-related situations, pre- to immediate posttest

Note. AIDS = acquired immunodeficiency syndrome, HIV = human immunodeficiency virus, IVDU = IV drug user, STD = sexually transmitted disease.

have focused on IVDUs and their partners. It can be seen in Table 1 that the conceptual basis of most of these interventions is informal and that elicitation research to design group-appropriate interventions is lacking. It can also be seen that outreach programs have demonstrated success in reaching IVDU populations (Ginzburg et al., 1986) and that interventions that have provided IVDUs with AIDS prevention information (Neaigus et al., 1990), with AIDS prevention information, motivation, and behavioral skills training (Gibson, Wermuth, Lovelle-Drache, Ham, & Sorensen, 1989) and with services such as needle exchange (Newcombe & Parry, 1989; van den Hoek, van Haastrecht, & Coutinho, 1989) have sometimes been successful in reducing needle sharing and unprotected sexual intercourse. For reasons that are unclear, however, other similar interventions have not been successful in reducing such AIDS-risk behavior (Calsyn, Saxon, Freeman, & Whittaker, 1990; MacNair, Elliott, & Yoder, 1990). Overall, it is encouraging to observe AIDS-risk reduction in interventions focusing on IVDUs. Nevertheless, reliance on self-report data, limitations in experimental design, failures to measure intervention impact on factors that presumably mediate risk reduction, and the fact that psychological and educational intervention components are often confounded with medical (e.g., HIV testing) and service (e.g., needle exchange) components preclude regarding any study as an unambiguous demonstration of intervention effects or from attributing such effects to psychological or educational as opposed to medical or service components of interventions.

Female prostitutes. We were able to locate only two published, statistically evaluated AIDS-risk-reduction interventions among female prostitutes and none among male prostitutes (see Table 1). Papaevangelou et al. (1988) report that AIDS education and HIV testing in a group of female prostitutes in Greece resulted in lower HIV seroconversion and sexually transmitted disease (STD) rates and in increased condom use, but the experimental design did not permit attribution of change to the intervention per se, as opposed to historical trends. Ngugi et al. (1988) report that Nairobi female prostitutes' attendance at group education sessions predicted increased condom use in prostitute–client contacts. The Ngugi et al. research suggests that interventions may be effective in modifying AIDS-risk sexual practices among prostitutes, but the extent to which these results may be generalized is unclear.

STD clinic patients. Despite the fact that STD clinic patients are at demonstrated risk of sexually borne infection, only one published, evaluated AIDS-risk-reduction intervention could be located for this group (see Table 1). Solomon and DeJong (1989) reported that a videotaped intervention that motivated condom use by eroticizing it, by stressing its normativeness, and by modeling communication skills resulted in increased condom knowledge, more favorable attitudes, better knowledge of strategies for persuading partners to accept condom use, and greater postintervention redemption of condom coupons. This study is noteworthy because of the population examined, because of the apparent effects of the motivational- and behavioral-skills-based intervention, and because it is a rare exemplar of the use of an indirect measure of intervention impact (i.e., redemption of condom coupons on two separate postintervention occasions, which may be suggestive of actual use of the condoms with sexual partners).

Adolescents. Among adolescents, AIDS-risk-reduction interventions have been based primarily on informal conceptualizations, designed without elicitation research, and directed primarily at providing AIDS information (see Table 1). Each of the interventions that involved the provision of AIDS information showed evidence of improving adolescents' AIDS knowledge (see Table 1). Several of these informational interventions also seem to have increased adolescents' behavioral intentions to practice AIDS prevention, at least in the short term (Brown, Barone, Fritz, Cebollero, & Nassau, 1991; Brown, Fritz, & Barone, 1989; Huszti, Clopton, & Mason, 1989; Lanier & McCarthy, 1989; Rickert, Gottlieb, & Jay, 1990). Beyond the provision of information for adolescents, AIDS education often involves promoting tolerance for people living with AIDS; interventions by Brown et al. (1989), Brown et al. (1991), DiClemente, Pies, et al. (1989), and Huszti et al. (1989) each focused on this issue, and each showed evidence of increasing adolescents' tolerance.

Three interventions among adolescents have demonstrated AIDS-risk reduction behavioral change. J. B. Jemmott, Jemmott, and Fong (in press) randomly assigned African-American male adolescents to a 5-hr intervention designed to increase AIDS knowledge and to elicit negative attitudes toward AIDS-risk behavior or to a parallel control intervention. At a 3-month follow-up, those in the treatment condition showed more AIDS knowledge, more negative attitudes toward risk behavior, and less risk behavior (including less coitus, fewer partners, and more consistent condom use). Rotheram-Borus et al. (1991) provided a multisession intervention—focusing on AIDS knowledge, preventive behavior skills training, identification of individually relevant barriers to prevention, social support for prevention, and provision of access to health care—to primarily minority adolescent runaways who were residents at an urban shelter. At 3- and 6-month follow-ups, attendance at intervention sessions was associated with significant self-reported increases in consistent condom use and significant decreases in high-risk sexual activity. Winett, Anderson, et al. (1990) randomly assigned parents and teenagers to view a video concerned with AIDS transmission and prevention that modeled parent–teen communication and teenage "survival skills," or to a control condition and found sustained increases both in AIDS knowledge and relevant problem-solving skills.

Overall, in the adolescent group, informational interventions were likely to produce increased AIDS knowledge, and as with gay males and IVDUs, interventions focusing on information and motivation or behavioral skills issues, or both, seemed most likely to affect AIDS-preventive behavior. Moreover, interventions that began with formal elicitation research in an attempt to design group-appropriate interventions (J. B. Jemmott et al., in press; Winett, Anderson, et al., 1990) appeared to fare best.

University students. AIDS-risk-reduction interventions targeted at university students have generally been based on informal conceptualizations, have rarely involved systematic elicitation research to design group-appropriate interventions, and have generally focused on delivering information rather than on increasing motivation or teaching relevant behavioral skills (see Table 1). The information-only interventions have demonstrated increases in information, decreases in fear of casual

contagion, and increases in the perceived efficacy of preventive behaviors (Clift & Stears, 1988; Dommeyer, Marquard, Gibson, & Taylor, 1989; Rhodes & Wolitski, 1989; for an exception, see Gilliam & Seltzer, 1989). One intervention involved a full college course on AIDS and appears to have resulted in an increase in AIDS knowledge, proprevention attitudes, and preventive behavior (Abramson, Sekler, Berk, & Cloud, 1989), and another involved AIDS information and behavioral skills training and resulted in increased assertiveness skills (Franzini, Sideman, Dexter, & Elder, 1990). Finally, experimental research has documented that instruction in the use of condoms and how to eroticize their use may improve attitudes toward this practice (Tanner & Pollack, 1988). As with preceding categories of research, experimental design limitations make it difficult to attribute intervention impact to an intervention or to any particular component of an intervention (e.g., Abramson et al., 1989; Rhodes & Wolitski, 1989), and broader interventions that focus on multiple determinants of AIDS-preventive behavior, including behavioral skills, seem most likely to impact on AIDS-risk behavior (e.g., Abramson et al., 1989; Franzini et al., 1990).

General public. A number of risk reduction interventions have been directed at the general public. As can be seen in Table 1, these have been based on informal conceptualizations, have rarely involved elicitation research to identify group-appropriate intervention strategies, and have primarily been informational in nature. Media campaigns directed at the general population in Great Britain have had mixed outcomes. Mills, Campbell, and Waters (1986) and Sherr (1987) report no effect of a media campaign on overall levels of information, although Wober (1988) reported a significant increase in knowledge after a different media campaign in Britain. A media campaign in Australia involving shock tactics appears to have had little effect on AIDS knowledge or on personal or societal AIDS concerns (Rigby, Brown, Anagnostou, Ross, & Rosser, 1989), but the Swiss media campaign (Lehmann, Hausser, Somaini, & Gutzwiller, 1987) and a study of U.S. work site AIDS information sessions (Bell et al., 1990) showed significant increases in AIDS knowledge. Under some circumstances, informational interventions directed at the general public appear to have been successful in improving AIDS knowledge, but research to date has not clarified the conditions under which such successes occur. None of these interventions have resulted in documented changes in AIDS-risk behavior.

Critique and Conclusions

Several themes emerge from the AIDS-risk-reduction intervention literature that was reviewed. First, although the need for conceptually based interventions has been stressed (e.g., T. J. Coates, 1990; Leviton, 1989), most interventions have been based on an informal blend of logic and practical experience. Ten years into the AIDS epidemic, published AIDS-risk reduction efforts that have been based on formal conceptualizations of any kind are exceedingly rare. Second, although many investigators stress the importance of tailoring interventions to specifically meet the needs of particular target groups (T. J. Coates, 1990; DiClemente & Houston-Hamilton, 1989; R. W. Johnson et al., 1990; McKusick, Conant, & Coates, 1985; H. G. Miller, et al., 1990; Mondanaro, 1987; Schinke, Botvin, Orlandi, Schilling, & Gordon, 1990; Winett, Altman, & King, 1990; Witte, 1989), our review showed that formal elicitation research to identify group-appropriate intervention tactics is rare. When elicitation research was present, intervention effectiveness seemed to increase, but the sample of such interventions was exceedingly small (e.g., J. B. Jemmott et al., in press; Winett, Altman, & King, 1990). Third, many authors allude to the need for AIDS-risk-reduction interventions that focus on informational, motivational, and behavioral skills elements that facilitate AIDS-preventive behavior (T. J. Coates, 1990; DiClemente & Houston-Hamilton, 1989; W. A. Fisher, 1990a, 1990b; Flora & Thoresen, 1988; Herold, Fisher, Smith, & Yarber, 1990; R. W. Johnson, et al., 1990; McKusick, Conant, & Coates, 1985; Melton, 1988; Schinke et al., 1990; Winett, Altman, & King, 1990), but such a broad focus is uncommon in the intervention literature. When interventions do stress AIDS-risk-reduction information, motivation, and behavioral skills (or at least AIDS-risk-reduction motivation and behavioral skills), their impact seems to be enhanced (see Franzini et al., 1990; Galavotti, Schnell, & O'Reilly, 1990; Gibson et al., 1989; Kelly et al., 1989; Kelly et al., 1990; H. G. Miller et al., 1990; Rotheram-Borus et al., 1991; Solomon & DeJong, 1989; Valdiserri et al., 1989). The success of interventions that focus on AIDS risk reduction motivation and behavioral skills but not information may derive from the generally high levels of AIDS knowledge present in many segments of the population. Fourth, many authors stress the need for systematic evaluation research to monitor the effectiveness of AIDS-risk-reduction interventions (T. J. Coates, 1990; W. A. Fisher, 1990a, 1990b; Flora & Thoresen, 1988; R. W. Johnson et al., 1990; Leviton & Valdiserri, 1990; Stoller & Rutherford, 1989; Valdiserri, 1989; Winett, Altman, & King, 1990), but even among the relatively small group of interventions that have been evaluated, there were nearly always serious problems with experimental design and control groups, reliance on direct, reactive, self-report measures, high subject self-selection and attrition rates, multiply confounded interventions, and failure to assess intervention impact on factors that are presumed to mediate intervention impact. These methodological limitations make the attribution of observed effects to an intervention, or to a specific component of an intervention, virtually impossible in most cases. Moreover, and quite understandably, the more "important" the intervention (e.g., a broad-based intervention directed at sustained behavioral change vs. a narrowly focused intervention designed to provide only information), the more serious the methodological problems typically observed.

Our review of the AIDS-risk-reduction literature has identified a number of intervention characteristics that seem to favor risk reduction behavior change. It appears that AIDS-risk-reduction interventions that are conceptually based and group specific and that focus on providing AIDS-risk-reduction information, motivation, and behavioral skills are the most impactful and sound bases for intervention. These interventions must then be evaluated in a methodologically adequate fashion and in terms of multiple direct and indirect measures of intervention outcome. The remainder of this article discusses a new conceptualization and a set of associated operations that are

intended to provide a basis for such AIDS-risk-reduction interventions.

A Three-Factor Conceptualization of AIDS-Preventive Behavior

Our conceptualization of AIDS-risk behavior change holds that there are three fundamental determinants of AIDS-risk reduction: AIDS-risk-reduction information, motivation, and behavioral skills (see Figure 1). *Information* regarding the means of AIDS transmission and information concerning specific methods of preventing infection are necessary prerequisites of risk-reduction behavior. *Motivation* to change AIDS-risk behavior is a second determinant of AIDS prevention and affects whether one acts on one's knowledge regarding AIDS transmission and prevention. *Behavioral skills* for performing specific AIDS-preventive acts are a third critical determinant of prevention and affect whether even a knowledgeable, highly motivated person will be able to change his or her behavior in an AIDS-preventive fashion.[4]

It is our assumption that AIDS-risk-reduction information and motivation work largely through AIDS-risk-reduction behavioral skills to affect AIDS-risk-reduction behavioral change (see Figure 1). In effect, information and motivation are thought to activate behavioral skills that result in risk-reduction behavioral change and maintenance of change. Risk-reduction information and risk-reduction motivation may also have direct effects on risk-reduction behavior, particularly when risk-reduction behavior requires relatively uncomplicated behavioral performances. Finally, note that information and motivation are regarded as generally independent constructs in this model.[5]

The constructs of the information–motivation–behavioral skills (IMB) model are regarded as highly generalizable determinants of AIDS-preventive behaviors in any population of interest. At the same time, these constructs should have content that is specific to particular target populations and particular AIDS-preventive behaviors. That is, within the IMB model, specific types of information, specific motivational issues, and specific behavioral skills will be implicated in a particular group's performance of a certain type of AIDS-preventive behavior. For example, for gay men the information required for engaging in prevention, the motivational factors associated with prevention, and the requisite behavioral skills may differ for the act of using condoms and for the act of avoiding anal intercourse, and both of these sets of information, motivation, and behavioral skills elements may differ from the specific information, motivation, and behavioral skills required for heterosexual males' use of condoms or avoidance of anal intercourse. By the same token, it is expected that some specific causal factors in the IMB model, and some specific causal paths among them, will prove to be more powerful determinants for particular populations and for particular AIDS-preventive acts than others. These variations should provide critical information for understanding and modifying AIDS risk in specific populations and in relation to specific AIDS-preventive behaviors.

Beyond identifying critical determinants of AIDS-risk reduction, the IMB model also specifies a highly generalizable set of operations that may be used to understand and promote AIDS-risk reduction within diverse populations. In practice, there are three steps in applying this conceptualization to promote AIDS-risk reduction. First, for each population of interest, it is necessary to perform *elicitation research* to identify the population's existing level of AIDS-risk-reduction knowledge, the factors that determine the population's motivation to reduce AIDS risk, and the population's existing AIDS-prevention behavioral skills.[6] Second, on the basis of this population-specific data, it is necessary to create population-appropriate interventions to produce proprevention changes in knowledge, motivation, behavioral skills, and consequently AIDS-preventive be-

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[4] While a number of papers we have reviewed also address information, motivation, and behavioral skills in a relatively integrated manner (T. J. Coates, 1990; H. G. Miller et al., 1990; Winett, Altman, & King, 1990), in this article and in J. D. Fisher and Fisher (1989), we discuss specific links among the proposed constructs and the methods for applying this conceptualization; in the present article, we also provide empirical tests of our information–motivation–behavioral skills (IMB) model.

[5] In the present conceptualization, *information* refers to basic knowledge concerning AIDS transmission and AIDS prevention, whereas *motivation* refers to personal attitudes toward AIDS-preventive behaviors and perceived normative support for such behaviors (see discussion that follows). In this conceptualization, the presence of information and motivation each make it more likely that behavioral skills will be used and that AIDS risk-reduction behavior will take place, but there is no necessary strong relationship between level of information and level of motivation. Well-informed people, who are aware that AIDS can be transmitted by partners who appear to be well, may have very positive attitudes toward preventive behavior (they may see prevention as minimizing very real risk) and perceptions of strong normative support for such behavior (they may assume that most people endorse the practice of prevention). Alternatively, however, well-informed people who are aware that AIDS can be transmitted by people who appear to be well may have less favorable attitudes about AIDS-preventive behavior (they may believe that condom use dulls sensations of sex or is embarrassing), and they may perceive little normative support for such behavior (they may believe that in our society, condom use stigmatizes people as "risky" and suspect partners). Conceptually, then, information and motivation are both thought to influence the use of behavioral skills to reduce AIDS risk, but information and motivation are viewed as separate entities that influence the utilization of behavioral skills and the enactment of risk-reduction behavior in quite separate ways. Empirically, the plethora of information-only interventions reviewed earlier, which showed little impact on behavior, also suggest that information per se and information alone is not sufficient to motivate AIDS-preventive behavior and that other factors—such as relatively independent attitudes and norms concerning preventive behavior—must be considered as well.

[6] In this context, the terms *elicit* and *elicitation* refer to the use of techniques in which people provide information to researchers in a context in which no correct answers or alternatives are provided to them; rather, they provide information on their knowledge base, on the factors that motivate them, and on their behavioral skills with respect to AIDS-prevention in an open-ended, relatively prompt-free context. It is felt that the use of such techniques (as opposed to supplying respondents with close-ended opportunities to respond) ensures greater ecological validity in terms of determining what AIDS-related information, motivation, and behavioral skills are spontaneously accessible to individuals in a population of interest and thus which of these elements is lacking and needs to be included in an intervention.

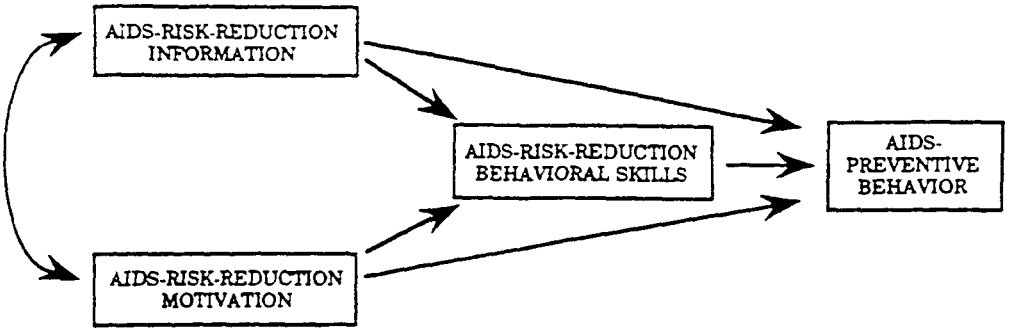

Figure 1. Three fundamental determinants of AIDS-risk reduction.

havior. Finally, it is necessary to carry out methodologically adequate evaluation research to determine whether the intervention has produced short- and long-term changes in multiple indicators of knowledge, motivation, and behavioral skills and to assess to what extent changes in each have resulted in long-term risk reduction behavior change per se.

The basic behavior change elements of our AIDS-risk-reduction model—information, motivation, and behavioral skills—are discussed individually in more detail below. For each element, we first review the literature on the relation between that element and AIDS-preventive behavior. We then identify specific components of the element that are critical for AIDS-risk-behavior change. Finally, we discuss how the element should be operationalized when conducting elicitation research and when designing and evaluating AIDS-risk-reduction interventions.

Information

A number of studies have focused on the relationship between people's levels of AIDS information and their levels of AIDS-preventive behavior. Overall, the knowledge–prevention relationship has been shown to be equivocal in gay men (see Emmons, Joseph, Kessler, Montgomery & Ostrow, 1986; J. D. Fisher & Misovich, 1990b; Kegeles, Catania, Coates, & Adler, 1986; Kelly, St. Lawrence, Brasfield, Lemke, et al., 1990; and McKusick, Coates, Wiley, Morin, & Stall, 1987, for studies confirming a knowledge–prevention relationship, and Joseph, Montgomery, Kirscht, et al., 1987; McKusick et al., 1987; and St. Lawrence, Kelly, Hood, & Brasfield, 1987, for studies finding no relation between knowledge and prevention). The knowledge–prevention relationship has also been equivocal in studies of primarily heterosexual young people (see Catania, Kegeles, & Coates, 1990, and L. S. Jemmott & Jemmott, 1990, for studies confirming a knowledge–prevention relationship, and J. D. Baldwin & Baldwin, 1988, and DiClemente, 1990, for studies failing to confirm such a relation), and there has been a failure to observe a relationship between knowledge and prevention among IVDUs (Friedman et al., 1987; Zielony & Wills, 1990).

There are likely important methodological reasons for the failure to observe a more consistent link between AIDS knowledge and AIDS-preventive behavior. A consistent relationship is most apt to prevail when both knowledge and behavior are measured at the same level of specificity and with respect to a similar content domain (Ajzen & Fishbein, 1980; Fishbein & Ajzen, 1975). In many of the studies reviewed, however, knowledge about AIDS in general was correlated with the performance of specific AIDS-preventive behaviors. Clearly, knowing what AIDS stands for (i.e., general knowledge measured in one content domain) is unlikely to have an impact on using condoms (i.e., a specific preventive behavior measured in another content domain). Second, most research assessing AIDS knowledge has used structured, close-ended questionnaires, which may have questionable ecological validity because they do not tap the type of "top of the head," unprompted AIDS knowledge that is spontaneously accessible to people in real-life AIDS-risk situations. The fact that knowledge measures may be ecologically invalid works against finding a relationship between measures of knowledge and real-life AIDS preventive behavior. Finally, in some relevant populations (e.g., urban gay men who belong to homophile organizations, college students), extant levels of the type of knowledge measured on such ecologically invalid instruments are extremely high, and ceiling effects make a knowledge–prevention relationship difficult to detect.

Notwithstanding these methodological problems, there are also conceptual explanations for the inconsistent relation between AIDS knowledge and prevention. The studies described above suggest, as have a growing number of researchers (e.g., J. I. Baldwin, Whiteley, & Baldwin, 1990; Des Jarlais & Friedman, 1988; DiClemente, 1989b; J. D. Fisher & Misovich, 1990a; W. A. Fisher, 1990b; Joseph, Montgomery, Kirscht, et al., 1987), that information is a necessary but often not a sufficient condition for AIDS-risk behavior change. This view is echoed strongly by the results of the large number of AIDS-risk-reduction interventions reviewed earlier that focused on increasing AIDS knowledge: few elicited changes in risk behavior. Information may be both necessary and sufficient for prevention when risk-reduction behavior requires a relatively uncomplicated behavioral performance (e.g., avoiding sexual contact, as opposed to acquiring, discussing, and consistently using condoms), and Joseph, Montgomery, Kirscht, et al. (1987) have suggested that information may impact on initial AIDS-risk behavior change (e.g., that which occurs early in an epidemic before knowledge becomes relatively widespread), as opposed to the maintenance of such behavior across time.[7]

[7] In this regard, Kelly and St. Lawrence (1990) imply that at present, knowledge level is more apt to predict AIDS prevention in small cities

According to our model, except under the conditions specified above (e.g., when AIDS-risk reduction requires a very uncomplicated behavioral performance), AIDS information is a necessary but not a sufficient condition for AIDS-risk reduction. The types of information that are necessary for prevention to occur involve specific knowledge regarding means of AIDS transmission and AIDS prevention—not behaviorally irrelevant information, such as what a T cell is. Although it would seem important for AIDS-risk-reduction interventions to target population-specific deficits in knowledge about AIDS transmission and prevention, previous interventions have not generally involved elicitation research to identify group-specific gaps in knowledge about transmission and prevention. It is our view that to be maximally effective, AIDS-risk-reduction efforts must first elicit participants' existing body of knowledge on relevant risk-reduction issues, then tailor group-appropriate interventions to improve such knowledge where it is lacking, and finally evaluate whether the information has been perceived and retained as intended.

It should be noted that we believe it is crucial to elicit the existing body of relevant AIDS knowledge in a target population in a fashion that provides as few cues to correct responses as possible. Therefore, in addition to using close-ended questions that may cue respondents and give them access to information not available to them in real-life settings, the use of open-ended questions that ask respondents how AIDS is transmitted, how it is prevented, what sexual behaviors are more and less risky, and what preventive behaviors are more and less effective is recommended. Another way to elicit unprompted, population-specific levels of AIDS-prevention knowledge involves the use of focus groups (Krueger, 1988) in which individuals discuss their beliefs about AIDS transmission and prevention. Using such techniques, we have found that both heterosexual college students and gay men have "implicit personality theories" of AIDS risk in which they believe it is easy to detect risky partners on the basis of how they dress, how they act, and where they are encountered and in which they believe that if they "know their partner," even in ways unrelated to their partner's HIV status, AIDS prevention is unnecessary (Offir, Williams, J. D. Fisher, & Fisher, 1991; S. S. Williams et al., 1991, in press). Such prevention-relevant knowledge deficits could not have been identified using close-ended techniques alone to assess group-specific AIDS knowledge. Once group-specific knowledge deficits have been identified, an intervention must be constructed to teach relevant information that is lacking. It must then be evaluated to determine whether changes in knowledge have occurred in the short and long term on multiple direct and indirect measures of intervention outcome.

Motivation

Except under circumscribed conditions outlined above, information is necessary but not sufficient for AIDS prevention. According to our model, even a well-informed and behaviorally skilled person must generally be highly motivated to initiate and maintain AIDS-preventive behavior. For gay men, primarily heterosexual university students, and minority high school students, various factors affect AIDS-risk-reduction motivation and ultimately AIDS prevention, including individuals' attitudes toward AIDS prevention (J. D. Fisher & Fisher, 1991; L. S. Jemmott & Jemmott, 1990; Pleck, Sonenstein, & Ku, 1990; Ross, 1988). Pro- and antiprevention social norms also affect motivation to practice prevention and levels of prevention among gay men, heterosexual college students, and IVDUs (Catania et al., 1989; DiClemente, 1990; DiClemente & Fisher, 1991; J. D. Fisher & Misovich, 1990b; Friedman et al., 1987; L. S. Jemmott & Jemmott, 1990; Joseph, Montgomery, Emmons, et al., 1987; Kelly, St. Lawrence, Brasfield, Lemke, et al., 1990; Kelly, St. Lawrence, Brasfield, Stevenson, et al., 1990; McKusick, Coates, & Morin, 1990; Zielony & Wills, 1990). In addition, several health belief model elements (e.g., perceived vulnerability to HIV, perceived costs and benefits of AIDS prevention;[8] Becker & Rosenstock, 1984; Rosenstock, 1966) may affect AIDS-risk-reduction motivation and ultimately AIDS prevention.

The studies reviewed above show that people's attitudes toward AIDS prevention consistently predict their practice of preventive behaviors. The relationship between individuals' AIDS prevention-relevant social norms and their practice of prevention was also shown to be consistent. However, the relationship between health belief model elements relevant to AIDS prevention and actual levels of prevention is inconsistent. Perceived susceptibility to HIV has been related to prevention in several studies with gay men and college students (Catania et al., 1990; DiClemente, Forrest, & Mickler, 1989; Emmons et al., 1986; J. D. Fisher & Misovich, 1990a; Kegeles et al., 1986), perceived costs and benefits of prevention have been related to AIDS prevention in heterosexuals and in gay men (Catania et al., 1989; Communication Technologies, 1984; Emmons et al., 1986; J. D. Fisher & Misovich, 1990a; Hingson, Strunin, Berlin, & Heeren, 1990; Kegeles et al., 1986; McKusick et al., 1987; Pleck et al., 1990), and cue stimuli (e.g., having friends or lovers with HIV or being able to visualize someone dying of HIV) have been related to prevention in gay men (McKusick, Horstman, & Coates, 1985; McKusick, Wiley, et al., 1985). Nevertheless, there are studies in which perceived susceptibility to HIV is not related to prevention (e.g., J. D. Baldwin & Baldwin, 1988; Catania et al., 1989; Emmons et al., 1986; Joseph, Montgomery, Emmons, et al., 1987; Weisman et al., 1989; Zielony & Wills, 1990),[9] studies in which perceived costs and

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or outside of the mainstream of the gay community (where, in a sense, it is still early in the epidemic, because people are not as cognizant of AIDS) than in larger cities or within the mainstream of the gay community.

[8] Although perceived severity of a health condition is often a health belief model predictor of preventive behavior, with HIV, the overwhelming majority of individuals view it as being very high on the severity dimension; therefore, perceived severity does not explain much variance in AIDS-preventive behavior (Hingson et al., 1990).

[9] One possible explanation for the inconsistency between perceived susceptibility and preventive behavior involves the fact that many studies of this relationship have been cross-sectional. Thus, a person who is presently engaging in risky behavior may both perceive him- or herself as being at risk and may report few risk-reduction efforts, or a person who is presently engaging in safer sexual practices may report few feelings of susceptibility and much safer sexual behavior.

benefits of prevention are unrelated to prevention (e.g., Emmons et al., 1986; Joseph, Montgomery, Emmons, et al., 1987), and studies in which the presence of cue stimuli are not related to prevention (Friedman et al., 1987; Zielony & Wills, 1990).

Overall, certain factors that affect AIDS-prevention motivation, especially attitudes toward prevention and prevention-relevant social norms, appear to have important effects on prevention. This conclusion is consistent with the AIDS-risk-reduction intervention research reviewed earlier, which showed that interventions that included a motivational component seemed to be especially effective in promoting AIDS-preventive behavior. Although it is clear that motivation is essential for prevention and that an array of variables (e.g., attitudes, social norms, perceived costs and benefits of prevention) may affect motivation to practice prevention, there has not been a unified conceptual framework that is sensitive to the effects of different elements that may affect motivation to practice AIDS prevention. To remedy this situation, the motivational construct of the IMB model uses Fishbein and Ajzen's theory of reasoned action (Ajzen & Fishbein, 1980; Fishbein & Ajzen, 1975) to provide a well-articulated social psychological conceptualization that may be applied to understanding and changing AIDS-prevention motivation within diverse target groups (Fishbein & Middlestadt, 1989). Within any population, the theory (and Fishbein & Ajzen's methodology) helps to pinpoint the specific motivational determinants of AIDS-risk behavior and of intentions to change such behavior. The theory can subsume the disparate motivational elements we have reviewed, which may affect motivation to practice AIDS-preventive behavior.

According to the Fishbein-Ajzen theory, a person's behavior (B) is a function of his or her behavioral intention (BI) to perform the act in question. Behavioral intentions (BI), in turn, are assumed to be a function of two factors that affect motivation to act: the person's attitude toward performing the act in question (A_{act}), and/or his or her subjective norm (SN) or perception of what significant others think should be done with respect to the behavior in question. Algebraically, the theory may be expressed by the following multiple regression equation, in which w_1 and w_2 are empirically determined regression weights:

$$B \sim BI = [A_{act}]w_1 + [SN]w_2.$$

The theory has been further specified with respect to the basic psychological underpinnings of A_{act} and SN. It is theorized that a person's attitude toward performing an act (e.g., using condoms every time I have sexual intercourse) is a function of his or her beliefs about the consequences of performing the act (B_i) multiplied by the person's evaluations of these consequences (e_i). Thus, $A_{act} = \sum B_i e_i$. With respect to subjective norms (e.g., perceptions of normative support for using condoms every time one has sexual intercourse), it is theorized that SN is a function of a person's perception of what specific referent others think should be done regarding the behavior (NB_j) multiplied by the person's motivation to comply with these referents (Mc_j). Thus, $SN = \sum NB_j Mc_j$. According to Ajzen and Fishbein (1980) and Fishbein and Ajzen (1975), factors external to this model—including the disparate motivational factors reviewed earlier—should generally work through the components of the model (A_{act}, SN, B_i, e_i, NB_j, Mc_j) to affect AIDS-prevention behavioral intentions and behavior (see Bagozzi, 1981; Bentler & Speckart, 1979; W. A. Fisher, 1984; and Kantola, Syme, & Campbell, 1982, for an extended discussion of this issue).

The theory holds that it is critical to identify, in open-ended elicitation research, specific beliefs (B_i), and referents (NB_j) that population members associate with specific behaviors (e.g., urban African-American women's beliefs about the consequences of, and referent support for, always using condoms during sexual intercourse). These procedures can identify the specific beliefs and referents that are salient for a particular AIDS-preventive behavior within a given population (e.g., beliefs that a consequence of condom use will be partner rejection because he or she will think I am promiscuous; referent others such as boyfriends or girlfriends who do not support condom use).

The data obtained from these elicitation procedures permit the researcher to conduct prospective studies to clarify whether attitudinal or normative factors, or both, predict AIDS-preventive behaviors and to pinpoint the specific B_i, e_i, NB_j, and Mc_j factors that influence performance of such behaviors. The findings of prospective research will indicate whether a behavior is under attitudinal or normative control, or both, and correspondingly whether attitudinal or normative interventions, or both, will be most effective in producing motivational change. This research will also identify the particular attitudinal (B_i, e_i) and normative (NB_j, Mc_j) underpinnings that determine the behavior and that must be altered or offset in group-specific interventions to increase motivation. (For a detailed discussion of the Fishbein-Ajzen procedures and how they can be applied in the present context, see Ajzen & Fishbein, 1980; Fishbein & Middlestadt, 1989; W. A. Fisher, 1984; and W. A. Fisher & Fisher, in press).

The theory of reasoned action asserts that to increase motivation to perform AIDS-preventive behaviors, one should influence attitudes toward the performance of AIDS-preventive acts or perceptions of social normative support for such behavior, or both. To change attitudes toward performing AIDS-preventive behaviors, one could change specific elicited beliefs about the consequences of the behavior, or evaluations of these consequences, that are correlated with A_{act}, BI, and B, or add proprevention beliefs and evaluations to the person's thinking about this issue. To change perceptions of normative support for AIDS-preventive behaviors, one could influence perceptions that specific referent others support AIDS-preventive behaviors or influence the person's motivation to comply with such referents, or both, or add proprevention referents and motivation to comply to the person's thinking about this issue. In practice, prospective research may be used to identify which elements in the model are most strongly inhibitive and facilitative of AIDS prevention, and these may then be targeted for intervention. Intervention-based, proprevention changes in the basic psychological underpinnings of attitudes toward AIDS-preventive behaviors (Bi, ei) and related subjective norms (NB_j, Mc_j) are theorized to work back through the constructs of the theory to alter in a proprevention direction attitudes towards AIDS prevention, subjective norms, behavioral intentions, and ultimately AIDS-preventive behavior itself. Evaluation research utilizing Fishbein-Ajzen indicators of relevant con-

structs should then be used to confirm these changes, as well as the overall efficacy of the intervention.

Behavioral Skills

In addition to AIDS-risk-reduction information and motivation, certain behavioral skills (e.g., the ability to communicate with, and to be appropriately assertive with, a potential sexual partner) are critical for practicing AIDS prevention. According to the IMB model, AIDS-risk-reduction information and motivation work largely through AIDS-risk-reduction behavioral skills to affect AIDS-preventive behavior. Consistent with our model, studies have strongly linked AIDS-prevention behavioral skills with AIDS prevention. It has been found that sexual communication skills are related to the practice of safer sex (Catania et al., 1989; Polit-O'Hara & Kahn, 1985; Schinke, Gilchrist, & Small, 1979; Weisman et al., 1989) and that AIDS-specific assertiveness skills are associated with practicing AIDS prevention in heterosexual women (Catania et al., 1989) and in IVDUs (Zielony & Wills, 1990). In addition, the ability to avoid drinking or drug use before sex has been related to safer sexual behavior in gay men and in heterosexual college students (cf. Misovich & Fisher, 1991; Ostrow et al., 1990; Siegel, Mesagno, Chen, & Christ, 1987; Stall, McKusick, Wiley, Coates, & Ostrow, 1986).

W. A. Fisher (1990b) has identified a broader range of behavioral skills that are assumed to be necessary for the practice of AIDS prevention (see Figure 2), some of which are not discussed above. According to W. A. Fisher, to engage in prevention, one must first be able to accept one's own sexuality (i.e., acknowledge that he or she is a sexual being who may have sex in the future and thus may need to consider AIDS prevention), must have the skills to acquire accurate information about AIDS prevention, and must be able to negotiate AIDS-preventive behavior with a partner and be capable of exiting a situation in which safer sex cannot be negotiated. The person must also be able to engage in public behaviors, such as condom purchasing, HIV testing, or both; must be able to observe safer sexual limits consistently; and must be able to reinforce him- or herself and the partner(s) involved if safer sex practices are to continue without relapse. In addition to such "universal" AIDS-prevention behavior skills, additional skills may be relevant for groups characterized by differences in ethnicity, sexual orientation, gender, power, chemical abuse status, and the like. For example, in the Hispanic-American population, where there may be especially significant power differences between the genders (Mays & Cochran, 1988; Peterson & Marin, 1988), special skills may be necessary to help women negotiate AIDS-preventive behavior. Behavioral skills that are especially significant within particular groups may be ascertained from thorough elicitation research using focus groups and related open-ended strategies.

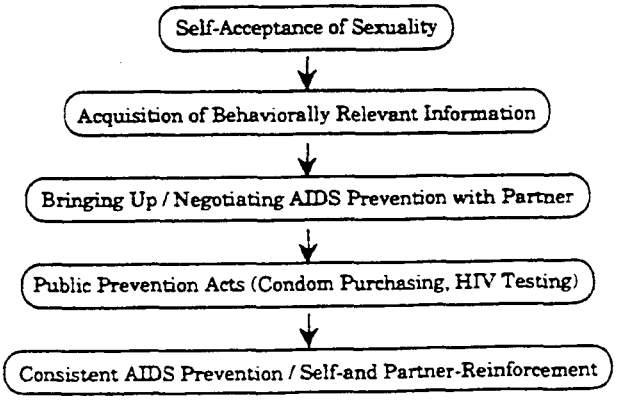

Figure 2. Behavioral skills involved in AIDS prevention.

Across populations at risk for HIV, a final behavioral skill is necessary for the practice of AIDS prevention. According to Bandura (1989), to engage in prevention, one must not only have the necessary behaviors in one's repertoire (e.g., possess safer-sex negotiation skills) but one must also possess a self-belief in one's ability to use them—a sense of self-efficacy—to practice the behaviors of which one is capable. In fact, the two constructs (possessing AIDS-prevention behavioral skills and perceiving that one is able to use them) are inextricably bound in much research on the relation between behavioral skills and prevention. Many self-report measures of whether people possess AIDS-relevant behavioral skills actually measure their perceived self-efficacy with respect to performing specific AIDS-preventive behaviors (J. D. Fisher & Fisher, 1991; O'Leary, Goodhart, & Jemmott, 1991).

In work with primarily heterosexual college students that has used this measurement strategy, perceived self-efficacy regarding prevention is strongly related to the practice of prevention (J. D. Fisher & Fisher, 1991; O'Leary et al., 1991). In gay men, high self-efficacy is associated with performing low-risk sexual behavior (McKusick et al., 1987), and high AIDS-health locus-of-control scores (which reflect the perception that one can control one's AIDS risk) predict low rates of unprotected anal intercourse (Kelly, St. Lawrence, Brasfield, Lemke, et al., 1990). High self-efficacy has also been associated with increased condom use in heterosexual IVDUs (Gibson et al., 1988) and predicts behavioral intentions to remain sexually abstinent among sexually inactive Hispanic teens (Furgeson, Chu, & Gregory, 1989).

Overall, possessing AIDS-relevant behavioral skills is clearly associated with greater levels of AIDS prevention. These findings parallel those of the AIDS-prevention interventions (reviewed earlier) that contain a behavioral skills component, which also suggest the critical role of behavioral skills in AIDS prevention (e.g., Kelly et al., 1989; Kelly, St. Lawrence, Betts, Brasfield, & Hood, 1990; Rotheram-Borus et al., 1991; Valdiserri et al., 1989). Although intervention studies that contain a behavioral skills component were shown to be more effective at changing behavior than those that did not, we would argue that to create a maximally effective AIDS-risk-reduction intervention, before implementing the intervention in a particular population, elicitation research should first be performed to ascertain those universal and group-specific behavioral skills that are both necessary for AIDS prevention and lacking in that population. The findings from such work can then be used to design the behavioral skills component of a group-specific intervention.

In the behavioral skills component of the intervention, those behavioral skills that are necessary and lacking should be

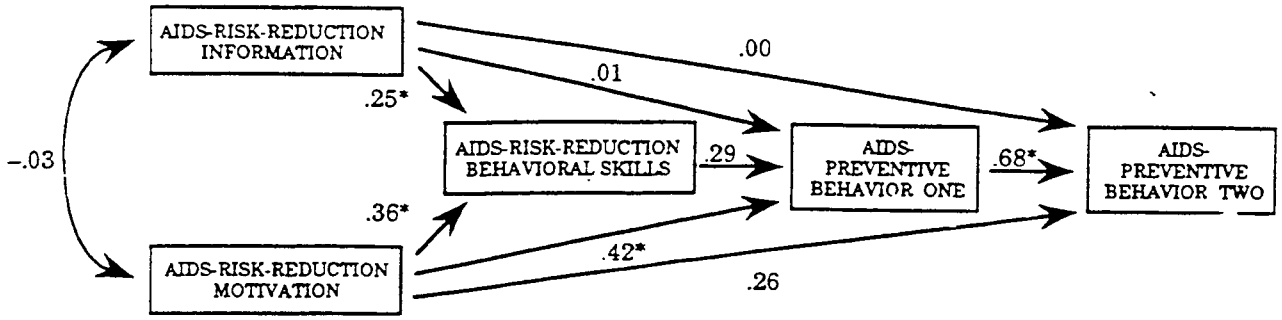

Figure 3. Relations among the three-factor model constructs for gay men. (AIDS-Preventive Behavior 1 = initial level of AIDS-preventive behavior; AIDS-Preventive Behavior 2 = level of AIDS-preventive behavior 2 months later. *$p < .05$.)

taught, rehearsed, and refined in an organized, scriptlike fashion that is readily translatable into improved AIDS-preventive behavior in participants' own social settings (Bandura, 1989; Byrne, 1983; W. A. Fisher, 1990a, 1990b; Kelly & St. Lawrence, 1988, 1990; Kelly et al., 1989). This can be done in several ways. For example, observing models of similar others who enact AIDS-preventive behaviors, personally role playing these behaviors, receiving subsequent feedback and reinforcement, and then refining one's performance have proven to be particularly effective in equipping individuals with necessary AIDS-prevention behavioral skills (Kelly & St. Lawrence, 1988; Kelly et al., 1989; Schinke, 1984). Fantasy and "in vivo" walk-throughs of public AIDS-preventive behaviors (e.g., condom purchasing, HIV testing) may help prepare people to actually engage in these acts (W. A. Fisher, 1990a, 1990b; Kelly & St. Lawrence, 1988). (For a fuller discussion of techniques to facilitate behavioral skills acquisition and practice, see W. A. Fisher, 1990a, 1990b.)

Note that there is empirical evidence that the teaching and rehearsal of behavioral skills for protected sexual behavior has a sustained impact on reducing gay men's risky sexual practices (Kelly & St. Lawrence, 1988, 1990; Kelly et al., 1989) and on increasing pregnancy prevention among adolescents (Schinke, 1984; Schinke, Blythe, & Gilchrist, 1981) and among university students (W. Fisher, 1990b). Studies have not yet assessed the effect of relevant behavioral skills training on AIDS-preventive behavior per se in the latter two groups, as well as others at risk for HIV, but there is no reason to believe it would not be effective. Once relevant behavioral skills have been taught and rehearsed, evaluation research must be performed to assess whether they have been mastered and retained and whether they are related to AIDS-risk behavior change per se. In such research, in addition to using self-report measures of perceived self-efficacy with regard to relevant behavioral skills, videotaped role plays are useful evaluation techniques because they tap individuals' actual ability to perform the requisite behaviors.

Testing the IMB Model

The proposed IMB model of AIDS-preventive behavior is both conceptually based and is consistent with an extensive review of the relevant literature. The model and the specific hypothesized relations among the three factors in the model (see Figure 1) have also been tested using structural equation modeling techniques (J. D. Fisher, Fisher, Williams, & Malloy, 1991). Both for gay men who were affiliated with homophile organizations and for primarily heterosexual university students, population-specific data were collected on subjects' initial levels of information, motivation, behavioral skills, and

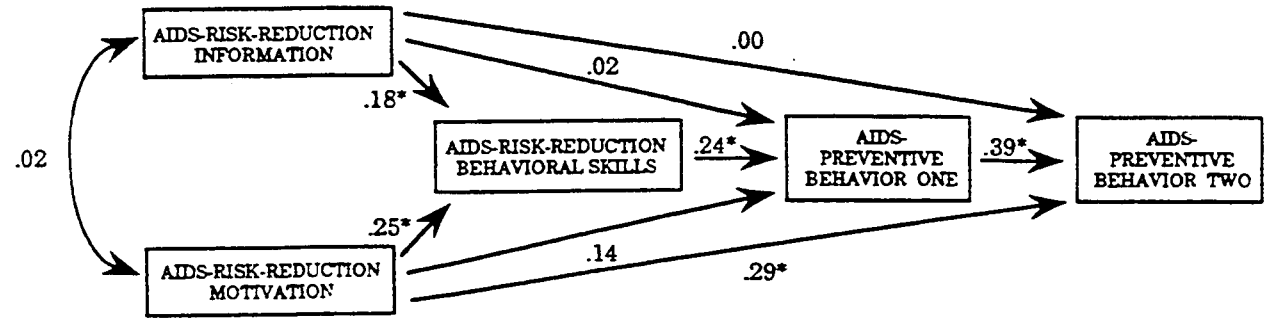

Figure 4. Relations among the three-factor model constructs for university students. (AIDS-Preventive Behavior 1 = initial level of AIDS-preventive behavior; AIDS-Preventive Behavior 2 = level of AIDS-preventive behavior 2 months later. *$p < .05$.)

AIDS-preventive behavior, and 2 months later, an additional measure of AIDS-preventive behavior was collected. For the gay male sample ($n = 91$), as can be seen in Figure 3, AIDS-prevention information and AIDS-prevention motivation are independent factors, they are each related to AIDS-prevention behavioral skills, and AIDS-prevention behavioral skills are related to AIDS-preventive behaviors per se. Moreover, there is a significant independent relation between AIDS-prevention motivation and AIDS-preventive behavior. The IMB model accounts for fully 35% of the variance in gay men's AIDS-preventive behaviors at the first measurement interval, and the model is stable in terms of consistent prediction of AIDS-preventive behaviors across 2 months.

For the university student sample ($n = 174$), as can be seen in Figure 4, information and motivation are again independent factors, they are each again related to AIDS-prevention behavioral skills, and AIDS-prevention behavioral skills are related to AIDS-preventive behaviors per se. Once again, AIDS-prevention motivation has an independent link with AIDS-preventive behavior. The model is stable in terms of consistent prediction of AIDS-preventive behaviors across 2 months, it accounts for 10% of the variance in university students' AIDS-preventive behaviors at the first measurement interval, and AIDS-preventive behavior per se remains stable across time. Overall, the hypothesized causal factors and paths are nearly identical across the university student's and gay men's samples. These structural equation models provide rare prospective tests of a comprehensive AIDS-risk-reduction model, and the results of these analyses provide consistent support for the information–motivation–behavioral skills conceptualization of AIDS-preventive behavior across two populations of interest.

Summary

We have proposed and conducted preliminary tests of a model for AIDS-risk reduction that holds that preventive behavior is a function of people's information about AIDS, their motivation to reduce AIDS risk, and their behavioral skills for performing the acts involved in AIDS-risk reduction. The conceptualization specifies a widely applicable technology for reducing AIDS-risk behavior and a three-phase implementation process: elicitation of the initial levels of information, motivation, and behavioral skills; intervention in a group-appropriate fashion to modify information, motivation, behavioral skills, and ultimately AIDS-preventive behaviors; and evaluation of the intervention in terms of each of the foci of intervention. We hope that application of this model can contribute to the containment of the tragic AIDS epidemic with which we are presently confronted.

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