Patient Education and Counseling xxx (2015) xxx–xxx

Contents lists available at ScienceDirect

Patient Education and Counseling

journal homepage: www.elsevier.com/locate/pateducou

A critical review of the effectiveness of educational interventions applied in HIV/AIDS prevention

Moruf Adelekan

Royal Blackburn Hospital, c/o Daisyfield Business Park, Appleby Street, Blackburn, Lancashire BB1 3BL, United Kingdom

ARTICLE INFO

Keywords:
Critical review
Effectiveness
Educational approaches
HIV/AIDS prevention

ABSTRACT

Objective: A critical review of issues around the effectiveness of educational approaches applied in the field of HIV/AIDS prevention.
Methods: Published papers, systematic reviews and technical reports were reviewed.
Results: The review has identified the large gap between the current state of the art and the ultimate goal of the education-based approaches contributing to the reduction of HIV incidence rates. Significant positive impact has been reported mainly on mediating factors to behavioural change (knowledge, attitude, and intentions). The reported impact on actual behaviour change has been weak and short-lived. Biological markers are not used in many studies as outcome measures and follow-up period is too short to facilitate the measurement of impact on behaviour change or biological markers. Several methodological flaws and cultural issues militate against effective programming. A guideline for standardising practice and research in school-based programme is available for use.
Conclusion: There is only very modest evidence of the effectiveness of educational interventions as a result of several gaps in project design, implementation and follow-up. There is urgent need to raise practice and research standards.
Practice implications: Educational interventions should utilise scientifically valid data gathering methods. Follow-up period should be long enough to allow for impact measurement.

1. Introduction

Recent systematic reviews of the effectiveness of educational-based HIV/AIDS prevention interventions have indicated that they have succeeded in improving the knowledge of and attitude of youth about the infection, but this has largely failed to translate to actual risk-reduction behavioural change [1–7]. The very few studies that included biological markers as outcome indicators have shown either no impact [8–10] or only borderline impact [11] of the interventions on HIV rates. Several recommendations have been made on how the effectiveness of the educational-based approaches could be improved to ensure that they contribute substantially, alongside other strategies, toward facilitating a global reduction of HIV/AIDS rates [1–7,12]. This paper aims to contribute to the growing discourse by examining some critical issues around the effectiveness of the educational approaches employed in HIV/AIDS prevention. Specifically, the paper will focus on: (i) Why HIV/AIDS prevention?; (ii) The role of education in HIV/AIDS prevention; (iii) Research methods employed in determining the effectiveness of the interventions; (iv) A discussion on some critical issues around the effectiveness of school-based HIV/AIDS prevention programming.

2. Methods

1. Published papers and technical reports on the subject matter were reviewed
2. The findings presented in 7 systematic review papers [1–7] that examined critical issues around the effectiveness of education-based HIV/AIDS prevention interventions are synthesized and presented in Section 4.1.

3. Results

3.1. Why HIV/AIDS prevention?

Human immunodeficiency virus (HIV), the virus that causes acquired immune deficiency syndrome (AIDS) has become one of the world's most serious health and development challenges. The first cases were reported in 1981 and today, more than 30 years

E-mail addresses: moruf_a@yahoo.co.uk, Moruf.Adelekan@lancashirecare.nhs.uk (M. Adelekan).

http://dx.doi.org/10.1016/j.pec.2015.12.004
0738-3991/

later, there are approximately 35 million people currently living with HIV and nearly 39 million people have died of AIDS-related causes since the beginning of the epidemic [13]. Worldwide, in 2013 about 2.1 million and 1.5 million people became newly infected with HIV and died from AIDS-related causes respectively [13]. While cases have been reported in all regions of the world, almost all those living with HIV (93%) reside in low- and middle-income countries, particularly in sub-Saharan Africa. Most people living with HIV or at risk for HIV do not have access to prevention, care, and treatment, and there is still no cure. HIV primarily affects those in their most productive years; about half of new infections are among those under age 25.5 years. HIV not only affects the health of individuals, it impacts on households, communities, and the development and economic growth of nations [13].

3.1. The role of education in HIV/AIDS prevention

In view of the lack of definitive cure for the infection, several prevention strategies are being implemented globally aimed at the reduction of HIV rates. These include, among others, social marketing of condoms, peer-based programmes, mass media concerning social and cultural customs that expose participants to heightened risk, voluntary counselling and testing, sexually transmitted infection treatment, antiretroviral treatment/therapy, mother-to-child HIV transmission interventions, educational interventions, harm reduction and structural interventions [11]. Of these strategies, prevention through education remains the cornerstone of intervention policies at global and national levels. At the United Nations General Assembly Special Session (UNGASS) on HIV/AIDS held in June 2001, one of the main targets agreed to by the international community was: “ensuring that by 2005 at least 90%, and by 2010 at least 95% of young men and women aged 15–24 have access to the information, education, including peer education and youth-specific HIV education, and services necessary to develop the life skills required to reduce their vulnerability to HIV infection” [14].

Educational programmes are widely implemented for in-school and out-of-school youths globally. School-based programmes are the most popular although similar interventions are available for out-of-school youth in clinic, youth centres and community settings. School-based programmes remain pivotal because of the practicality of the school setting in executing interventions to reach the youth. Schools also provide an opportunity for interventions to achieve high coverage of young people before or around the time they become sexually active [15]. Further, a key advantage of the school system is the availability of pre-existing body of educators, that is, teachers, who are in regular contact with the youths [15]. In addition, schools are linked to communities through families, and other community organizations, extending their reach and enhancing local ownership of interventions [16].

Some school-based programmes are curriculum based [17–24] while others are non-curriculum based [25]. Teachers are strategically positioned to deliver the school-based interventions once they are adequately trained [15,26–28]. However, particularly in developing countries, the role of teachers may be constrained by availability of teachers, curriculum materials and teacher training; access to other financial, material and technical resources; the culture and norms of both the local communities and the schools themselves [29]. Some studies have reported teachers’ reluctance or outright refusal to participate in HIV/AIDS programmes, which they considered contentious, sensitive or embarrassing [26–28,30,31]. In some studies, health workers [23,32], peer groups [33–35], and non-governmental organizations [36] have either implemented the school-based programmes solely or alongside school teachers.

The outcome variables in educational-based HIV/AIDS programming could vary widely. Most target only improvement in knowledge; (e.g. about AIDS, HIV transmission), attitudes, norms and intentions; some include skills and abilities; behaviours (e.g. condom use, abstinence, number of sexual partners in specified time period, sexual debut) [1–6,37] while only a few have included biological outcomes [7–10].

Different methods of varying form and complexity are used to deliver the educational interventions. While some interventions employ didactic lectures, the large majority have utilised interactive methods including the use of board game [38], 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 [27,28] and drama [24]. The interactive activities are utilised to inculcate life skills-based education aimed at providing the youth with problem-solving skills, decision-making skills, communication, refusal and negotiating skills [8,39].

3.2. Research designs employed in the effectiveness studies

Most effectiveness studies have utilized either the experimental randomised control trial (RCT) design or the quasi-experimental (Q-E) design.

RCT has long been the gold standard for clinical research, representing the best way to determine efficacy and effectiveness for many intervention and prevention programmes. A RCT design has the highest internal validity because it requires the fewest assumptions to attain unbiased estimates of intervention effects [40]. However, HIV/AIDS prevention researchers have noted that RCT may not take adequate account of complex social and cultural factors that characterise sexual behaviour and practice [41,42]. Secondly, in the face of the need to act urgently to stem the tide of HIV epidemic in the whole community, RCTs could prove to be inappropriate and expensive. Thirdly, there is the ethical issue of selecting controls when it is desirable for everyone in the community to be exposed to the intervention. Fourthly, the findings of RCTs conducted on a small sample of the population may not be strictly generalizable to the whole community or some other communities with different socio-cultural characteristics. Despite these limitations, several effectiveness studies across the globe have successfully employed the RCT design [8,9,21,23,24,43–47].

The Q-E designs have been employed to address some of the highlighted limitations of RCT. Q-Es get their name because they are not true experimental designs, where subjects are randomly assigned to intervention and control groups [48]. In these designs, outcomes may only be measured at the end of the study (rather than at the beginning and end), there may not be a control group, or patients may be assigned to the control and intervention groups by methods other than randomization [48]. Assignment to a given intervention may be influenced by factors such as cost, feasibility, political concerns or convenience. As such, Q-Es are subject to concerns regarding internal validity because the treatment and control groups may not be comparable at baseline. Further, with Q-E studies, it may not be possible to convincingly demonstrate a causal link between the intervention and observed outcomes. Q-E research designs are easily more frequently implemented than RCTs.

Of the many types of available Q-E research designs (e.g. Non-Equivalent Groups Design, the Regression-Discontinuity Design, the Proxy Pretest Design, Double Pretest Design, the Interrupted Time Series Design), the most commonly used in education-based HIV/AIDS prevention interventions is the Non-Equivalent Groups Design (NEGD) [40]. In NEGD, presumably “similar” intact groups are used as intervention and control groups (e.g. comparable

Please cite this article in press as: M. Adelekan, A critical review of the effectiveness of educational interventions applied in HIV/AIDS prevention, Patient Educ Couns (2015), http://dx.doi.org/10.1016/j.pec.2015.12.004

schools or classrooms; similar communities). These groups are selected to be as similar as much as possible. However, the groups could not be as similar as they would if they were assigned randomly. As such, NEGD is especially susceptible to the internal validity threat of selection. The selection method may be associated with confounding factors, resulting in bias that might occur in naïve statistical analysis. However, advances in methodology have provided a much stronger toolkit for NEGD. The latter includes, for example the use of causal inference methods based on propensity scores and the addition of design elements that address likely threats to internal validity (e.g. matching and stratifying, use of pre-tests on multiple occasions to estimate pre-existing trends) [49]. The NEGD design has been employed in several education-based HIV/AIDS prevention effectiveness studies [28,32–34,38,44,50,51].

4. Discussion and conclusion

4.1. Discussion

This section is based on the synthesis of the findings of 7 systematic reviews published between 2003 and 2014 that have focused solely or partly on the effectiveness of education-based approaches applied in the prevention of HIV/AIDS [1–7]. Two of these reviews covered the global picture [1,7], three focused on developing countries [3–6] while the remaining two focused on Africa [2,4]. The reviews also differed slightly in their designs and focus. For example, while one review focused mainly only on curriculum-based school programmes [7], others covered reviews of all types of school-based programmes [2–6]. These differences notwithstanding, the following interesting findings were extracted from the reviews.

A critical question issue is whether education-based interventions have been effective in achieving the ultimate goal of reducing the HIV/AIDS incidence rates. Or have they only been successful in impacting positively on the mediating factors (knowledge, attitude, intentions) without this translating to real risk-reduction behavioural changes?

All the systematic reviews [1–7] noted that significant positive impact was reported in all the effectiveness studies on items related to acquisition of knowledge about HIV/AIDS. However, one of the reviews noted that while each study showed statistically significant improvements in overall summed knowledge scores, responses to individual questions were often unchanged and patterns of responses within studies showed incomplete knowledge [5]. Paul-Ebhohimhen et al. [2] on their African review also noted the lack of durability of the knowledge acquired. For example, they pointed out that knowledge regarding condoms was evaluated immediately following the intervention in three studies [32,35,54] with significant effects, but in the six-month follow up assessment later conducted by Agha and Van Rosse [17], this change had disappeared, suggestive of a decay effect of the intervention.

Similarly, all the systematic reviews noted that significant positive impact was reported in most studies that evaluated attitudes toward persons living with HIV/AIDS (PLWHA) or toward risk reduction behaviours. For example, Paul-Ebhohimhen et al. [2] noted that the attitude toward PLWHA improved in all the three studies that evaluated this outcome measure [27,52,53]. Assessment of attitudes towards condom use at six months in Fitzgerald et al. [44] and six weeks in James et al. [53] yielded significant positive outcomes, but no significant effect was reported by Klepp et al. [27] who reported outcomes at one year follow-up.

The effectiveness studies have yielded equivocal results on items relating to intentions towards adopting risk reduction behaviour such as condom use or abstinence. For example, Paul-Ebhohimhen et al. [2] noted that intentions regarding condom use were evaluated in four of the studies they reviewed. Desired outcomes reached statistical significance in two of the studies [44,53]. However, in one of these studies by James et al. [53], further sub-group analysis showed that intentions to use condoms was positively predicted by sex being male and persons who had been sexually active at baseline. Kuhn et al. [52] reported no effect immediately post-intervention on intentions to use condoms but in Stanton et al. [54], the significant change in intentions observed immediately post intervention had worn off by the 6-month and 12-month follow-up assessments.

While the effectiveness studies have yielded fairly positive results on knowledge and attitude, and to a lesser extent on intentions, only very modest equivocal results have been reported on behavioural changes among the study populations [1–6]. For example, Paul-Ebhohimhen et al. [2] noted that the increase in reported practice of abstinence following intervention at 6-month follow up was significantly more in intervention than control group in Fawole et al. [23], but did not reach levels of statistical significance in three studies [24,27,44]. In Stanton et al. [54], the practice of abstinence was not significantly improved until the 12-month follow-up and only among females and baseline virgins. Positive outcomes regarding actual condom use was evaluated in five studies. In four of these [23,24,53,54], there was no significant change except for an immediate post-intervention significant effect observed in a subset made of males who were baseline virgins in Stanton et al. [54]. Although there were no statistically significant changes within the intervention group in the fifth study [44], significant inter-group differences were reported on condom use at the six-month follow-up due to a drop in the percentage of youth using condoms in the control group.

Kirby et al. [7] reported more positive impact on behavioural changes in the 83 curriculum-based school programmes they reviewed throughout the world. All but one of these studies measured programme impact on one or more of six sexual behaviours: initiation of sex, frequency of sex, number of sexual partners, condom use, contraceptive use in general, and composite measures of sexual risk-taking. The authors noted that these studies strongly indicate that these programmes were far more likely to have a positive impact on behaviour than a negative impact. Across all 83 studies, two thirds (65%) had a significant positive impact on one or more of these sexual behaviours or outcomes, while only 7% had a significant negative impact on one or more of these behaviours or outcomes. One third (33%) of the programmes had a positive impact on two or more behaviours or outcomes. The authors further noted that while the positive effects of some curriculum-based programmes lasted only a few months, the effects of other programmes lasted for years. For example, the MEMA kwa Vijana [10] intervention found positive behavioural effects over a 36-month period and Safer Choices [22] found positive behavioural effects over a 31-month period.

The systematic reviews have provided information on the characteristics of successful or effective education-based interventions in HIV/AID prevention. This information is important as a guide for improvement in practice and research. Mavedzenge et al. in their recent global systematic review [1] listed the characteristics of school-based programmes that are associated with better outcome to include: delivery by trained adult facilitators; multiple session programmes; curricula that include skills and knowledge building activities and a programme design appropriate to local context. Kirby et al. [7] also provided a comprehensive list of 17 of similar characteristics generated through an in-depth systematic review of 83 curriculum-based school programmes implemented throughout the world. The authors noted that curriculum-based interventions that incorporated most of the effectiveness

Please cite this article in press as: M. Adelekan, A critical review of the effectiveness of educational interventions applied in HIV/AIDS prevention, Patient Educ Couns (2015), http://dx.doi.org/10.1016/j.pec.2015.12.004

characteristics and that were led by adults have particularly strong evidence for their impact on behaviour and should be implemented widely throughout the world. The authors grouped these characteristics into three categories namely: (i) *The process of developing the curriculum* (e.g. involved multiple people with different backgrounds in theory, research and sex/HIV education to develop the curriculum; assessed the relevant needs and assets of the target group); (ii) *The contents of the curriculum itself* (e.g. focused on clear health goals: the prevention of STD/HIV and/or pregnancy; focused narrowly on specific behaviours leading to these health goals, gave clear messages about these behaviours, and addressed situations that might lead to them and how to avoid them) and (iii) *The implementation of the curriculum* (e.g. secured at least minimal support from appropriate authorities such as ministries of health, school districts or community organizations; selected educators with desired characteristics (whenever possible), trained them and provided monitoring, supervision and support). The full list of the characteristics can be found in the reference.

Some challenges that could militate against effective programming of education-based interventions were highlighted in the systematic reviews as follows:

(i) Research methods and project implementation: General methodological limitations included the use of weak Q-E designs, lack of linking pre- and post-test samples in multiple cross-sectional surveys, immediate post-intervention assessment or short follow-up periods. Lack of programme monitoring was identified as a major cause of poor outcomes some African studies [26,30]. In regard to data analysis, some studies were noted to have included control groups but did not appropriately control for baseline differences between experimental and control groups [23,38,52]. Other flaws highlighted were 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 and the lack statistical power in some studies [1–6].

(ii) Culturally sensitive issues: In the African review by Gallant and Maticka-Tyndale [4], nine out of the eleven 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 [28,30,50,51]. However, discussion on condom use was allowed only in two programmes: the drama programme in South Africa [24] and the Nigerian study where head teachers specifically requested that information on condoms be included as a way to address the high levels of sexual activity among their students [23]. These results support the conclusion that condoms are a particularly difficult element in prevention programming in parts of the globe. 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 [4].

(iii) Teachers' issues: Two additional problems unique to teachers in the African setting were highlighted in the review by Gallant and Maticka-Tyndale [4]. The first is teacher attrition resulting from teacher transfer, illness, absence and death [55] while the second one is that of sexual harassment of students by teachers [26].

(iv) Use of biological markers: All the systematic reviews have noted the lack of use of biological markers (HIV or STDs incidence rates) as outcome measures in almost all the reviewed studies. In the report by Kirby et al. [3], only 1 of 22 studies [10] used this impact measure.

(v) Cost-effectiveness studies: All the systematic reviews [1–7] noted the dearth of literature on cost-effectiveness studies of education-based HIV/AIDS prevention programmes. Galarraga et al. [55] attributed this situation to the modest evidence of effectiveness, as well as limited costing data.

5. Conclusions

The review of the systematic and individual effectiveness papers on education-based approaches applied in HIV/AIDS prevention has identified a huge gap between the current practice and the achievement of the ultimate goal of these approaches contributing to the reduction of HIV rates. First, the most significant changes in the reviews were reported in knowledge, being followed by changes in attitudes. Outcomes relating to future intentions were next, while the least significant changes were in actual behaviour. Secondly, many of the effectiveness studies focused only on the mediating factors in behaviour change (knowledge, attitude and intentions) and did not include items relating to actual risk-reduction behaviour change as outcome measures. While it is necessary to begin any behavioural change programme with an emphasis on knowledge gain, knowledge in itself does not lead to change, while attitude and intent do not automatically translate to behavioural change. Thus, measuring behaviour change should be a requirement in asserting the effectiveness of a preventive programme. Thirdly, the short follow-up periods in the majority of the education-based interventions and the lack of inclusion of biological markers mean that it would be practically impossible to identify any long-term impact of these approaches. Fourthly, the several methodological and programmatic flaws identified in these approaches is an indication to strengthen the research and programmatic base. In this regard, the generation of the guideline encompassing the 17 characteristics of a successful programme [7] is a step in the right direction to assist researchers and programmers to raise practice and research standards.

5.1. Practice implications

Based on the findings of this review, the following recommendations are suggested as possible ways of addressing some of the identified gaps in practice and research:

1. To overcome some of the barriers posed by culturally sensitive issues, researchers should involve community stakeholders including the youth in their interventions right from the stage of project conception through to completion.
2. Researchers and practitioners should utilise as guideline the principles itemised in the 17 characteristics of successful curriculum-based school programmes [7].
3. Teachers should receive regular training and monitoring to guide and encourage their participation in school-based interventions.
4. Every school-based programme should include behaviour change and biological markers as outcome measures. The follow-up period should be sufficiently long enough to facilitate the measurement of the impact on behaviour change and HIV incidence rates.
5. All education-based effectiveness studies should utilise scientifically valid methods (RCTs or at the very least Q-E design). This review has shown that such designs have been employed even in the poorest of nations.
6. In view of the several methodological and statistical flaws reported in many of the effectiveness studies particularly from developing countries, epidemiologists and statisticians should

Please cite this article in press as: M. Adelekan, A critical review of the effectiveness of educational interventions applied in HIV/AIDS prevention, Patient Educ Couns (2015), http://dx.doi.org/10.1016/j.pec.2015.12.004

form part of the research team right through every stage of programming.
7. Sample sizes should be sufficiently large enough to have adequate statistical power for important statistical analyses, including those among sub-groups.
8. Cost-effectiveness studies on school-based HIV/AIDS programming are urgently needed and should be integrated into projects.

Role of the funding source

In 2013, International Alliance for Responsible Drinking (IARD) sponsored this review paper along with other similar papers with the aim of exploring how the principles of effective intervention strategies applied in other medical, health and social issues could be transferred to the field of alcohol prevention.

In addition to providing financial support for the preparation and publication of this article, IARD also provided guidance on its template and structure.

"This publication presents the work product, findings, viewpoints, and conclusions solely of professor Moruf Adelekan. The views expressed are not necessarily those of IARD's sponsoring companies."

Conflict of interest

I do not have any conflict of interest in regard to the preparation of this manuscript. I am a member of the Research Advisory Committee of IARD. However, I am not involved in any project funded by the organization other than the honorarium paid for preparing and publishing this manuscript.

Acknowledgements

I acknowledge the sponsorship by International Alliance for Responsible Drinking (IARD) for the preparation and publication of this article in the form of honorarium. I also thank IARD for the technical support of promptly sourcing and supplying all the literature requests made by me.

References

[1] S.N. Mavedzenge, E. Luecke, D.A. Ross, Effective approaches for programming to reduce adolescent vulnerability to HIV infection, HIV risk, and HIV morbidity and mortality: a systematic review of reviews, J. Acquir. Defic. Syndr. 66 (2014) S154–S169.
[2] V. Paul-Ebhohimhen, A. Poobalan, E.R. van Teijlingen, A systematic review of school-based sexual health interventions to prevent STI/HIV in sub-Saharan, Africa, BMC Pub. Health. 8 (2008/2008) 4, doi:http://dx.doi.org/10.1186/1471-2458-8-4.
[3] D. Kirby, A. Obasi, B.A. Laris, The effectiveness of sex education and HIV education in schools in developing countries, World Health Organ. Tech. Rep. Ser. 938 (2006) 103–150.
[4] M. Gallant, E. Maticka-Tyndale, School-based HIV prevention programmes for African youth, Soc. Sci. Med. 58 (2004) 1337–1351.
[5] L. Magnussen, J.E. Ehiri, H.O. Ejere, P.E. Jolly, Interventions to prevent HIV/AIDS among adolescents in less developed countries: are they effective? Int. J. Adolesc. Med. Health 16 (2004) 303–332.
[6] I.S. Speizer, R. Magnani, C.E. Colvin, The effectiveness of adolescent reproductive health interventions in developing countries: a review of the evidence, J. Adolesc. Health 33 (2003) 324–348.
[7] D.B. Kirby, B.A. Laris, L.A. Rolleri, Sex and HIV education programs: their impact on sexual behaviors of young people throughout the world, J. Adolesc. Health 40 (2007) 206–217.
[8] F.M. Cowan, S.J.S. Pascoe, L.S.F. Langhaug, W. Mavhu, S. Chidiya, S. Jaffar, M. Mbizvo, J.M. Stephenson, A.M. Johnson, R.M. Power, G. Woelk, R.J. Hayes, The Regai Dzive Shiri project: results of a randomized trial of an HIV prevention intervention for Zimbabwean youth, AIDS 24 (2010) 2541–2552.
[9] D.A. Ross, J. Chanchalucha, A. Obasi, J. Todd, M.L. Plummer, B.C. Mazige, A. Anemona, D. Everett, H.A. Weiss, D.C. Mabey, H. Grosskurth, R.J. Harvey, Biological and behavioural impact of an adolescent sexual health intervention in Tanzania: a community randomized trial, AIDS 21 (2007) 1943–1955.
[10] A.M. Doyle, D.A. Ross, K. Maganja, K. Baisley, C. Masesa, A. Andreasen, M.L. Plummer, A.I. Obasi, H.A. Weiss, S. Kapiga, D. Watson-Jones, J. Chanchalucha, R. J. Hayes, Long-term biological and behavioural impact of an adolescent sexual health intervention in Tanzania: follow-up survey of the community-based MEMA kwa Vijana trial, PLoS Med. 7 (2010) e1000287.
[11] R. Jewkes, M. Nduna, J. Levin, N. Jama, K. Dunkle, A. Puren, N. Duvvury, Impact of stepping stones on incidence of HIV and HSV-2 and sexual behaviour in rural South Africa: cluster randomised controlled trial, BMJ 337 (2008) a506.
[12] UNAIDS, Innovative approaches to HIV prevention—selected case studies, UNAIDS Best Practice Collection, Geneva, 2000.
[13] UNAIDS, 2014 Global Report, UNAIDS, Geneva July 2014.
[14] UNAIDS, 2001 United Nations General Assembly Special Session on HIV/AIDS: Declaration of Commitments: http://www.unaids.org/en/media/unaids/contentassets/dataimport/publications/irc-pub03/aidsdeclaration_en.pdf.
[15] UNAIDS, Strategic guidance for evaluating HIV prevention programmes, UNAIDS Geneva 2009.
[16] E. Barnett, K. de Koning, B. Francis, Health and HIV/AIDS education in primary and secondary schools in Africa and Asia, Overseas Development Administration, Education Resource Group, Serial No. 14, Liverpool, England, 1995.
[17] S. Agha, R. Van Rosse, Impact of a school-based peer sexual health intervention on normative beliefs, risk perceptions, and sexual behaviour of Zambian adolescents, J. Adolesc. Health 34 (2004) 441–452.
[18] M. Antunes, R. Stall, V. Paiva, C.A. Peres, J. Paul, M. Hudes, N. Hearst, Evaluating an AIDS sexual risk reduction program for young adults in public night schools in São Paulo, Brazil, AIDS (1997) S121–S127.
[19] E. Borawski, E. Trapl, L. Lovegreen, N. Colanbuachi, T. Block, Effectiveness of abstinence-only intervention in middle school teens, Am. J. Health Behav. 29 (2005) 423–434.
[20] C. Boyer, M. Shafer, J. Tschann, Evaluation of a knowledge- and cognitive-behavioral skills-building intervention to prevent STDs and HIV infection in high school students, Adolescence 32 (1997) 25–42.
[21] C. Cabezon, P. Vigil, I. Rojas, M.E. Leiva, R. Riquelme, W. Aranda, C. Garcia, Adolescent pregnancy prevention: an abstinence-centered randomized controlled intervention in a Chilean public high school, J. Adolesc. Health 36 (2005) 64–69.
[22] K. Coyle, K. Basen-Enqquist, D. Kirby, G. Parcel, S. Banspach, J. Collins, E. baumler, S. Carvajal, R. Harrist, Safer choices: reducing teen pregnancy, HIV and STDs, Public Health Rep. 116 (2001) 82–93.
[23] I. Fawole, M. Asuzu, S. Oduntan, W. Brieger, A school-based AIDS education programme for secondary school students in Nigeria: a review of effectiveness, Health Educ. Res. 14 (1999) 675–683.
[24] B. Harvey, J. Stuart, T. Swan, Evaluation of a drama-in-education programme to increase AIDS awareness in South African high schools: a randomized community intervention trial, J. STD AIDS 11 (2000) 105–111.
[25] D. Wilson, A. Mparadzi, S. Lavelle, An experimental comparison of two AIDS prevention interventions among young Zimbabweans, J. Soc. Psychol. 132 (1991) 415–417.
[26] J. Kinsman, S. Harrison, J. Kengeya-Kayondo, E. Kanyesigye, S. Musoke, J. Whitworth, Implementation of a comprehensive AIDS education programme for schools in Masaka District, Uganda, AIDS Care 11 (1999) 591–601.
[27] K.I. Klepp, S. Ndeki, M.T. Leshabari, P.J. Hannan, B.A. Lyimo, AIDS education in Tanzania: promoting risk reduction among primary school children, Am. J. Public Health 87 (1997) 1931–1936.
[28] D.A. Shuey, B.B. Babishangire, S. Omiat, H. Bangarukayo, Increased sexual abstinence among in-school adolescents as a result of school health education in Soroti district, Uganda, Health Educ. Res. 14 (1999) 411–419.
[29] D.C. Oshi, S. Nakalema, L.L. Oshi, Cultural and social aspects of HIV/AIDS sex education in secondary schools in Nigeria, J. Biosoc. Sci. 37 (2005) 175–183.
[30] M. Visser, Evaluation of the first AIDS kit, the AIDS and lifestyle education programme for teenagers, S. Afr. J. Psychol. 26 (1996) 103–113.
[31] M. Applegate, AIDS education for adolescents: a review of the literature, J. HIV/AIDS Prev. Educ. 2 (1998) 5–29.
[32] D. Munodawafa, P.J. Marty, C. Gwede, Effectiveness of health instruction provided by student nurses in rural secondary schools of Zimbabwe: a feasibility study, Int. J. Nurs. Stud. 32 (1995) 27–38.
[33] T. Menna, A. Ali, A. Worku, Effects of peer education intervention on HIV/AIDS related sexual behaviors of secondary school students in Addis Ababa, Ethiopia: a quasi-experimental study, Prod. Health 12 (2015) (2015) 84–93.
[34] A.A. Adeomi, O.A. Adeoye, E.O. Asekun-Olarinmoye, O.L. Abodunrin, A.I. Olugbenga Bello, A.O. Sabageh, Evaluation of the effectiveness of peer education in improving HIV knowledge, attitude and sexual behaviours among in-school adolescents in Osun State, Nigeria, AIDS Res. Treat. 2014 (2014) Article ID 131756, 10 pages.
[35] S. Agha, An evaluation of the effectiveness of a peer sexual health intervention among secondary-school students in Zambia, AIDS Educ. Prev. 14 (2002) 269–281.
[36] W.R. Brieger, G.E. Delano, C.G. Lane, O. Oladepo, K.A. Oyediran, West African youth initiative: outcome of a reproductive health education program, J. Adolesc. Health 29 (2001) 436–446.
[37] E. Yankah, P. Aggleton, Effects and effectiveness of life skills education for HIV prevention in young people, AIDS Educ. Prev. 20 (2008) 465–485.

Please cite this article in press as: M. Adelekan, A critical review of the effectiveness of educational interventions applied in HIV/AIDS prevention, Patient Educ Couns (2015), http://dx.doi.org/10.1016/j.pec.2015.12.004

[38] M. MacLachlan, M. Chimombo, N. Mpemba, AIDS education for youth through active learning: a school-based approach from Malawi, Int. J. Educ. Dev. 17 (1997) 41–50.
[39] D. Walker, J.P. Gutiereeez, P. Torres, S.M. Bertozzi, HIV prevention in Mexican schools: prospective randomised evaluation of intervention, Br. Med. J. 332 (2006) 1189–1194.
[40] W.R. Shadish, T.D. Cook, D.T. Campbell, Experimental and Quasi-Experimental Designs for Generalised Causal Inference, Houghton Mifflin, Boston, MA, 2002.
[41] P. Van de Ven, P. Aggleton, What constitutes evidence in HIV/AIDS education? Health Educ. Res. 14 (1999) 461–471.
[42] S. Kippax, N. Stephenson, Meaningful evaluation of sex and relationship education, Sex Educ. 5 (2005) 359–373.
[43] M.R. Aplasca, D. Siegel, J.S. Mandel, R.T. Santana-Arciaga, J. Paul, E.S. Hudes, O.T. Monzon, N. Hearst, Results of a model AIDS prevention program for high school students in the Philippines, AIDS 1 (1995) S7–S13.
[44] A.M. Fitzgerald, B.F. Stanton, N. Terreri, H. Shipena, X. Li, J. Kahihuata, I.B. Ricardo, J.S. Galbraith, A.M. De Jaeger, Use of Western-based HIV risk-reduction interventions targeting adolescents in an African setting, J. Adolesc. Health 25 (1999) 52–61.
[45] J.B. Jemmott II, L.S. Jemmott, HIV risk reduction behavioural interventions with heterosexual adolescents, AIDS 14 (2000) S40–S52.
[46] M.T. Mbizvo, J. Kasule, V. Gupta, S. Rusakaniko, S.N. Kinoti, W. Mpanju-Shumbushu, A.J. Sebina-Zziwa, R. Mwateba, J. Padayachy, Effects of a randomized health education intervention on aspects of reproductive health knowledge and reported behaviour among adolescents in Zimbabwe, Soc. Sci. Med. 44 (1997) 573–577.
[47] J.S. St Lawrence, T.L. Brasfield, K.W. Jefferson, E. Alleyne, R.E. O'Bannon III, A. Shirley, Cognitive-behavioral intervention to reduce African American adolescents' risk for HIV infection, J. Consult. Clin. Psych. 63 (1995) 221–237.
[48] G.A. Morgan, Quasi-experimental designs, J. Am. Acad. Child Adolesc. Psych. 39 (2000) 794–796.
[49] P.R. Rosenbaum, Observation Studies, 2nd ed., New York Springer, New York, 2002.
[50] J. Kinsman, J. Nakiyingi, A. Kamali, L. Carpenter, M. Quigley, R. Pool, J. Whitworth, Evaluation of a comprehensive school-based AIDS education programme in rural Masaka, Uganda, Health Educ. Res.—Theory Prac 16 (2001) 85–100.
[51] K.I. Klepp, S.S. Ndeki, A.M. Seha, P.J. Hannan, B.A. Lyimo, M.H. Msuya, M.N. Irema, A. Schreiner, AIDS education for primary school children in Tanzania: an evaluation study, AIDS. 8 (1994) 1157–1162.
[52] L. Kuhn, M. Sternberg, C. Mathews, Participation of the school community in AIDS education: an evaluation of a high school programme in South Africa, AIDS Care 6 (1994) 161–171.
[53] S. James, P.S. Reddy, R.A.C. Ruiter, M. Taylor, C.C. Jinabhai, P. Van Empelen, B. Van Den Borne B, The effects of a systematically developed photo-novella on knowledge, attitudes, communication and behavioural intentions with respect to sexually transmitted infections among secondary school learners in South Africa, Health Prom. Int. 20 (2005) 157–165.
[54] B.F. Stanton, X. Li, J. Kahihuata, A.M. Fitzgerald, S. Neumbo, G. Kanduuombe, I.B. Ricardo, J.S. Galbraith, N. Terreri, I. Guevara, H. Shipena, J. Strijdom, R. Clemens, R.F. Zimba, Increased protected sex and abstinence among Namibian youth following a HIV risk-reduction intervention: a randomized, longitudinal study, AIDS 12 (1998) 2473–2480.
[55] O. Galarraga, M.A. Colchero, G.W. Richard, S.M. Bertozzi, HIV prevention cost-effectiveness: a systematic review, BMC Public Health (Suppl. (S5)) (2009) , doi:http://dx.doi.org/10.1186/1471-2458-9-s1-s5.

Please cite this article in press as: M. Adelekan, A critical review of the effectiveness of educational interventions applied in HIV/AIDS prevention, Patient Educ Couns (2015), http://dx.doi.org/10.1016/j.pec.2015.12.004