



PREVENTION OF SEXUALLY TRANSMITTED INFECTIONS IN DIFFERENT POPULATIONS: A REVIEW OF BEHAVIOURALLY EFFECTIVE AND COST-EFFECTIVE INTERVENTIONS

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ABSTRACT: This paper reviews literature supporting the development and implementation of effective HIV/STI interventions for different populations. Evaluation research indicating favourable behavioural outcomes for HIV/STI prevention interventions with adolescents, street youth, STI clinic patients, women, heterosexually active men, men who have sex with men, and communities is summarized. Research suggesting that HIV/STI prevention interventions can be cost-effective or result in cost-savings is also described. Based on the interventions reviewed, some common characteristics of behaviourally effective HIV/STI interventions are identified and discussed. These include: use of theoretical models; incorporation of behavioural skills training; emphasis on promoting condom use; helping clients create a personal sexual health plan; use of community/culturally appropriate strategies; use of peer educators and community opinion leaders; and appropriate intervention duration.

Key Words: HIV STI STD Prevention Intervention Evaluation

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INTRODUCTION

Human immunodeficiency virus (HIV) and other sexually transmitted infections (STI) pose a significant threat to the health and well-being of Canadians. Infertility, ectopic pregnancy, cirrhosis of the liver, perinatal morbidity and cancer are among the potential outcomes of STI and infection with HIV, in particular, is life-threatening. Up to the end of 1999, over 45,000 Canadians had tested positive for HIV and it is estimated that up to 15,000 Canadians are HIV-positive but unaware of their infection (Health Canada, 2000a). With respect to reportable STIs, in 1999, reported chlamydia, gonococcal and infectious syphilis cases accounted for 44% of all notifiable disease reports to Health Canada (Health Canada, 2000b). In addition, it is estimated that between 40% and 70% of chlamydial infections are asymptomatic suggesting that the actual number of chlamydia cases in Canada may be much higher than reported (Health Canada, 2000b). With respect to nonreportable STIs, regional studies have suggested prevalence rates of human papillomavirus of up to 25% in some population subgroups (i.e., young women) (Sellors et al., 2000).

The high incidence of some STI in Canada and the continuing concern about HIV infection underscore the importance of developing and implementing high quality prevention interventions to reduce the incidence of HIV/STI infection. Such STI/HIV prevention interventions must enable individuals to adopt and maintain behaviours that substantially reduce their risk of exposure to infection and/or to change behaviours that increase risk. In order to appreciably lessen the burden of HIV/STI on Canadian society, such interventions must be available to at risk individuals and communities across Canada.

An important first step in decisions about allocating resources to develop implement HIV/STI prevention interventions is assembly and analysis of accurate information on the efficacy, characteristics, and cost-effectiveness of previously tested interventions to prevent HIV/STI in different populations. This information is important because service providers, and funders, should begin with a clear understanding of the characteristics of effective interventions, the potential of a particular intervention to help individuals reduce HIV/STI risk behaviour, and an ability to apply

this knowledge in their programming (Neumann & Sogolow, 2000). This paper seeks to support individuals and organizations contemplating or currently involved in such interventions. It first summarizes literature that documents the success of specific HIV/STI prevention interventions in helping individuals from different populations to reduce their risk of HIV/STI infection. Secondly, it identifies from this literature some of the key characteristics of behaviourally effective interventions that should be considered planning intervention programs. Finally, because decisions regarding resources and funding for public health and education programs may be influenced by considerations of cost or cost-benefit, this paper summarizes evidence suggesting that many effective HIV/STI prevention interventions can be cost-effective or result in cost-savings.

METHODOLOGY OF LITERATURE REVIEW AND ANALYSIS

Relevant data-bases (e.g., Medline, Expanded Academic Index, PsychINFO) were searched for research articles that reported the outcomes of HIV/AIDS and/or STI prevention interventions conducted in North American settings. The search was restricted to interventions that addressed the main population groups most often targeted by public health HIV/STI programs (i.e., adolescents, street youth, heterosexual women and men, and men who have sex with men). Interventions targeting populations at the community level were also included.

The programs and evaluations described in this review were selected according to the following criteria: (a) the evaluation was based on behavioural outcomes or HIV/STI rates; (b) control groups were used to measure effectiveness, in most cases with a randomized trial design; (c) success was reported in terms of either a demonstrated reduction in STI infections or a change of behaviour in the direction of HIV/STI risk-reduction; and (d) positive intervention effects were reported that were statistically significant compared to control or comparison conditions. This paper also briefly describes the content and conclusions of previous literature reviews concerning the behavioural effectiveness of HIV/STI prevention interventions among the different populations of interest. An



additional literature search was conducted to find articles and research reports that assessed the potential of HIV/STI interventions to be cost-effective or cost-saving. Particular attention was given to locating cost-effectiveness studies of interventions that had been shown to be behaviourally effective on the basis of separate, methodologically-sound evaluations.

Literature uncovered using the foregoing methodology was analyzed to determine whether behaviourally effective HIV/STI prevention interventions had important common characteristics. The paper concludes with a summary of such examples and with the suggestion that a review of the scientific research to identify such key intervention characteristics can provide the basis for a checklist against which to assess one's plans for the development and implementation of new HIV/STI prevention programs.

BEHAVIOURAL INTERVENTIONS TO PREVENT HIV/STI IN DIFFERENT POPULATIONS

INTERVENTIONS TO PREVENT HIV/STI AMONG ADOLESCENTS

A majority of young adults in Canada have their first experience of sexual intercourse during their teenage years (Maticka-Tyndale, 1997; Maticka-Tyndale, Barrett, & McKay, 2000). While there is evidence for increasing use of condoms among sexually active teens and young adults (Maticka-Tyndale, 1997), consistency of use is sporadic and well below what would be needed for optimal prevention of STI (Fisher & Boroditsky, 2000; McCreary Centre Society, 1999; Thomas, DiCenso, & Griffith, 1998). Rates of common STI's, and particularly chlamydia, are highest among teens and young adults (Health Canada, 2000a). Although the prevalence of HIV infection among Canadian youth is currently low, adolescents are, according to Health Canada (1999), "...a group that could experience an increase in HIV infection" (p. 1).

HIV/STI prevention interventions for adolescents can be offered at different venues including schools, public health clinics and a number of different community settings. Jemmott & Jemmott (2000) reviewed 21 evaluation studies examining interventions conducted

in community settings and designed to reduce HIV sexual risk behaviour among adolescents. Sixteen of the studies were randomized control trials and 5 were nonrandomized intervention studies that included a control group. Follow-up data collection periods ranged from 1 to 24 months with just over half including follow-ups at 6 months or more post intervention. Mean ages in the samples ranged from 11.4 to 20.1 years with over half of the studies focusing on subjects in late adolescence. Sample sizes ranged from 43 to 659. The number of intervention sessions ranged from 1 to 20 and the number of contact hours ranged from 0.3 hours to 35 hours with a median of 4.5 hours. Most of the studies were informed by one or more theories of behaviour change with the most common being cognitive behavioural theory, social cognitive theory, the theory of reasoned action, the health belief model, the theory of planned behaviour, and the information, motivation, behavioural skills model.

With respect to the measures used to evaluate the 21 interventions, Jemmott & Jemmott (2000) found that condom use (62%) and number of sexual partners (52%) were the most common outcome variables. Other outcomes included condom acquisition, frequency of unprotected sexual intercourse, abstinence, frequency of sexual intercourse, number of sexual partners and frequency of anal intercourse. The most commonly assessed mediator variable were self-efficacy (62%), attitudes and intentions (48%), knowledge and hedonistic beliefs (43%) and perceived vulnerability (34%).

Jemmott & Jemmott (2000) used meta-analytic techniques to estimate intervention effect sizes. Meta-analysis of the 21 studies indicated that the interventions significantly reduced HIV risk behaviour. There was a statistically significant impact on condom acquisition, condom use, frequency of unprotected sexual intercourse, and on number of sexual partners, whereas the effect size on abstinence was marginally significant and the effect size for frequency of sexual intercourse was nonsignificant. "The magnitude of effects suggests that interventions have had the greatest impact on condom use and on condom acquisition. Effects of the interventions on frequency of sexual intercourse, abstinence, and number of sexual partners were considerably smaller" (Jemmott



& Jemmott, 2000, p. 114). Of the studies that examined long-term effects, none of the abstinence-based interventions had a significant impact 12 months post intervention whereas several other interventions maintained an impact on condom use 12 months later. Overall, Jemmott & Jemmott (2000) note that the available research "...particularly the studies showing the strongest results, has used a cognitive behavioral framework and small group interventions" (p. 121).

Kim, Stanton, Li, Dickersin & Galbraith (1997) reviewed 40 adolescent AIDS risk reduction intervention evaluations published between January 1983 and November 1995. Less than half of the studies were randomized control trials but nearly all of the studies employed a control group of some kind. Of the outcomes assessed in the studies, most reported a positive impact. That is, 88% found increases in knowledge, 58% changes in attitude, 60% increased intentions to use condoms, 73% increased use of condoms, and 64% resulted in a decrease in the number of sexual partners.

Yamada et al. (1999) identified 24 randomized and/or controlled trials of primary prevention programs to prevent STI infection among adolescents published before October 1998. These researchers were particularly concerned with the methodological rigor of the evaluations, giving each one a rating of strong, moderate, or weak. None of the studies were rated as methodologically strong and only four were given a moderate rating. All four of these interventions had a positive behavioural impact on one or more of the following outcomes: improved condom use, reduced number of sexual partners, and reduced frequency of sexual intercourse. All four of the interventions were theory-based and included skill building exercises. Three of the interventions were delivered by trained facilitators and lasted a minimum of eight hours. Based on the results of the four studies, the authors conclude that increasing condom use appears to be the most changeable behaviour and that interventions should therefore focus on condom use.

Among the evaluations of HIV/STI prevention interventions for adolescents delivered through the schools, the randomized control trial evaluation conducted by Jemmott, Jemmott & Fong (1998) of

an HIV risk reduction intervention for students from sixth and seventh grade classes is perhaps among the most informative in terms of documenting the potential effectiveness of such programs and of identifying the most effective types of instruction. Their study was the first randomized control trial to directly compare the efficacy of abstinence and safer sex interventions and to compare the behavioural effects of peer-led and adult-led interventions.

Jemmott, Jemmott & Fong's (1998) study subjects were 659 African American adolescents (mean age = 11.8 years) at three middle schools in Philadelphia. About 53% of subjects were female and 25% of the total sample reported ever having sexual intercourse. The sample was age- and gender-stratified, and then the subjects were randomly assigned to either an abstinence or safer-sex intervention or a control group. Each intervention consisted of eight 1-hour classes delivered on two consecutive Saturdays. The interventions were based on social cognitive theory, the theory of reasoned action, and the theory of planned behaviour. Additional information came from elicitation research and adolescent focus groups. Both the abstinence and safer sex interventions focused on self-efficacy and negotiation skills. Both interventions utilized group discussions, videos, games, brainstorming, experiential exercises, and skill-building activities. All subjects completed confidential questionnaires immediately before and after the interventions and at 3-, 6-, and 12-month follow-ups. Among the outcome measures were self-reported sexual behaviours in the previous three months, including frequency of sexual intercourse and condom use.

At the 3-month follow-up, the subjects in the abstinence intervention were slightly less likely to have had intercourse in the previous three months than those in the safer sex intervention, and significantly less likely to have had intercourse than those in the control group (12.5%, 16.6%, and 21.5%, respectively). Among those adolescents who had been sexually active in the previous three months, subjects in the safer sex intervention were more likely to report having used condoms consistently (65.6%) than those in the abstinence (38.1%) or control (36.1%) groups.



At the 6-month follow-up, subjects in the abstinence intervention were not less likely to have had intercourse in the previous three months than those in the safer sex intervention or the control group (17.2%, 15%, and 22.7%, respectively). However, subjects in the safer sex intervention were again more likely to report having used condoms consistently in the previous three months (50.0%) than those in the abstinence intervention (44.4%) or control group (37.5%).

At the 12-month follow-up, subjects in the abstinence intervention were not less likely to have had intercourse in the previous three months than those in the safer sex intervention or the control group (20%, 16.5%, and 23.1% respectively). Once again, however, subjects in the safer sex intervention were more likely to report having used condoms consistently in the previous three months (62.5%) than those in the abstinence intervention (41.2%) or control group (51.2%).

The Jemmott, Jemmott & Fong (1998) study is important to consider because it demonstrates that a carefully developed, theory-based, and skills focused HIV/STI intervention for young adolescents can significantly reduce unprotected sexual intercourse. Furthermore, this study supports the findings of other evaluation literature that casts doubt on the efficacy of abstinence-based interventions.

Safer Choices is a school-based curriculum designed to reduce the number of students who either begin to or have sexual intercourse during their high school years and to increase condom use among students who do have sex. Although the intervention content focuses mainly on STIs, reduction of unwanted teen pregnancy is also a program objective. The intervention is theory-based, informed by social cognitive theory and social influence theory. Thus, the intervention seeks to influence a number of factors related to adolescent sexual risk taking:

Knowledge about HIV and other STDs; attitudes about sexual behaviour and condom use; normative beliefs regarding sexual intercourse and condom use; students' belief in their abilities (self-efficacy) to refuse sexual intercourse or unprotected sexual

intercourse, to use a condom, and to communicate about safer sexual practices; perceived barriers to condom use; perceived risk of becoming infected with HIV or other STDs; and communication with parents (Coyle et al., 1999, p. 181).

Safer Choices consists of five components: establishing a school health promotion council of teachers, parents, students, administrators, and community representatives; curriculum and staff development; establishment of a *Safer Choices* peer team or club at every school; a parent education component including a newsletter; and school-community linkages designed to enhance students' access to support services outside the school. The most intensive components are the 10-lesson curriculum and school-wide, peer-sponsored events.

The program evaluation was conducted through a randomized control trial involving 20 schools in Texas and California. Ten schools received the *Safer Choices* program and the other schools received a standard knowledge-based HIV prevention curriculum. The study sample consisted of 3,600 grade-nine students who completed self-report surveys. Baseline data was collected in the fall of 1993 and the first wave of follow-up data was collected an average of seven months later. The survey questionnaire addressed demographic characteristics, psychosocial factors, and a wide array of sexuality measures.

At baseline, students in both groups had a "modest" knowledge of HIV and other STIs but at follow-up, while both groups demonstrated greater knowledge, the increase was significantly higher in the *Safer Choices* group. At follow-up, the *Safer Choices* group expressed significantly more positive attitudes towards condoms than the comparison groups but there were no significant differences between groups in their attitudes towards sexual intercourse. Similarly, students in the *Safer Choices* group had significantly higher scores on a condom use self-efficacy scale than the comparison group but there was not a significant difference between groups in their self-efficacy to refuse sex or to communicate with a partner about sexual limits. Compared to the comparison group, students in the *Safer Choices*



program reported a significantly greater reduction in barriers to condom use.

With respect to behavioural outcomes, there were no statistically significant differences between students in the *Safer Choices* group and the comparison group in the incidence of first intercourse between baseline and follow-up. However, Coyle et al. (1999) note that because very few students in either group had first intercourse between baseline and follow-up, it was unlikely that statistically significant differences would be found. Among students who had sexual intercourse, those who took *Safer Choices* were approximately one half as likely to have engaged in unprotected intercourse as those who took the standard program. Coyle et al. (1999) report that

At follow-up, sexually experienced students in the intervention schools were significantly more likely to have used condoms ($P = 0.02$) and an effective pregnancy prevention method, including birth control pills plus condoms, or condoms alone ($P = 0.03$), than were students in the comparison schools (p. 186).

In sum, the Coyle et al. (1999) report on a randomized control trial of a school-based pregnancy and STI prevention intervention showed that such programs can be effective. Furthermore, as discussed in further detail elsewhere in this review, this same intervention was subjected to a cost benefit analysis which found that, with respect to the prevention of STDs alone, for every dollar spent on the program, \$2.65 in total medical and social costs were saved (Wang et al., 2000) (See the Cost Effectiveness of Interventions to Promote Sexual Health section of this literature review). In other words, *Safer Choices* is a school-based adolescent sexual health promotion intervention that is, according to available evaluation reports, both effective in reducing risk behaviour and cost-effective.

Kirby, Barth, Leland, and Fetro (1991) evaluated *Reducing the Risk*, a classroom intervention designed to help students postpone first intercourse and to reduce unprotected sex among sexually active students. Grade 10 students were offered the 15-session intervention as part of a comprehensive health

curriculum. The intervention was provided in 13 California high schools while students in comparison schools received the usual sexuality education program available at their schools. The average age of students participating in the study was 15 years and about 37% had had intercourse before the intervention began.

The intervention was theoretically-based, informed by a combination of the social learning, social inoculation, and cognitive behavioural theories. Teachers who volunteered to teach the intervention received three days of training on how to implement *Reducing the Risk*. The curriculum emphasized the development of the social skills relevant to the reduction of sexual risk-taking behaviour and made extensive use of role playing exercises to practice and model such skills. The intervention encouraged the social norms that students should avoid unprotected sex by either not having sex or by using protection. The role plays, which became less scripted as the intervention progressed, helped students to recognize social pressures to have sex and develop assertive communication skills. Students were encouraged to go to stores and clinics to obtain relevant health information and to ask their parents about their views on abstinence and birth control.

In their evaluation of the intervention, Kirby et al. (1991) found that students who had received *Reducing the Risk* were significantly less likely to have had first intercourse at follow-up than students in the comparison schools. Students who received the intervention were also significantly less likely to have had unprotected intercourse than sexually active students in the comparison schools. In addition, *Reducing the Risk* has been selected by the U.S. Centers for Disease Control and Prevention (CDC, 1999a) for its *Compendium of HIV Prevention Interventions with Evidence of Effectiveness*.

It should be noted that, although the effectiveness of school-based sexuality education is sometimes questioned, the three evaluated school-based interventions summarized above (Coyle, et al., 1999; Jemmott, Jemmott, & Fong; Kirby et al., 1991) demonstrate that such interventions can reduce adolescents sexual risk behaviour.



INTERVENTIONS TO PREVENT HIV/STI AMONG STREET YOUTH

The population known as street youth, sometimes referred to as homeless youth or runaways, encompasses a varied and diverse subset of young people. According to Walters (1999), street youth include,

...(a) runaways—those who have left their home without a parent's or guardian's consent; (b) throwaways—those who are forced out of their homes; (c) system and foster care youth—those who leave problematic social service placements; (d) school dropouts—those who are exposed to and engage in risk behavior, but who may return to a residence to sleep; and (e) homeless youth—those whose families become homeless (p. 188-189).

There are significant numbers of homeless young people living on the streets of Canadian cities. In 1990, the number of street youth living in the city of Toronto was estimated to be between 3000 and 5000 (Smart, Adlaf, Walsh, & Zdanowicz, 1992). Informal observation would suggest that this number has increased since then. Street youth are at high-risk for HIV/STI infection. Among the factors placing them at high risk are living in an urban environment, poverty, poor health, social marginalization and a host of other factors (Walters, 1999). A recent seroprevalence study of street involved youth aged 14 to 25 years in the city of Toronto found that 2.2% were HIV-positive (Dematteo, Major, Block, et al., 1999). Other research suggests that the incidence and prevalence of chlamydia, herpes, and viral hepatitis are high among homeless adolescent populations (Noel, et al., 2001). Research from New York City suggests that up to 26% of street youth were involved in survival sex (Rotheram-Borus et al., 1992). A comparable report on street youth in Montreal identified patterns similar to those identified above including the high prevalence of markers for Hepatitis B (Haley, Roy, Belanger & Crago, 1998). In addition, consistent condom use among street youth is low (Rotheram-Borus & Koopman, 1991). Walters (1999) notes that because street youth are usually unaware of their HIV status and may rely on survival sex to meet basic needs, "...they may serve as an active

vector for HIV transmission. Thus they pose a threat to public health by jeopardizing their own health and the health of their sexual partners" (p. 198). In sum, it is clear that high quality, effective HIV/STI risk reduction interventions are among the range of health and social services required by street youth.

For a number of reasons, conducting follow-up evaluation studies of HIV/STI prevention interventions with street youth is very difficult. For example, they usually do not have a fixed address or telephone number and may move in and out of a study area repeatedly. Consequently, there are few evaluation studies measuring the behavioural outcomes of HIV/STI prevention interventions for street youth. However, the evaluation studies that do exist suggest that well designed and implemented HIV/STI prevention interventions for street youth can result in significant reductions in high-risk sexual behaviour.

The most comprehensively documented evaluation of an HIV/STI prevention intervention targeting street youth was conducted by Rotheram-Borus, Koopman, Haignere, & Davies (1991) who assessed a prevention program for runaway youth in New York City. The study was conducted at two residential shelters for runaway youth. Runaways at one of the shelters participated in an intensive HIV risk reduction intervention consisting of four elements. First, knowledge about HIV/AIDS was addressed through video and art workshops where the participants developed soap opera dramatizations, public service announcements, commercials, and raps about HIV prevention and by reviewing commercial HIV/AIDS prevention videos. Second, training related to emotional and behavioural responses and strategies for high HIV risk situations was provided. Each session, for these first two components, lasted from 90 to 120 minutes and consisted of about 10 participants and a trained public health facilitator. Third, the runaway youth visited a community-based agency that provided comprehensive health and mental health care as well as legal aid, vocational and educational training, recreational opportunities and a health nurse visited the shelter every week to address specific health concerns. Fourth, individual barriers to safer sex were addressed in an individual counselling session. To evaluate the effectiveness of the intervention, Rotheram-Borus et al. (1991) used



the findings from self-report questionnaires to compare the sexual behaviours of runaway youth at the intervention shelter (n=78) with those of runaways at a control shelter (n=67) at baseline, 3-month follow-up, and at a 6-month follow-up. The study sample included predominately minority youth (63% Black, 22% Hispanic); there 52 males and 93 females ranging in age from 11 to 18 years. At each assessment, the study participant provided data about his or her sexual behaviour in the previous three months. Three indexes of sexual risk behaviours were calculated. First, abstinence was defined as having no sexual partners. Second, high-risk sexual behaviour was defined as infrequent condom use (in 0% to 49% of sexual encounters) combined with 10 or more sexual encounters and/or three or more sexual partners. Consistent condom use was defined as using a condom for every encounter of vaginal, anal, or oral sex.

The number of sessions that a runaway was exposed to depended on her or his length of stay at the shelter. Rotheram-Borus et al. (1991) reported that for two of the three indexes of sexual behaviour, the intervention appears to have had a significant impact in reducing high-risk sexual behaviour. Among those runaways receiving 15 or more sessions, consistent condom use rose from 33% at baseline to 57% at 3 months and 63% at 6 months. Also, for runaways receiving 15 or more sessions, high-risk sexual behaviour fell from 20% at baseline to zero at 3 and 6 months. The intervention did not, however, result in a significant increase in abstinence. Reductions in HIV risk were linearly related to the number of intervention sessions that a runaway received. In sum, this evaluation study indicates that an intensive (i.e., 15+ session) HIV/STI prevention intervention for runaway youth can significantly reduce high-risk behaviour. A subsequent version of this intervention, entitled StreetSmart, was chosen for the CDC's (1999a) *Compendium of HIV Prevention Interventions with Evidence of Effectiveness*.

In a more recent, but as yet unpublished study, Rotheram-Borus et al. (1999) conducted a controlled trial study of an HIV prevention intervention for homeless and runaway youth in New York City. The intervention targeted injection drug use and sexual behaviour. The intervention included components that

addressed the social roles, identities, routines, and behaviours of the youth as they related to drug use and sexuality. For example, the intervention sought to incorporate definitions and routines of sexual responsibility into the social role of "junkie" or "druggie". These social routines were developed through role plays and mobilization of support for beliefs and attitudes that reinforce safer sex acts and abstinence from substance use, as well as maintaining positive social support networks for behaviour change. This intervention resulted in significant reductions in unprotected sex and substance use at follow-up.

Although the evaluation research on HIV/STI prevention interventions for street youth is sparse, the available research does indicate that well developed and intensive programs can be behaviourally effective. However, program planners developing HIV/STI prevention interventions for street youth need to recognize that "Human immunodeficiency virus prevention strategies will be successful only when street youth are provided with long-term and stable living environments. Risk from HIV must be examined in conjunction with the risks from other circumstances that befall these individuals" (Walters, 1999, p. 196).

INTERVENTIONS TO PREVENT HIV/STI AMONG CLIENTS OF STI CLINICS

Interventions and services targeted at HIV/STI prevention among women and men are delivered in a variety of venues. Public health STI clinics are a common setting for HIV/STI interventions targeting adults as they provide direct access to women and men likely to be at high-risk for infection (Richert et al., 1993). General health clinics and community centres provide other venues for reaching adults for HIV/STI prevention interventions. A number of studies point to the behavioural effectiveness of HIV/STI prevention interventions targeted at adult women and men visiting STI clinics.

Kamb et al. (1998) conducted a randomized control trial of the effectiveness of HIV/STI prevention counselling interventions at U.S. inner city STI clinics. Study participants were 5758 HIV-negative men and women aged 14 years or older who visited a study clinic for a full STI diagnostic examination. Intervention participants were assigned to 1 of 3



different groups receiving individual face-to-face HIV prevention counselling. The interventions, titled *Project RESPECT*, were carried out by public health department staff who, for the most part, did not have advanced degrees or extensive experience in interactive counselling. Interventions were tailored to each individual's personal HIV risk but all interventions encouraged consistent condom use for vaginal and anal intercourse. Participants in the first group (enhanced counselling) received a four session (220 minutes total) intervention based on the Theory of Reasoned Action and Social Cognitive Theory. The sessions included behavioural goal setting exercises and the development of a long-term risk reduction plan. Participants in the second group (brief counselling) received a short (40 minutes total) two-session counselling intervention based on the U.S. Centers for Disease Control and Prevention's client centred approach to HIV counselling. The sessions were designed to help the participant recognize personal barriers to risk reduction and the development of short-term and long-term HIV risk reduction goal setting. The third group (didactic counselling) received a very brief (10 minutes total) two-session intervention that provided didactic, non-interactive HIV/STD prevention counselling.

Kamb et al. (1998) evaluated the interventions at 3-, 6-, and 12-month follow-ups through self-reported condom use (used condoms 100% of the time) and new diagnosis of STIs (gonorrhoea, chlamydia, syphilis, HIV) defined by laboratory tests. Participants in the enhanced counselling and brief counselling interventions were significantly more likely than those in the didactic counselling intervention to report "no unprotected vaginal intercourse" at the follow-ups. Fewer participants in the interactive counselling interventions than in the didactic intervention were diagnosed with STIs at the follow-ups. For example, at the 6-month follow-up, 7.2% of participants in the enhanced counselling group were diagnosed with new STIs compared to 7.3% in the brief counselling group and 10.4% in the didactic counselling group. Overall, the interactive counselling resulted in a reduction in STI incidence of about 30% after 6 months and 20% after 12 months. Kamb et al. (1998) suggest that their study indicates that,

...counselling leads to a reduction in sexually

transmitted infections. In addition to concerns about efficacy, concerns that interactive counselling is not feasible for busy, publicly funded clinics, or cannot be conducted by personnel currently employed by health departments, should now be put to rest (p. 1166).

Project RESPECT was selected for the CDC's (1999a) *Compendium of HIV Prevention Interventions with Evidence of Effectiveness*. Several of the behaviourally effective interventions targeting women and men summarized below were also conducted at STI clinic settings (i.e., Latka, Gollub, French, & Stien, 2000; O'Donnell, O'Donnell, San Doval, Duran, & Labes, 1998).

INTERVENTIONS TO PREVENT HIV/STI AMONG WOMEN

STIs can have profound negative health consequences for women and particularly so when they are undiagnosed and untreated. These negative outcomes can include ectopic pregnancy, infertility, and cervical cancer. According to Health Canada (2000c), "Canadian women are increasingly becoming infected with HIV, especially those who use injection drugs and whose sexual partners are at increased risk for HIV" (p. 5). Furthermore, the proportion of women among new HIV infections in Canada has increased steadily over time. "Before 1995, adult women represented 9.6% of all positive HIV test reports with known age and gender in Canada. In 1995, this proportion increased to 18.5%, and now stands at 23.9% in 1999" (p. 2). Over a third of new HIV infections among women in Canada are due to heterosexual contact (Health Canada, 2000c).

Overall, there are a sufficient number of methodologically sound evaluations of HIV/STI prevention interventions aimed specifically at women resulting in statistically significant positive behavioural impacts on sexual risk reduction to conclude that properly developed and implemented interventions can achieve their desired objectives (O'Leary & Wingood, 2000; Shepard, Peersman, Weston, & Napuli, 2000). From their review of HIV prevention programs targeting women, O'Leary and Wingood (2000) concluded that "...a growing number of studies reporting positive risk reduction effects of behavioral



prevention interventions is encouraging and suggests that many women possess or can develop the skills to effectively reduce their risk of HIV infection" (p. 179). Successful prevention interventions for women have been conducted at both the clinic- and community-levels. Sikkema, Kelly, Winett et al.'s (2000) evaluation of a community-level HIV prevention intervention for women living in low-income housing developments in 5 U.S. cities provides evidence that a neighbourhood-based HIV prevention intervention can result in a significant reduction in high-risk sexual behaviours among women (For a description of this intervention see the Large Scale Community Wide HIV/STI Prevention Interventions section of this review). Several behaviourally effective clinic-based HIV/STI interventions for women are described below.

Latka, Gollub, French, & Stein (2000) conducted an observational cohort study to evaluate an intervention that used different strategies to promote condom use among women at high risk for HIV/STI infection. The sample for the study consisted of 292 women attending the largest STI clinic in Philadelphia. Most (91%) of the women were black, 17% traded sex for money, and 9% were using crack cocaine at least once a week. All subjects were 18 years of age or older, had been sexually active with men in the previous four weeks, and had been diagnosed with or had contact with an STI in the previous three months.

The women agreed to participate in one of three interventions (each woman chose which of the three interventions to participate in). One intervention focused exclusively on promoting use of the male condom. The second intervention focused exclusively on promoting the female condom. In the third intervention, subjects received counselling on six different contraceptive methods: male condoms, female condoms, diaphragm, cervical cap, spermicides, and pre-ejaculatory withdrawal in order of their effectiveness (i.e., hierarchy counselling). Counselling for all groups consisted of either individual or small group sessions.

In all counselling sessions, we cited abstinence as the only foolproof way to avoid infection. For those choosing to be sexually

active (the great majority of clinic clients) we stressed the need to use protection consistently and for all types of sex. During male-condom sessions we covered proper use of a male condom and gave tips on negotiating use with a partner. During female-condom sessions we introduced the female condom, described how to insert and use it, and gave a brief overview of female reproductive anatomy to aid in teaching proper insertion of the device (Latka et al., 2000, p. 432).

All women were provided with a six-month supply of the appropriate contraceptive depending on which intervention they were in. Women enrolled in the male condom intervention with the understanding that they would use male condoms for the duration of the study and women in the female condom group agreed to use only female condoms. Women in the hierarchy group were allowed to choose multiple methods and change them at will.

After the intervention, the women were interviewed and they then returned for follow-up visits at 2 weeks, 4 months, and 6 months. Subjects were assessed in terms of the proportion of male condom or female condom protected coital acts. All three interventions resulted in large increases in the proportion of condom-protected coital acts from baseline to the three follow-ups. For example, the proportion of condom protected acts in the hierarchy counselling group increased from 32% at baseline to 71% at four months and 66% at six months. When the full study group initially enrolled was considered, at the six-month follow-up, condom use was significantly higher in the hierarchy group than for the male condom group but not for the female condom group. Among the other findings was that some of the women in the female condom group continued to use male condoms even though they entered the group with the understanding that they would only use female condoms. Male condoms use accounted for about one third of all condom protected acts throughout the follow-up period in the female condom group. In addition, in the hierarchy group, condom use increased most for women who received one-on-one rather than group counselling.



Belcher et al. (1998) conducted a randomized controlled trial to evaluate the effectiveness of a single-session, skill-based sexual risk reduction counselling intervention for women at high risk for HIV infection. Participants were predominantly African American women ($n = 68$) from a low income inner-city community in Atlanta, Georgia. To be included in the study a woman needed to be at least 18 years of age and to have had sex with a man without a condom in the previous 90 days as well as having experienced at least 1 of 10 risk factors in the previous 90 days (e.g., had sex with a new partner, had sex with more than one partner). Participants in the experimental intervention received a single one-on-one counselling session (120 minutes) based on the Information, Motivation, Behavioural Skills Model (IMB) for sexual risk reduction and the Motivational Enhancement Interviewing Model. The first part of the session provided basic information about HIV/AIDS prevention and emphasized the importance of communication in relationships. In accordance with the IMB, the rest of the session helped participants learn effective communication skills related to sexual limit setting. The counsellor and participant engaged in role playing exercises emphasizing interpersonal assertiveness, refusal to engage in high-risk behaviours, and the negotiation of safer sex activities with partners. The final part of the session involved the integration of the individual IMB components and the creation of an individualized personal action plan to reduce HIV risk. The action plan was developed by the participant and was tailored to her own personal life circumstances. The control intervention group received a 2 hour counselling session that provided HIV/AIDS information but did not include motivational or skill building elements.

Belcher et al. (1998) assessed participants at baseline, and at 1-month and 3-month follow-ups on self-report measures of AIDS knowledge, behavioural intentions, self-efficacy, and sexual risk behaviour (i.e., frequency of intercourse, condom use, unprotected sex). Results of both the 1-month and 3-month follow-ups indicated that neither intervention significantly increased AIDS knowledge, or significantly impacted on behavioural intentions of self-efficacy. At follow-up there were no differences between the two groups in frequency of intercourse. However, women in the experimental intervention reported significantly higher

rates of condom use and lower rates of unprotected intercourse at the 3-month follow-up than did women in the control intervention. At baseline, women in the intervention group reported condom use 22% of the time and 66% of the time at the 3-month follow-up. The Belcher et al. (1998) intervention evaluation is important in that it provides evidence that even a single 120-minute session can potentially reduce HIV/STI risk among high-risk women.

Kelly et al. (1994) conducted a randomized controlled trial of an HIV/AIDS risk reduction intervention for high-risk minority women attending a primary health care clinic in Milwaukee Wisc. The clinic was located in a city neighbourhood with high rates of STI, teen pregnancy, poverty, and substance use. The mean age of study participants was 29 and 97% were unemployed. All participants had one of the following HIV risk factors: multiple male partners, STI diagnosis, or unprotected sex with a high-risk male in the previous 12 months. After baseline assessment, participants ($n=197$) were randomly assigned to either an intervention group or control group. Women in the intervention group received four weekly 90-minute group HIV/AIDS prevention group sessions and a one-month follow-up session. The sessions were conducted by 2 female group leaders and attended by 8 to 10 women.

Because success in effecting risk behaviour change is also determined by cognitive-attitudinal, behavioral skill, and social factors, the intervention emphasized these areas. The participants role-played how they would initiate a discussion of AIDS concerns and condom use with a potential sexual partner and how they would resist sexual pressure from a man whose risk history was unknown or with whom the woman did not want to have sex (Kelly et al., 1994, p. 1919).

The women completed a follow-up assessment 3 months post intervention. For women in the intervention group, condom use increased from 26% of intercourse occasions to 56%. There was little change in the control group. The number of women in the intervention group who used condoms at some point in the previous three months increased from 43% to 66% whereas there was no significant change



among the control group. Women in the intervention became more knowledgeable about HIV risk and viewed themselves as more vulnerable to HIV infection than did women in the control group. In addition, women in the intervention group "...exhibited change indicative of greater sexual negotiation and assertive communication skills than comparison group women" (Kelly et al., 1994, p. 1921).

Kelly et al. (1994) point out that their study contributes to the research literature indicating that providing knowledge alone is very likely insufficient to change sexual health behaviour and that in order to be successful interventions must attend to attitudinal factors and skills training. They conclude their study by noting that their results "...underscore the potential benefits of making HIV/AIDS risk behavior change groups routinely available in health and public health clinics that serve high-risk patients" (Kelly et al., 1994, p. 1922). This intervention is also particularly noteworthy because a subsequent published analysis found that, from an economic perspective, this intervention was cost-effective (See Holtgrave & Kelly [1996] described in the Cost-Effectiveness of Interventions to Promote Sexual Health section of this review). In addition, this intervention was chosen for the CDC's (1999a) *Compendium of HIV Prevention Interventions with Evidence of Effectiveness*.

INTERVENTIONS TO PREVENT HIV/STI AMONG MEN

The vast majority of HIV/STI prevention interventions targeted at men have focused specifically on men who have sex with men. However, there is also evidence to suggest that HIV/STI prevention interventions targeted at heterosexually active men can be effective in reducing STI's.

O'Donnell, O'Donnell, San Doval, Duran, & Labes (1998) evaluated a small group intervention to reduce STIs among 2004 men attending an STI clinic in New York City. The average age of study participants was 30 years and 62% were African-American while 38% were Hispanic. More than 60% of the men reported a prior STI and over 99% reported that they regularly engaged in vaginal sex. The objective of the study was to discover if a video-based STI prevention intervention could reduce rates of new STI infection among men attending a public STI clinic.

The men were divided into three study conditions. In the first condition, the men were organized into groups of 3 to 8 and shown a culturally appropriate 20-minute video on STI prevention. African-American men were shown a video titled "Let's Do Something Different" and Hispanic men were shown a video called "Porque SI". "Both videos provide information and correct misinformation about STDs and their prevention, portray positive attitudes about condom use, and model culturally appropriate strategies for encouraging condom use" (O'Donnell et al., 1998, p. 163). The videos were then used as a trigger for interactive discussion of key topics including the obstacles to condom use that the participants had experienced by and how these obstacles could be overcome. Men in the second condition watched the video only. Men in the third condition served as controls and received the standard clinic services which included an individual counselling session on STI prevention and the proper use of condoms. All study participants were offered a selection of free condoms. The New York City Department of Health surveillance database was used to determine if any of the men in the study were diagnosed with a new STI subsequent to completion of the interventions. The average length of follow-up was 17 months.

O'Donnell et al. (1998) found that, at follow-up, men who received the video-based intervention had a significantly lower rate of new STI than in controls (22.5% vs. 26.8%). There were no significant differences in rates of new infection among men who viewed the video only and those who viewed the video and participated in the interactive discussion. At follow-up men in the control group with multiple partners had a new infection rate of 32.2%, whereas men with multiple partners who received the intervention had a new infection rate of 24.8%. "This represents a 23% reduction in the rate of new infections among the group that is at greatest risk of an STD after a clinic visit" (O'Donnell et al., 1998, p. 164). This is one of the few studies to evaluate an STI intervention for heterosexually active men. However, the findings of this single study are encouraging and this intervention was also selected for the CDC's (1999) *Compendium of HIV Prevention Interventions with Evidence of Effectiveness*.



INTERVENTIONS TO PREVENT HIV/STI AMONG MEN WHO HAVE SEX WITH MEN (MSM)

As of December, 1999, of the total of 15,463 adult male AIDS cases reported in Canada, 79.2% were attributed to men who have sex with men (MSM) and an additional 5.0% were attributed to the combined category of MSM and injection drug use (Health Canada, 2000d). While data from provincial testing programs indicate that transmission by MSM is decreasing as a percentage of among newly-diagnosed adult male HIV infections, MSM transmission of HIV continues at unacceptably high levels. For example, data from Ontario suggest that the incidence of new HIV infections among MSM who are repeatedly tested for HIV decreased from 1.9/100 person-years in 1992 to 1.1/100 person-years in 1996 and then increased to 1.5/100 person years (Health Canada, 2000d). Because HIV transmission continues to occur in the MSM community it is important to continue efforts to reduce levels of HIV sexual risk behaviour among MSM who do not consistently practice safer sex and to reinforce and maintain increased safer sex behaviour changes among MSM who have been reached by HIV/STI prevention interventions.

Because HIV/AIDS has disproportionately affected MSM, particularly in the early years of the HIV/AIDS epidemic, many of the best developed and most rigorously evaluated intervention studies in the field have focused on MSM at both the individual and community levels. As a consequence, many of the theoretical approaches to prevention which now have strong scientific support, were developed through the implementation and testing of HIV prevention interventions among MSM. These models for intervention have now been broadly adopted and adapted by sexual health promotion programs for a variety of populations and for the general public.

Recent reviews of the HIV prevention literature by Ross & Kelly (2000) and Kelly (2000) have drawn a distinction between face-to-face and individual-focused HIV prevention interventions and community-level HIV prevention interventions. These reviews identify a number of well-evaluated studies that have shown the behavioural effectiveness of both face-to-face and individually focused interventions and of modestly sized community-level interventions

aimed at reducing high HIV-risk behaviour among MSM. These studies are among those most frequently cited in the HIV/STI prevention intervention literature as models for the development and implementation of interventions likely to result in behaviour change.

Kelly et al. (1989) conducted a randomized controlled trial of an HIV-risk reduction program for MSM. A sample of 104 men recruited from the community, all of whom reported high-risk sexual behaviours with male partners in the past year, were divided randomly into an intervention group and a waiting-list control group. Intervention participants received a 12-session small-group HIV risk reduction intervention. The intervention was based on cognitive behavioural theory and emphasized AIDS risk information, condom use skills training, skills training related to sexual assertiveness and negotiating safer sex, self-management training to help participants identify triggers to risky sex, cognitive self-guidance and self-reinforcement skills. The intervention also assisted participants in linking HIV-risk reduction to themes of pride, self-respect, and the responsibility to protect one's self and others. All study participants filled out a sexual behaviour questionnaire at baseline and 8 months after the experimental group received the intervention. Among participants in the intervention group, condom use for all occasions of anal intercourse increased from 23% to over 77%. Among control group participants, condom use for anal intercourse declined from 24% to 19%. The intervention group also demonstrated improvements in AIDS risk knowledge and sexual assertiveness skills. This intervention was selected for the CDC's (1999a) *Compendium of HIV Prevention Interventions with Evidence of Effectiveness*.

Valdiserri et al. (1989) demonstrated that even an extended single-session workshop focusing on skills development for gay and bisexual men can result in sustained HIV sexual risk reduction behaviour. In their intervention evaluation, the authors randomly assigned 292 gay and bisexual men to either a workshop that addressed AIDS risk reduction education alone or a workshop that combined risk reduction education with extensive risk reduction skills training involving the adoption of safer sex behaviours. The men were assessed at baseline and at 6- and 12-months post intervention on HIV/AIDS knowledge, attitudes,



behavioural intentions, and sexual behaviour including condom use. Twelve months after the intervention, those men in the enhanced skills training workshop reported greater changes in sexual risk reduction intentions and behaviours at the two follow-ups than men in the education only group. Among men in the enhanced skills training group, the proportion who used condoms consistently increased from 35% at baseline to 80% at the one-year follow-up. This intervention was also selected for the CDC's (1999a) *Compendium of HIV Prevention Interventions with Evidence of Effectiveness*.

Peterson et al. (1996) conducted a randomized controlled trial of HIV sexual risk reduction interventions involving African American MSM. Participants ($n = 318$) were randomly assigned to either a 3-hour or 9-hour intervention (delivered in three hour segments) or a control group. The interventions focused on cognitive behavioural skills training including an emphasis on safer sex negotiation skills, self-management skills, and developing a positive self-identity. Participants were followed for 18 months post-intervention. There was little change in the sexual risk behaviours of men in the control group and only modest change among men in the 3-hour intervention. However, at 18 month follow-up of men who attended the 9-hour intervention, less than half as many in comparison to baseline reported any unprotected anal intercourse in the prior 6 months (20% versus 45% at baseline). This intervention evaluation is particularly important because it demonstrates the efficacy and adaptability of a skills-based intervention in meeting the needs of a minority (MSM) within a minority community (African American men).

In discussing the findings of the three intervention evaluations described above, Kelly (2000) states that,

These studies show, using randomized clinical trial designs, that it is possible to assist gay and bisexual men to make behaviour changes to lessen their risk for contracting HIV infection. A common element underlying these successful trials is their focus on extending beyond AIDS education alone, teaching participants critical risk reduction skills, and providing assistance in helping

participants in planning how to apply those skills in personally relevant relationships and situations (p. S37).

LARGE SCALE COMMUNITY-LEVEL HIV/STI PREVENTION INTERVENTIONS

While clinic-based and school-based HIV/STI interventions clearly play an important role in efforts to prevent HIV/STI, the prevalence and health implications of HIV/STI also require the use of larger-scale, community wide interventions to bring about behaviour change at the population level. In some instances, public health departments have launched large-scale, often highly visible community wide interventions designed to promote increased awareness of HIV/STI and to encourage members of the community to adopt lower risk sexual behaviours. In particular, such interventions focus on changing community wide norms related to risk behaviour as the primary mechanism in supporting the individual's personal efforts to change HIV/STI risk behaviour. Is there any solid evidence to suggest that large-scale community wide interventions have a meaningful impact on sexual risk behaviour? Although accurately evaluating the behavioural impact of large-scale community-wide interventions is exceedingly difficult and expensive, there are several examples of such evaluations in the literature. These evaluations, suggesting that community-wide interventions can have a positive impact on sexual risk behaviour are summarized below.

The largest and most comprehensive evaluation of a community-level HIV/STI intervention was conducted by the U.S. Centers for Disease Control and Prevention (CDC) Demonstration Projects Research Group over a multi-year period beginning in the mid 1990s. The CDC research group evaluated the results of a five-city trial to assess the effects of a community-level intervention for underserved populations at risk for HIV infection. The five cities were Dallas, Denver, Long Beach, New York and Seattle. For the purposes of the study, a community was defined as "an at-risk population in a specific geographic region" (CDC, 1999b, p. 336). The populations that the study focused on were active drug users, female sex partners of male injection drug users, female commercial sex workers and other women who trade sex for money or drugs, youth in



high-risk situations, non-gay-identified men who have sex with men, and residents of census areas where STI rates were high. Each intervention community was matched to a non-intervention comparison community. The intervention consisted of three main components. First, small media materials (e.g., newsletters, pamphlets, baseball cards) containing theory-based prevention messages in the form of role model stories were created. Second, community members were mobilized to distribute and verbally reinforce prevention materials and messages among their peers. Third, the availability of condoms and bleach kits was increased.

The CDC (1999b) intervention, including its evaluation component, was based upon the Transtheoretical Model of behaviour change which specifies a continuum of 5 behaviour change stages. With respect to condom use, the continuum of five stages is as follows:

1 = Precontemplation: has little or no intention to always use condoms in the future. 2 = Contemplation: does not use condoms but intends to begin using them every time in the future. 3 = Preparation: almost always or sometimes uses condoms and intends to use condoms every time in the future. 4 = Action: has used condoms every time for less than 6 months. 5 = Maintenance: has used condoms every time for 6 or more months (CDC, 1999b, p. 338).

The role model stories were designed to move people along these stages of the continuum and the evaluation questionnaire assessed, using the 1 to 5 stage scale, where people in the communities were at on the continuum before and after the intervention. For condom use, a 1 to 5 stage of change score was calculated for each respondent who reported having vaginal sex in the past 30 days with a main or non-main partner.

Results indicated that 27 months after the intervention had begun, 54% of respondents in the intervention communities had a mean score on the stages continuum of 1.66 for condom use with main partners and 2.76 for condom use with nonmain partners compared to comparison community scores of 1.60

and 2.82 respectively. Thus, preintervention scores indicated that, on average, participants were at the precontemplation stage for using condoms with main partners and at the contemplation stage for using condoms with nonmain partners. By the final wave of data collection about 3 years after the intervention had begun, the mean scores for condom use on the continuum for the intervention communities had increased to 2.07 for condom use with main partners and 3.18 for condom use with nonmain partners. Comparison community scores were 1.82 and 2.90 respectively. For condom use with nonmain partners, "The increase in the intervention communities was 5 times that in the comparison communities" (CDC, 1999b, p. 340). In sum, the intervention resulted in mean scores moving from the precontemplation stage to the contemplation for condom use with main partners and from the contemplation stage to the preparation stage for condom use with nonmain partners. In their discussion of the findings, the authors note that the increases in the condom use scores

...were observed not only among individuals reached directly by the intervention but across the study communities as a whole. The ability of the intervention to reach and motivate change in these geographically and demographically diverse communities suggests the potential usefulness of this approach to HIV prevention (CDC, 1999b, p. 341).

The results of this well documented evaluation of a community-level HIV prevention intervention targeting multiple and diverse risk groups provides solid evidence that well developed, theory-based community wide HIV/STI interventions can effectively assist individuals in moving towards increasingly better levels of lower risk behaviour. This intervention was selected for the CDC's (1999a) *Compendium of HIV Prevention Interventions with Evidence of Effectiveness* as an example of an effective intervention targeting youth, heterosexual adults, drug users, and MSM.

The research of Sikkema et al. (2000) also provides important data on the potential effectiveness of a community-level intervention in positively impacting on sexual health behaviour. They investigated the



efficacy of a community intervention to help low-income women in 18 housing developments in 5 US cities to make behaviour changes that reduce their risk for HIV infection. The study was conducted between 1994 and 1996 in the geographically diverse cities of Milwaukee, Wis, Roanoke, Va, Cleveland, Ohio, Rochester, NY, and Tacoma, Wash. Nine intervention housing developments were matched to 9 demographically similar control housing developments. Women in all 18 housing developments ($n=690$) completed baseline assessments of HIV risk behaviour knowledge, sexual behaviour including levels of condom use, risk level of male partners, estimation of personal risk, availability of condoms, and communication with male partners about condoms and AIDS concerns.

Over a 12-month period, women in the intervention housing developments were given access to HIV risk reduction workshops and to community HIV prevention events conducted by women at the housing developments who were popular opinion leaders among their peers. The resident popular opinion leaders formed Women's Health Councils (WHC) and then recruited women in the housing developments to attend HIV/STD risk reduction workshops. These workshops were attended by an average of 48% of the adult women living at the housing developments. The workshops included HIV/STI risk information, women's reproductive health and sexuality issues, male and female condom use, sexual assertiveness and negotiation skills for condom use, risk behaviour self-management, and skills training to talk with family and friends about HIV and sexual behaviour. The women also received \$15 for participating in each workshop session. In addition,

Each WHC undertook at least 3 major community events over a 9-month period. Examples of events included tenant picnics that featured presentations made by local AIDS prevention resource speakers, a family carnival with contests for women based on the theme of safer sex, musical events interspersed with AIDS prevention messages, and a potluck dinner with HIV-positive women. These events were attended by an average of 55 (range = 15-200) members of each housing development

community representing from 20% to over 90% of family units. Each WHC also conducted 6 smaller scale activities such as the distribution of safe-sex materials, WHC AIDS newsletter, woman-to-woman conversations focused on AIDS risk reduction, and local AIDS Day walks (Sikkema et al., 2000, p. 59).

At baseline, 50% of the women in the intervention housing developments and 49.5% of the women in the control housing developments reported that they had engaged in unprotected intercourse in the previous two months. At the 12-month follow-up, the percentage of women in the control group who reported unprotected intercourse in the previous two months declined slightly to 46.2% but it declined to 37.6% among women in the intervention group. Condom use increased slightly in the control group from 33.9% to 36.3% but among the intervention group the percentage of acts of intercourse protected by condoms rose from 30.2% to 47.2%. The increase in condom use was larger among women who attended at least 2 workshop sessions (29.8% at baseline vs 48.5% at follow-up). Also, women in the intervention group were more likely to talk about condoms with male sexual partners.

Sikkema et al. (2000) note that the success of their community-level HIV prevention intervention can be attributed to several characteristics.

The HIV behavior change intervention evaluated in this research involved conducting neighbourhood-based risk reduction workshop programs and using supportive community events to reinforce women's efforts toward behaviour change. The intervention was tailored to women's HIV risk issues and was developed with input from women living in low-income housing developments. Perhaps most importantly, many of the intervention activities were organized and carried out by popular and well-liked female opinion leaders who lived in the housing developments. The robustness of the intervention's impact may have been due to the combination of risk reduction skills-building activities with community events that



supported women's efforts towards behaviour change (p. 63).

COST-EFFECTIVENESS OF INTERVENTIONS TO PREVENT HIV/STI

Although program effectiveness is the first and most important objective of interventions to promote sexual health, economic considerations are increasingly taken into account when evaluating the viability of designing and implementing sexual health promotion interventions. In recent years, the immense economic and social costs of HIV/AIDS has drawn attention to not only the potential of public health interventions to save lives and alleviate suffering but also to reduce the overall economic and social costs of HIV/AIDS. In other words, it is clear that the negative outcomes of sexual health risk behaviours (e.g., HIV/STI infection) result in direct and indirect medical and social costs for individuals, communities, and governments. Thus, from an economic perspective, interventions can be evaluated in terms of whether the cost savings derived from improvements in risk reduction behaviour equal or outweigh the costs of designing and implementing prevention interventions. There is growing evidence that interventions to promote sexual health can be cost effective or result in cost savings. While the literature evaluating the economic implications of sexual health promotion interventions is small, recent evidence is more clearly illustrating that well designed, behaviourally effective interventions, even those that result in modest levels of behaviour change, are economically cost effective.

Much of the research relevant to the cost-effectiveness of sexual health promotion interventions has addressed the issues and costs of HIV/AIDS. HIV/AIDS, because of the significant financial cost associated with disease treatment, has drawn particular attention to the potential cost savings associated with behaviourally effective sexual health promotion interventions. The Center for AIDS Prevention Studies (1996) in the United States estimated that the lifetime medical costs of treating a person with HIV infection was about \$119,000 (US) and that \$1,000,000 dollars spent on AIDS prevention programs could result in \$2,700,000 in cost savings. Targeted, behaviourally effective HIV/AIDS interventions can, therefore, in many cases, not only

help to prevent human suffering but they may also result in considerable cost-savings. For example, a frequently cited intervention that trained community leaders to deliver AIDS risk reduction messages to men in gay bars resulted in a decrease in unprotected sex (Kelly, Lawrence, Stephenson et al., 1992) and an economic evaluation of the intervention indicated that the estimated intervention cost per HIV infection prevented was \$12,000, considerably less than the \$119,000 lifetime cost of treatment (Kahn & Haynes-Sanstad, unpublished manuscript cited in Center for AIDS Prevention Studies, 1996).

Below, two cost-effectiveness evaluations of behaviourally effective sexual health promotion interventions which were discussed earlier in this review are summarized. Both of these economic evaluations suggest that sexual health promotion interventions can be either cost-effective or cost-saving.

As described earlier in this review, *Safer Choices* is a school-based curriculum designed to reduce the number of students who begin or have sexual intercourse during their high school years and to increase condom use among students who do have sex. Among the main components of the program is a ten-lesson curriculum. The behavioural evaluation of the program indicated that, at 7-month follow-up sexually experienced students in the program were significantly more likely to have used condoms and an effective pregnancy prevention method than students in a control group (Coyle, et al., 1999). However, in addition to the behavioural effectiveness of *Safer Choices*, and other similar programs, the authors of the economic evaluation note that,

Because resources to fund school-based HIV, other STDs, and pregnancy prevention programs are limited, program efficacy alone is not sufficient to justify program implementation. Issues of practical concern to policy makers and program planners are cost (whether they can afford a particular prevention program), cost effectiveness (whether the effects of a program justify the cost of its implementation), and cost benefit (whether the benefits of a program exceed its costs) (Wang et al., 2000).



The cost-effectiveness and cost benefit of *Safer Choices* was determined using a four-step process. First, intervention costs were determined by adding program implementation costs to the cost of condoms and oral contraceptives for students in the program. Second, the authors used the Bernoulli model to translate increases in condom use into cases of HIV infection and other STIs prevented. They also developed a model to translate increases in contraceptive use into the number of pregnancies prevented. Third, Wang et al. (2000) translated the number of HIV/STI cases into medical and social costs averted. Fourth, the net benefit of the program was calculated and a multivariable sensitivity analysis was performed to determine the robustness of the base-case results.

Based on this four-step process, Wang et al. (2000) determined that the intervention cost a total of \$105,243 (US). Among the 345 sexually active students participating in the intervention there was a 15% increase in condom use and an 11% increase in contraceptive use. Thus, the intervention prevented an estimated 0.12 cases of HIV, 24.37 cases of chlamydia, 2.77 cases of gonorrhea, and 18.5 pregnancies. The authors calculate, based on these findings, that for every dollar invested in the intervention, \$2.65 in medical and social costs was saved. The multivariable sensitivity analysis indicated that in most scenarios the intervention resulted in cost savings. The exception would be a scenario involving a low probability of HIV or STI transmission, low percentage of students using contraceptives, high contraceptive failure rate, low medical costs, and low prevalence or incidence rates. Thus, although *Safer Choices* is likely to result in cost savings in most scenarios, the savings may vary according to geographic region and student population.

In sum, *Safer Choices* is a behaviourally effective, school-based, HIV/STI and pregnancy prevention intervention and an economic evaluation indicates that implementing the program can be a wise investment. As Wang et al. (2000) suggest,

The model developed in our study allowed us to test the cost-effectiveness and cost benefit of a sexual risk reduction intervention to determine whether the intervention can be

justified from an economic perspective. The methods and data used are conservative, and the findings are generally robust. The results of our study suggest that the *Safer Choices* program can be delivered at a reasonable cost and that it is cost-effective and cost-saving in most scenarios (p. 1022).

Earlier in this review, a behaviourally effective HIV/AIDS intervention for high-risk women attending urban health clinics was described (Kelly et al., 1994). This intervention was also subsequently analyzed in terms of cost-effectiveness (Holtgrave & Kelly, 1996). Specifically, the researchers sought to estimate the number of HIV infections averted by the intervention in order to determine the intervention's cost-effectiveness. The analysis was based on the assumption that all women were seronegative at the start of the intervention and that the intervention's behavioural effects lasted for a period of three months (time of intervention follow-up assessment). The analysis included the costs to society of an HIV infection and the cost per quality-adjusted life-year (QALY) saved.

Standard methods of cost-utility analysis were used and a societal perspective was taken. The major analytic steps were (1) a retrospective estimation of the intervention's cost, (2) mathematical modelling to translate the observed behavioral effects into an estimate of the number of HIV infections averted and QALYs saved, and (3) an estimation of the cost per QALY saved by the intervention (Holtgrave & Kelly, 1996, p. 1442).

Using base case assumptions, for 100 intervention participants the total cost of the intervention was \$26,914 (US), or \$269 per client. The cost-utility analysis indicated that 0.38 HIV infections were averted and that the cost-utility ratio was \$2,024 per discounted QALY saved. The various HIV transmission models used yielded cost-utility ratios generally considered to be cost-effective. The intervention was not cost-effective only when very low per-act HIV transmission probability models and very low local HIV seroprevalence levels were used to calculate cost-effectiveness. Holtgrave & Kelly



(1996) therefore suggest that,

It is justifiable to conclude that the intervention is cost-effective under most scenarios considered and is cost saving under some. Interventions of this type warrant careful consideration by policy makers, program managers, HIV prevention community planning group members, and other key decision makers for inclusion in portfolios of HIV prevention programs (p. 1445).

A number of researchers have pointed out that relatively expensive interventions need to be targeted to high-risk groups in order to be cost effective. For example, with respect to HIV prevention interventions, cost-effectiveness will be determined, in part, by the HIV prevalence rate of the population being targeted by the intervention.

Prevention interventions targeted to high-risk populations have a greater effect on the number of infections prevented. One way to assess this is to compare the number of HIV infections likely to be prevented over five years in a program that reduces risk behaviours by a modest 10% (many programs are better). In populations with HIV prevalence of 10-15% (injection drug users or young gay men in San Francisco) \$1 million will prevent about 100 infections. In populations with HIV prevalence of about 1% (female patients in STD clinics in California) \$1 million will prevent about 15 infections. In the large portion of the US population at very low risk, with 0.1% prevalence (job corps applicants), about two infections would be prevented (Center for AIDS Prevention Studies, 1996, p. 2).

It should be noted, then, that assuming lifetime HIV treatment costs of \$119,000 (U.S.) per infected individual, behaviourally effective HIV prevention interventions costing \$1 million will be cost-effective with populations with HIV prevalence rates as low as 1%. In addition, when multiple outcomes are considered (e.g., HIV, other STIs, unintended teen pregnancy) only "modest behavioral effects" may be

required to result in intervention cost-effectiveness (Wang et al., 2000). In sum, cost-benefit analysis can provide an important supporting justification for the implementation of high quality sexual health promotion interventions.

CONCLUSIONS CONCERNING THE BEHAVIOURAL EFFECTIVENESS AND COST-EFFECTIVENESS OF HIV/STI PREVENTION INTERVENTIONS

WELL-DEVELOPED HIV/STI PREVENTION

INTERVENTIONS CAN BE BEHAVIOURALLY EFFECTIVE

The review of the HIV/STI intervention literature presented here, indicates that well developed and properly implemented HIV/STI prevention interventions can result in significant reductions in sexual risk behaviour among individuals and groups. Moreover, such interventions can be effective with individuals of diverse demographic characteristics. This review has provided examples of behaviourally effective, well evaluated, interventions targeting adolescents (e.g., Coyle et al., 1999), street youth (e.g., Rotheram-Borus et al., 1991), STI clinic patients (e.g., Kamb et al., 1998), women (e.g., Latka et al., 2000), heterosexually active men (O'Donnell et al., 1998) men who have sex with men (e.g., Kelly et al., 1989), and high risk communities (e.g., CDC, 1999b). In addition, interventions designed for each of these populations have been included in the CDC's (1999) *Compendium of HIV Prevention Interventions with Evidence of Effectiveness* providing further support for the efficacy of such interventions with a wide variety of target populations.

WELL-DEVELOPED HIV/STI PREVENTION

INTERVENTIONS CAN BE COST-EFFECTIVE OR COST-SAVING

As noted above, the primary criteria upon which sexual health promotion interventions ought to be evaluated is in terms of their behavioural effectiveness. That is, such interventions must be assessed with respect to their contributions to the health and well-being of individuals and groups in the community. Nevertheless, sexual health promotion interventions are increasingly being assessed in terms of their cost-effectiveness. Although the literature in this area is small, the existing research is compelling. For example, the review of the literature presented



here provided overviews of two behaviourally effective interventions (Coyle et al., 1999; Kelly et al., 1994) that have also been shown to be cost-effective (Holtgrave & Kelly, 1996; Wang et al., 2000). In addition, it is clear that the high costs associated with outcomes such as HIV infection point to the high probability that appropriately targeted interventions addressing these outcomes are not only likely to be cost-effective but also likely to be cost-saving.

COMMON CHARACTERISTICS OF EFFECTIVE HIV/STI PREVENTION INTERVENTIONS

Although there is considerable evidence that well planned and implemented interventions can and do have a significant positive impact on sexual health behaviour, it cannot be assumed that all interventions will lead to the desired outcomes. Indeed, many sexual health promotion interventions, while well intentioned, do not have the desired impact on behaviour. However, many of the effective interventions described in this review share a common set of intervention characteristics, suggesting that such characteristics may play a role in intervention success. These include: incorporation of theoretical models; specific behavioural skills training; an emphasis on consistent condom use; helping clients to create a personal sexual health plan; the use of strategies that are community/culturally appropriate; the involvement of peer educators or community opinion leaders; and the choice of appropriate duration of the intervention.

INCORPORATION OF THEORETICAL MODELS

One of the characteristics shared by nearly all of the behaviourally effective interventions reviewed here is the incorporation of theoretical models of behaviour change, or components of these models, as a foundation for intervention development and implementation. A number of behaviour change models have been empirically tested and have shown positive results with respect to their application to sexual health promotion interventions. These include Social Cognitive Theory, the Transtheoretical Model, the Theory of Reasoned Action, and the Information-Motivation-Behavioural Skills Model (IMB) (for a complete review of these models and their application

to sexual health promotion interventions, see Fisher & Fisher, 1998; Fisher & Fisher, 2000).

A theoretical underpinning helps to illuminate the specific goals and objectives of an intervention, specifies the methods and process of implementation, and suggests a framework for evaluation. As Nitz (1999) suggests,

One of the benefits of grounding intervention programs in theory is that clearly defined intervention strategies emerge. For example, programs based on social learning theory would include sessions on how to avoid behaviours through role playing and modelling of socially desirable behaviours by peers or teachers (p. 466).

Just as importantly, as Jemmott & Jemmott (2000) point out in regard to HIV risk reduction interventions for adolescents, assessment of the theoretical mediators of behaviour change can help to pinpoint the specific aspects of a theory-based intervention which may need to be modified in order to improve program effectiveness if the intervention has not been as successful as anticipated. "By measuring the theoretical mediators of intervention-induced behaviour change, a better conceptual understanding of risk behaviour can emerge. If an intervention is ineffective, assessment of theoretical mediators can inform the analysis of why it is ineffective" (Jemmott & Jemmott, 2000, p. 112).

In sum, the results of this review clearly suggest that all sexual health promotion interventions targeting HIV/STI risk reduction be informed by a relevant, empirically tested, behaviour change model.

INCORPORATION OF SPECIFIC BEHAVIOURAL SKILLS TRAINING

It has become increasingly evident that the provision of factual sexual health information is not enough to impact on sexual health behaviour. While relevant information and attitudinal factors are clearly important components in the process of behaviour change, it is unlikely that sexual health promotion interventions will have the desired impact on sexual health behaviour without specific behavioural skills training. All of the behaviourally effective interventions



summarized in this review explicitly focused on behavioural skills training and/or modelling. In most cases, as part of a theoretically based intervention, participants were taught, and they rehearsed, sexual refusal skills and safer sex negotiation. As Fisher & Fisher (1998) suggest, "A variety of techniques may be used to model, rehearse, and refine specific behavioral skills required for the practice of sexual and reproductive health behaviour" (p. 64). They note specifically that

...performing the scriptlike sequence of acts involved in the initiation and maintenance of sexual and reproductive health practices (e.g., self-acceptance of sexuality and reproductive potential, establishing a sexual and reproductive health agenda, negotiating prevention with a partner, engaging in public preventive acts, self-reinforcement, planfully shifting preventive scripts) is one method which has been used to facilitate the learning and performance of such acts...Role playing this sequence of behaviours and refining performance in response to constructive feedback, and assignment of homework involving performance of components of these behaviours in the individual's social ecology, comprise additional direct techniques for acquiring and improving skills for enacting sexual and reproductive health promotion behaviours (Fisher & Fisher, 1998, pp. 64-65).

In sum, the findings of this review strongly indicate that when one of the stated or implicit objectives of a proposed HIV/STI prevention intervention is to modify sexual health behaviour, the relevant and specific skills training exercises should be incorporated as a prerequisite to program implementation.

EMPHASIS ON FACILITATING CONSISTENT CONDOM USE

Nearly all the behaviourally effective sexual risk reduction interventions considered in this review achieved all or the greatest part of their reductions in intervention participants sexual risk behaviours through increased use of condoms. Targeting increased and consistent condom use should therefore be the primary objective of such interventions. This

is particularly important for interventions targeting adolescents. For a variety of reasons, program planners for school- and community-based adolescent sexuality education and sexual risk reduction interventions are sometimes encouraged to make sexual abstinence the primary, if not exclusive, behavioural objective of such programs. The two intervention evaluations considered in this review that assessed program effectiveness in terms of success in increasing sexual abstinence among teenage populations found that such efforts were unsuccessful (Jemmott, Jemmott, & Fong, 1998; Rotheram-Borus et al., 1991). These findings are corroborated by the evaluation research literature examining the behavioural effectiveness of abstinence-based sexuality education programs for adolescents which indicates that such programs do not have a significant or lasting behavioural impact on adolescent sexual behaviour (for a review of this literature see McKay, 2000). However, a number of evaluated, and effective, sexuality education programs have included the relevant information and skills to delay first intercourse as part of a comprehensive curriculum that included contraception and safer sex practices (see Kirby, 2000). Thus, interventions targeting young, sexually inexperienced adolescents may be able to successfully incorporate the relevant information and skills to delay first intercourse in tandem with explicit instruction regarding consistent condom use. Nevertheless, it would appear that promoting consistent condom use is the most effective behaviour change target for prevention interventions (Maticka-Tyndale, 1997). In sum, an emphasis on the information, motivation, and behavioural skills to consistently use condoms should be a prerequisite for all sexual health risk reduction interventions and education programs including those targeting adolescents.

HELPING CLIENTS TO CREATE A PERSONAL SEXUAL HEALTH PLAN

An important component of a number of the effective interventions described in this review was the creation, by clients, of a personal sexual health plan (i.e., individual behavioural goal setting). The development of personal sexual health plans was a fundamental component of interventions aimed at STI clinic patients (Kamb et al., 1998), and women at high risk for HIV/STI infection (Belcher et al., 1998).



According to Fisher & Fisher (1998), creating a personal sexual health plan is a major step in the client's sexual and reproductive health behaviour sequence. Provided that the client has developed the necessary self-efficacy and behavioural skills, the creation of a sexual health plan can provide a key mechanism whereby a client is able to put into action the information they have learned and the commitment they have made to change their behaviour. As a result, the creation of a personal sexual health plan may be an appropriate and necessary component of effective intervention implementation for many of the different audiences who may receive such programs.

USE OF STRATEGIES THAT ARE COMMUNITY/ CULTURALLY APPROPRIATE

Although most of the behaviourally effective HIV/STI interventions summarized in this review share common characteristics (i.e., theoretical models, behavioural skills training, promoting condom use), each effective intervention was tailored to the specific characteristics and needs of the target audience. The obstacles to sexual risk reduction and mechanisms for change are likely to be quite different for specific target audiences based on factors such as age, gender, sexual orientation, socio-economic circumstances, cultural/ethnic identity, and peer group affiliation. Thus, effective HIV/STI prevention strategies will be suited to the norms and behaviours of the target audience's characteristics and social networks. For example, the Sikkema et al. (2000) intervention focused on tailoring HIV-risk reduction activities to the specific circumstances and needs of women living in a low income housing development. Similarly, the prevention education materials developed for the O'Donnell (1998) STI intervention targeting men were designed to incorporate the specific cultural aspects of risk reduction for African-American and Hispanic men.

Ensuring that an HIV/STI prevention intervention employs strategies that are community/culturally appropriate for a particular target audience will require, in most cases, some level of pre-intervention elicitation research (Fisher, 1997). Such research would seek to identify the target audience's specific knowledge gaps as well as attitudes and existing social norms related to sexual behaviour and risk reduction. Thus, elicitation research can provide key information that can be incorporated into intervention activities

that effectively correct group specific knowledge gaps and address attitudes and norms that may contribute to high HIV/STI risk behaviour. Conversely, elicitation research can identify existing group specific community/cultural norms that contribute to or support preventive behaviours, which can then be utilized in intervention activities (Fisher, 1997).

INVOLVEMENT OF PEER EDUCATORS AND COMMUNITY OPINION LEADERS

Several of the behaviourally effective interventions described in this review utilized peer educators or community opinion leaders in helping clients modify sexual health behaviour. Both of the community-level interventions (CDC, 1999b; Sikkema et al., 2000) effectively used community opinion leaders to promote prevention messages, suggesting that this may be an important component of community-wide interventions.

The use of peer educators may be particularly effective with sexual health promotion interventions targeting adolescent audiences. Several of the adolescent sexual health interventions described in this review (Coyle et al., 1999; Jemmott, Jemmott, & Fong, 1998) incorporated peer educators as a key component of highly effective interventions. With respect to HIV/AIDS prevention with interventions, Dunn, Ross, Caines, & Howorth (1998) point out that the use of peer educators has several advantages:

For example, some adolescents may be more comfortable receiving sexuality-related information from peers than adults and peers may also have added credibility because of their perceived recent experience of the issues under discussion. In this respect, peers can be positive role models who contribute to the development of social and group norms favouring HIV/AIDS risk reduction behaviours among adolescents. An added benefit is that peer educators can increase their own knowledge and skills related to HIV/AIDS prevention in the process of training for and presenting such interventions (p. 340).

In sum, in order to ensure the maximal effectiveness of sexual health promotion interventions, the use of



peer educators or community opinion leaders should be considered.

APPROPRIATE DURATION OF INTERVENTION

There is little consensus in the literature with respect to the relationship between the length of sexual health promotion interventions and program effectiveness. For example, Kim et al.'s (1997) review of the literature on adolescent AIDS prevention interventions suggested that longer interventions were more successful in increasing condom use. However, Jemmott & Jemmott's (2000) meta-analytic review of programs to prevent AIDS among adolescents did not find a significant relationship between program duration and intervention effectiveness. In the present review, there was considerable variation in intervention duration among the effective interventions examined. For example, for HIV/STI prevention counselling, effective interventions ranged in time duration from 40 minutes (Kamb et al., 1998) to 120 minutes (Belcher et al., 1998) to 360 minutes (Kelly et al., 1994). These findings suggest that while the time duration of effective interventions may vary depending on the nature of the intervention and its target audience, it is likely that an intervention will not succeed unless there is sufficient time provided to ensure that all of its major components are implemented.

CONCLUSION

The HIV/STI prevention intervention evaluation literature summarized here provided direct evidence that well designed and implemented interventions can and do help people from different populations modify their sexual behaviour in the direction of risk reduction. This literature also indicated that HIV/STI interventions can be cost-effective or cost-saving. In addition, an analysis of the literature revealed a number of key shared characteristics common among effective HIV/STI interventions.

The present review has several important limitations. First, although the evaluation studies described in the review were chosen based on specific criteria, the review was intentionally selective rather than systematic. In particular, the review is selective in that it only described and discussed those studies that had favourable outcomes and that, in the author's

judgement, provided support for the development and implementation of HIV/STI interventions in different populations. As such, while this review does demonstrate the potential for HIV/STI interventions to be effective, it does not provide an assessment of the field overall or a systematic comparison of effective versus ineffective interventions.

Second, with respect to the identification of the characteristics of effective interventions, several limitations should be noted. The identification of a characteristic of effective interventions was based on the observation that it appeared to be a feature of some or most of the successful interventions reviewed. While these characteristics likely play important roles in intervention success, it should be noted that this review did not attempt to show through statistical analysis that each or any of these characteristics is independently associated with a high probability of successful outcomes. Furthermore, while the intervention characteristics discussed here likely make key contributions to intervention success, they do not constitute a complete list of the characteristics necessary for successful intervention development and implementation. It is also likely that effective interventions share other common characteristics including a realistic development, implementation, and evaluation time-table, adequate administrative support, sufficient staff training to deliver the intervention, allocation of monetary and staff resources necessary for successful implementation, and adequate evaluation procedures. Nevertheless, in addition to providing evidence for the potential of HIV/STI prevention interventions to be behaviourally effective in different populations and cost effective, the literature summarized in this review does point to specific characteristics which are likely key elements in intervention success.



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