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School-based HIV prevention programmes for African youth

Melanie Gallant[a,*], Eleanor Maticka-Tyndale[b]

[a] Department of Psychology, University of Windsor, 401 Sunset Ave. Windsor, Ont., Canada N9B 3P4
[b] Department of Sociology & Anthropology, University of Windsor, Canada

Abstract

The high rate of HIV infection among youth in Africa has prompted both national and international attention. Education and prevention programmes are seen as the primary way of decreasing this rate. This paper reviews 11 published and evaluated school-based HIV/AIDS risk reduction programmes for youth in Africa. Most evaluations were quasi-experimental designs with pre–post test assessments. The programme objectives varied, with some targeting only knowledge, others attitudes, and others behaviour change. Ten of the 11 studies that assessed knowledge reported significant improvements. All seven that assessed attitudes reported some degree of change toward an increase in attitudes favourable to risk reduction. In one of the three studies that targeted sexual behaviours, sexual debut was delayed, and the number of sexual partners decreased. In one of the two that targeted condom use, condom use behaviours improved. The results of this review suggest that knowledge and attitudes are easiest to change, but behaviours are much more challenging. The article provides details about programmes and identifies characteristics of the most successful programmes. Clearly, however, more research is needed to identify, with certainty, the factors that drive successful school-based HIV/AIDS risk reduction programmes in Africa.

Keywords: HIV/AIDS prevention; School; Programme evaluation; Africa; Youth; Developing countries

Introduction

The pandemic proportions of AIDS and the devastation it is wreaking in sub-Saharan Africa are widely acknowledged. What is not as often acknowledged is its impact on youth. With over 80% of those currently living with AIDS aged between 15 and 24 and three-quarters of these youth living in sub-Saharan Africa, it is not an exaggeration to say that youth in sub-Saharan Africa must become a focus for prevention efforts if the problem is to be controlled (UNAIDS, 2001). In countries with the highest rates of infection, AIDS not only constitutes a health crisis, but a crisis that threatens to dismantle the social fabric, as the next generation of workers, parents, and leaders is lost. This has prompted the call by the United Nations for a 20–25% reduction in HIV prevalence among youth by the year 2010 (UNAIDS, 2001).

Several strategies suggested for decreasing infection rates include, among others, social marketing of condoms, peer education for groups with highest infection rates (such as sex workers), mass media concerning social and cultural customs that expose participants to heightened risk (such as wife inheritance or circumcision ceremonies), voluntary counselling and testing for those who believe themselves to be infected, and school-based programmes. Of these strategies, school-based HIV prevention programming, starting as early as primary school, has been viewed as a necessary step to protect the general population from further infection (Barnett, de Koning, & Francis, 1995; Finger, Lapetina, & Pribila, 2002; Grunsheit, 1997; Kaaya Mukoma, Flisher, & Klepp, 2002b; World Bank, 1993).

Four reasons are commonly articulated in support of this position. First, given that 70% of children enter primary school and 67% of primary school entrants in

*Corresponding author. Tel.: 1-519-253-3000; fax: +1-519-971-3621.
E-mail address: gallan2@uwindsor.ca (M. Gallant).

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sub-Saharan Africa reach grade 5 (UNICEF, 2001), primary schools are the single location where the largest proportion of young people (approximately 50%) can be reached. Second, studies in different locations support the conclusion that most youth in sub-Saharan Africa initiate sexual activity while they are still of school age, whether or not they are in school (Kaaya et al., 2002a; WHO, 1992). Third, the importance of initiating prevention programming in primary schools is evident from the conclusions of reviews of interventions demonstrating that those conducted prior to sexual debut are the most effective in reducing rates of sexually transmitted infections (e.g., Grunsheit, 1997). Finally, schools provide an established venue for intervention (Barnett et al., 1995). Their location is known, they are sustained within the community, their hours and mode of operation are known, they have established mechanisms for introduction of new programmes and accessing students, and the size of the target population is known. In addition, schools are linked to communities through families, and other community organizations, extending their reach and enhancing local ownership of interventions. It is for these reasons that Stover and colleagues' recent assessment of the effectiveness of AIDS reduction strategies identified school-based programmes as a necessary basis for other programmes (Stover et al., 2002).

This paper critically reviews and synthesizes the results of 11 evaluated programmes designed to reduce HIV transmission to youth and delivered in sub-Saharan African schools. Several similar reviews have been published in recent years. The most comprehensive have focused exclusively on programmes in wealthy nations, particularly the United States (e.g., Kirby, 2000). Those that included programmes from developing nations either had a meagre representation from sub-Saharan Africa (e.g., 2 in Merson, Dayton, & O'Reilly, 2000), or described outcomes of a wide range of programmes uncritically, without considering whether the design and conduct of the evaluation supported the conclusions drawn by the authors (e.g., Finger et al., 2002; Grunsheit, 1997; Kaaya et al., 2002b). This article differs from these earlier reviews in two ways. First, it includes a larger number of sub-Saharan African programmes than any of the previous reviews. Second, it provides critical commentary on the evaluation procedures and analyses, interpreting reported results within the context of the quality of the research design.

Method

Evaluated prevention programmes were located by searching literature databases such as Psychological Literature (PsychLit), Population Information Program, Sociological Abstracts, and MEDLINE; the tables of contents of journals that published articles evaluating HIV/AIDS interventions between 1994 and 2002; and publication lists from international organizations such as the United Nations Joint Commission on HIV/AIDS and the World Health Organization Global Programme on AIDS. To be included in this review, a programme had to meet the following criteria: (a) be designed to affect a change in AIDS-related knowledge, attitudes, behavioural intentions, and/or behaviours; (b) be evaluated using quantitative data; (c) be reported in a peer reviewed journal between 1990 and 2002; (d) target youth under the age of 25; and (e) report on school-based programmes implemented in sub-Saharan Africa.

The literature search produced a pool of 32 reports of HIV prevention programmes targeting African youth. Of these, 17 were excluded because they did not include a complete evaluation using quantitative data or did not meet the criteria for this review, and one because it could not be obtained. Overall, 11 evaluated school-based interventions reported in 14 articles were used. Considering the size of sub-Saharan Africa and the severity of the epidemic among youth in this region, the paucity of published evaluations was surprising.

Several steps were taken to synthesize and compare the programmes, their evaluations, and results. First, descriptions of each programme were examined for information that would permit assessment of how well each intervention conformed to existing best practice guidelines for school-based interventions (e.g., Grunsheit, 1997; Kirby, 2000). This included information about the target population and population subgroups, theoretical framework, intervention content, implementation strategies, duration, local community input and/or cultural modifications, discussion of specific cultural issues, programme monitoring, and discussion of any problems in implementation or evaluation. Information on the programmes themselves was gathered into tabular form to facilitate comparison. Information on context and problems in implementation was used to help interpret the evaluation results.

Second, descriptions of evaluation procedures, including targeted outcomes, evaluation design, sampling strategy, control groups, operationalization and measurement, and statistical analyses, were reviewed. These were compared to the gold standard for evaluations which calls for: (1) randomized, controlled trials, (2) statistical control of potential confounders if random assignment is not used, (3) valid measurement of constructs, (4) outcomes measured at several time points, and (5) statistical procedures that control for baseline effects (Fisher & Foreit, 2002). Finally, evaluations were divided into three groups based on the intended outcome of the intervention: change only in knowledge; change in knowledge, attitudes, and intentions; and change in knowledge, attitudes and behaviours. Comparison of the effectiveness of interventions was drawn both within outcome categories

(e.g., knowledge changes in all interventions) and across all evaluated outcomes in each intervention (e.g., all of the targeted outcomes of a particular programme). The strengths of programme implementation and evaluation methodology were taken into consideration in drawing comparisons among programmes. Results of programmes with stronger implementation and evaluation were given greater credence than those with weaker ones. Conditional results (e.g., only girls, only pre-programme virgins) and results of tests for confounding factors were also noted. Specifics about intervention content, implementation, cultural context and evaluation method were drawn on to assist in interpretation of the results.

This paper first describes the interventions and their implementation, highlighting differences and challenges. This is followed by a description and critique of the evaluation designs, and then a review of the evaluation results. Finally, the implications for school-based interventions in sub-Saharan Africa are discussed with a suggested set of guidelines for the design of effective interventions based on the programmes reviewed here.

Interventions

The published articles provided little information about the content and characteristics of the interventions. Notably missing, e.g., was information about whether activities included skills building or practice sessions, both of which have been shown to increase programme effectiveness (Kirby, 2000). In the absence of explicit information on message content, the messages conveyed in the programmes were deduced from the content of questions used in evaluation instruments. The appropriateness of behavioural goals or curriculum for the age, experience and culture of students was also only available from descriptions of steps taken to create culturally appropriate materials, or from reported teacher and community responses to the appropriateness of materials and programmes. Table 1 summarizes the interventions.

Theoretical frameworks

Having a theoretical framework that guides programme design and evaluation is considered essential for successful programmes (Kirby, 2000). Three levels of theory were evident in these programmes: cognitive theories of behaviour, theories of learning and pedagogy, and theories of community influence and power. Although only seven of the 11 programmes articulated a cognitive theory of behaviour as a basis for the choice of programme content and outcomes, all programmes were founded on the assumption that the determinants of behaviour change include knowledge, beliefs, and attitudes. Thus, all programmes were based on stated or implied theories that viewed behaviour within a cognitive framework. Specific theories of learning or pedagogy were articulated in four programmes (Dalrymple & duToit, 1993; Harvey, Stuart, & Swan, 2000; Klepp et al., 1994; Klepp, Ndecki, Leshabari, Hannan, & Lyimo, 1997; Shuey, Babishangire, Omiat, & Bangarukayo, 1999). However, the descriptions of the content of all but one intervention (Munodawafa, Marty, & Gwede, 1995) made it clear that students were engaged in active learning through some combination of debates, discussions, role play, games, drama, song, story, and the role modeling of desirable behaviours. This suggests that the learning strategies of programmes were based on theories of participatory pedagogy. Finally, eight programmes explicitly acknowledged the role of communities in the schools and as repositories of cultural norms, beliefs and values related to sexuality, health and illness, by insuring varying degrees of community input or collaboration.

Targeted outcomes

All programmes targeted an increase in knowledge about HIV and AIDS, some as an end in itself and some as an indirect route to behaviour change. Six also targeted a change in attitudes, most typically related to people living with HIV and AIDS, abstinence and, in some cases, condom use. Only three programmes targeted behaviour change as an outcome, two targeting sexual behaviour (age of debut, recent intercourse activity, number of partners) and condom use, and one only sexual behaviour, although two additional programmes reported on outcomes related to sexual behaviour. The absence of immediate attention to behaviour change in the remaining programmes was justified by the short time until evaluation. In fact, the interventions that measured behaviour change all evaluated programmes 6 months or more after their implementation, while those that omitted behaviour typically evaluated outcomes within 3 months of programme completion.

While direct or indirect reference was made to all three components of the ABC approach to prevention that is common in many African countries,[1] there was great variation in the extent to which condom use was covered. In all cases, selection of the behaviours to be covered was influenced by community tolerance for a particular content. Community views of appropriate and acceptable programme content often conflicted with the sexual development stage of targeted youth. Thus, although components that deal with condoms are

[1] First and foremost, **A**bstain from sex until marriage; if not abstaining, **B**e faithful to one, uninfected partner; if this is not possible, use a **C**ondom.

Table 1
Characteristics of programmes

Evaluated by	Theory	School level	Implemented in *x* schools	Community involved in design	Content		Form		Implementation		
					Targeted behaviour	Main activities	In/after school	Total exposure	Instructors	Instructor training	Monitored
Knowledge only											
Dalrymple and duToit (1993) Tanzania	Theories of play	Secondary	Not specified	KABP and participatory research		Participatory educational drama	In school	DK	Teachers and University Drama Team	Not specified	No
MacLachlan et al. (1997) Malawi	Not specified	Secondary (boys 17.7 yr; girls 16.4 yr)	2	Qualitative and survey research in community	A	Board game	After school	4 h	University students	Not specified	No
Munodawafa et al. (1995) Zimbabwe	Not specified	Secondary (forms 2–3)	5	No	A and C	Student nurses teaching	In school	8 h	Student nurses	12 days (twice/week, 6 weeks)	Yes
Knowledge and attitudes											
Fitzgerald et al. (1999)	PMT	Secondary (STD 9 and 11) (15–18 yr)	Entire country 10 evaluated	Curriculum altered to fit culture	A and C	Multiple activities	After school	28 h	Teacher and out-of-school youth	40 h	Yes
Stanton et al. (1998) Namibia											
Kinsman et al. (2001) Uganda	BCI	Primary (STD 7 and 8) Secondary (forms 1 and 2)	67	Some	A	Multiple activities	In school	19 h	Teachers	3 sessions over 5 days	Informal
Klepp et al. (1994, 1997) Tanzania	TRA, SLT	Primary (mean 14 yr)	18	Local health educator and community participation	A	Activities infused, includes peer educators	In school	20 h	Teachers	1 week	
Retrospectively											
Kuhn et al. (1994) S. Africa	PDB	Secondary (mean 18 yr)	2	Teachers, students and parents	A and C	Multiple activities—create displays in AIDS awareness	In school	DK	Teachers	Not specified	No
Visser (1996) S. Africa	HBM, TRA, SLT	STD 6–9	11	Nat'l Health and Population Dept. designed	A and C	AIDS kit with varied activities	In school	8–18 h	Guidance teacher	Not specified	
Retrospectively											
Knowledge, attitudes and behaviours											
Fawole et al. (1999) Nigeria	Not specified	Secondary (men 17–18 yr)	4	Baseline KABP survey and NGO input	A and C	Multiple activities including condom demonstrations	After school	12–36 h	Physician and teachers	Not specified	Implemented by programme designer
Harvey et al. (2000) S. Africa	Drama-in-education and an applied behaviour change framework	Primary (STD 8) (mean 17.6 yr)	770 (tested in 14)	No	A and C	Drama in education	In school	DK	Teachers	Not specified	No
Shuey et al. (1999) Uganda	SLT implied	Primary (age range 13–14 yr)	95 (tested in 37)	Community sensitization and input	A[a]	Activities infused. School Health Club, peer led, question box	In school	> 100 h	Teachers	Teachers 1 week, head teacher 1 day	Yes

Notes: DK do not know.

Theories: PMT: Protective Motivation Theory; BCI: Behaviour Change for Intervention; TRA: Theory of Reasoned Action; SLT: Social Learning Theory; HBM: Health Belief Mode; PDM: Psychological Determinants of Behaviour.

Targeted outcomes: A: Abstinence; C: Condoms.

Main activities: Multiple activities: Lectures, role play, songs, poetry, essays, debates, poems, stories. Activities infused: multiple activities are infused throughout the curriculum.

[a] Goal was a shift to rational decision making about sexual activity.

essential for sexually active youth, community resistance led to the exclusion of such content in four of the seven programmes where youth were identified as already sexually active. Resistance was seen in teacher refusal to include any reference to condoms (Kinsman et al., 2001; Klepp et al., 1994, 1997; Shuey et al., 1999; Visser, 1996). Teachers and community representatives explained this resistance in terms of community norms and strong beliefs that teaching about condoms implicitly condoned or encouraged sexual activity (Kinsman et al., 2001; Klepp et al., 1994, 1997; Shuey et al., 1999; Visser, 1996). In some countries resistance to including condoms in the curriculum was supported by national guidelines or local policies. For example, in Tanzania national guidelines from the Ministry of Education prohibited discussion of condoms (Klepp et al., 1994). In Uganda and South Africa, teachers spoke of potentially being fired if they spoke about condoms in schools (Kinsman et al., 1999, 2001; Shuey et al., 1999; Visser, 1996).

Programme form and length

The form and complexity of programmes ranged widely. The simplest programme was the board game designed to increase knowledge (MacLachlan, Chimombo, & Mpemba, 1997). The most complex programme trained teachers to use a selection of lectures, role playing, group exercises, audio–visual materials, essay writing, debates, and development of artistic activities such as poems, songs, plays, games, and posters in diverse courses and co- or extra-curricular activities (e.g., Klepp et al., 1994, 1997; Shuey et al., 1999). Some interventions consisted of a 'kit' that contained materials and guidelines for activities that teachers could use and adapt as they felt were appropriate (Visser, 1996). Some focused on a single technique, such as drama, and trained teachers in how to involve pupils in developing their own AIDS drama. Pupils learned about AIDS and had to make decisions about how to present various situations in drama, which they developed and presented to other groups in their school and/or community (Harvey et al., 2000).

Information on session length, frequency and duration of programmes was used to produce an estimate of total time of exposure. This ranged from four hours (over a 1-month period) to hundreds of hours (over a 2-year period). Programmes also ranged in scale from those implemented in only one or two schools to those that covered multiple schools in an entire region, or, ultimately, to programmes that were in place in all schools in a country.

Programme delivery and community involvement

As would be expected with school-based programmes, teachers delivered most programmes either as part of the school curriculum or in after-school programming. The exceptions involved the health sector. Munodawafa et al. (1995) used student nurses who completed a portion of their training by implementing an HIV intervention in schools. Fawole and colleagues reported on a programme designed and delivered by a physician (with the assistance of two teachers) (Fawole, Asuzu, Oduntan, & Bieger, 1999). Health educators worked with teachers in two other programmes (Klepp et al., 1994, 1997; Shuey et al., 1999). Local knowledge, attitudes and culture were taken into consideration in the development of all programmes, most typically through prior research within the community or meeting with youth, parents, and/or community representatives to identify issues of concern. Several programmes (e.g., Shuey et al., 1999; Visser, 1996) were modified based on community input, with, e.g., sections on condom use excluded or made optional in response to community opposition. Several evaluators commented on the negative consequences of not having enlisted full community commitment and support for their programmes (e.g., Kuhn, Steinberg, & Mathews, 1994).

Programme monitoring

Several researchers (e.g., Akukwe, 1999; Kaaya et al., 2002b) have aptly pointed out that it cannot be assumed that programmes are implemented as their designers intend them to be, making programme supervision or monitoring an essential component of evaluation. The importance of monitoring is clearly evident in the Ugandan programme evaluated by Kinsman et al. (2001). Here, informal monitoring identified lack of programme implementation as a probable reason for poor outcomes. Other researchers identified segments of programmes that were not implemented (e.g., Visser, 1996) or poorly implemented (e.g., Kuhn et al., 1994). Despite their importance, procedures for monitoring interventions were mentioned by only three authors, though retrospective comments about implementation were collected by several others. It was clear from both the formal monitoring and the anecdotal comments that programmes were not uniformly implemented. This must be taken into consideration when interpreting evaluations.

Evaluation designs

There was considerable variation in the form and quality of evaluations (see Table 2). One study used an experimental design with random assignment; the remainder used quasi-experimental designs, most including a control group ($n = 8$). In all but one case, control and experimental groups completed surveys before and after the intervention. Both longitudinal

Table 2
Summary of evaluation methods

Evaluated by	Design	Sampling strategy	*N* base/post	Control group	Experimental / control contamination	Time to evaluation	Local input in design	Pre-test	Base effects controlled	Statistical procedures	Statistics or interpretation appropriate	Corrected alpha level
Dalrymple and duToit (1993)	Longitudinal panel	Purposive[a]	72/72	No	n/a	Immed	n/s	Yes	n/a	*T*-test	Yes	n/a
MacLachlan et al. (1997)	Repeated cross section	Purposive	72/72	No	n/a	Immed[b]	Yes	Yes	No	*T*-test	No	n/a
Munodawafa et al. (1995)	Longitudinal panel	Volunteer	285/285	Yes	No	Immed	n/s	No	Yes	Chi-square ANOVA	Yes	No
Fitzgerald et al. (1999), Stanton et al. (1998)	Longitudinal panel	Multi-stage random	515/437, 379, 359	Yes	Potential	Immed, 6 and 12 mos	Yes	Yes	Yes	Chi-square ANOVA	Yes	No
Kinsman et al. (2001)	Repeated cross section	Multi-stage random	2077/not stated	Post only	No	6 mos	Yes	Yes	Yes	Bivariate linear regression	Yes	n/a
Klepp et al. (1994, 1997)	Repeated cross section	Multi-stage random	2025/1772, 814	Yes	No	6 mos, 12 mos	Yes	Yes	Yes	ANOVA	Yes	n/a
Kuhn et al. (1994)	Longitudinal panel	Purposive	567/482	Yes	Potential	Unspecified	Yes	n/s	No	Chi-square	No	No
Visser (1996)	Longitudinal panel	Purposive	187/187	No	n/a	Immed	Yes	Yes	Yes	Hotelling's T^2 and *t*-test	Yes	n/a
Fawole et al. (1999)	Longitudinal panel	Multi-stage convenience	440/440	Yes	No	6 mos	Yes	Yes	No	*t*-test Chi-square	No	No
Harvey et al. (2000)	Longitudinal panel	Multi-stage random	1080/699	Yes	No	6 mos	Yes	Yes	Yes	Bivariate linear regression	Yes	n/a
Shuey et al. (1999)	Repeated cross section	Multi-stage random	400/400	Yes	No	24 mos	Yes	Yes	Yes	Chi-square	Yes	n/a

[a] Selected schools from the community where the university was located.
[b] Re-tested students 6 times over 6 weeks.

panel ($n = 7$) and repeated cross-sectional ($n = 4$) designs were used.

Longitudinal panel designs permitted the tracking of changes in responses of student participants in the intervention; however, the impact of interventions on behaviours that could not be changed, such as sexual debut, could only be partially assessed, relying on a post-programme comparison of the increase in such behaviours in control and experimental groups. While repeated cross-sectional designs could not track changes in participating students, they made it possible to examine whether sequential cohorts of students (beginning with those who had not participated in the intervention and proceeding to those who had) responded differently to survey questions and reported different behaviours. This facilitated testing of whether an intervention influenced the initiation of certain sexual behaviours, such as sexual debut.

Typically, participants were assigned to random or matched ($n = 5$) control and experimental groups by community, school or class, with physical distance maintained between experimental and control groups. This prevented contamination of the control group by contact with those in the experimental group. The evaluation of the Namibian intervention was the only one that used random assignment of pupils rather than communities (Fitzgerald et al., 1999; Stanton et al., 1998). Although control students did not participate in the evaluated after-school intervention, they attended school with and lived in the same communities as the participants, raising the possibility that information may have been shared between the two groups, potentially biasing evaluation results. Design of Kuhn et al. (1994) with experimental and control students drawn from neighbouring high schools in the same community also left open the possibility for control group contamination.

Six studies conducted post-test assessments at 6, 12, or 24 months post-intervention, or over several of these periods ($n = 2$). The remaining five evaluated results immediately or within 3 months of programme completion. It is only in the longer-term evaluations that the question of the durability of results can begin to be answered. The control groups of two interventions received some form of treatment. In the Ugandan programme evaluated by Shuey et al. (1999), controls received the standard national school health and education curriculum. In the South African programme evaluated by Harvey et al. (2000), controls were provided with an HIV/AIDS information pamphlet. This produces a more meaningful study and allows for the effect to be attributed to the specific differences between the two programmes. However, most acknowledge that it is more difficult to find an experimental effect in these cases. The more typical design was to provide no intervention for the control group or to provide it at the close of the evaluation.

Sample size and retention

Sample sizes varied across studies, ranging from 72 to over 2000, with sample size decreasing over repeated waves of longitudinal panels. High rates of attrition and absenteeism from school are common concerns in many African countries (World Bank, 2002). In the two studies that used baseline data to compare participants who completed the intervention and those who dropped-out (Klepp et al., 1997; Stanton et al., 1998), drop-outs were more likely to be older, have less exposure to AIDS information at baseline, and be more favourable to sexual activity compared to participants who completed the interventions.

Measurement

All 11 studies used some form of survey or questionnaire to measure knowledge, attitudes, intentions, and behaviours. Three studies also included qualitative information from focus group discussions (Kinsman et al., 2001; Kuhn et al, 1994; Visser, 1996). None used biological markers of HIV, other sexually transmitted diseases or pregnancy to validate self-reports of sexual and condom use behaviours.

Four evaluations modified standardized questionnaires such as the WHO/UNESCO knowledge, attitudes, beliefs and practices survey instrument for adolescents (World Health Organization, 1989), and the American *Toward a Healthy Tomorrow* instrument (Stanton et al., 1998). The rest of the researchers developed their own questionnaires—some with questionable validity. For example, Kuhn et al. (1994) claimed to measure perceived susceptibility to AIDS by agreement with the statement, 'AIDS is everyone's problem.' Such an item is unlikely to demonstrate content or construct validity when compared with more standard measures of perceived susceptibility. It was therefore not included in the results presented in this article. A general limitation of most studies was the lack of complete, or any, information on the psychometric properties of their instruments.

Data analysis

Not all evaluations used the most appropriate data analytic procedures. Three that included control groups did not appropriately control for baseline differences between experimental and control groups (Fawole et al., 1999; Kuhn et al., 1994; MacLachlan et al., 1997). This resulted in incorrect interpretations of statistical results. The second major flaw was the use of multiple tests of statistical significance on individual items without correcting or compensating for the chance occurrence of significance on a few items. In the evaluations of two programmes (Fitzgerald et al., 1999; Munodawafa et al.,

1995; Stanton et al., 1998), the reported number of significant changes was so few in relation to the number of tests conducted, and the significance levels for most were so low, that many could easily have been chance occurrences. In addition, placing confidence in changes in single items as indicators of real change in knowledge and attitudes is questionable, given the instability in responses to single questions (Fisher & Foreit, 2002). Five of the evaluations stand out as having used appropriate designs (e.g., inclusion of a control group) and/or data analytic procedures (Fitzgerald et al., 1999; Harvey et al., 2000; Kinsman et al., 2001; Klepp et al., 1994, 1997; Shuey et al., 1999; Stanton et al., 1998) by controlling for baseline differences and minimizing chance findings.

Despite analytic flaws, sufficient data were provided in all articles to either correct errors or at least note their effect on results. Results reported in Tables 3 and 4 are based on such corrections and notations. Where a large number of bivariate tests were performed, a Bonferroni correction was applied to estimate the true probability of a *type I error* for blocks of tests on items measuring a single construct (Miller, 1981). Where baseline experimental/control comparisons needed to be taken into account and were not, outcome effects were re-assessed with baseline scores taken into consideration.

Evaluation results

Knowledge

It is well recognized that although knowledge is not sufficient to affect behaviour change, it may be a necessary condition. The importance of knowledge justified its measurement in all programmes and the singular focus on knowledge in three programmes. There was great variation in the knowledge that was assessed as well as the method and quality of assessment, making direct comparison of areas of knowledge improvement in different programmes difficult. Despite this diversity, results of all but one programme support the conclusion that significant improvements were produced in knowledge.

The lack of improvement in knowledge for the Ugandan programme (Kinsman et al., 2001) appears curious. This programme was an adaptation of the WHO/UNESCO School Health Education to prevent AIDS and STD and was evaluated with tools designed for it. Although implementation was not formally monitored, interviews with teachers and students following the programme revealed that it was not implemented in the majority of schools. The authors pointed out that positive outcomes are jeopardized when large-scale implementation precludes the possibility of close supervision and support.

Attitudes, beliefs, and intentions

Many theories specify attitudes, beliefs, and/or intentions as proximal determinants of behaviour. As a result, changes in attitudes are viewed as an important goal in many AIDS prevention programmes and intentions to engage in low-risk behaviours are often taken as a sufficient indicator of subsequent behaviour. Five programmes set improvements in attitudes, beliefs, and intentions as their targeted outcomes and all but one programme with behaviour change as its focus also tested attitude change. Attitudes toward people living with HIV/AIDS changed in all programmes where they were measured. With the exception of Kinsman et al. (2001), greater acceptance was recorded regardless of programme form, duration, content, or target population. Evaluation of Klepp et al. (1997) demonstrated the durability of this change over a 12-month period. Although Visser (1996) only found a change in attitudes for males, she noted that the attitudes of females were already high ($>90\%$ acceptance) before the intervention.

Changes in attitudes toward abstinence and condoms, and intentions to abstain or to use a condom were inconsistent. Two programmes with strong evaluation designs (Harvey et al., 2000; Kinsman et al., 2001) recorded a change to more positive attitudes toward abstaining from sex. Two did not (Fitzgerald et al., 1999; Klepp et al., 1994, 1997). Intention to abstain was likewise positively affected in two studies using strong designs (Kinsman et al., 2001; Klepp et al., 1994, 1997) but not in two others. Attitudes toward condom use were not improved as a result of the programmes in the three studies where they were measured, although intentions to use condoms were higher, although short-lived, in one strong study and several weaker ones.

Perceptions of personal risk or susceptibility appear to be the most difficult to change. Both of the evaluations that measured these found no change. However, self-efficacy in abstaining from sex and/or using condoms was examined in two evaluations, both showing positive results. Harvey et al. (2000) found improvements in self-efficacy for both abstinence and condom use following an intervention using dramatic techniques with students in upper primary/lower secondary school (STD 8; mean age = 17.6 years). Results of Fitzgerald et al. (1999) and Stanton et al. (1998) in Namibia suggest there may be a difference in self-efficacy for boys and girls. They found that girls improved in their perceived ability to use condoms, while boys tentatively improved in their perceived ability to be intimate without sex. The result for girls remained significant after application of a Bonferroni correction for the number of statistical tests performed on measures of attitudes. The significance level for boys, however, moved out of the acceptable range once corrected, raising questions about the validity of this finding.

Table 3
Results for knowledge, attitudes and intentions

Evaluation	Knowledge			Attitudes toward			Intentions		Other		
	General	Abstinence	Condom use	PHAs	Abstinence	Condom use	Abstinence	Condom Use	Perc'd susceptibility	Self-efficacy	Close friends sexually active
Knowledge only											
Dalrymple and DuToit (1993)	+										
MacLachlan et al. (1997)	+										
Munodawafa et al. (1995)	+										
Knowledge, attitudes and intentions											
Fitzgerald et al. (1999)	+	+f			0	0	0	+		+fm	0
Stanton et al. (1998)							0/0/0	+/0/0f		+fm	
Kinsman et al. (2001)	0	0	0	0	+	0	+	0			
Klepp et al. (1994, 1997)	+/+			+/+	0/+0		+/+				
Kuhn et al. (1994)	+		+	+				+x			+
Visser (1996)	+	+	+	+m (f high pre)		0	+[a]	+[a]	0		
Knowledge, attitudes, intentions and behaviour											
Fawole et al. (1999)	+	+	+	+							
Harvey et al. (2000)	+			+	+				0	+	
Shuey et al. (1999)	+										+

Note: +: a statistically significance programme effect ($p<0.05$) in the desired direction; 0: no statistically significant programme effect; / to left: is result at 6 month post-programme; / to right: is result at 12 month post programme; x: results reported here are corrected for errors in original statistics; f: only present for girls; m: only present for boys; fm: differential result for boys and girls.

[a] Measured as willingness to abstain/use a condom in order to prevent HIV.

Table 4
Results for communication and behaviour

Evaluation	Communication	Sexual intercourse behaviour			Condom use behaviour		
		Ever sex	Recent sex	No. of partners	Ever use	Use at last sex	Always use
Knowledge only							
Dalrymple and DuToit (1993)							
MacLachlan et al. (1997)							
Knowledge, attitudes and intentions							
Fitzgerald et al. (1999)		0	0	0	+		+
Stanton et al. (1998)	M: 0/+/0						
	F: +/0/0	0/0/+(fbv)		0/0/0	+/0/0(mbv)[a]		
Kinsman et al. (2001)							
Klepp et al. (1994, 1997)	+	0					
Kuhn et al. (1994)	+						
Visser (1996)							
Knowledge, attitudes, intentions and behaviour							
Fawole et al. (1999)		0x		0x		0	0
Harvey et al. (2000)		0		0	+		0
Shuey et al. (1999)	+	+	–	+			

Notes: M: males; F: females; +: a statistically significance programme effect ($p<0.05$) in the desired direction; 0: no statistically significant programme effect; —: a statistically significant programme effect opposite to the desired direction; / results to left of /: for immediate post-programme; / results to right: for 6 and 12 months post; x: results reported here are corrected for errors in original statistics; fbv: experimental/control differences only for female baseline virgins; mbv: experimental/control differences only for male baseline virgins.

[a] Exceptionally small sample sizes (experimental = 11; control = 6).

These results provide some evidence that attitudes toward people living with HIV/AIDS, self-efficacy with respect to both condom use and abstinence and, on occasion, intentions to abstain and to use condoms can be changed with school-based programmes. Programmes that recorded these changes targeted diverse ages, used multiple, participatory learning techniques and were generally at least 20 h in duration. Attitudes toward abstention and towards condoms, and perceptions of one's own risk or susceptibility showed less promising results. The first of these is somewhat curious in light of theoretical connections between attitudes and intentions and the uniform improvement in intentions. In all programmes, attitudes toward abstinence and condoms were low at baseline and remained low at follow-up. Several possible interpretations come to mind. Perhaps when faced with high rates of HIV infection and information about self-protection, people intend to use condoms even if they do not like them. Alternatively, the measure of intentions may be more subject to social desirability biases and unreliability if measured with a single item. Clearly, this result warrants further research.

Behaviour change

The ultimate goal of all interventions was to affect a change in the behaviour of youth in a direction that would decrease their risk of HIV infection. Such change includes communication with others (especially potential sexual partners) about HIV and AIDS, delay in sexual debut, abstinence, reduction in number of partners, and use of condoms. Only three programmes specifically set behaviour change as a targeted outcome, although three others included some questions on behaviour in their evaluation instruments.

Increasing communication with others about HIV and AIDS is considered an important first step towards prevention (Klepp et al., 1997; Shuey et al., 1999) since such communication exposes youth to information and encourages a dialogue about risks and options. Clearly, communication was the easiest behaviour to change. All programmes that evaluated communication found increases in talking with parents, peers, other community members, and even with boyfriends and girlfriends with the latter two specifically about sexual risks. While the Stanton et al. (1998) evaluation raises a question about the durability of this change for secondary school students, the evaluations by Klepp et al. (1997) and Shuey et al. (1999) at 12 and 24 months after programme initiation support its durability for primary school pupils. The differences between these programmes are too numerous to identify a reason for the difference in durability. However, Shuey's positive results may be due to the young age of students, the number of programme hours and the focus on behaviour.

Changes in sexual behaviour: The Ugandan primary school programme evaluated by Shuey et al. (1999) produced significant, desirable improvements in reports of sexual initiation and number of sexual partners. In this study only 11% of the cross-sectional sample of students surveyed 2 years after programme initiation reported having begun sexual activity compared to 43% prior to programme initiation.[2] This change remained strong and statistically significant when controlling for gender and rural/urban residence. The four other studies that measured sexual initiation reported no difference between experimental and control groups. In two there was also no change in the number of sexual partners. Three of these evaluations were judged to have strong designs and appropriate statistical procedures, and the results reported here for the other two were adjusted to compensate for analysis flaws. The Namibian intervention did produce a conditional result (Stanton et al., 1998): girls who were virgins at the beginning of the programme were less likely to initiate sex by the time of the 12-month evaluation. Although the true statistical significance of this finding is questionable, it does coincide with observations based on a strong design (Shuey et al., 1999) that affecting a change in sexual debut was easier than producing abstinence among those who were already sexually active.

It is important to note, that of the studies reporting no change in sexual intercourse, there was no evidence that sexual activity increased as a result of the intervention. In fact, all studies reported a decrease in sexual activity following the interventions, though not all such changes reached statistical significance.

Changes in condom use: Four studies evaluated increase in condom use. The South African programme evaluated by Harvey et al. (2000) was the only one that resulted in an increase in the proportion of students who reported ever using a condom. The Namibian programme produced an immediate increase in reported condom use by boys who became sexually active after the programme started (i.e., pre-programme virgins). However, this gain was lost by the 6-month evaluation. After correcting for errors in interpretation of results, evaluation by Fawole et al. (1999) produced no improvement in condom use.

Insights from focus groups

Three evaluations of school-based interventions also used focus groups with teachers to assess intervention processes (Kinsman et al., 2001; Kuhn et al., 1994; Visser, 1996). Generally, teachers voiced considerable enthusiasm with respect to delivering the AIDS prevention programmes and felt optimistic that they could affect a change in their students. The focus groups with teachers conducted as part of the Kinsman et al. (2001) evaluation produced a picture of the personal and social conflict involved in delivering this intervention. Some teachers were reluctant to teach about HIV prevention because of the community's power to fire those who were considered to be teaching 'inappropriate' or 'morally unjust' topics. Others experienced personal conflict because the condom content of the curriculum was against their own belief system and values. In discussions among teachers, it was suggested that these problems may be overcome with the use of health workers, but large-scale school programmes will require teachers to deliver the messages.

Teachers in the other two studies also expressed discomfort with speaking about sexually related matters in the classroom, especially about condom use. This reluctance is not surprising, as many African cultures have strict rules prohibiting the open discussion of sexually related matters. Such reluctance is not limited to Africa, and has been observed in countries around the world. In other countries, training has helped to increase comfort and change attitudes regarding the teaching of HIV/AIDS and sex education. Evaluations of instructor training in Africa are limited, however. In the one study that evaluated teacher knowledge and attitudes post training, teachers continued to hold unfavourable attitudes towards people living with HIV/AIDS and continued to display a number of misconceptions about HIV/AIDS (Kuhn et al., 1994).

Successful school-based interventions

Three programmes stand out as being particularly successful in meeting their objectives: the Tanzanian programme evaluated by Klepp et al. (1994, 1997), the Ugandan programme evaluated by Shuey et al. (1999), and the drama-in-education programme in South Africa, evaluated by Harvey et al. (2000). All targeted primary or lower-secondary school pupils (Standard 8 or younger), had strong programme and evaluation designs (providing confidence in their findings), and all met almost all of their objectives. The two programmes working with younger youth (mean ages 13–14 years) produced changes in sexual behaviours, particularly in numbers initiating sexual activity. The programme working with older youth (mean age 17.6 years) produced change in condom use but not sexual behaviour (initiation or number of partners).

Both the Tanzanian and Ugandan programmes were the longest of all programmes in duration and were among those employing the greatest diversity of activities. The upper primary school students participating in these programmes were exposed to lectures, plays,

[2] There was no change in reports of sexual initiation in the control groups drawn at baseline and at 2 years post-programme. About 27% of those in the control group reported sexual initiation at baseline and post-programme.

poems and songs that were designed to potentially remain part of the school curriculum. Peer leaders or peer-to-peer models of education were used in both locations. The programmes were in place for 1 and 2 years, respectively, before their outcomes were evaluated. The Ugandan programme (Shuey et al., 1999) produced the largest number of significant behaviour changes with a decrease in those reporting initiation of sexual activity and in multiple sexual partners for the sexually active. The Tanzanian study (Klepp et al., 1994, 1997) was not designed to evaluate sexual behaviour, but did examine changes in knowledge, attitudes, intentions, and communication. Changes in the desired directions were recorded in all of these areas. In addition, sizable differences between control and experimental schools were recorded in the proportion reporting sexual debut (35% compared to 14% for boys and 6% compared to 3% for girls); however, these were just short of statistical significance. Researchers reporting on both of these programmes noted that there was official and/or community opposition to including information about condoms. Programme implementers responded to these objections by removing condom materials from the curriculum, although these materials were provided for teachers to use on an optional basis in Tanzania. Both programmes used a cascade approach to programme dissemination and teacher training. Teachers trained to implement the programme were expected to share information with their fellow teachers, thus producing a cadre of teachers to implement the programmes and provide mutual collegial support. The techniques used to bring both of these programmes into the schools demonstrated the feasibility of wide-scale application. The success of these two programmes provides only limited support for the widely supported conclusion that interventions based on established theoretical frameworks are most successful (e.g., Fishbein, 2000; Kirby, 2000). While the Tanzanian programme was founded on two established theories (Theory of Reasoned Action and Social Learning Theory), the Ugandan programme did not have a stated theoretical foundation. Principles from Social Learning Theory were, however, evident in the description of this programme. The conclusions that can be drawn from these two programmes are that targeting younger children, infusing a programme throughout the curriculum, using peer educators as well as teachers, providing multiple participatory activities, using a cascade approach to train teachers as widely as possible, and sustaining a programme over a prolonged period can have an impact on attitudes and behaviours associated with HIV transmission. What must be recognized, however, is that several other, less successful programmes shared some, but not all, of these characteristics.

The grade 8 South African intervention evaluated by Harvey et al. (2000) applied what was referred to as a behaviour change framework in programme design and evaluation. The programme focused on learning from and then developing a dramatic presentation of HIV/AIDS issues. No information was provided on the length or duration of the intervention. From its description it appears to have been of limited duration and not to have been infused throughout the curriculum. There were no significant changes in the proportion engaging in sexual intercourse or in the number of sexual partners following this programme. A larger proportion of these older students were sexually active at programme initiation than in the programmes working with younger students. The older age of participants and the smaller number not yet sexually active may account for the less positive results. Even the Ugandan programme (Shuey et al., 1999) found no significant changes in the sexual behaviour of youth who were already sexually active. From these results it appears that changing behaviours of those already sexually active may be particularly difficult. The effectiveness of this programme, however, is seen in its ability to increase and sustain increased condom use. Behaviour change was accompanied by a shift in attitudes and knowledge to ones more favourable towards condoms. At the time of evaluation, the programme had already been implemented in 770 schools and reached 800,000 students (Harvey et al., 2000), clearly demonstrating the feasibility of scaling up.

Discussion and conclusions

HIV prevention programmes in wealthier countries can build on a foundation of knowledge established as a result of numerous, well-resourced programmes and evaluations (see Centers for Disease Control and Prevention (CDC), 1999 for an overview). From this body of literature, Kirby (2000) identified specific characteristics that contribute to the effectiveness of programmes. While there are still too few evaluations of programmes to confirm with confidence the components of successful programmes in sub-Saharan Africa, this review has begun to identify some promising components and calls for confirmation of their importance in future work.

First, Kirby and others have argued that building a programme on a theoretical foundation contributes to its effectiveness. All of the programmes reviewed here had explicit or implicit behaviour change, learning and community development theories evident in their design, implementation, and evaluation. Coincident with WHO guidelines (1992), all programmes were described as having been adapted to local culture and context. These results confirm Fishbein's (2000) contention that 'northern' theories, when adjusted to the local context, can produce effective programmes. However, unlike

Kirby's observation that programmes are more likely to be successful if a theory is explicitly articulated, whether the theoretical foundation was articulated or implied did not appear to make a difference.

Second, there is some evidence that the stages of sexual development in youth influence programme outcomes. Programmes targeting younger, primary school children have had greater success in influencing sexual behaviours compared with those targeting older, secondary school children, likewise there appears to be a differential success among youth who were virgins at programme initiation compared to those already sexually active (Shuey et al., 1999; Stanton et al., 1998). For older youth (e.g., 17–18 years of age), no programmes were able to affect a change in sexual behaviours (e.g., abstinence and number of partners), although one programme (Harvey et al., 2000) was able to increase condom use. These results coincide with programmes in wealthier countries providing evidence that it is easier to establish low-risk behaviours than to change existing behaviours and resulting in calls to target younger children (Grunsheit, 1997).

Third, programmes must be prepared to cope with reluctance to include the topic of condoms. All but two programmes attempting to address condom use as a method to reduce the risk of HIV transmission encountered resistance from communities and teachers. Several evaluations noted that teachers did not use the materials on condoms, omitting any such information from the programmes (e.g., Kinsman et al., 2001; Klepp et al., 1994, 1997; Visser, 1996). Two exceptions were the South African programme evaluated by Harvey et al. (2000), which used drama as the vehicle for conveying information, and the Nigerian programme implemented by a physician with the assistance of two teachers (Fawole et al., 1999). In the latter programme, head teachers specifically requested that information on condoms be included as a way to address the high levels of sexual activity among their students. These results support the conclusion that condoms are a particularly difficult element in prevention programming. Their introduction may work best with older youth, when teachers are not the primary programme implementers, and when there is clear community support for this programme component. All of these conditions were present with the drama approach in South Africa and the after-school programme in Nigeria—the only two programmes that were able to include condom use.

Fourth, special resource needs to be considered when planning programmes and evaluation in the resource-poor settings found in much of sub-Saharan Africa. While videos were popular with students (Visser, 1996), they could not be used in schools without electricity (e.g., Klepp et al., 1994, 1997). The need to communicate with schools to provide support, monitoring, and evaluation were often stymied by absence of telephones and good roads, making visits to the schools both necessary and problematic. Programme materials such as posters for information, paper and pencil for essay writing, and art supplies for creating displays were not always available. Finally, resource-poor settings already demand a great deal of teachers in order to bring basic education to children. An AIDS programme taxes the time and talents of teachers even further. All of these must be taken into consideration in designing programmes for African settings. Two of the most successful programmes reviewed here were specifically designed with resources in mind (Klepp et al., 1994, 1997; Shuey et al., 1999) and several of the evaluations provided insights into the problems posed by lack of resources (e.g., Visser, 1996).

Fifth, if a programme is to be faithfully implemented, teachers must be properly trained for and committed to it. Two studies mentioned that teachers failed to address some of the major HIV/AIDS prevention issues (Kinsman et al., 2001; Visser, 1996) due to fear of community disapproval, reluctance to discuss sex and HIV, curriculum overload, and preference for doctrinaire instruction. Such reasons have been cited as barriers to HIV/AIDS intervention effectiveness worldwide (Applegate, 1998). Two problems are more unique to the African setting. The first is teacher attrition resulting from teacher transfer, illness, absence, or death (World Bank, 2002). The reality of life in Africa is that teachers are not immune to disease, including HIV. For example, in the intervention in Uganda 20 teachers had been transferred and five had died over the course of the 1-year program. In Kenya, Zimbabwe, and Zambia it is estimated that over 1.5% of the teaching population is lost each year to AIDS (World Bank, 2002). Moreover, it has been estimated that over 30% of teachers in Uganda and Malawi, 20% in Zambia, and 12% in South Africa are HIV positive (World Bank, 2002). This poses a barrier to effectiveness as the intervention may come to a halt when a trained teacher falls ill and dies. The second problem is that of sexual harassment of students by teachers. One teacher in the study of Kinsman et al. (1999) was incarcerated for impregnating a female student, and several studies have reported on girl students having their school fees paid by a teacher in exchange for sex (Jewkes & Abrahams, 2002; World Bank, 2002). All of these issues suggest that more attention must be paid to teachers as the means by which HIV/AIDS programmes reach students.

There are several limitations that must be recognized when considering the conclusions drawn here. First, and as already discussed, some of the evaluations had serious flaws either in design or in analysis. Although some of these flaws were corrected as part of this review, this still reduced the number of studies whose results could be interpreted with confidence. Some of the apparent absence of programme effect may be a result of poor

evaluation design (or poor implementation) rather than ineffective programmes themselves. Second, conclusions drawn about behaviour change are based exclusively on self-report with no verification from biological markers. While some may consider this problematic and prone to both over- and under-reporting, it should be recognized that the consensus of researchers who have examined the validity of self-reports is that they are generally credible (Cleland & Ferry, 1995; Dare & Cleland, 1994). Third, most programmes were not monitored, leaving room for doubt about how faithfully they were implemented or whether other programmes were present in communities that might have affected results. Both poor implementation and other HIV/AIDS programmes in control communities and schools would be expected to reduce the experimental effect and lead to the absence of statistically significant change. Alternatively, additional HIV/AIDS programmes in experimental communities and schools would be expected to accentuate the experimental effect and lead to stronger evidence of change. In either case, however, the evaluation results would not be a fair reflection of the effect of the school-based programme.

Even with these limitations, the results reported here support the conclusion that school-based HIV/AIDS prevention programmes targeting youth can be successful in changing knowledge and attitudes, and, under certain conditions, behaviours. What this review also demonstrates is that there are challenges faced in designing, implementing, and evaluating such programmes. Designing programmes appropriate to the context of different sub-Saharan Africa settings and the sexual development stages of youth, implementation of programmes as designed, gaining community ownership or support for programmes, and use of sound evaluation methods are among these challenges. Attention must be paid to meeting these challenges if programmes are to address the needs of African young people.

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