

Cervical cancer and sexual lifestyle: a systematic review of health education interventions targeted at women

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Abstract

A systematic review was conducted to determine the effectiveness of health education interventions to promote sexual risk reduction behaviours amongst women in order to reduce transmission of human papillomavirus (HPV), a leading agent in the development of cervical cancer. A comprehensive search was conducted to identify relevant studies. Studies were included in the review if they evaluated educational interventions targeting women only and measured the impact on either a behavioural outcome such as condom use for sexual intercourse, partner reduction or abstinence, or a clinical outcome such as incidence of a STD. Thirty studies met the inclusion criteria for the review; all had the primary aim of preventing HIV and other STDs rather than cervical cancer. Ten of the 30 studies were considered to provide the strongest evidence for a causal relationship between the intervention and the change in outcomes measured. Each of these 10 most rigorous studies showed a statistically significant positive effect on sexual risk reduction, typically with increased use of condoms for vaginal intercourse. This positive effect was generally sustained up to 3 months after intervention. It was concluded that educational interventions

targeting socially and economically disadvantaged women in which information provision is complemented by sexual negotiation skill development can encourage at least short-term sexual risk reduction behaviour. This effect has the potential to reduce the transmission of HPV and thus possibly reduce the incidence of cervical carcinoma.

Introduction

Cervical cancer is one of the most common cancers affecting women worldwide. Based on WHO's 1997 estimates, the overall prevalence is 3 955 000 cases with 425 000 new cases diagnosed each year, 80% of which are in developing countries, and 195 000 deaths worldwide each year (WHO, 1998). In England and Wales, the incidence rate for 1997 was approximately 10 per 100 000 women and the mortality rate was around 5 per 100 000 [based on data by Quinn *et al.* (Quinn *et al.*, 1998)].

Cervical cancer is one of the few cancers with a readily detectable and treatable precursor stage. There are two distinct conditions, 'carcinoma *in situ*' and 'invasive cervical cancer'. The former refers to the development of pre-malignant lesions whilst the latter is a more advanced stage in which a tumour is present. The most significant risk factor is considered to be human papillomavirus (HPV) (Munoz and Bosch, 1996; Montero *et al.*, 1997). HPV prevalence in cervical carcinomas has been estimated to be 99.7%, higher than previously thought (Walboomers *et al.*, 1999). The virus, particularly types 16 and 18, is transmitted sexually and when in contact with the transformation zone of the cervix is known to contribute to invasive

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cervical carcinoma. HPV can result in cervical cancer 5–30 years after the initial infection (WHO, 1998). The greater number of sexual partners a woman has without the use of condoms, the greater her risk of coming into contact with HPV and of later developing cervical cancer. Enabling women to successfully negotiate condom use with their sexual partners may therefore decrease the risk for cervical cancer.

The age at which women engage in their first sexual intercourse has also been cited as a risk factor for cervical cancer as damage might be caused to the cervix at a time when it is still developing. The risk of getting HPV and cervical cancer in women who initiated sexual intercourse around age 15 has been shown to be twice the risk of those who did so after age 20 (WHO, 1998). Given that the median age of first sexual intercourse is continuing to fall (Wellings *et al.*, 1994), this may have serious implications for cervical cancer incidence.

Other factors influencing the development of cervical cancer include smoking (Sood, 1991), oral contraceptive pill use (La Vecchia *et al.*, 1996; Beral *et al.*, 1999) and *Chlamydia* infection (Jha *et al.*, 1993; Markowska *et al.*, 1999). The trend that women of lower socio-economic class have a higher risk for developing cervical cancer may be explained by their higher rates of smoking in this group (Cancer Research Campaign, 1996).

Screening has contributed to declines in cervical cancer in many developed countries; however, it is rarely accessible in developing countries, especially to women in rural areas, or to older women who are considered at greatest risk (WHO, 1998). The contribution of primary prevention for cervical cancer is often understated and ignored. Health education to promote the use of condoms for sexual intercourse (especially amongst young women), sexual partner reduction and negotiated safer sex strategies have been recommended as a necessary approach to limit the spread of HPV (De Vet *et al.*, 1994; Lovejoy, 1994). Interventions tackling structural issues which determine health such as increasing access to health facilities, improving housing conditions and increasing

household income have been recommended as part of the UK government's strategy for reducing inequalities in health (Department of Health, 1999). Although one of the primary aims of this strategy is to reduce the death rate for cancer by a fifth, the emphasis with regard to cervical cancer is on improving screening rather than tackling the societal and material circumstances that may put women at increased risk for STDs.

The strongest measures of the effectiveness of primary prevention of cervical cancer are a decrease in abnormal vaginal smears, morbidity and ultimately mortality related to the disease. However, sexual risk reduction interventions are rarely, if at all, evaluated in terms of such long-term outcomes. At best, proximal measures such as reported condom use over a given time period following intervention (e.g. 1 to 2 years) may provide an indication of the potential for such initiatives to reduce the incidence of cervical cancer.

As a pre-requisite to the planning and implementation of primary prevention for cervical cancer, there is a need to systematically review what can be learned from previous research in this area. This review critically appraised outcome evaluation studies of interventions targeted at women that aimed to promote safer sexual behaviours such as condom use, sexual partner reduction or delayed first intercourse, as a way of preventing transmission of HPV and potentially reducing the likelihood of the development of cervical cancer. Interventions which aim to delay or dissuade women from taking up smoking, another major risk factor for cervical cancer, or which promote smoking cessation were not included as several reviews in this area have already been completed by (or are ongoing within) the Cochrane Tobacco Addiction Group (Cochrane Library, 1999).

Methods

Inclusion criteria

The target population was sexually active women and pre-sexually active women within the age

range 13–64 years. Educational interventions were sought that targeted women only (counselling, health education, media campaigns, etc.), in any setting (schools, colleges, communities, clinics, etc.) and by any provider (teachers, health promotion specialists, clinical staff, peer educators, etc.). Interventions that aimed to change policy or legislation were excluded.

Outcomes of interest included condom use for vaginal intercourse, sexual partner reduction, development of sexual negotiation skills (e.g. assertiveness, communication), delayed first intercourse, abstinence and/or a relevant clinical outcome (e.g. STD incidence, HPV/cervical cancer incidence).

Identification of studies

This review incorporated all relevant studies from a previous systematic review of sexual health interventions for young people (aged 10–21) conducted by the Centre for the Evaluation of Health Promotion and Social Interventions (EPI Centre), University of London Institute of Education (Peersman *et al.*, 1996). The systematic search methods of this review were expanded to obtain more recent studies and to include studies targeting women of a broader age range. The following databases were searched for the given time periods: the Cochrane Controlled Clinical Trials Register (CCTR) (1998, Issue 2), EMBASE (1994–1997), ERIC (1994–1997), MEDLINE (1994–1997), PsycLIT (1996–1997) and Social Science Citation Index (SSCI) (1994–1997).

In addition, the most recent issues of a number of key health education and sexual health journals as well as wider public health journals and psychology journals were hand-searched. The full search strategies including the list of journals hand-searched can be found on the Cochrane Library (Shepherd *et al.*, 1999) or are available on request. Other publications hand-searched included the reference lists of relevant published trials and systematic reviews, and the Health Education Authority (HEA, England) ‘Current Awareness/Journal Articles of Interest to Health Educators’ bulletins. Unpublished (‘grey’) literature was sought by

searching HealthPromis, the HEA’s database of references to research reports and ongoing research, and contacting researchers and research institutions. In cases where it was not clear whether multiple publications described the same trial, the relevant authors were contacted. They were also asked to provide details of any relevant unpublished/ongoing trials they were aware of.

Assessment of the methodological quality of studies

All studies meeting the inclusion criteria for the review were assessed for the presence of four core methodological qualities:

- (1) Employing a control/comparison group equivalent at baseline to the intervention group on socio-demographic and outcome variables
- (2) Reporting pre-intervention outcome data for each group
- (3) Reporting post-intervention outcome data for each group
- (4) Reporting on all outcomes targeted as indicated in the aims of the study

As randomization is not always feasible, we did not restrict the review to well-designed and well-executed randomized trials only. Both randomized and non-randomized trials meeting all four quality criteria were included in the analysis of the review as they were considered to provide the strongest evidence for a causal relationship between the intervention and any change in outcomes measured.

A standardized data extraction guide (Peersman *et al.*, 1997) was used to obtain data from all relevant studies on the planning, content, delivery and implementation of the intervention; the study population; the evaluation design and evaluation findings (outcome data as well as process data, where available). Data on each study were abstracted independently by two reviewers and any disagreements were resolved. A random 10% of all studies were assessed by a third reviewer as an additional quality assurance check and any changes were made in consultation with the initial reviewers.

Part of the reviewing process consisted of com-

paring the claims to effectiveness made by the authors of each study with the findings derived at by the reviewers, bearing in mind the methodological quality of studies as a base for establishing effect. Effectiveness was judged in terms of each of the study's aims. For example, if an intervention aimed to increase the use of condoms for vaginal intercourse and showed a significant positive effect on this outcome, it was judged to be effective in terms of this outcome. Where there were multiple outcome measures such as changes in reported condom use and changes in incidence of a STD, the intervention was judged effective/ineffective in terms of each outcome.

Results

Identification of studies

Electronic database searching identified a total number of 8395 citations of which the abstracts were scanned to identify potentially relevant studies for which full reports were subsequently obtained. Only 21 studies met the inclusion criteria for the review of which 14 (66%) were located on SSCI, 13 (62%) on EMBASE, 12 (57%) on MEDLINE and one (5%) on CCTR. Some studies were found on more than one database, hence figures do not add up to 21 or 100%. In addition, six relevant studies were incorporated from the previous systematic review carried out by the EPI Centre (Peersman *et al.*, 1996) and three were identified through hand-searching. Therefore, the total number of studies meeting the inclusion criteria was 30.

Methodological quality of the studies

Following critical appraisal, 20 (66%) of the 30 studies did *not* meet all four methodological criteria; the primary reason was a lack of equivalence between study groups at baseline assessment (12 studies/60%). Other methodological reasons for exclusion of relevant studies from the analysis are listed in Appendix 1.

Of the 10 studies meeting the four core methodological criteria, eight were randomized controlled trials and two were non-randomized trials. Self-

completion questionnaires or structured interviews were the most common means of assessing outcomes. Attrition (drop-out) rates in the 10 studies were generally under 30%, with two exceptions (Kelly *et al.*, 1994; Eldridge *et al.*, 1997). The rest of this review will focus on these 10 most rigorous studies as they provide the strongest evidence for a causal relationship between the intervention and any change in outcomes measured.

Characteristics of the interventions

All 10 studies had a primary focus on improving sexual health, stating the prevention of HIV and other STDs as the primary aim; none specifically aimed to prevent cervical cancer. Most of them had an additional focus on substance abuse (alcohol, illicit drugs and solvents) encouraging women not to use alcohol and drugs prior to sex, mainly due to the associated inhibitive effect on the ability to negotiate safer sex with their partners.

In terms of intervention content, factual information regarding transmission and prevention of STDs (most commonly HIV) was a feature in all 10 studies. This was generally complemented by the teaching of safer sex negotiation skills (eight studies/80%). These skills included practising correct condom use (Diclemente and Wingood, 1995; Eldridge *et al.*, 1997; St Lawrence *et al.*, 1997), communication skills (Eldridge *et al.*, 1997; St Lawrence *et al.*, 1997) and refusing sex without a condom (Kelly *et al.*, 1994; Carey *et al.*, 1997). One study, targeting commercial sex workers, sought to create a supportive environment for behaviour change in that brothel owners were encouraged to foster condom use as the norm (Bhave *et al.*, 1995). All but one study (Bhave *et al.*, 1995) cited a theoretical model underpinning the development of the intervention with 'Social Learning Theory' (Bandura, 1963, 1990) most commonly cited (six studies/60%).

A variety of intervention media and formats were employed (Table I) ranging from discussion group sessions incorporating role-play exercises to video presentations. The length of the interventions varied from a one-off session lasting just over an hour (Ploem and Byers, 1997) to a 3-year peer-

led community intervention (Corby and Wolitski, 1996) (Table II). Intervention providers included health promotion practitioners (Hobfoll *et al.*, 1994; Bhave *et al.*, 1995), peer educators (DiClemente and Wingood, 1995; Corby and Wolitski, 1996), psychologists (Hobfoll *et al.*, 1994; Carey *et al.*, 1997), researchers (Bhave *et al.*, 1995; Ploem and Byers, 1997), social workers (Bhave *et al.*, 1995; Carey *et al.*, 1997) and group facilitators (Kelly *et al.*, 1994; Kalichman *et al.*, 1996; St Lawrence *et al.*, 1997).

The settings in which the interventions were delivered were community sites (Kalichman *et al.*, 1996; Carey *et al.*, 1997), prison (DiClemente and Wingood, 1995; St Lawrence *et al.*, 1997), specialist health care units such as a drug detoxi-

fication clinic or STD clinic (Hobfoll *et al.*, 1994; Kelly *et al.*, 1994; Bhave *et al.*, 1995; Eldridge *et al.*, 1997) and a university college (Ploem and Byers, 1997). Only one study did not provide details on where the intervention took place (Kalichman *et al.*, 1996).

Studies measured one or more of the following outcomes: knowledge of sexual risks, intentions to use condoms, attitudes towards condoms, self-esteem, self-efficacy, condom use negotiation skills and self-reported condom use during sexual intercourse. Timing of post-intervention follow-up varied from 1 to 6 months (Table II).

Characteristics of study participants

A total of 5089 women were targeted across the 10 studies. Sample sizes per study ranged from 87 participants (Kalichman *et al.*, 1996) to 541 (Bhave *et al.*, 1995). Overall, women between 11 and 54 years of age were targeted. In all but one study (Ploem and Byers, 1997), women were of low socio-economic status. In terms of ethnicity, eight of the studies (all conducted in the US) targeted predominantly African-American women (ranging from 43 to 100% of the study population).

Effectiveness

All 10 studies showed a favourable intervention effect upon sexual risk reduction outcomes. Condom use increase ranged from 25% (Bhave *et al.*, 1995) to 56% (Kelly *et al.*, 1994). The one study which measured clinical outcomes found that incid-

Table I. Media used in interventions (N = 10)

Medium of intervention	No. of studies	%
Discussion group sessions	8	80
Practising practical skill	7	70
Role play	7	70
Film/video/slides	6	60
Presentation/lecture	3	30
Printed materials/posters	3	30
Outreach	2	20
Curriculum materials	2	20
One-to-one communication	1	10
Theatre	1	10

Numbers do not add up to 10 studies or 100% as in some studies more than one medium was used.

Table II. Length of the interventions and follow-up measurement (N = 10)

Study	Length of intervention	Timing of post-intervention assessment
Carey <i>et al.</i> , 1997	1 week to 1 month	1–3 months
Kalichman <i>et al.</i> , 1996	1 week to 1 month	3 months
St Lawrence <i>et al.</i> , 1997	1–3 months	6 months
DiClemente and Wingood, 1995	1–3 months	up to 3 months
Bhave <i>et al.</i> , 1995	6 months	6 months
Kelly <i>et al.</i> , 1994	1–3 months	up to 3 months
Hobfoll <i>et al.</i> , 1994	1–3 months	6 months
Eldridge <i>et al.</i> , 1997	1 week to 1 month	2 months
Corby and Wolitski, 1996	3 years	not stated
Ploem and Byers, 1997	1 day	1 month

Table III. Summary of evaluation design: comparisons between different conditions (N = 10)

Component	Study
Factual information with skills development	
Information provision with safer sexual skills development versus no intervention control/waiting list group	Bhave <i>et al.</i> , 1995 Carey <i>et al.</i> , 1997 Kalichman <i>et al.</i> , 1996
Information provision with safer sexual skills development versus 'generic health promotion' group	Hobfoll <i>et al.</i> , 1994 Kelly <i>et al.</i> , 1994
Information provision with safer sexual skills development versus information only	DiClemente and Wingood, 1995 Eldridge <i>et al.</i> , 1997 Ploem and Byers, 1997
Information only	
Information provision versus no intervention control group	Corby and Wolitski, 1996
Skills development only	
Safer sexual skills development versus comparison group	St Lawrence <i>et al.</i> , 1997

ence of HIV and STDs was significantly different between intervention and control groups (Bhave *et al.*, 1995): for HIV it was 0.05 and 0.16 per person-year of follow-up, and for syphilis 0.08 and 0.22, respectively. One study of inner-city women which included abstinence as a measure found that there were no changes in this outcome (Hobfoll *et al.*, 1994). Similarly, three studies (Hobfoll *et al.*, 1994; Carey *et al.*, 1997; Eldridge *et al.*, 1997) detected no statistically significant reduction in the number of sexual partners.

Table III summarizes the evaluation design of the different studies in terms of the intervention and control/comparison conditions used. Factual information provision in combination with skills development was evaluated against a control group/waiting list control group in three studies, against 'generic' health promotion in two studies and against information only in three studies. It was generally the case that the combined intervention was more effective than the comparison conditions (see Appendix 2 for a fuller description of results). Only one study evaluated information provision alone against a no-treatment control group, whilst one study assessed the effect of safer sexual skills development against a comparison group who participated in small group discussions of gender

and power issues; in both cases the intervention was more effective than the comparison condition.

Process evaluation

Generally, where a process evaluation was conducted in conjunction with the outcome evaluation (five studies; 50%) the results were minimally reported on. Three studies (DiClemente and Wingood, 1995; Carey *et al.*, 1997; Ploem and Byers, 1997) evaluated the acceptability of the intervention to its targeted audience. Session participants in one of these studies (DiClemente and Wingood, 1995) indicated that they found the content of the intervention to be very acceptable; the other two studies (Ploem and Byers, 1997; Carey *et al.*, 1997) did not report the participants' response.

Implementation of the intervention (e.g. whether providers adhered to the intervention protocol) was evaluated in three studies (Corby and Wolitski, 1996; Carey *et al.*, 1997; St Lawrence *et al.*, 1997); only one of these reported the findings in terms of 'no sessions departed substantially from the protocols for either condition' [(St Lawrence *et al.*, 1997), p. 505]. The study by DiClemente and Wingood (DiClemente and Wingood, 1995) also included participant attendance and found that participants in the intervention group attended a median of four out of five sessions.

Discussion

The results of this review are encouraging in that the 10 most rigorous studies detected a positive effect upon sexual risk reduction, albeit in the short term. How long these intervention effects can be maintained, however, is not clear as the average period of follow-up in the reviewed studies was between 3 and 6 months post-intervention only and behaviour change may take much longer to become routine (Oakley *et al.*, 1995; Prochaska *et al.*, 1994). The magnitude and duration of effect may also depend upon the 'dosage' of the intervention, i.e. how long it lasted for and whether regular booster sessions were provided (Bandura, 1990). Here, the average length of an intervention was 1–3 months.

Elements of an effective intervention

The interventions tested in the 10 most rigorous studies differed substantially (in terms of content, length, media employed, etc.) which implied that calculating an overall summary estimate of effect (i.e. meta-analysis) would be potentially misleading. However, it is possible to gain some insights from the studies reviewed concerning effective methods. The majority of interventions tested, provided factual information in conjunction with other activities such as skill development, motivation building and attitude change. These interventions were generally more effective compared to a control/comparison condition, suggesting that an effective intervention needs to be multi-faceted in content. Several health promotion studies have found that information provision, although a useful first step, alone is insufficient to encourage health behaviour change (Ross and Rosser, 1989; Gold *et al.*, 1994; Jagdeo, 1996). With regard to the effectiveness of different types of intervention delivery, again, it is not possible to be definitive. However, the reviewed studies suggest that small group discussion sessions led by peer educators in which a variety of media are used (e.g. video, slides, posters, etc.) can be effective, a finding corroborated by previous reviews (Coleman and Ford, 1996; Wingood and DiClemente, 1996).

It is generally considered important for interventions to be guided by sound theoretical constructs, although there is little consensus about which theories are most powerful in affecting behavioural outcomes (Peersman and Levy, 1998). All but one of the 10 most rigorous studies analysed in this review were based upon established theories of health behaviour change. It is noticeable, however, that only two studies were based on theories which recognize that women often lack power in sexual relationships with regard to sexual decision making. It is crucial that interventions targeted at women are gender relevant, to enable them to negotiate safer sex with their sexual partners.

All of the studies reviewed here promoted sexual risk reduction within the context of STDs (most notably HIV); none made specific reference to protection against cervical cancer. It is important to promote the fact that sexual risk reduction has a protective influence on a variety of diseases/conditions including gonorrhoea, *Chlamydia*, infertility, pelvic inflammatory disease and potentially cervical cancer. It is possible that this wider perspective may provide a greater incentive for behaviour change (a topic for further research) and may also avoid the promotion of mixed messages.

Ethics

An ethical and moral dimension to sexual risk reduction concerns the debate of what type of sexual behaviour is promoted. Abstinence and the delay of first intercourse, for example, may well be protective against cervical cancer; however, whether the promotion of such messages is likely to be realistic is questionable given that the age at which young people initiate sexual activity continues to decline (Wellings *et al.*, 1994). The study by Hobfoll *et al.* (Hobfoll *et al.*, 1994) targeting young inner-city women did not detect a significant increase in abstinence following the intervention and the studies promoting partner reduction showed mixed results.

There are also ethical issues related to the context in which research takes place. The WHO Jakarta Declaration (WHO, 1997) reinforced the need to challenge structural issues within health

promotion. It is questionable whether research with 'captive participants' (such as prisoners, drug addicts, alcoholics and commercial sex workers) is appropriate without addressing at least some of the issues relating to participants' material and social context. In this review, two studies in particular were carried out with such populations (Bhave *et al.*, 1995; Eldridge *et al.*, 1997) and though the authors reported that consent from participants was obtained, they did not report that other than only individual determinants of health were addressed. The UK government has recently started to advocate a shift in emphasis from health education directed at individuals and small groups to a focus on wider determinants of health (housing, employment, the environment) in an effort to tackle health inequalities (Department of Health, 1999). Health promoters now talk in terms of building 'social capital', focusing upon building healthy neighbourhoods and social networks (Gillies, 1998). Therefore, the interventions reviewed in this article should be viewed as only part of the effort towards preventing cervical cancer and STDs (although community peer education/support initiatives could be viewed as one form of social capital). Resources may usefully be directed towards further research into tackling the structural causes of ill-health which disproportionately affect women in lower social classes.

Methodological quality of studies

The conclusions of this review are based on only a third of the total number of identified studies meeting the inclusion criteria, as we aimed to select those studies for which a causal relationship between intervention and outcomes were most plausible.

Differences between study groups at baseline was the most common reason for studies failing to meet the methodological quality criteria and such imbalances may lead to considerable bias in what can be concluded about the effectiveness of the intervention (Sackett *et al.*, 1997). It is, however, acknowledged that there are inherent difficulties with conducting research in dynamic and complex community settings, and it is not always

possible or appropriate to use the most rigorous research designs. What is appropriate evaluation and what constitutes evidence in health promotion are currently much debated. The issue is not one of competition between different research methods, but is about integrating methods. However, only half of the studies in this review included, for example, any process measures; the range of the process measures was limited and the findings were poorly reported. The need to ascertain whether an intervention is effective often takes precedence over questions regarding why and how it might work. Occasionally, authors report the results of a process evaluation in separate articles [e.g. (Beadnell *et al.*, 1997)], facilitating a deeper discussion of how an intervention was implemented or received. Increased inclusion of process measures in outcome evaluation studies and in-depth discussion of the findings are to be encouraged to maximize learning from evaluation research.

All behavioural outcomes included in the reviewed studies were obtained by self-report. This raises questions regarding the validity of these measures, especially in sensitive areas such as sexual behaviour, an issue which has been discussed extensively in the literature (Lee, 1993; Oppenheim, 1993; Copas *et al.*, 1997). Interviewees may provide answers which they perceive to be socially acceptable and not necessarily a true reflection of their sexual activity, whilst reported intended action may not translate into actual behaviour. Only the study by Bhave *et al.* (Bhave *et al.*, 1995) reported steps that were taken to minimize the risk of bias in self-report data by validation with clinical outcomes; none of the other studies reported if and how those issues were addressed.

Despite extensive literature searching including soliciting of unpublished studies, all of the identified relevant studies were from peer-reviewed journals or from books (most of which were published during the 1990s). Thus, there might be a risk of publication bias generally favouring effective interventions. Indeed, none of the included studies reported any negative/harmful effects of the tested interventions.

In terms of external validity, caution must be

exercised with regard to the applicability of the results of this review to other cultural and socio-economic groups of women. The majority of the included studies targeted economically and socially disadvantaged women at high risk for STDs, most of whom were of African-American origin living in North American cities. Many of the studies framed the intervention within the context of ethnicity and local culture in order to enable the participants to learn and develop skills in a manner relevant and acceptable to them. Thus, those wishing to replicate these interventions need to ensure cultural adaptation to the local population.

Finally, though this review focused on studies targeting women only, a range of sexual health promotion studies have been conducted with both men and women, or with men only. All of these studies should be taken into consideration when making decisions about the most effective approaches to sexual risk reduction. Inclusion of these studies was beyond the time and resources available to this review, but future updates and an expansion of this review are envisaged within the Cochrane Gynaecological Cancer Collaborative Review Group or other relevant Cochrane Review Groups.

Conclusion

This is the first review to address cervical cancer prevention in terms of sexual risk reduction behaviour, thus claims cannot be made regarding the impact upon the incidence and prevalence of the disease. However, this review does provide an indication of the potential of health education interventions to prevent transmission of STDs, most notably HPV, and thus their potential impact upon the development of cervical carcinoma.

Although in many countries screening programmes have been effective in early detection with successful treatment of cervical cancer, primary prevention through sexual risk reduction interventions needs to complement secondary prevention to reduce the cervical cancer morbidity and mortality further.

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Appendix 1: Excluded studies (n = 20)

Reason for exclusion	Study	Number	%
Study groups not equivalent at baseline/equivalence unclear	Wong <i>et al.</i> , 1996; Ford <i>et al.</i> , 1996; O'Neill <i>et al.</i> , 1996; Orr <i>et al.</i> , 1996; Nyamathi and Stein, 1997; Flaskerud <i>et al.</i> , 1997; Nyamathi <i>et al.</i> , 1994; Ickovics <i>et al.</i> , 1994; Quirk <i>et al.</i> , 1993; Postrado and Nicholson, 1992; Sikkema <i>et al.</i> , 1995; Maynard and Rangarajan, 1994	12	60
No comparison/control group	Asamoah Adu <i>et al.</i> , 1994; Singh, 1994; Bearss, 1995; Marsh and Wirick, 1991; Slap <i>et al.</i> , 1991; Seitz <i>et al.</i> , 1991	6	30
Baseline data not reported/Baseline data reported for some outcomes only	Schilling <i>et al.</i> , 1991; Bryan <i>et al.</i> , 1996; Sikkema <i>et al.</i> , 1995	3	15
Post-intervention data reported for some outcomes only	Quirk <i>et al.</i> , 1996	1	5

For some studies there was more than one reason for exclusion, hence numbers do not add up to 20 (100%)

Appendix 2: Details of the subset of analysed studies (*n* = 10)

Author (country)	Study population	Intervention	Design	Effectiveness
Hobfoll <i>et al.</i> , 1994 (US)	Pregnant women (aged 16–29 years)	Four session HIV/AIDS community informational, motivational and skills training intervention (<i>n</i> = 68) versus four session generic health promotion intervention (<i>n</i> = 77) versus control group (<i>n</i> = 61)	RCT	Increases were observed in condom use for vaginal intercourse for all three study groups. At 6-month follow-up mean usage was 3.86 for the AIDS prevention group, 3.70 for the health promotion group, and 3.40 for the control group.
Eldridge <i>et al.</i> , 1997 (US)	Women drug users (average age = 34.2 years)	Six session behavioural skills training group (BST) (<i>n</i> = 51) versus two session educational control group (EC) (<i>n</i> = 48)	RCT	BST women increased their condom use from 35.7 to 49.5% at 2-month follow-up; EC group women reduced their condom use from 28.8 to 15.8%. Increase of 27% of BST women reporting condom use at last intercourse, no increase for EC group. Decrease in mean number of sexual partners at follow-up for both groups (4.2 for BST group; 3.9 for EC group), mean number of reported high-risk sex acts decreased by 16.2 for BST and for 27 for the EC group.
Corby and Wolitski, 1996 (US)	'High-risk' women (mean age 33 years)	Peer-led education and distribution of flyers, posters, condoms and IDU cleaning equipment versus control group (total number of women targeted not stated)	CT	Significant differential increases were observed in the intervention group for condom use with non-main partners ($P < 0.01$), but not for main partners ($P > 0.05$) relative to control group.
Ploem and Byers, 1997 (Canada)	Female college students (aged 18–32 years)	One session information only (<i>n</i> = 44) versus one session information and skills and attitudes intervention (<i>n</i> = 49) versus control (<i>n</i> = 19)	RCT	There was a greater increase in condom use amongst women in the information/skills group than the information only or control groups (an increase of 28.2% to 50% of intercourse occasions)
Di Clemente and Wingood, 1995 (US)	African-American women (aged 18–29 years)	Five session community peer-led education and skills development intervention (<i>n</i> = 53) versus one session education only intervention (<i>n</i> = 35) versus education only waiting list control group (<i>n</i> = 40)	RCT	Increases in consistent condom use; peer-led skills group = 11.5% ($P = 0.04$), education only waiting list = 7.5% ($P = 0.04$), (there was a 17.2% increase in this outcome for the education only group, but it is not possible to tell if this was statistically significant in relation to main intervention).
Bhave <i>et al.</i> , 1995 (India)	Female sex workers (aged 17–32 years) (+ their 'madams')	Series of three to four small group educational sessions promoting negotiation skill and condom use skills (<i>n</i> = 334) versus control group (<i>n</i> = 207)	CT	Increases in consistent condom use: small group educational = 25% ($P < 0.0001$), control group = 3% <u>DECREASE</u> ($P < 0.05$). Incidence densities (per person-year of follow-up): HIV: small group educational = 0.05, control group = 0.16; syphilis: small group educational = 0.08, control group = 0.22; Hepatitis B surface antigen: small group educational = 0.04, control group = 0.12.

Appendix 2: Continued

Author (country)	Study population	Intervention	Design	Effectiveness
Kelly <i>et al.</i> , 1994 (US)	'High-risk' African-American urban women attending an STD clinic (aged 18–40 years)	Five session group workshops on education, skills training, problem solving, risk management and peer support (<i>n</i> = 100) versus generic health education comparison group (<i>n</i> = 87)	RCT	Condom use increased to an average of 56% of all intercourse occasions compared to 26% in the three months preceding intervention (five session intervention group versus generic comparison group, respectively). There was no significant effect upon number of male sexual partners.
Carey <i>et al.</i> , 1997 (US)	'Low-income' urban women (aged 16–64 years)	Four session motivation building and skills training intervention in the community (<i>n</i> = 53) versus waiting list control (<i>n</i> = 49)	RCT	Mean change in number of unprotected vaginal intercourse occasions (in last 2 weeks): <i>post-intervention</i> : intervention group = -1.12, waiting list control group = -0.05; <i>follow-up</i> : intervention group = +0.49, waiting list control group = +0.09. Mean effect size = 0.56 (for all behaviour outcome measures). The biggest effect upon condom use was generated by the intervention combining skills, behavioural management and factual information. Furthermore, at 3-month follow-up 77% of women who received the communication skills training reported condom use compared with 55% of women in groups which did not include communication skills [χ^2 (<i>N</i> = 53) = 8.45, <i>P</i> < 0.01].
Kalichman <i>et al.</i> , 1996 (US)	Inner-city women (aged 18–55 years)	Four session skill development intervention versus four session self-management intervention versus four session education only versus four session combination interventions (total no. of women <i>n</i> = 87)	RCT	Skills training group demonstrated greater competence in condom application skills than the comparison group (increase of 25% in correct skill compared with an increase of 10%). There was a significant intervention of group × time, <i>F</i> (3,86) = 9.23, <i>P</i> = 0.003.
St Lawrence <i>et al.</i> , 1997 (US)	Incarcerated women (aged 17–53 years)	Six session small group skills training intervention versus 6 session unstructured small group discussion of gender and power relations in relation to safer sex (total no. of women <i>n</i> = 90)	RCT	

RCT = randomized controlled trial.
 CT = controlled trial (without randomization).