



# **Prevention of sexually transmitted infections (STIs): a review of reviews into the effectiveness of non-clinical interventions**

## **Evidence Briefing Update**

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## Executive summary

### Introduction

In 2004, the Health Development Agency (HDA; now the National Institute for Health and Clinical Excellence) published *Prevention of sexually transmitted infections (STIs): a review of reviews into the effectiveness of non-clinical interventions* (Ellis and Grey, 2004). This evidence briefing updates the original report, assessing the effectiveness of interventions to impact on the factors which influence the sexual risk behaviours for STI transmission. As in the original Evidence Briefing, the aims of this update were to:

- Identify and synthesise review-level material to highlight 'what works' to prevent or reduce sexual risks and promote sexual health
- Highlight conflicting evidence, gaps in the evidence and provide recommendations for research.

This updated evidence briefing focuses upon particular types and features of interventions in order to draw out findings on the effectiveness of interventions for specific populations to reduce inequalities in sexual health.

### Policy

In 2001, the Department of Health published the first *National Strategy for Sexual Health and HIV* (DH, 2001). This set out five main aims, including reducing the transmission of STIs (with a national goal of a 25% reduction in newly gonorrhoea infections by 2007), reducing prevalence of undiagnosed STIs and reducing stigma associated with STIs.

Following on from this, the white paper *Choosing Health: making healthy choices easier* (DH, 2004) included sexual health as one of its six key priorities. This has encouraged a renewed determination to tackle sexual ill-health, and additional resources have been provided in order to do so. In the action plan the Government outlined its plans to improve sexual health services in a new £300m programme over the next three years.

### Epidemiology

National data on STIs reveal that chlamydia remained the most common STI diagnosed at GUM clinics in 2005, with the number diagnosed rising by 4.9% (104,733 to 109,958) with 53% (57,577) of those diagnoses among women. Gonorrhoea diagnoses have shown a decrease in the last year, with 19,392 diagnoses in 2005, 13% fewer than 2004. In 2005, 2,814 cases of syphilis were reported, an increase of 123% since 2004 (2,282 cases) and an increase of 273% since 2001 (753). Genital warts are caused by infection with two distinct subtypes of the human papilloma virus (HPV). Many other subtypes are linked to cervical cancer, but because they do not cause symptoms they remain undiagnosed. Diagnoses of genital warts increased by 1.3% between 2004 and 2005 (80,055 to 81,137). In 2005, 50% of diagnoses were in heterosexual men, 47% in women and 3% in men who have sex with men (MSM). The number of cases of herpes simplex virus (HSV) identified in GUM clinics represents only a small proportion of the total number

of cases. In 2005, 19,837 cases were diagnosed in GUM clinics, up 4% on the previous year, with the highest numbers in both men and women in the 25 to 34 year age group (2,838 and 3,628 respectively) (HPA, 2006).

### **Sexual behaviour**

The sexual behaviour of the population is an important determinant of the rates of STIs. The second National Survey of Sexual Attitudes and Lifestyles (NATSAL) in 2000, provides the most recent data on sexual behaviour among the general population in Britain (Johnson et al., 2001; Wellings et al., 2001). Since the first NATSAL in 1990, there have been notable changes in sexual behaviour during the intervening decade, these include:

- A greater number of lifetime partners – from 8.6 to 12.7 for men, and from 3.7 to 6.5 for women
- Lower median age at first intercourse – from 17 years among 16 to 19 year olds in NATSAL 1990 to 16 years among 16 to 19 years old in NATSAL 2000
- A greater proportion with concurrent partnerships in the past year (two or more partners at the same time) – from 11.4% to 14.6% for men (20% for 15 to 24 year olds); and from 5.4% to 9% for women (15% for 15 to 24 year olds)
- A greater proportion with two or more partners in the past year and who did not use condoms consistently – from 13.6% to 15.4% in men; and from 7.1% to 10.1% in women, and
- A greater proportion of men reporting ever having had a homosexual partner – from 3.6% to 5.4%.

Data on sexual behaviour needs to be interpreted with caution, acknowledging that unprotected sex is not the same as unsafe sex. Similarly, data on the number of partners can provide an indication of potential STI risk, even where intercourse is protected.

### **Inequalities**

The statistics on incidence clearly show how STIs disproportionately affect communities already suffering from considerable inequalities relating to their sexual orientation, ethnicity and gender. Statistics show that Black Caribbean populations continue to be disproportionately affected by gonorrhoea (UK Collaborative Group for HIV and STI Surveillance, 2005), for example, one study (Low et al., 1997) showed that gonorrhoea rates among some inner city black and minority ethnic groups were ten times higher than in white communities.

### **Cost-effectiveness**

Aside from the obvious ethical reasons for averting infections, the economic arguments are substantial. First, there are the costs associated with diagnosing and treating STIs. Second, there are also the health and societal costs of dealing with the consequences of poor sexual health, including pelvic inflammatory disease (which can cause ectopic pregnancies and infertility), HIV, cervical and other genital cancers, hepatitis, chronic liver disease and liver cancer, recurrent genital herpes, bacterial vaginosis and premature delivery, unintended pregnancies and abortions, psychological consequences of sexual coercion and abuse, and poor educational, social and economic opportunities for teenage mothers (DH,

2001). In a recent guide for planning and commissioning services, Payne and O'Brien (2005) concluded that investment in sexual health interventions is good value for money and can also be cost-saving. Examples of cost-saving interventions were listed as: wide-spread condom provision; outreach safe sex training for high risk groups; school education programmes; needle exchange services; screening programmes; high quality rapid access to STI services; wide choice of contraceptive services; and abortion services provided with minimal delay.

### **Conceptual framework**

This review draws on the same conceptual framework as the original review of reviews. For full details of the framework see Ellis and Grey (2004).

### **Methodology**

A standardised methodology was developed by the HDA (now the National Institute for Health and Clinical Excellence) for the analysis and synthesis of review-level evidence (Swann et al., 2003b, Kelly et al., 2002). The strategies used in this update were based on an updated 2003 HDA search strategy.

The following process was applied:

All databases were searched from January 2001 to January 2006 for references published in the English language. Results were downloaded into a Reference Manager database. Two reviewers independently appraised all of the titles and abstracts of the identified references to determine whether to retrieve the full paper on the basis of the following criteria:

- English language only
- Published since 2001
- Systematic review, synthesis, meta-analysis or literature review
- Relevance to STI prevention or sexual health promotion
- Presents (and synthesises) data from primary evaluation studies of intervention effectiveness.

This evidence briefing update excludes:

- Screening and treatment of STIs
- Interventions that focus mainly on the prevention of teenage pregnancy or HIV
- Reviews covered in the original evidence briefing.

A joint decision was made as to whether the full paper would be retrieved for critical appraisal; if the reviewers disagreed, or no clear decision could be made on the basis of the title or abstract, the full paper was obtained for appraisal. Two reviewers appraised the identified papers (including journal articles, book chapters and reports) independently. A joint decision was made regarding whether the paper was to be classified as Category 1, 2, 3, 4 or 5 based upon how well the paper satisfied the criteria of the appraisal tool.



In total 10 papers were judged to be Category 1, 2 or 3 and went on to analysis and synthesis. This compares to 14 Category 1, 2 or 3 papers from Ellis and Gray, 2004. Category 1 and 2 papers were used to derive evidence statements.

The categorisation process is only briefly described here, for further information see Ellis and Grey (2004). A joint decision was made regarding whether the paper was to be classified as Category 1, 2, 3, 4 or 5. The 'data pool' for the review of reviews consists of those reviews categorised as 1, 2 or 3. The categories are:

### **Category 1**

The review satisfied the criteria in both stages one and two of the CAT. Category 1 reviews are included within the data pool and analysed to derive evidence statements.

### **Category 2**

The review passed stage one of the CAT, but failed to meet all the criteria within stage two – usually because it was not clear how the review had assessed the quality of the included studies. Category 2 reviews are also included within the data pool and analysed to derive evidence statements.

### **Category 3**

The research question(s) was judged to be highly pertinent, and the paper is a review of interventions; however it failed to pass stage one of the CAT – it is not clear how the included studies were identified and the review had additional shortcomings. Category 3 reviews are included within the data pool and so may provide some evidence about effectiveness, but these reviews alone are insufficient to inform conclusions about effectiveness.

### **Category 4**

This paper is either not a review of effectiveness of interventions, or it is not a review in its own right (e.g. it may extract findings from another review). However it is relevant and contains useful policy, background, epidemiological or interpretive information.

### **Category 5**

The paper is not directly relevant and is therefore not used.

Category 1, 2 and 3 reviews are used to derive 'evidence statements' about types and features of interventions. Where relevant review evidence has been considered in conjunction with that of the original Evidence Briefing (Ellis and Grey, 2004) and evidence statements were derived based upon the combined evidence. The evidence statements reflect the strength of the conclusions made by the review(s), the outcomes used to judge effectiveness, the category of the review, and any inconsistencies within and between reviews. The reviews are used to derive the following evidence statements:

- **Sufficient review-level evidence** – clear evidence/conclusions from at least one Category 1 review, with no conflicting evidence/conclusions between Category 1 reviews
- **Tentative review-level evidence** – tentative evidence/conclusions from Category 1 review; or conflicting conclusions from Category 1 reviews; or clear conclusions from at least one Category 2 review
- **Insufficient review-level evidence** – no evidence/conclusions from Category 1 reviews and only tentative evidence/conclusions from Category 2 reviews; or clear evidence/conclusions from Category 3 reviews
- **No review-level evidence** – no evidence/conclusions from Category 1, 2 or 3 reviews.

### **Findings and discussion and conclusions**

The **Evidence** section (4) considers the evidence by individual, group, community and socio-political level interventions. In addition, we consider the ‘features of effectiveness’; cost-effectiveness; and, evidence of interventions to reduce inequalities in sexual health.

The **Findings, discussion and conclusions** section (5) address the key questions posed by the review of reviews, namely:

### **What works to prevent STI transmission? What works to reduce the risk behaviours for STI transmission? What works to address the determinants of STI risk?**

We found that most reviews analysed only intermediate health outcomes (e.g. behaviour) as opposed to health promotion outcomes (e.g. knowledge or skills), as such there was insufficient evidence available with which to make conclusions. However, we present the features of effectiveness elicited from the evidence. Some evidence statements have not changed from the original review (stated as ‘No change from Ellis and Grey, 2004’) and all evidence statements ought to be considered in conjunction with those of the previous review (Ellis and Grey, 2004).

#### *Features of effective interventions*

There is **sufficient review-level evidence** to conclude that interventions are more likely to be effective if they include the following features:

- The use of theoretical models (No change from Ellis and Grey, 2004)
- Use of behavioural skills training, including self-efficacy (No change from Ellis and Grey, 2004)
- Provision of basic, accurate information through clear, unambiguous messages (No change from Ellis and Grey, 2004)
- Use of targeted and tailored interventions (in terms of age, gender, culture, etc.), making use of needs assessment or formative research (No change from Ellis and Grey, 2004).

There is **tentative review-level evidence** to conclude that interventions are more likely to be effective if they include the following features:

- Have an emphasis on risk reduction (No change from Ellis and Grey, 2004)
- Use a trained facilitator
- Extend the delivery of their intervention (e.g. using 'booster' sessions).
- Use peers and community opinion leaders (No change from Ellis and Grey, 2004).

#### *Clinic-based sexual health promotion*

There is **tentative review-level evidence** to conclude that individual risk counselling can be effective.

#### *Partner notification*

There is **sufficient review-level evidence** to conclude that partner notification is an effective means of detecting new infections (No change from Ellis and Grey, 2004).

#### *Improved communication between parents and adolescents*

We conclude that there is **insufficient review-level evidence** to support or discount the effectiveness of parent/adolescent communication (No change from Ellis and Grey, 2004).

#### *Clinic-based interventions*

There is **insufficient review-level evidence** to conclude that:

- Clinic-based interventions aimed at adolescents are effective at reducing the sexual risk behaviour of adolescents.

There is **tentative review-level evidence** to conclude that:

- Clinic-based interventions using behavioural skills are an effective way to reduce the sexual risk behaviour of clinic attendees (No change from Ellis and Grey, 2004).

There is **insufficient review-level evidence** to support or discount the effectiveness of parental inclusion in clinic-based interventions.

#### *School-based programmes/sex education*

There is **sufficient review-level evidence** to conclude that:

- School-based sex education can be effective in reducing adolescents' sexual risk behaviour (No change from Ellis and Grey, 2004).

There is **tentative review-level evidence** to conclude that:

- Sex education is more effective if begun before the onset of sexual activity (No change from Ellis and Grey, 2004).

There is **insufficient review-level evidence** to conclude that:

- School-based interventions linked to clinical services and/or to the provision of condoms in schools are more effective (No change from Ellis and Grey, 2004)
- Condom availability in schools is not associated with increased sexual activity
- Parent involvement in school-based interventions is effective at improving parent/adolescent communication thereby reducing adolescent risk-taking behaviour.

#### *Small group work*

There is **sufficient review-level evidence** to conclude that small-group work interventions can be effective in reducing sexual risk behaviour (No change from Ellis and Grey, 2004).

#### *Detached education and outreach by professionals*

There is **tentative review-level evidence** to conclude that detached education and outreach work by professionals is effective in reducing sexual risk behaviour.

#### *Community level interventions*

There is **insufficient review-level evidence** to conclude that community outreach is effective at reducing sexual risk-taking behaviour.

#### *Socio-political interventions*

There is **insufficient review-level evidence** to support or discount the effectiveness of legislation or policy.

There is **no review-level evidence** to reach a conclusion about the effectiveness of equality work, regulation, facilitation, resource allocation, or organisation and delivery of services.

### **Are multi-component and multi-level interventions more likely to be effective in influencing sexual risk behaviours?**

There is **sufficient review-level evidence** to conclude that the most successful interventions are multi-component interventions. There is **insufficient review-level evidence** to support or discount the effectiveness of multi-level interventions (No change from Ellis and Grey, 2004).

### **What works to reduce inequalities in sexual health?**

There is **no review-level evidence** on interventions that aim to reduce inequalities in sexual health. In particular, there was **no review-level evidence** relative to socio-economic status (No change from Ellis and Grey, 2004).

### **What interventions are cost-effective?**

This update found **no new review level evidence** to add to the findings in the previous Evidence Briefing that reported **tentative review-level evidence** (see Ellis and Grey, 2004 for further information).

### *Implications for policy and practice*

Limitations of the evidence (section 5.1) leave us to conclude that we are unable to make recommendations for policy and practice. It is very important to note that **'no evidence' of 'insufficient evidence' does not equal evidence of ineffectiveness**. It simply means that we are unable to support or discount the effectiveness of interventions from the review-level evidence provided. We have, however, made recommendations for research. We also emphasise that practitioners and policy makers should not consider this review of review alone, but in conjunction with other the original Evidence Briefing (Ellis and Grey, 2004), non-review evidence and other relevant source information.

### *Research recommendations*

The **Conclusions and research recommendations** (section 5.2) highlights the research needed specific to target groups and types of interventions. The following is a summary of general research recommendations. Some recommendations have not changed from the original Evidence Briefing (stated as 'No change from Ellis and Grey (2004)' followed by their recommendation) and all recommendations ought to be considered in conjunction with those of the previous review (Ellis and Grey, 2004).

- No change from Ellis and Grey (2004). A key research recommendation is that intervention evaluations should measure outcomes relating to the personal and structural determinants of risk (e.g. knowledge, attitudes, skills, behavioural intentions, access to condoms, peer norms). This should be done in addition to the measurement of intermediate health outcomes (e.g. changes in behaviour) and, where appropriate (e.g. for large-scale multi-component interventions or programmes), health outcomes (e.g. changes in STI incidence). In turn, reviews should cease to exclude studies that only include data on health promotion outcomes alongside their effects on intermediate health outcomes and health outcomes. Reviews should fully report all of these outcomes where possible.
- No change from Ellis and Grey (2004). It is imperative that data on intermediate health outcomes (i.e. sexual behaviour surveys) are more specific about the context in which certain behaviours take place. Primary studies and future reviews should therefore focus on more meaningful risk indicators when making judgements about the relative effectiveness of interventions in influencing so-called 'risky' behaviours. Where feasible and appropriate these should be correlated with biological behavioural indicators and other socio-demographic variables. In conclusion, we need a consensus on the appropriate indicators for assessing the effectiveness of STI prevention programmes with different target populations.
- There is a need for more rigorous evaluations of UK-based STI prevention interventions. It is necessary for researchers to clearly report the methodology that they use, including their methods for randomisation. Future research should include appropriate comparison groups and should consider longer follow-up periods. In these cases research should report: levels of attrition, intent-

to-treat analysis, and effect sizes. There is also a need for primary studies to be standardised in their reporting.

- In addition to the recommendations from Ellis and Grey (2004), we recommend that further research is needed on the cost-effectiveness of STI prevention interventions in different settings. There is also a need for further research aimed at vulnerable 'high-risk' groups in the UK such as commercial sex workers (CSWs) and looked-after children. Finally, there is a need for further research to explore the effectiveness of interventions that aim to address inequalities and socio-political issues specific to target populations.

# 1 Introduction

## 1.1 Background

In 2004, the Health Development Agency (HDA) published *Prevention of sexually transmitted infections (STIs): a review of reviews into the effectiveness of non-clinical interventions* (Ellis and Grey, 2004). Since then, sexual health has continued to be at the forefront of policies, guidelines and initiatives, and these have identified the HDA's Evidence Briefing as the resource for ascertaining what works in preventing STIs. In 2004, the Department of Health (DH) produced its plan to improve the health of the population *Choosing health: making healthy choices easier*. In this key national policy document, sexual health is named as one of six key priorities, and the HDA evidence briefings identified as the source of information on effective interventions. In 2005, DH published the action plan *Delivering choosing health* which sets key targets around STIs, rolling out chlamydia screening and access to genitourinary medicine (GUM) clinics within 48 hours (DH, 2005). In 2005, the HDA joined with the National Institute for Clinical Excellence (NICE) to form the new National Institute of Health and Clinical Excellence (and retained the acronym NICE). The new organisation continues the commitment to build on the evidence base in public health. In the light of the Government's continued commitment to sexual health and HIV, and the necessity to ground STI prevention in good evidence, it was deemed necessary to update the 2004 Evidence Briefing to ensure that the most recent review-level evidence is available for planning services and improving the sexual health of the population.

NICE evidence briefings report on **reviews of reviews**, sometimes referred to as tertiary level research. They consist of detailed expositions of the strengths and weaknesses of the evidence from reviews, identification of gaps in the evidence, an analysis of future primary and secondary research needs, and a discussion of the implications of the evidence for policy and practice. The full rationale for carrying out reviews of reviews is given in the 2004 Evidence Briefing on STI prevention, as is a detailed consideration of the limitations of such a methodology. One such limitation is that of the inevitable time-lag between publication of primary research material and review level material. To mitigate this somewhat, Ellis and Grey (2004) stated an intention to update the Evidence Briefing regularly to keep the evidence base as up to date as reasonably practicable. This document is the first such update, and should be used in conjunction with the Ellis and Grey (2004)'s original Evidence Briefing. Each document has a freestanding summary that is published separately. The documents are also published on and supported by the NICE website at [www.publichealth.nice.org.uk](http://www.publichealth.nice.org.uk). This website also contains electronic copies of, or means of access to, the original reviews upon which the evidence briefings draw (if they are in the public domain).

Reviews that focus primarily on teenage pregnancy or HIV prevention, while clearly relevant, are excluded on the basis that their findings are considered in detail by the HDA/NICE evidence briefings on HIV prevention (Ellis et al., 2003, and updated in 2006 by Downing et al.) and teenage pregnancy (Swann et al., 2003a). Professionals are encouraged to refer to these documents (see [www.publichealth.nice.org.uk](http://www.publichealth.nice.org.uk)), since the outcomes for many of the included reviews are similar to those

for STI prevention (e.g. age at first intercourse, number of partners, condom use). Many of the topic areas covered have a reference group (e.g. for HIV, teenage pregnancy) comprising key academics, practitioners and officials with relevant expertise. All of the NICE evidence briefings are externally peer reviewed.

## 1.2 Context: sexual health in England

### 1.2.1 Policy context

In 2001, the Department of Health published the first *National Strategy for Sexual Health and HIV* (DH, 2001b). This set out five main aims, including reducing transmission of STIs (with a national goal of a 25% reduction in newly gonorrhoea infections by 2007), reducing prevalence of undiagnosed STIs and reducing stigma associated with STIs.

As part of its commitments in the *Implementation Action Plan* (DH, 2002), the DH published two sexual health and HIV toolkits, one on commissioning (DH, 2003a) and one on health promotion (DH, 2003b). The sexual health promotion toolkit gives practical advice on making inter-agency work effective, running health promotion projects, managing group work, developing resources and managing outreach work. The document also emphasises the need for a lot more research, and the need for health professionals to evaluate and document their health promotion interventions, in terms of intermediate outcomes (e.g. knowledge, attitude) as well as behavioural outcomes (DH, 2003b).

The white paper *Choosing Health: making healthy choices easier* (DH, 2004) identified six key priorities:

- Tackling health inequalities
- Reducing the numbers of people who smoke
- Tackling obesity
- **Improving sexual health**
- Improving mental health and wellbeing, and
- Reducing harm and encouraging sensible drinking.

The spotlight on sexual health in this key health policy document has encouraged a renewed determination to tackle sexual ill-health, and provides additional resources in order to do so. In the action plan the Government outlined its plans to improve sexual health services in a new £300m programme over the next three years. The main aims are to:

- Use £50m to implement a national and regional sexual health campaign aimed at young men and women to promote condom use and explain the risks of unprotected sex
- Make a commitment to sexual health in England through additional funding to deliver multidisciplinary sexual health services in a range of settings
- Expand the national Chlamydia screening programme to cover the whole of England by March 2007 (with an additional £80m to help achieve this goal)
- Carry out an audit of contraceptive services in 2005 in order to improve service provision



- Focus on modernizing Genito-Urinary Medicine (GUM) clinics, with an investment of £130m over three years including upgraded prevention services with an additional £40m provided for this purpose
- Ensure that every individual referred to a GUM clinic has an appointment within 48 hours by 2008.

### **1.2.2 Epidemiology – prevalence of STIs**

The surveillance of sexually transmitted infections relies on GUM clinicians reporting aggregated numbers of selected conditions by sex and age, and for some conditions, whether cases in men are heterosexual or from sex between men. These are submitted quarterly on KC60 forms. While there are limitations of the system (principally that only diagnoses made in GUM clinics are included, there are limited demographic data and no geographical marker), it is a good source of data on trends. More detailed information is sought from additional surveys, such as The Gonococcal Resistance to Antimicrobials Surveillance Programme (GRASP) survey to investigate resistance to gonorrhoea treatment and enhanced surveillance of outbreaks of previously rare infections such as syphilis and lymphogranuloma venereum (LGV).

Chlamydia remained the most common STI diagnosed at GUM clinics in 2005, with the number diagnosed rising by 4.9% (104,733 to 109,958) with 53% (57,577) of those diagnoses among women (HPA, 2006). In 2005, the highest rates of chlamydia in women were among young women aged 16 to 19 (1,359/100,000) while the men were slightly older, with the highest rate in men aged 20 to 24 years (1,070/100,000) (UK Collaborative Group for HIV and STI Surveillance, 2006). Factors that may have contributed to increases more recently include increased awareness of chlamydia and the roll out of chlamydia screening programmes. However, the rates calculated from GUM diagnoses represent only the tip of the iceberg when considering the prevalence of chlamydia in the general population. A study based on the first phase of the screening programme indicates that 10% of women and 13% of men aged under 25 years have chlamydia (LaMontagne et al 2004).

Gonorrhoea diagnoses have shown a decrease in the last year, with 19,392 diagnoses in 2005, 13% fewer than 2004. However, there was a 9.8% increase among MSM (3,994 to 4,388) (HPA, 2006). As was the case with chlamydia, the highest rates in 2005 were in young women between the ages of 16 and 19 years and men between the ages of 20 to 24 years. The GRASP 2005 survey shows that rates of gonorrhoea are higher in urban populations, among MSM, young women and some black ethnic minorities (UK Collaborative Group for HIV and STI Surveillance, 2006).

In 2005, 2,814 cases of syphilis were reported, an increase of 123% since 2004 (2,282 cases) and an increase of 273% since 2001 (753). In 2005, only 14.8% (418) of cases were in women, while among men infection among MSM account for 60% of all cases (HPA, 2006). Unlike chlamydia and gonorrhoea, it is not the younger age groups that experience the higher levels of syphilis. The highest prevalence is recorded in 2005 was among men aged 25 to 34 years (19/100,000) (UK Collaborative Group for HIV and STI Surveillance, 2006). Enhanced surveillance has revealed much detail about these localised outbreaks of a previously rare infection. In MSM, syphilis has been associated with oral sex and large numbers of

anonymous sex partners (Bellis et al., 2002), while heterosexual outbreaks have been associated with commercial sex work and exposure abroad (Simms et al., 2005).

Genital warts are caused by infection with two distinct subtypes of the human papilloma virus (HPV). Many other subtypes are linked to cervical cancer, but because they do not cause symptoms they remain undiagnosed. There are currently two new vaccines under consideration, both of which aim to protect against two of the common subtypes of HPV that cause cervical cancer and one that also includes protection against the two subtypes that cause warts (Steinbrook, 2006). Diagnoses of genital warts increased by 3.1% between 2005 and 2006 (81,201 to 83,745). In 2005, 50% of diagnoses were in heterosexual men, 47% in women and 3% in men who have sex with men (MSM) (HPA, 2006). In common with chlamydia and gonorrhoea, diagnosed men tend to be older than women with the highest male prevalence in those 20 to 24 years compare to females aged 16 to 19 years and 20 to 24 years (UK Collaborative Group for HIV and STI Surveillance, 2006). When considering all types of HPV infection, both those that cause warts and those associated with cancer, the prevalence is thought to be very high. An Edinburgh study showed that the prevalence of all types of HPV was 42% in women aged under 25 years and 20% of all women (Cuschieri et al., 2004). HPV infection is also linked to anal cancer, and its prevalence may be very high in men who have sex with men (57% of MSM in a USA study: Chin Hong et al., 2004).

Genital herpes is caused by the herpes simplex virus (HSV). Aside from HIV, genital herpes is the only incurable STI, often causing recurrent debilitating disease in those infected. Genital herpes is thought to be caused by one of two subtypes of the virus, HSV-1 and HSV-2. HSV-1 used to be more frequently associated with oral infection. The antibodies to the oral infection offer protection from the genital infection. However, the proportion of genital HSV infections attributed to HSV-1 is increasing, possibly because childhood exposure to HSV-1 is decreasing. Another possible link is to the reported increasing levels of oral sex among young people (Johnson et al., 2001). The number of cases of herpes simplex virus (HSV) identified in GUM clinics represents only a small proportion of the total number of cases. In 2005, 19,837 cases were diagnosed in GUM clinics, up 4% on the previous year, with the highest numbers in both men and women in the 25 to 34 year age group (2,838 and 3,628 respectively) (HPA, 2006).

### **1.2.3 Sexual behaviour**

The sexual behaviour of the population is an important determinant of the rates of STIs. The second National Survey of Sexual Attitudes and Lifestyles (NATSAL) in 2000, provides the most recent data on sexual behaviour among the general population in Britain (Johnson et al., 2001; Wellings et al., 2001). Since the first NATSAL in 1990, there have been notable changes in sexual behaviour during the intervening decade:

- A greater number of lifetime partners – from 8.6 to 12.7 for men; and from 3.7 to 6.5 for women
- A lower median age at first intercourse – from 17 years among 16 to 19 year olds in NATSAL 1990 to 16 years among 16 to 19 years old in NATSAL 2000

- A greater proportion with concurrent partnerships in the past year (two or more partners at the same time) – from 11.4% to 14.6% for men (20% for 15 to 24 year olds); and from 5.4% to 9% for women (15% for 15 to 24 year olds)
- A greater proportion with two or more partners in the past year and who did not use condoms consistently – from 13.6% to 15.4% in men; and from 7.1% to 10.1% in women
- A greater proportion of men reporting ever having had a homosexual partner – from 3.6% to 5.4%.

However, comparison of successive age groups in the NATSAL 2000 survey showed that condom use has continued to increase in the last decade. The proportion of men and women reporting condom use at first intercourse increased from 60% of 25 to 29 year olds (who would have become sexually active in 1990 or thereabouts) to 80% of 16 to 19 year olds (who would have become sexually active around the year 2000).

The main UK wide source of information about gay men's behaviour is the annual Sigma Research surveys. Periodically, the survey asks whether respondents have had unprotected anal intercourse: the last three surveys to include this were 1995 and 2000 (Hickson et al., 2001) and 2004 (Weatherburn et al., 2005). MSM in 2000 reported increases in unprotected anal intercourse (UAI) with both regular and casual partners compared with 1995:

- A greater proportion have UAI with a regular partner – from 42.3% in 1995 to 54.9% in 2000
- Fewer men having anal intercourse with a regular partner in 2000 always used a condom compared with men in 1995
- A greater proportion of men have casual UAI – from 9.8% of all men in 1995 to 14.4% in 2000.

The 2004 survey (Weatherburn et al., 2005) did not repeat these questions. The 2004 findings on self-reported behaviour showed that the more sexual partners a man reported the more likely he was to have had an HIV or STI test within the last year (22% of men who had only one partner had an HIV test, and 24% an STI test, compared to 43% of men who had 15-29 partners having an HIV test and 54% were tested for STIs). Men who reported more sexual partners expressed a wish for more sexual education than men who had fewer sexual partners. However, a worryingly high number of men who had many different sexual partners were not tested; 55% of men who had sex with 30 or more partners in the last 12 months had not had an HIV test and 39% not had an STI test in the last year. The survey also revealed that 10% had paid or been paid for sex in the last year, with over 40% of men involved with commercial sex work citing gay websites as their most likely method of finding partners.

The 2005 survey (Hickson et al., 2006) also revealed that in the past year three quarters of all men questioned had engaged in sex with a man of unknown serostatus. If these findings are representative of the whole MSM population they indicate a widespread lack of communication around HIV status among MSM. The survey also revealed that 11% of men who had anal intercourse in the last year never used a condom and inconsistent condom use was as common as consistent condom use. Furthermore, 19% of

men whose last HIV test was negative or who had never been tested for HIV, had participated in receptive unprotected anal intercourse with a partner of unknown status in the last year. This figure rose to 32% of untested men with thirty or more partners.

Data on sexual behaviour needs to be interpreted with caution, acknowledging that unprotected sex is not the same as unsafe sex. Similarly, data on the number of partners can provide an indication of potential STI risk, even where intercourse is protected.

#### **1.2.4 Inequalities**

The statistics on incidence clearly show how STIs disproportionately affect communities already suffering from considerable inequalities relating to their sexual orientation, ethnicity and gender. Statistics show that Black Caribbean populations continue to be disproportionately affected by gonorrhoea (UK Collaborative Group for HIV and STI Surveillance, 2005), for example, one study (Low et al., 1997) showed that gonorrhoea rates among some inner city black and minority ethnic groups were ten times higher than in white communities.

#### **1.2.5 Costs**

Aside from the obvious ethical reasons for averting infections, the economic arguments are substantial. First, there are the costs associated with diagnosing and treating STIs. Second, there are also the health and societal costs of dealing with the consequences of poor sexual health, including pelvic inflammatory disease (which can cause ectopic pregnancies and infertility), HIV, cervical and other genital cancers, hepatitis, chronic liver disease and liver cancer, recurrent genital herpes, bacterial vaginosis and premature delivery, unintended pregnancies and abortions, psychological consequences of sexual coercion and abuse, and poor educational, social and economic opportunities for teenage mothers (DH, 2001). In a recent guide for planning and commissioning services, Payne and O'Brien (2005) conclude that investment in sexual health interventions is good value for money and can also be cost-saving. Examples of cost-saving interventions were listed as: wide-spread condom provision; outreach safe sex training for high risk groups; school education programmes; needle exchange services; screening programmes; high quality rapid access to STI services; wide choice of contraceptive services; and abortion services provided with minimal delay.

#### **1.2.6 Conceptual framework**

This review draws on the same conceptual framework as the original Evidence Briefing. For full details of the framework see Ellis and Grey (2004).

## 2 Methodology

A standardised methodology was developed by the HDA (now the National Institute for Health and Clinical Excellence) for the analysis and synthesis of review-level evidence (Swann et al., 2003b, Kelly et al., 2002). The specific methodology used in the review of reviews is outlined below.

### 2.1 Identification of the literature

#### 2.1.1 *Electronic searches*

A wide-ranging set of search strategies was developed for the original Evidence Briefing by Ellis and Grey, (2004) in an attempt to identify as many types of 'review' relevant to the subject as possible.

Briefly, the topic strategy was developed to identify papers with a focus on any intervention with the goal of reducing the sexual risk of transmitting or acquiring an STI. The topic search was developed using general terms for STIs (e.g. STD, chlamydia, gonorrhoea). For each database, strategies were developed with a combination of Medical Subject Headings ('MESH') (using various 'operators' such as 'and', 'or', 'adjacent' and 'near') and text words (appropriately truncated, e.g. 'STI\$') in order to achieve as many relevant reviews as possible.

The strategies used in this update were based on an updated 2003 HDA search strategy, which included papers to December 2002. The Medline search strategy used is provided as an example in Appendix A.

The following databases and websites were searched:

- The Cochrane Library (including HTA database, DARE [Database of Abstracts of Reviews of Effects] and NHS EED [Economic Evaluation Database])
- The 'Wider Public Health' report
- MEDLINE
- TRIP (database with access to largest collection of 'evidence-based' material on the web)
- SIGN (Scottish Intercollegiate Guidelines Network)
- Health Evidence Bulletins Wales
- National Guidelines Clearing House
- NCCHTA (National Co-ordinating Centre for Health Technology Assessment) website
- NICE (National Institute for Clinical Excellence) website
- REFER (Research Findings Electronic Register)
- National Research Register
- Clinical Evidence
- EMBASE
- Sociological Abstracts
- PsycINFO
- Cinahl (Cumulative Index to Nursing and Allied Health Literature)

- Sociofile
- EPPI-Centre's \*\*\* Register of Reviews of Effectiveness (RoRE).\*\*\*

All databases were searched from January 2001 to January 2006 for references published in the English language. Results were downloaded into a Reference Manager database.

### **2.1.2 Selection and filtering**

Two reviewers independently appraised all of the titles and abstracts of the identified references to determine whether to retrieve the full paper on the basis of the following criteria:

- English language only
- Published since 2001
- Systematic review, synthesis, meta-analysis or literature review
- Relevance to STI prevention or sexual health promotion in the UK
- Presents (and synthesises) data from primary evaluation studies of intervention effectiveness.

This evidence briefing update excludes:

- Screening and treatment of STIs
- Interventions that focus mainly on the prevention of teenage pregnancy or HIV
- Reviews covered in the original evidence briefing.

A joint decision was made as to whether the full paper would be retrieved for critical appraisal; if the reviewers disagreed, or no clear decision could be made on the basis of the title or abstract, the full paper was obtained for appraisal.

## **2.2 Critical appraisal**

Two reviewers appraised the identified papers (including journal articles, book chapters and reports) independently. The appraisal process sought to identify the extent to which papers were:

- *Systematic* – do the review authors apply a consistent and comprehensive approach? If repeated, would this give the same results?
- *Transparent* – are the review authors clear about the processes involved, the individual study results, the findings and conclusions drawn from these? Is there sufficient detail to repeat?
- *Analytically sound* – do the authors undertake the appropriate methods of analysis and are they undertaken correctly?
- *Relevant* – is the content relevant to the UK and the priority populations under consideration?

### **2.2.1 Assessing the quality of the reviews**

The HDA's standard protocol (Swann et al., 2003; Kelly et al., 2002) and critical appraisal tool (CAT) was used to make judgements about the quality of the identified papers. See Appendix B for further details.

For a further discussion about the assessment of quality please see the previous Evidence Briefing (Ellis and Grey, 2004).

### **2.2.2 Categorisation of reviews**

The categorisation process is only briefly described here, for further information see Ellis and Grey (2004).

A joint decision was made regarding whether the paper was to be classified as Category 1, 2, 3, 4 or 5. The 'data pool' for the review of reviews consists of those reviews categorised as 1, 2 or 3. The categories are:

#### **Category 1**

The review satisfied the criteria in both stages one and two of the CAT. Category 1 reviews are included within the data pool and analysed to derive evidence statements.

#### **Category 2**

The review passed stage one of the CAT, but failed to meet all the criteria within stage two – usually because it was not clear how the review had assessed the quality of the included studies. Category 2 reviews are also included within the data pool and analysed to derive evidence statements.

#### **Category 3**

The research question(s) was judged to be highly pertinent, and the paper is a review of interventions; however it failed to pass stage one of the CAT – it is not clear how the included studies were identified and the review had additional shortcomings. Category 3 reviews are included within the data pool and so may provide some evidence about effectiveness, but these reviews alone are insufficient to inform conclusions about effectiveness.

#### **Category 4**

This paper is either not a review of effectiveness of interventions, or it is not a review in its own right (e.g. it may extract findings from another review). However it is relevant and contains useful policy, background, epidemiological or interpretive information.

#### **Category 5**

The paper is not directly relevant and is therefore not used.

## 2.3 Analysis and synthesis

Reviews categorised as 1, 2 or 3 were subject to analysis and synthesis. Detailed structured summaries were completed for each Category 1, 2 and 3 reviews (see Appendix D).

### 2.3.1 Evidence statements

Category 1, 2 and 3 reviews are used to derive 'evidence statements' about types and features of interventions. Where relevant review evidence has been considered in conjunction with that of the original Evidence Briefing (Ellis and Grey, 2004) and evidence statements were derived based upon the combined evidence. The evidence statements reflect the strength of the conclusions made by the review(s), the outcomes used to judge effectiveness, the category of the review, and any inconsistencies within and between reviews. The reviews are used to derive the following evidence statements:

- **Sufficient review-level evidence** – clear evidence/conclusions from at least one Category 1 review, with no conflicting evidence/conclusions between Category 1 reviews
- **Tentative review-level evidence** – tentative evidence/conclusions from Category 1 review; or conflicting conclusions from Category 1 reviews; or clear conclusions from at least one Category 2 review
- **Insufficient review-level evidence** – no evidence/conclusions from Category 1 reviews and only tentative evidence/conclusions from Category 2 reviews; or clear evidence/conclusions from Category 3 reviews
- **No review-level evidence** – no evidence/conclusions from Category 1, 2 or 3 reviews.

Where there was no change from the evidence statement in the original Evidence Briefing this was stated in the text and followed by the original evidence statement from Ellis and Grey (2004). Evidence statements remained the same where there was evidence from the same category or lower than in the original Evidence Briefing and/or where all current evidence agreed with the previous evidence.

Evidence statements were amended from the original Evidence Briefing (Ellis and Grey, 2004) where current evidence originated from a higher category. Evidence statements also changed where there was evidence from the same category or higher where the authors' conclusions were more definitive than those in the original Evidence Briefing<sup>1</sup>.

## 2.4 Presentation of data

Complete bibliographic lists of the Category 1-5 papers are presented in the **References** (section 6).

The **Results** (section 3) contains a flow chart of the paper identification process and includes a summary table of the assessment of each Category 1-3 review according to the critical appraisal process.

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<sup>1</sup> On one occasion (Cost-effectiveness section 4.7) the evidence statement was amended because there was no current cost-effectiveness evidence found to continue to maintain the original evidence statement in relation to current sexual health interventions.



**Appendix C** contains lists of all of the reviews by category 1-5.

**Appendix D** contains detailed summaries of Category 1-3 reviews. **Appendix E** contains the primary studies from Category 1 and 2 reviews.

The findings of Category 1, 2 and 3 reviews are analysed and synthesised in **section 4 (The Evidence)**. There are sections on different 'types' of individual, group, community and socio-political interventions, as well as a section on 'features of effective interventions'; other sections consider the evidence for cost effectiveness and interventions to reduce inequalities in sexual health.

Within each section, having weighed up the evidence a number of 'evidence statements' are made, based on the findings from the Category 1, 2 and 3 review papers (see section 3.2).

The **Discussion, conclusions and research recommendations (section 5)** considers methodological issues, gaps, inconsistencies and limitations of the review of reviews drawn out from the evidence statements in section 4, particularly in relation to the UK and in the context of the those reported in the previous Evidence Briefing.

### 3 The Results

#### 3.1 Summary of identification of papers

A total of 2,319 titles and abstracts were screened for inclusion. Compared to 2,430 in Ellis and Grey, 2004. Of these, 99 papers were ordered as full papers and appraised using the CAT. In total, 10 papers were judged to be Category 1, 2 or 3 and went on to analysis and synthesis. A summary of the process of review identification is shown in Figure 1. Table 1 summarises the Category 1-3 review-level evidence.

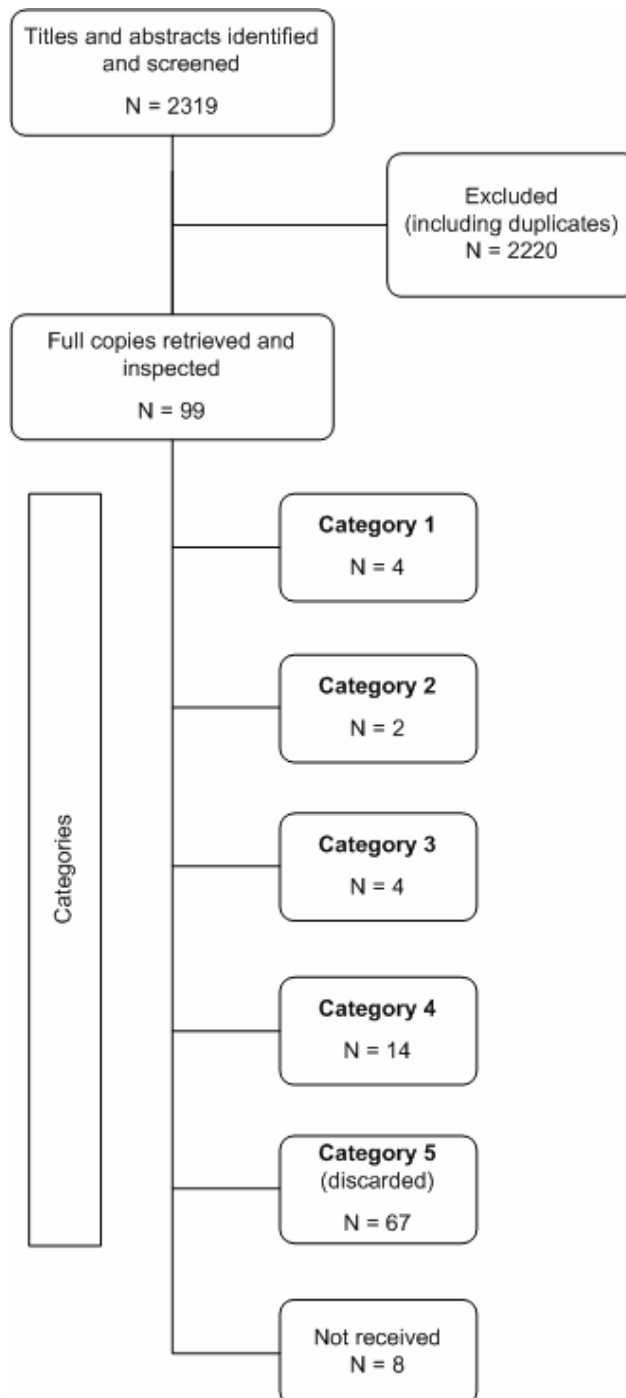


Figure 1. Flowchart showing the process of identification and categorisation of papers

### 3.2 Summary of reviews in categories 1- 3

**Table 1: Category 1-3 review-level evidence**

Author and date*	Stage one					Stage two							
	1	2			2d	3			3d	4		5	CATEGORY
	Clear aim/ question inc. Setting population, intervention	Comprehensive search strategy			Inclusion criteria specified	Assessment of quality of included studies			Assessment of the studies' quality	Quality of analysis		Conclusions related to findings	
		2a Identify approp. range of source databases	2b Additional search strategies **	2c Specifies search terms		3a Definition of quality	3b Tool used to assess quality	3c How assessments generated		4a Study findings clear and consistent	4b Study findings analysed appropri- ately		
DiClemente R.J. et al., (2005)	✓	✓	✗	✓	✓	✓	✓	✓	✓	✓	✓	✓	
Ward D.J. et al., (2005)***	✓	✓	(in part)	✓	✓	✓	✓	✓	✓	✓	✓	✓	1
Ward D.J. et al., (2004)	✓	✓	(in part)	✓	✓	✓	✓	✓	✓	✓	✓	✓	1
Manhart L.E. et al., (2005)	✓	✓	(in part)	✓	✓	✓	✓	✓	✓	✓	✓	✓	1
Robin L. et al. (2004)	✓	✓	(in part)	✗	✓	✓	✓	✗	✓	✓	✓	✓	2
Pedlow C.T and Carey M.P., (2004)	✓	✓	(in part)	✗	✓	✓	✓	✗	✓	✓	✓	✓	2
Shrier L. A., (2004)	✓	✗	✗	✗	✗	-	-	-	-	-	-	-	3
Schaalma H.P., et al., (2004)	✓	✗	✗	✗	✗	-	-	-	-	-	-	-	3
Schmiedl R. (2004)	✓	✗	✗	✗	✗	-	-	-	-	-	-	-	3
DiClemente R.J. et al., (2002)	✓	✗	✗	✗	✗	-	-	-	-	-	-	-	3

\* Complete bibliographic details of Category 1, 2 and 3 review papers are provided in Appendix C. Detailed summaries of Category 1-3 reviews can be found in Appendix D.

\*\* Additional search strategies involve follow-up of references/journals, consultation with experts in the field and grey literature searches.

\*\*\* Ward D. J. et al., (2005) is a journal article containing many of the same primary studies and findings from Ward D. J. et al., (2004).



## 4 The evidence

We follow each section with evidence statements regarding the effectiveness of interventions. Where there is no change from the evidence statement in the original Evidence Briefing this is stated in the text and followed by the original evidence statement from Ellis and Grey (2004). This Evidence Briefing also contains evidence statements on topics not previously included in the original Evidence Briefing (Ellis and Grey, 2004). Further, statements were amended from the original evidence briefing where current evidence was deemed to be of a higher quality. The quality of evidence was judged by the category from which it originated.

Detailed summaries of Category 1-3 reviews can be found in Appendix D. Details of the primary studies for each Category 1 and 2 reviews can be found in Tables 2-7 in Appendix E.

### 4.1 Individual level interventions

We found a total of eight Category 1, 2 and 3 reviews that included individual-level interventions. This compares with the eight Category 1, 2 and 3 reviews in the original evidence briefing (Ellis and Grey, 2004). The most frequently reported individual level intervention was clinic-based risk reduction interventions.

**Category 1:** DiClemente et al., 2005; Manhardt and Holmes, 2005; Ward et al., 2004; Ward et al., 2005.

**Category 2:** Robin et al., 2004; Pedlow and Carey, 2004.

**Category 3:** DiClemente et al., 2002; Shrier, 2004.

#### 4.1.1 *Clinic-based sexual health education*

We found a total of six reviews that referred to primary studies covering sexual health education in a clinic setting. These findings add to the five Category 1 and 3 reviews identified in the original Evidence Briefing (Ellis and Grey, 2004) concerning individual counselling.

#### *Outcomes*

The most frequently reported outcomes were condom use, sexual activity and incidence of STIs.

**Category 1:** DiClemente et al., 2005; Manhardt and Holmes, 2005; Ward et al., 2004; Ward et al., 2005.

**Category 2:** Robin et al., 2004; Pedlow and Carey, 2004.

**Category 3:** No evidence.

Seven Category 1 and 2 reviews examined the evidence of effectiveness of clinic-based sexual health education (DiClemente et al., 2005; Manhardt and Holmes, 2005; Ward et al., 2004; Ward et al., 2005; Robin et al., 2004; Pedlow. and Carey, 2004). The main outcomes considered were condom use, sexual

activity and STI incidence. Sexual health knowledge and self-efficacy of condom use were also considered.

DiClemente and colleagues (2005) reviewed five individual-level clinic-based STI prevention interventions (Boekeloo et al., 1999; DeLameter et al., 2000; Mansfield et al., 1993; Scholes et al., 2003 and Schrier et al., 2001) (some overlap with Ward et al., 2004, 2005 and Pedlow and Carey, 2004). Interventions primarily included risk-assessment, condom attitudes and skills, STI education, culturally tailored information, and information on drug and needle use. One intervention (Scholes et al., 2003) involved sending out postal information. None of the interventions showed significant effects for all their outcomes however, the individual interventions that showed at least one significant impact in measurable outcomes (e.g. consistent condom use) in the intervention group compared to the control group incorporated risk-assessments and used tailored educational materials. Overall (including the results for group clinic interventions), there were significant results for condom-protected sex at six and 12 months follow up.

Manhardt and Holmes (2005) (some overlap with Ward et al., 2004, 2005 and Robin et al., 2004) included five additional individual-level interventions targeted at people attending STI clinics (Boyer et al., 1997; Kamb et al., 1998; Peterman et al., 2000; VCT Efficacy study group, 2000; EXPLORE Study Team, 2004). Intervention methods included cognitive-behavioural intervention, individual risk-reduction counselling and voluntary counselling and testing (VCT). All interventions examined STI incidence as the primary outcome. Findings of the VCT interventions showed that although a reduction in the incidence of STIs and HIV acquisition was seen, the effects were non-significant. However, results were more positive for counselling interventions. Manhardt and Holmes (2005) stated that “client-centred counselling was as effective as interactive-counselling intervention based on the theory of reasoned action and social cognitive theory at reducing the incidence of STIs over a 12-month period, when compared to the efficacy of didactic messages” (S15). The findings in these studies add to those of the previous Evidence Briefing (Ellis and Grey, 2004), which found that there was tentative review-level evidence to conclude that individual risk counselling can be effective.

Ward and colleagues (2005) (some overlap with Ward et al., 2005, DiClemente et al., 2005, Manhardt and Holmes, 2005 and Robin et al., 2004) examined nine clinic-based interventions (see Table 5, Appendix E). Interventions primarily included counselling and skills-building techniques. Four out of the nine trials considering the outcome of laboratory confirmed STIs found greater reductions in their intervention groups relative to their controls, which was statistically significant ( $p < 0.05$ ) for two studies. However, pooled results did not indicate an overall effect (RR 1.00 (95% CI, 0.81 to 1.23)). Of the four studies considering clinically diagnosed STIs one found no reduction (Branson et al., 1998) whilst the remaining studies showed that participants in the intervention group had higher STI rates than the control group following the intervention. Two trials considering self-reported STIs also found no significant effects (Shrier et al., 2001; Metzler et al., 2000). Six out of seven trials reporting consistent condom use observed an increase in the intervention groups compared to the controls (Kamb et al., 1998; NIMH, 1998; Imrie et al., 2001; Kalichman et al., 1999; Shrier et al., 2001; Boyer et al., 1997) and pooled results suggested an overall

effect (RR 1.17 (1.10 to 1.25)). Also, five out of seven trials considering number of sexual partners found fewer sexual partners among their intervention groups compared to their control groups.

In addition to one study already mentioned (Boyer, 1997), Robin and colleagues (2004) examined one other clinic-based intervention that included risk-assessment, counselling on condom use and prevention, educational material and the offer of free condoms (Mansfield, 1993). However, analysis showed no effects on any behavioural outcome and the authors make no further comment about it.

**Evidence statement: No change from Ellis and Grey (2004). There is tentative review-level evidence to conclude that individual risk counselling can be effective in reducing sexual risk behaviour among clinic attendees.**

#### **4.1.2 Partner notification**

We found one Category 1 review to add to the six Category 1, 2 and 3 reviews relevant to partner notification in the originals Evidence Briefing (Ellis and Grey, 2004).

**Category 1:** Manhardt and Holmes, 2005.

**Category 2:** No evidence

**Category 3:** No evidence

The previous Evidence Briefing (Ellis and Grey, 2004) found evidence to support the effectiveness of partner notification. In this update, Manhart and Holmes (2005), reported on one study relevant to partner notification (Peterman et al., 1997) that randomly assigned people diagnosed with syphilis to different intervention approaches. The methods used were: partner notification by patients within two days; immediate notification by disease-intervention specialist; or immediate notification by disease-intervention specialist with optional blood draw in the field. Findings showed similar success for all three approaches in terms of locating and treating partners.

**Evidence statement: No change from Ellis and Grey (2004). There is sufficient review-level evidence to conclude that notification can be an effective means of newly detecting infections**

#### **4.1.3 Improved communication between parents and adolescents (parental/family intervention)**

A total of four reviews were identified that discussed studies relevant to parental monitoring. These findings add to those previously reported from three Category 3 reviews in the original evidence briefing (Ellis and Grey, 2004).

#### *Outcomes*

The main outcomes examined were unprotected sex, pregnancy and sexual debut.

**Category 1:** No evidence

**Category 2:** Robin et al., 2004; Pedlow and Carey, 2004.

**Category 3:** DiClemente et al., 2002; Shrier, 2004.

Robin et al. (2004) reported on one individual-level intervention by Miller et al. (1993). This intervention involved adolescents and their families viewing six videos and supplementary printed material over a three-month period. However, this intervention showed null results, Robin et al. (2004) made no additional comments about this intervention.

Pedlow and Carey (2004) included three school-based studies that aimed to promote parent/adolescent communication (further details provided in section 4.2.5 (ii)). Pedlow and Carey (2004) noted that “Parents continue to be important, and parent-adolescent discussions about sex can protect teens from other influences that might encourage risky sex. Thus, encouraging parent-teen communication and assisting parents in monitoring teens’ behaviour may be especially important for the prevention of HIV/STDs as well as unintended pregnancy” (p174).

Shrier (2004) and DiClemente et al. (2002) also highlighted the importance of parental monitoring. DiClemente et al. (2002) reported findings from several studies that involved parental monitoring and family support as a prevention intervention. Li et al. (2000a, 2000b; cited in DiClemente et al., 2002) examined parental monitoring to prevent unprotected sex. DiClemente et al. (2002) stated that “parental monitoring had a direct and stronger protective effect against adolescents’ engagement in unprotected vaginal sex at the 2-, 3-, and 4-year follow-up” (p.173). DiClemente et al. (2001; cited in DiClemente et al., 2002) found that adolescents with perceived low parental monitoring were significantly more likely to participate in unprotected sex; have multiple sexual partners; and have partners who were not monogamous compared to others with perceived high parental monitoring. Romer et al. (1994) found that high levels of parental monitoring were related to lower odds of initiating sex before 11 years of age and greater likelihood of delayed sexual initiation in female adolescents. Additional relationships between parental monitoring and risky sexual practices among adolescents have been reported by Metzler et al, (1994); Luster et al. (1997); Benda and DiBlasio, (1994); and Crosby et al. (2002). One study showed that behavioural interventions resulted in significant improvements in parental monitoring (Stanton et al., 2000).

Ellis and Grey (2004) found Category 3 evidence for greater communication between parents and adolescents. Our findings add to those from the original Evidence Briefing, however, we conclude that there is insufficient evidence to change the previous evidence statement.

**Evidence statement: No change from Ellis and Grey (2004). There is insufficient review-level evidence to support or discount the effectiveness of improved communication between parents and adolescents (parental/family involvement) at reducing the sexual risk behaviour of adolescents.**



## 4.2 Group-level interventions

We found a total of nine Category 1, 2, and 3 reviews that included group level interventions. These add to those previously reported from 17 Category 1, 2, and 3 reviews in the original Evidence Briefing (Ellis and Grey, 2004). The most frequently reported group-level interventions were clinic-based.

**Category 1:** DiClemente et al., 2005; Manhart and Holmes, 2005; Ward et al., 2004; and Ward et al., 2005.

**Category 2:** Robin et al., 2004; Pedlow and Carey, 2004

**Category 3:** DiClemente et al., 2002; Schmiedl, 2004; Schaalma et al., 2004

### 4.2.1 Clinic-based interventions

We found a total of seven reviews that reported findings on clinic-based interventions.

#### *Outcomes*

The most frequently reported outcome was condom use.

#### **(i) Clinic-based interventions aimed at adolescents**

A total of five reviews reported findings on clinic-based interventions aimed at adolescents. The original Evidence Briefing did not contain any reviews that explored clinic-based interventions aimed at adolescents.

**Category 1:** DiClemente et al., 2005; Ward et al., 2004; Ward et al., 2005

**Category 2:** Robin et al., 2004; Pedlow and Carey, 2004

**Category 3:** No evidence

DiClemente et al. (2004) reported on five clinic or health service-based interventions (DiClemente et al., 2004; Gillmore et al., 1997; Metzler et al., 2000; Orr et al., 1996; Lawrence et al., 1995) all of which included adolescent populations. The interventions used group sessions that focused primarily upon safe sex, attitudes towards condoms, various skills training and assertion. Across the five interventions, outcomes were mixed. In three studies, participants receiving the intervention reported higher levels of consistent condom use at six- (DiClemente et al., 2004; Orr et al., 1996; St. Lawrence et al., 1995) and 12-month follow-up (DiClemente et al., 2004; St. Lawrence et al., 1995). One study (Metzler et al., 2000) found that the intervention group demonstrated a significant reduction in sexual partners at six-month follow-up. Gilmore et al. (1997) reported no significant effect of the intervention on condom use, number of sexual partners or refusing sex without a condom.

Ward et al. (2004) (the same studies as DiClemente et al., 2004) reported on two group-level clinic-based STI interventions targeted at adolescents (Metzler et al., 2000; Orr et al., 1996; also reported in Ward et al., 2005). Metzler et al. (2000) incorporated role-play and skills training into their interventions. Findings

showed that there was a significant decrease in the number of sexual partners who were strangers, in addition to significant decreases in the mean number of sexual partners and the mean number of non-monogamous sexual partners. Orr et al. (1996) also examined an intervention that included role-play, condom negotiation and skills training. Findings from this study showed that there was a significant increase in consistent condom use in both the intervention and control group. Ward et al. (2004) made no specific comment on clinic-based interventions specific to adolescents.

Pedlow and Carey (2004) (overlap with Ward et al., 2004; 2005; DiClemente et al., 2004) reported on two clinic-based interventions targeting adolescents that have not previously been mentioned<sup>2</sup> (DeLamater et al., 2000; Mansfield et al., 1993). These interventions included decision-making skills, booster sessions, condom skills, negotiation skills, and one also measured risk perception. However, the authors made no specific comment on the effectiveness of these interventions relative to their setting.

Robin et al. (2004) described one group-level health centre-based intervention aimed at adolescent African Americans (St. Lawrence et al., 1995; also reported in DiClemente et al., 2004). This randomised controlled trial involved small-group discussion modelling skills, skills practice, external speakers and role-play. The intervention showed positive results on rate of sexual activity, condom use, and sexual initiation. However Robin et al. (2004) categorised this study as 'mixed' due to the fact that it showed null results when carried out on males in a state reformatory (St. Lawrence, 1999).

**New evidence statement: There is insufficient review-level evidence to conclude that clinic-based interventions aimed at adolescents are effective at reducing the sexual risk behaviour of adolescents.**

#### **(ii) Clinic-based interventions aimed at the general clinic attendees**

A total of three reviews reported findings on interventions aimed at general adult clinic attendees.

**Category 1:** Manhart and Holmes, 2005; Ward et al., 2004; Ward et al., 2005

**Category 2:** No evidence

**Category 3:** No evidence

Manhart and Holmes (2005) reported details of six clinic-based interventions (seven studies) (Branson et al., 1998; NIMH, 1998; Shain et al., 1999; Shain et al., 2002; Hobfall et al., 2002; Baker et al., 2003; Cohen et al., 1991). Two interventions targeted both men and women and the remaining four interventions targeted women only. All six interventions involved small-group work including counselling, attitudes, skills and behaviour change. All but two of the studies (Branson et al., 1998; Hobfall et al., 2002) reported reductions in STI incidence. Cohen et al. (1991) compared group discussion on condoms in waiting rooms

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<sup>2</sup> Pedlow and Carey, 2004 also included Orr et al., 1996 and Metzler et al., 2000.

(intervention group) to no group discussion (control), finding a non-significant 50% reduction in repeat clinic attendances with a subsequent STI for the intervention group.

Ward et al. (2004) reported on ten group-level clinic-based STI interventions, five of which have not previously been discussed and were aimed at general STI clinic attendees (Balmer et al., 1998; Imrie et al., 2001; Kalichman et al., 1999; O’Leary et al., 1996; Solomon et al., 1989). Ward et al. (2004) stated that, “This review suggests that behavioural interventions may be effective in increasing the proportion of GUM clinic patients reporting consistent condom use, though there were inconsistent effects on STI rates and other measures of sexual behaviour (e.g. number of sexual partners)” (p.53). Ward et al. (2005) also found “evidence that behavioural interventions increase consistent condom use, though effects on other aspects of behaviour were inconsistent” (p. 390).

**New evidence statement: There is tentative review-level evidence to conclude that clinic-based interventions using behavioural skills are an effective way to reduce the sexual risk behaviour of clinic attendees.**

### **(iii) Parental involvement in clinic-based interventions**

A total of two reviews referred to parental involvement in clinic-based interventions. The original Evidence Briefing did not contain any reviews that explored parental involvement in clinic-based interventions.

**Category 1:** DiClemente et al., 2004

**Category 2:** No evidence

**Category 3:** DiClemente et al., 2002

Although they provided no evidence of effectiveness DiClemente et al. (2004) highlighted the importance of involving parents as behaviour-change agents through improved parent-teen communication. They also maintained that clinicians who see young people are in a good position to provide parents with the information they need to facilitate parent-adolescent discussions.

DiClemente et al. (2002) also suggested that clinic-level interventions involving parental counselling may enable physicians to emphasise the importance of parental monitoring (p.175).

**New evidence statement: There is insufficient review-level evidence to either support or discount the effectiveness of parental inclusion in clinic-based interventions at reducing the sexual risk behaviour of students.**

#### **4.2.2 Linking schools to clinic services and/or providing condoms in schools**

One review we identified reported on five primary studies relevant to school-based STI prevention interventions. These reviews add to the five relevant Category 1, 2 and 3 reviews previously reported in the original Evidence Briefing (Ellis and Grey, 2004).

##### *Outcome*

The most frequently reported outcome was condom use.

**Category 1:** No evidence

**Category 2:** No evidence

**Category 3:** Schmiedl, 2004

Schmeidl (2004) reported on five school-based condom distribution interventions (Schuster et al., 1998; Wolk and Rosenbaum, 1995; Guttmacher et al., 1997; Kirby et al., 1999; Blake et al., 2003). Findings from Schuster et al. (1998) showed that there was no increase in the level of sexual activity at one-year follow-up. However, condom use increased among males, and there was an increase in the percentage of male students who had used condoms at recent first sex. Wolk and Rosenbaum (1995) found that condom distribution in schools was three times more beneficial to a sexually active student than the risk of encouraging a non-sexually active young person to become sexually active. Guttmacher et al. (1997) reported increased condom use in students with three or more partners in the last six months in a school with condom provision compared to a school without. Kirby et al. (1999) found that condom provision did not increase sexual activity in students. Blake et al. (2003) found that students from schools with condom provision were less likely to report sexual intercourse, more likely to receive condom use education, and where they did report sexual activity, were more likely to use condoms but were less likely to use any other method of contraception. Overall, findings showed that some young people received condoms but did not use them. In addition, there was no difference in pregnancy rates between intervention schools and schools without condom distribution schemes. None of the studies examined the effects of condom distribution on rates of STIs.

These findings add to those in the first Evidence Briefing and although they do not measure changes in STI rates they do show evidence of increased condom use. However, they original only from Category 3 papers therefore, there is insufficient evidence.

**Evidence statement: No change from Ellis and Grey (2004). There is insufficient review-level evidence to conclude that condom distribution in schools can be effective at reducing the sexual risk behaviour of students.**

##### **(i) Condom availability in schools and association with increased sexual activity**

One review identified studies relevant to condom availability in schools. The original Evidence Briefing did not include evidence relating to an association between condom availability in schools and sexual activity.

**Category 1:** No evidence

**Category 2:** No evidence

**Category 3:** Schmiedl, 2004

Schmiedl (2004) stated that, “school-based condom availability programs were not associated with an increase in teen sexual activity, whereas data from most programs indicated increased use of condoms by teens who are sexually active, these programs should be seriously considered when developing school-based programs focused in preventing pregnancy, STDs, and HIV” (p.19).

**New evidence statement: There is insufficient review-level evidence to support or discount the view that condom distribution in schools is not associated with increased sexual activity.**

#### **4.2.3 School curriculum-based sex education**

We found a total of three reviews that reported on 52 relevant primary studies. These findings add to those previously reported by the relevant 14 Category 1, 2 and 3 reviews in the original Evidence Briefing (Ellis and Grey, 2004).

##### *Outcomes*

The most frequently reported outcomes were delay of sexual initiation, condom use, contraceptive use and frequency of sexual intercourse.

**Category 1:** No evidence

**Category 2:** Robin et al., 2004; Pedlow and Carey, 2004

**Category 3:** Schaalma et al., 2004

Robin et al. (2004) reported on 12 primary studies that addressed school-based sex education (see Table 6, Appendix E). Eight studies reported positive intervention effects, two showed mixed effects and two, aimed at older adolescents, showed negative effects.

Pedlow and Carey (2004) reported on 13 school-based interventions (see Table 7, Appendix E). Findings showed that programmes targeting pre-adolescent youth (aged 9-12 years) were effective at delaying the onset of sexual intercourse and improving condom use among sexually active youth. With young adolescents (aged 13-15 years) interventions were effective at increasing condom use, reducing unprotected sex, and reducing the frequency of sexual intercourse.

Schaalma et al. (2004) reported on five school-based interventions (Abraham et al., 2002; Schaalma et al., 1996; Schaalma and Kok, 2001; Wight and Abraham, 2000; Paulussen et al., 1994). Schaalma et al.

(2004) noted that these interventions include aspects such as, discussion groups, role-play, rehearsal and modelling, which are methods that have proven to be effective at preventing risk behaviours.

The findings from the previous Evidence Briefing concluded that after-school based interventions, and the inclusion of skills building techniques such as role-play were effective at changing sexual behaviour.

**Evidence statement: No change from Ellis and Grey (2004). There is sufficient review-level evidence to conclude that school-based sex education can be effective in reducing the sexual risk behaviours of young people.**

### **(i) Start sex education early, before the onset of sexual activity**

We found one review to add to the two Category 1 and 2 reviews in the original Evidence Briefing (Ellis and Grey, 2004).

**Category 1:** No evidence

**Category 2:** No evidence

**Category 3:** Shrier, 2004

Shrier (2004) concluded that the earlier young people receive sex education, the less likely they are to participate in risky sexual behaviour.

These comments agree with those provided by two reviews in the original evidence briefing (Ellis and Grey, 2004).

**Evidence statement: No change from Ellis and Grey (2004). There is tentative review-level evidence to conclude that sex education is more effective if begun before the onset of sexual activity.**

### **(ii) Parents and school-based interventions**

Two Category 2 and 3 reviews (Pedlow and Carey, 2004; DiClemente et al., 2002) were identified that reported on five primary studies relevant to parental inclusion in school-based interventions. The original Evidence Briefing did not include evidence of parent and school-based interventions.

#### *Outcomes*

The most frequently reported outcomes were improved parent-adolescent communications, multiple partners, and pregnancy.

**Category 1:** No evidence

**Category 2:** Pedlow and Carey, 2004

**Category 3:** DiClemente et al., 2002

Pedlow and Carey (2004) reported details of three studies that included parental involvement (Coyle et al., 2001; Levy et al., 1995; Aarons et al., 2000). The interventions examined incorporated aspects such as completing homework assignments with parents, providing material to parents to encourage communication, meetings and newsletters for parents. Two studies found no change in parent and adolescent communication after the intervention, and one study (Coyle et al., 2001) found improved adolescent-parent communication at almost three years follow-up.

DiClemente et al. (2002) reported on one intervention aimed at reducing the sexual risk behaviour of young people in schools through parental inclusion in school-based intervention. Hawkins et al. (1991) examined a youth development programme that provided training to both young people and their parents in a school setting. This intervention decreased the odds of young people participating in risky sexual behaviour, such as multiple partners and pregnancy, during adolescence.

**New evidence statement: There is insufficient review-level evidence to conclude that parental involvement in school-based interventions is effective at reducing the sexual risk behaviour of young people.**

#### **4.2.4 Small-group work**

Six reviews were identified that reported on small group work. These findings add to the seven Category 1 and 3 reviews previously reported in the original evidence briefing (Ellis and Grey, 2004).

##### *Outcomes*

The most frequently reported outcome was condom use.

**Category 1:** DiClemente et al., 2004; Manhart and Holmes, 2004; Ward et al., 2004; Ward et al., 2005.

**Category 2:** Robin et al., 2004; Pedlow and Carey, 2004

**Category 3:** No evidence

DiClemente et al. (2004) reported on successful primary studies (DiClement et al., 2004; Metzler et al., 2000; Orr et al., 1996; St Lawrence et al., 1995) showing significant effects on outcomes including, for example, consistent condoms use in the intervention group compared to the control group. These studies incorporated clinic-based small-group work, and highlighted the importance of role-play and skills building.

Manhart and Holmes (2005) reported details of five small-group RCTs with passive follow-up (e.g. review of clinic records as opposed to actively testing individuals) (O'Donnell et al., 1998; Cohen et al., 1992a; Cohen et al., 1992b; Gollub et al., 2000; Imrie et al., 2001). Findings showed mixed results with one study (Imrie et al., 2001) demonstrating an increase in STI incidence in the intervention group.

Pedlow and Carey also included studies focused at pre- and young adolescents (9-12 years and 13-15 years) that included small group work. They found evidence of successful group-level interventions addressing cognitive factors, risk perception and skills development. Pedlow and Carey (2004) classified the design of the intervention by Kirby et al. (1997) as being a developmentally appropriate study for this target group as it included decision-making skills and preparation for risky situations.

Robin et al. (2004) reported details of 21 primary studies that included small group work with young people from communities, clinics, schools, detention facilities and a state reformatory (see Table 6, Appendix E). Robin et al. (2004) reported details of three primary studies that were undertaken with participants from schools and clinics as well as family planning clinics and community based organisations (Jemmott et al., 1992<sup>3</sup>; Kirby et al., 1997; Eisen et al., 1990). These interventions included, among other aspects, role-play, discussion, and videos. Findings from Jemmott et al. (1992) favoured the intervention group (who received a career planning intervention) for risky sexual behaviour index, frequency of sex, number of partners, occasions of sex without a condom and having had anal sex. Robin et al. (2004) deemed the studies by Kirby et al. (1997) and Eisen et al. (1990) to have negative effects due to inconsistencies in the randomisation process. Robin and colleagues noted “the most common strategies for content delivery were small group discussion, role-playing and interactive and experiential exercises, use of media and interactive media, use of structured games, and lecture” (p.18).

Manhart and Holmes (2005) stated that, “Interventions delivered in small-group settings were as effective as those delivered to individuals” (S20) and other reviews have also found that group interventions although effective, are no more effective than individual-level interventions. Ward et al. (2004) carried out a pooled analysis and found no difference in effects between group interventions and those interventions using either an individual format or those with one or two sessions. Ward et al. (2005) reported that, “intervention format and length was not associated with trial results [group based relative risk (RR) 0.94 (0.70 to 1.25) versus individual based RR 1.16 (0.76 to 1.75)]” (p.390).

These findings add to the evidence of effectiveness reported in the previous evidence briefing (Ellis and Grey, 2004).

**Evidence statement: No change from Ellis and Grey (2004). There is sufficient review-level evidence to conclude that small group work involving skills-building activities can be effective at reducing the sexual risk behaviour of all target groups.**

#### **4.2.5 Detached education and outreach by health professionals**

Two reviews were identified that reported details of education and outreach-based interventions employing group-level education and condom-distribution. The original Evidence Briefing did not include evidence of group level detached education and outreach by health professionals.

<sup>3</sup> Also reported by Pedlow and Carey (2004).



## Outcomes

The most frequently reported outcome was STI incidence.

**Category 1:** Manhart and Holmes, 2005

**Category 2:** Robin et al., 2004

**Category 3:** No evidence

Condom distribution was a characteristic of three studies included by Manhart and Holmes (2005) (Feldblum et al., 2001; Fontanet et al., 1998; Celentano et al., 1998; also reported in Speizer et al., 2003). Feldblum and colleagues examined an intervention that included the provision of information, education and communication (IEC) as well as female condoms to female plantation workers in Kenya. The intervention had no impact on STI incidence. Fontanet et al. (1998) provided male and female condoms to brothel workers in Thailand. The intervention resulted in a non-significant decrease in STI incidence compared to brothels that only received male condoms.

Robin and colleagues (2004) reported on three community-based education programmes, all with positive outcomes on risky sexual behaviour (e.g. condom use) (Jemmott et al., 1998; Stanton et al., 1996; Stanton et al., 1997). Interventions included, among other aspects, small-group discussions, role-play, videos, and skills-building activities. However, these interventions were aimed at African American young people and their generalisability to the UK population of young people may be limited.

One additional group-level intervention reported by Manhart and Holmes (2005) addressed STI prevention for male Thai army conscripts using condom distribution at brothels targeted at men with an STI history. Findings showed significant, desirable effects on rates of STIs with greater than 80% reduction in STI recurrence compared to that in the control groups. Findings also showed a reduction in HIV incidence, risk behaviour, brothel visits and an improvement in consistent condom use.

**New evidence statement: There is tentative review-level evidence to conclude that detached education and outreach by health professionals, including targeted condom distribution, is effective at reducing the sexual risk behaviour of high risk groups.**

## 4.3 Community level interventions

Only one review identified reported on relevant community level interventions. This adds to the seven Category 1, 2 and 3 reviews included in the original Evidence Briefing (Ellis and Grey, 2004).

### 4.3.1 Community outreach

One review reported details of two community-level mixed modality interventions. The original Evidence Briefing did not include evidence relating to community outreach.

### *Outcomes*

The reported outcome was STI incidence.

**Category 1:** Manhart and Holmes, 2005.

**Category 2:** No evidence

**Category 3:** No evidence

Manhart and Holmes (2005) reported on two community-level interventions (Hayes et al., 2003; Kamali et al., 2003). Both interventions were mixed modality and included behavioural and treatment strategies. The study by Kamali et al. (2003) showed that communities receiving only information, education and communication (IEC) experienced a decrease in HSV-2 seroconversion compared to the communities receiving IEC and management of STI symptoms, which experienced decreased incidence of syphilis and gonorrhoea. However, all groups, including the control group, reported an increase in condom use. Hayes et al. (2003) carried out a four-component intervention that included school health and reproductive education, reproductive youth services, condom distribution and community activities. However, no intervention effects were found for STI or HIV incidence even though improvements in knowledge and behaviour were reported.

**Evidence statement: There is insufficient review-level evidence to support or discount the effectiveness of community level outreach interventions on sexual risk behaviour.**

## **4.4 Socio-political interventions**

Three reviews were identified that addressed socio-political interventions. They add to the four Category 3 reviews reported in the original evidence briefing (Ellis and Grey, 2004).

### *Outcomes*

The most frequently reported outcome was condom use.

#### **4.4.1 Legislation, policy, equality work, regulation**

We found three reviews to add to one Category 3 review regarding Legislation, policy, equality work and regulation.

**Category 1:** Manhart and Holmes, 2005

**Category 2:** No evidence

**Category 3:** DiClemente et al., 2002; Schaalma et al., 2004.

Manhart and Holmes (2005) included one study (Egger et al., 2000) that reported on an intervention in Nicaragua where a health ordinance required motels to provide condoms to guests when requested.

Motels frequented by CSWs were randomly assigned to either (1) offering condoms when requested at check-in, (2) always offering condoms at check-in, or (3) placing condoms on each bed before check-in. Findings showed that both offering condoms at check-in and placing condoms on the bed resulted in significant increases in condom use.

DiClemente et al. (2002) discussed the benefits of parental involvement in school-based programmes (see section 4.2.3 (ii)). DiClemente and colleagues concluded that, “community policies that involve parents in the sex education programs offered to children and adolescents in schools may also be beneficial” (p.176).

In relation to sex education in schools, Schaalma et al. (2004) commented on the policies in The Netherlands that state that teenagers in school should be taught about condom use, contraceptive use and social skills relative to sexual health. Findings have shown that the theory and evidence based interventions implemented in The Netherlands have had favourable effects. However, Schaalma and colleagues also noted the negative effects policies can have on sex education in schools. For example, abstinence based sex education in US schools has shown little or no evidence of effectiveness yet continues to be implemented, and national guidelines in Tanzania discourage the promotion of condom and contraceptive information. Schaalma et al. (2003) argue that when policy or legislation constrains evidence-based practice the PRECEDE/PROCEED or Intervention Mapping approaches could be applied to politicise health promotion and mobilise community members to support and aid the establishment of health promotion policies.

**Changed evidence statement: There is insufficient review-level evidence to support or discount the effectiveness of legislation, policy, equality work or regulation.**

The previous evidence statement reported no review-level evidence to support or discount the effectiveness of legislation, policy, equality work or regulation.

#### **4.4.2 Resource allocation**

Four reviews were identified that referred to the issue of resource allocation. They add to the two Category 3 reviews included in the original Evidence Briefing (Ellis and Grey, 2004).

**Category 1:** Ward et al., 2004.

**Category 2:** Robin et al., 2004.

**Category 3:** DiClemente et al., 2002; Schaalma et al., 2004.

Although the reviews considered in this evidence briefing presented no evidence of effective models of resource allocation they have considered resource allocation when making conclusions regarding the effectiveness of interventions and suggestions for future research.

Ward et al. (2004) stated, “one of the studies to show success in reducing STI rates found no advantage of an enhanced four-week intervention over and above two 20-minute individually based counselling sessions. However, even if such an approach was shown to be effective in a UK setting, currently it could not be delivered as part of routine clinic care without increased resources, clinic time, and trained staff. In addition, the potential impact of such an intervention on STI rates is not clear. This will depend on the uptake of such an intervention were it offered, and crucially on the proportion of STIs thought to occur in those who have previously attended GUM clinics” (p.55).

DiClemente et al. (2002) discussed the importance of parental monitoring and suggested that parental counselling by clinicians may be effective as an STI intervention aimed at young people. However, they highlight that further resources would be needed to develop and undertake this intervention.

With regard to resource allocation for school-based interventions Schaalma et al. (2004) stated that, “high quality teacher training is required for high quality sexual health promotion in classrooms and this needs to be acknowledged in budget planning” (p.264). In light of the evidence that suggested interventions carried out over longer periods of time are more effective Robin et al. (2004) noted, “the effect of duration and intensity on interventions results in a particular challenge for school-based educators because they may have limited time to implement programs within a school year” (p.23). They also noted, “community-based organisations also need sufficient resources to implement programs in multiple sessions” (p.23).

**Evidence statement: No change from Ellis and Grey (2004). There is no review-level evidence to support or discount the effectiveness of difference models of resource allocation.**

## **4.5 Features of effective interventions**

### **4.5.1 Use of theoretical models in developing interventions**

Findings from five Category 1, 2 and 3 reviews add to those reported in 13 reviews from the original evidence briefing (Ellis and Grey, 2004) that concluded that many successful interventions were underpinned by theories of behaviour change.

**Category 1:** Manhart and Holmes, 2005; Ward et al., 2004; Ward et al., 2005.

**Category 2:** Pedlow and Carey, 2004

**Category 3:** Schaalma et al., 2004

With regard to theory-based interventions, Ward et al. (2004; 2005) concluded that interventions using social cognitive or related theories were related to intervention effectiveness, although pooled results were

not statistically significant [social cognition models RR 0.91 (0.71 to 1.16) versus other trials RR 1.19 (0.84 to 1.68)].

In relation to theory-based interventions, Manhart and Holmes (2005) concluded that “among the behavioural interventions reviewed, those that showed no effect were theory based as often as those that demonstrated benefit, and no underlying behavioural theory or approach (e.g., skills building, counselling, and motivational interviewing) was more often successful than another” (S20).

Pedlow and Carey (2004) concluded that the majority of theories applied to interventions aimed at young people were developed primarily for adults and do not focus upon the developmental determinants of sexual risk (p.181).

Schaalma et al. (2004) reported details of several studies that found evidence of effectiveness in interventions underpinned by cognitive behavioural theories. Schaalma et al. (2004) referred specifically to one study by Jemmott and Jemmott (2000) that examined 36 theoretically based interventions that were effective at changing behaviour to see if they were more effective on condom use. Findings showed that those studies with effects on mediators of behaviour change such as knowledge and intentions, also had greater effects on condom use and abstinence.

**Evidence statement: No change from Ellis and Grey (2004). There is sufficient review-level evidence to conclude that theory-based interventions are more likely to be effective.**

#### **4.5.2 *Emphasis on risk reduction (e.g. promoting condom use or reduction in number of partners), rather than promotion of abstinence only***

Findings from three Category 1, 2 and 3 reviews contribute to the evidence from eight reviews reported in the original evidence briefing (Ellis and Grey, 2004).

**Category 1:** DiClemente et al., 2004.

**Category 2:** Robin et al., 2004

**Category 3:** Schaalma et al., 2004

DiClemente et al. (2004) noted that adolescents should understand the value of abstinence in accordance with recommendations (US). They also stated that adolescents should be informed about the use of condoms and contraceptives.

Although Robin et al. (2004) made no specific conclusions regarding risk reduction compared to abstinence only programmes they did highlight that more effective programmes were usually of a longer

duration and focused on developing knowledge and life skills, compared to shorter programmes that focused specifically on abstinence and condom-use skills.

From the evidence reviewed on abstinence-based interventions, Schaalma et al. (2004) concluded, “programs with an exclusive abstinence message generally have not succeeded in the promotion of abstinent sexual behaviour, although some have succeeded in changing attitudes towards abstinence” (p.265).

**Evidence statement: No change from Ellis and Grey (2004). There is tentative review-level evidence to conclude that interventions that promote risk reduction, rather than abstinence alone, are more likely to be effective.**

**Evidence statement: No change from Ellis and Grey (2004). There is insufficient review-level evidence to support or discount the effectiveness of school-based abstinence-only approaches.**

#### **4.5.3 Use of behavioural skills and social skills training, including self-efficacy**

Nine Category 1, 2 and 3 reviews were found to add to the 15 Category 1, 2 and 3 reviews in the original Evidence Briefing.

**Category 1:** DiClemente et al., 2004; Manhart and Holmes et al., 2005; Ward et al., 2004; Ward et al., 2005

**Category 2:** Pedlow and Carey, 2004; Robin et al., 2004

**Category 3:** DiClemente et al., 2002; Schaalma et al., 2004; Shrier, 2004

Ward et al. (2004; 2005) commented that trials of behavioural interventions showed a reduction in STI rates and was associated with increased consistent condom use. Many of the interventions included training such as condom use, training in how to deal with high-risk situations, and decision-making skills.

DiClemente et al. (2004) concluded that characteristics of effective interventions include technical skills, such as condom-use skills, and active learning skills, through the use of role-play, as well as self-efficacy through communication and assertiveness skills (p.215).

Manhart and Holmes (2005) included studies that used behavioural skills and although skills-building was listed as a feature of successful interventions, Manhart and Holmes (2005) concluded that no theory or approach (e.g. behavioural skills) was more often successful than another (S18).

With regard to interventions aimed at adolescents, Pedlow and Carey (2004) concluded that skills-training is effective (p.174).

Robin et al. (2004) found that typically, programmes that were effective at reducing sexual risk behaviours included skills-building activities such as communication skills, problem-solving, changing peer-norms and decision-making. However, Robin et al. (2004) also found that programmes more generally targeted towards increasing adolescent resiliency and competencies have also shown promising results.

DiClemente et al. (2002) suggested that clinic and community-based interventions should be further utilised in order to promote behavioural skill-based interventions through physician counselling and social/friendship/peer networks.

Although Shrier (2004) provided no evidence of effectiveness he/she maintained that the incorporation of behavioural skills such as partner notification, sexual negotiation and risk perception into prevention interventions can increase self-efficacy.

Schaalma et al. (2004) highlighted studies that call for behavioural-skills and social-skills development, including what they term “life skills” such as decision-making, communication and negotiation (p.262). Through these skills young people will learn how they would react in social situations that could lead to risky behaviour. They report on two successful programmes (three studies) that contain relevant aspects (Abraham et al., 2002; Schaalma et al., 1996; Schaalma and Kok, 2001). Schaalma et al. (2004) highlighted the relationship between self-efficacy and condom use and also identified four cognitions that have medium to large correlations with condom use, they are: (1) attitudes toward condoms ( $r = .32$ ); (2) descriptive norms in relation to condom use (i.e., perceptions that others approve of and use condoms;  $r = .37$ ); (3) intentions to use condoms ( $r = .43$ ); and (4) pregnancy motivation (e.g. condoms should be used for contraceptive purposes, as well as STI protection;  $r = .37$ ) (p.261). Schaalma et al. (2004) referred to a study by Jemmott and Jemmott (2000) that examined 36 theoretically based interventions that were effective at changing behaviour to see if they were more effective on condom use. Interventions were divided into those that had a small effect on these cognitions. Findings showed that those interventions with greater effects on cognitive mediators also had greater effects upon behaviour such as condom use “( $d_s = 0.15$  for interventions with a small effect on mediators vs.  $d_s = 0.41$  for those with larger effects on mediators)” (p.262).

**Evidence statement: No change from Ellis and Grey (2004). There is sufficient review-level evidence to conclude that interventions that incorporate behavioural skills training (specifically negotiation skills) are more likely to be effective.**

#### **4.5.4 Provision of basic, accurate information through clear, unambiguous messages**

Two reviews were found to add to the 10 Category 1, 2 and 3 reviews from the original Evidence Briefing (Ellis and Grey, 2004).

**Category 1:** DiClemente et al., 2004

**Category 2:** Pedlow and Carey, 2004

**Category 3:** No evidence

DiClemente et al. (2004) concluded that one of the fundamental aspects of clinic-based interventions aimed at young people and achieving positive effects on STI-associated risk behaviours, included timely and accurate STI related information in a clear and understandable format (p.215).

Pedlow and Carey, (2004) argued for developmentally appropriate prevention interventions and maintained that prevention concepts aimed at young people need to be clearly illustrated using personalised examples appropriate to their cognitive maturity.

**Evidence statement: No change from Ellis and Grey, 2004. There is sufficient review-level evidence to conclude that interventions which include the provision of basic, accurate information through clear, unambiguous messages are more likely to be effective at reducing sexual risk-taking behaviour.**

#### **4.5.5 Facilitator training**

The findings from two Category 2 and 3 reviews explored the influence of facilitator training. Facilitator training was not covered in the original Evidence Briefing (Ellis and Grey, 2004).

**Category 1:** No evidence

**Category 2:** Robin et al., 2004

**Category 3:** Schaalma et al., 2004

Robin et al. (2004) stated that, “Programs that produced positive effects used trained adult facilitators” (p.18). The authors went on to conclude that, “program facilitators’ training may be more important than whether facilitators’ and participants’ demographic characteristics match” (p.23).

Schaalma et al. (2004) examined the role of school-based intervention facilitators. They stated, “Health promotion in classrooms depends upon the establishment of a “safe” classroom atmosphere. Young people should feel free to discuss intimate issues because discussing sexual behaviour may break taboos concerning the public discussion of sexuality” (p.264). Schaalma et al. (2004) concluded that, “sexual health promotion in schools is a specialised aspect of health promotion requiring particular expertise from planning through delivery. High quality teacher training is required for high quality sexual health promotion in classrooms” (p.264).



**New evidence statement: There is tentative review-level evidence to conclude that school-based interventions that use trained adult facilitators are more likely to be effective.**

#### **4.5.6 Of appropriate duration, length and intensity**

We found five Category 1 and 2 reviews to add to the six Category 1, 2 and 3 reviews included in the original Evidence Briefing (Ellis and Grey, 2004).

**Category 1:** Manhart and Holmes, 2005; Ward et al., 2004; Ward et al., 2005.

**Category 2:** Robin et al., 2004; Pedlow and Carey, 2004.

**Category 3:** No evidence

In this Evidence Briefing we have examined reviews relating to the extended delivery of interventions and booster sessions separately. In the original Evidence Briefing both issues were considered together under a general category of appropriate duration, length and intensity.

##### **(i) Extended delivery**

**Category 1:** Manhart and Holmes, 2005; Ward et al., 2004; Ward et al., 2005.

**Category 2:** Robin et al., 2004; Pedlow and Carey, 2004.

**Category 3:** No evidence

With specific reference to interventions aimed at clinic patients, Ward and colleagues (2004) found no evidence to suggest that duration or format affected the impact of interventions. Ward et al. (2005) also stated that, “there was no evidence that an intervention’s success in reducing infections or increasing consistent condom use was related to its format or length” (p.392). They concluded that, “Intervention format and length was not associated with trial results (group based RR 0.94 (0.76 to 1.25) versus individual based RR 1.16 (0.76 to 1.75))” (p.390).

Considering clinic-based interventions, Ward and colleagues (2005) also noted that there is no difference in effectiveness between studies that received a multiple session enhanced intervention and a brief intervention. However, they stated that, “the control groups in these trials received an intervention that goes beyond current UK practice, making it difficult to generalise results or transfer effect estimates to a UK population” (p. 392).

Manhart and Holmes (2005) highlighted evidence that the number of sessions may affect the impact of the intervention, they stated that, “All trials of successful counseling interventions involved at least 2

counseling sessions. However, 2 interventions of 4 and 6 sessions had no effect on the incidence of STI[s]" (S20).

With reference to adolescents, findings from Pedlow and Carey (2004) showed that "extending the delivery of interventions is a promising strategy for reaching youth during developmental periods". They concluded that preliminary findings "suggest that it may be necessary to design, and fund, interventions to be delivered over time as youth mature rather than providing multiple interventions in a single-shot intervention" (p.182).

With specific reference to interventions aimed at adolescents, Robin and colleagues (2004) stated that, "Programs that were more than 15 hours long addressed a greater variety of knowledge topics (including violence prevention and drug and alcohol use) than did those of shorter duration. In addition, more programs that were longer than 15 hours included more general life skills (such as community service learning, career planning, and general problem solving) than programs of shorter duration, and included a greater variety of general life skills. In contrast, programs between 7 and 15 hours were more likely than longer or shorter programs to teach abstinence and condom-use skills, and to teach a greater variety of each" (p.18). Robin and colleagues report one study (Rotheram-Borus et al., 1998) that tested two versions of a study of the same duration delivered in a different number of sessions. Findings showed that the intervention delivered in more sessions (seven compared to three) was more effective.

This evidence adds to that of Shepherd et al. (2001), included in the original evidence briefing, which concluded that, "interventions should be sustained over longer periods of time" (Ellis and Grey, 2004) (p.50). It also adds to the reviews by Kirkby and Coyle (1997) and Kirby (1999) which concluded that, "effective programmes lasted a sufficient length of time to adequately complete a variety of activities" (Ellis and Grey, 2004) (p.50).

**Changed evidence statement: There is tentative review-level evidence to conclude that extended delivery of an intervention relates to its effectiveness.**

## **(ii) Booster sessions**

**Category 1:** No evidence

**Category 2:** Pedlow and Carey, 2004

**Category 3:** No evidence

Pedlow and Carey, 2004 commented on four studies (Coyle et al., 2001; Levy et al., 1995; Aarons et al., 2000; Shrier et al., 2001) that incorporated booster sessions into their interventions. They stated that, "All studies that provided booster sessions were effective in reducing sexual risk behaviours. Suggesting that extended delivery of interventions is a promising strategy for reaching youth during development periods.

The use of extended interventions is different from interventions with a longer “dose”. Prior reviews have shown that intervention dose is not necessarily related to effectiveness” (p.175).

This evidence is in accordance with the recommendation by Kirkby et al. (1994), included in the original Evidence Briefing (Ellis and Grey, 2004), for future research to assess whether re-inforcement measures, such as booster sessions, are effective in sustaining the desired intervention outcome (Ellis and Grey, 2004) (p50).

**Changed evidence statement: There is tentative review-level evidence to conclude that extended delivery using ‘booster’ sessions enhances intervention effectiveness.**

#### **4.5.7 Use of peers and community opinion leaders**

We found three Category 1 and 2 reviews to add to the eight Category 1, 2 and 3 reviews from the original Evidence Briefing (Ellis and Grey, 2004).

**Category 1:** DiClemente et al., 2004.

**Category 2:** Pedlow and Carey, 2004; Robin et al., 2004

**Category 3:** No evidence

DiClemente et al. (2004) reported on two interventions involving peers (DiClemente et al., 2004b; Gillmore et al., 1997). Only one study, (DiClemente et al., 2004b) which used a multi-component approach, reported positive outcomes for consistent condom use.

In relation to peer-led interventions, Robin et al. (2004) found one study (Jemmott et al., 1998) that suggested there was no difference in effectiveness between adult versus peer-led interventions.

Pedlow and Carey (2004) reported on several studies that aimed to improve peer norms or used peer educators. Six out of the seven studies measuring peer norms for condom use or abstinence reported improvements in peer norms. In addition, five out of six studies that aimed to improve peer norms also achieved reductions in sexual risk behaviour. Pedlow and Carey concluded, “improvements in peer norms for safer sex and sexual communication skills were strongly associated with reductions in sexual risk behaviour” (p.181). One promising strategy reported by Pedlow and Carey (2004) for directly influencing peer norms involved working with young people in existing friendship groups.

**Evidence statement: No change from Ellis and Grey (2004). There is tentative review-level evidence to conclude that interventions that use peers and community opinion leaders are effective at reducing risk-taking behaviour.**

#### **4.5.8 Targeted and tailored (in terms of age, gender, culture, development etc), making use of needs assessment or formative research**

We found four relevant Category 1 and 2 reviews to add to the 11 Category 1, 2 and 3 reviews in the original Evidence Briefing (Ellis and Grey, 2004).

**Category 1:** DiClemente et al., 2004; Ward et al., 2004; Ward et al., 2005

**Category 2:** Pedlow and Carey, 2004

**Category 3:** No evidence

Ward et al. (2004) stated that, “study interventions that were appropriately tailored to their population following extensive formative research were more likely to reduce subsequent bacterial STIs than those that were not” (p. 55). Ward et al. (2004) also stated that, “the most effective interventions were developed through extensive formative research” (p.386). Ward et al. (2005) noted, with reference to clinic-based interventions, that, “extensive formative research, including interviews, focus groups, input from community representatives, and pilot testing, was reported by the four most effective trials” (p.390).

DiClemente et al. (2004) stated that all effective elements of interventions uncovered should be tailored to gender and race.

With regard to pre- and young adolescents, Pedlow and Carey (2004) noted that interventions “must be tailored to meet the unique needs of younger versus older youth or sexually naïve versus experienced teens” (p.174). Characteristics of successful and developmentally appropriate interventions were, for example, prevention interventions aimed at adolescents who have not yet initiated sex, booster sessions, illustrated abstract concepts with examples, peer educators and skill-building activities.

Pedlow and Carey (2004) also argued that literature relating to pre- and young adolescents is limited because it fails to measure menarche, which is a developmental transition that has implications for sexual risk behaviour.

**Evidence statement: No change from Ellis and Grey (2004). There is sufficient review-level evidence to conclude that interventions are more likely to be effective if they are targeted and tailored for specific populations, making appropriate use of formative research or needs assessments.**

## 4.6 Multi-component and multi-level interventions

See also section 4.5 for 'features of effective interventions'. These findings from seven Category 1, 2 and 3 reviews suggest that interventions with multiple components are more likely to be effective than those without. This adds to the five Category 1 and 3 reviews in the original Evidence Briefing (Ellis and Grey, 2004).

**Category 1:** DiClemente et al., 2004; Ward et al., 2004; Ward et al., 2005; Manhart and Holmes, 2005

**Category 2:** Pedlow and Carey, 2004; Robin et al., 2004.

**Category 3:** Schhalma et al., 2004

Ward et al. (2004; 2005) concluded that the several clinic-based trials using behavioural interventions observed greater reduction in STI rates. Interventions used personal goal setting, condom negotiation, risk-perceptions, role-play, group discussion, modelling behaviours and skills-building.

DiClemente et al. (2004) summarised that effective interventions included the following cornerstones: (1) providing timely and accurate STI-prevention information in clear, understandable language, (2) developing and mastering social (e.g., sexual negotiation/communication) and technical competency (e.g., condom application) skills through observational learning and active learning techniques (e.g. role playing, preferably a series of graded-intensity of high-risk situations), (3) enhancing adolescents' self-efficacy to communicate assertively and effectively with sex partners, (4) motivating adolescents to use newly acquired STI-prevention knowledge and risk-reduction skills; and (5) tailoring all the aforementioned messages and activities for gender and, if possible, race (p.215). DiClemente et al. (2004) also commented that the next generation of clinic-based STI risk-reduction programs should include a two-tier system, with the first tier consisting of clinic-based counselling and the second tier consisting of community-based prevention accessed through physician referral (p.216).

Manhart and Holmes (2005) reported on two studies (Celentano et al., 2000; Lonczak et al., 2002). Celentano et al. (2000) examined a multi-component behavioural intervention aimed at Thai army conscripts. Participants receiving the intervention showed a greater than 80% reduction in STI recurrence than controls. However, units were not randomly assigned to the intervention or the control. Lonczak et al. (2002) examined an intervention carried out in public schools in high-crime areas using a multi-component design that included teacher training, child social and emotional skills, and parent training. The African American subset of the intervention group reported a statistically significant decrease in self-reported STIs by aged 21 years (odds ratio (OR) 0.11;  $p < 0.01$ ).

Pedlow and Carey (2004) commented that the use of multiple intervention strategies should be used in prevention intervention design targeting adolescents and they called for "the continued development of multifaceted interventions that address biological, psychological, and social influences on sexual behaviour" (p.182).

Robin et al. (2004) concluded that effective interventions contained skills-building activities such as sexual communication, decision-making and problem solving and that “this may reflect a shift toward multi-component interventions that target a variety of youth competencies” (p.23).

Schaalma et al. (2004) made the point that behaviour change cannot be achieved through increasing knowledge alone, they maintained that interventions also need to influence the “proximal cognitive determinants of decision-making and goal enactment...[and should]..be informed by cognitive theories that have been successfully applied to a variety of other health related behaviours” (p.262).

**Evidence statement: No change from Ellis and Grey (2004). There is sufficient review-level evidence to conclude that multi-component interventions are more likely to be effective than single-component interventions.**

**Evidence statement: No change from Ellis and Grey (2004). There is insufficient review-level evidence to support or discount the effectiveness of multi-level interventions.**

#### **4.7 Cost-effectiveness of sexual health interventions**

**Category 1:** No evidence

**Category 2:** No evidence

**Category 3:** No evidence

We found no review level evidence regarding the cost-effectiveness of STI prevention interventions to add to the findings of the previous evidence briefing.

**Changed evidence statement: There is no new review-level evidence to support or discount the cost-effectiveness of STI interventions.**

The original evidence statement declared that there was tentative review-level evidence to conclude that STI prevention interventions are cost effective, and can be cost saving. However, there is no current evidence to demonstrate that recent interventions are either cost effective or cost saving.

#### **4.8 Interventions to address inequalities in sexual health**

**Category 1:** No evidence

**Category 2:** No evidence

**Category 3:** No evidence

We found no review level evidence regarding interventions to address inequalities in sexual health to add to the findings of the previous evidence briefing. As such we recommend no change from the previous evidence statement.

**Evidence statement: No change from Ellis and Grey (2004). There is no review-level evidence to support or discount the effectiveness of interventions to address inequalities in sexual health.**

## 5 Discussion, conclusions and research recommendations

This evidence briefing update aims to address the following research questions:

- What works to prevent STI transmission? What works to reduce the risk behaviours for STI transmission? What works to address the determinants of STI risk?
- Are multi-component and multi-level interventions more likely to be effective in influencing sexual risk behaviours?
- What works to reduce inequalities in sexual health?
- What interventions are cost-effective?

In the Evidence section (4), we considered the evidence from Category 1, 2 and 3 reviews regarding the effectiveness of STI prevention interventions giving consideration to the level and feature of interventions to inform our evidence statements regarding effectiveness.

In this section we consider the methodological issues. We explore methodological issues and provide research recommendations relating to outcome measures of effectiveness (5.1.1), behavioural indicators (5.1.2), limitations identified by the reviews (5.1.3), limitations and gaps in the evidence (5.1.4) and the limitations of this review (5.1.5).

Where we have not found additional review-level evidence to add to the recommendations of the original Evidence Briefing (Ellis and Grey, 2004) we have stated that there is no change and reported the previous recommendation. All recommendations ought to be considered in conjunction with those of the previous review (Ellis and Grey, 2004).

### 5.1 Methodological issues

#### 5.1.1 *Outcome measures of effectiveness*

The original Evidence Briefing found limited information regarding the effects of STI prevention intervention approaches on health promotion outcomes such as health literacy (e.g. sexual negotiation, condom skills). We also found that the majority of reviews selected primary studies for inclusion based upon health outcomes (e.g. STI incidence) or made conclusions of intervention effectiveness based upon intermediate health outcomes (e.g. behaviour). We did find reviews that included primary studies with health promotion outcomes (DiClemente et al., 2004; Manhart and Holmes, 2005; Pedlow and Carey, 2004). However, only one review (Pedlow and Carey, 2004) made conclusions regarding health promotion outcomes (knowledge and self-efficacy; condom use skills and attitudes to condoms, respectively) and this was in conjunction with intermediate health outcomes.

Similar to the original evidence briefing, we found that reviews called for more robust research using intermediate health outcomes to determine effectiveness (DiClemente et al., 2004; Ward et al., 2004). Also, we found that instead of authors calling for small-scale studies to measure outcomes at different



stages along the causal pathway (which would include measuring the personal and structural determinants of risk (e.g. knowledge or skills)) (as recommended by Ellis and Grey, 2004), there were calls for guidance on how to scale-up successful small scale interventions. However, DiClemente et al. (2004) highlight that health outcomes (e.g. STI incidence) should be measured in clinic-based interventions. DiClemente et al. (2004) also emphasise that many of the clinic-based interventions they examined did not measure health outcomes and they recommend that future clinic-based studies should measure STI incidence. In addition to these comments, Pedlow and Carey (2004) recommended that risk perception be linked to actual behaviour, however they also recommended that there is a need to measure process outcomes of developmental factors.

For further discussion of the conclusions of effectiveness and their implications, see the Evidence (4) and Conclusions and recommendations for policy and practice (5.2) sections. We conclude that there are no further research recommendations to add to those from the original Evidence Briefing.

***Recommendations: No change from Ellis and Grey (2004). A key research recommendation is that intervention evaluations should measure outcomes relating to the personal and structural determinants of risk (e.g. knowledge, attitudes, skills, behavioural intentions, access to condoms, peer norms). This should be done in addition to the measurement of intermediate health outcomes (e.g. changes in behaviour) and, where appropriate (e.g. for large-scale multi-component interventions or programmes), health outcomes (changes in STI incidence). In turn, reviews should cease to exclude studies that only include data on health promotion outcomes (e.g. knowledge or skills) alongside their effects on intermediate health outcomes (e.g. behaviour) and health outcomes (e.g. STI incidence). Reviews should fully report all of these outcomes where possible.***

### **5.1.2 Methodological issues: behavioural indicators**

The previous Evidence Briefing found that indicators of 'risk' were unsophisticated and defined as, for example, number of partners, condom use and contraceptive use. We found no evidence to show that the terminology for risk indicators has become more specific. As such we agree with the research recommendations from the previous Evidence Briefing.

***Recommendations: No change from Ellis and Grey (2004). It is imperative that data on intermediate health outcomes (i.e. sexual behaviour surveys) are more specific about the context in which certain behaviours take place. Primary studies and future reviews should therefore focus on more meaningful risk indicators when making judgements about the relative effectiveness of interventions in influencing so-called 'risky' behaviours. Where feasible and appropriate these should be correlated with biological behavioural indicators and other socio-demographic variables. In conclusion, we need a consensus on the appropriate indicators for assessing the effectiveness of STI prevention programmes with different target populations.***

### **5.1.3 Methodological issues: limitations identified by the reviews**

The reviews in this update reported similar limitations to those reported in the original Evidence Briefing (Ellis and Grey, 2004). Reviews reported that their inclusion criteria limited their findings and although most reviews only included RCTs, authors reported on the poor quality of the primary studies (DiClemente et al., 2004; Manhart and Holmes, 2005; Ward et al., 2005) and called for further rigorous trials. One review noted that the results of studies were limited in their generalisability (Ward et al., 2004). Reviews also highlighted the weaknesses of the effect sizes due to differences in follow-up periods (Robin et al., 2004; DiClemente et al., 2004) as well as sample size and appropriateness of the comparison group (DiClemente et al., 2004).

Other inconsistencies reported referred to the differences among groups that were reported but not controlled for in the analysis (Robin et al., 2004). It has also been highlighted that interventions aimed at adolescents have reported inconsistent findings from studies that have not been replicated (Pedlow and Carey, 2004).

Other limitations expressed by the reviews included the absence of reporting rates of attrition, the absence of intent-to-treat analyses, lack of power analyses, the lack of description in the primary studies relating to RCT methods (DiClemente et al., 2004). In addition to these limitations Manhart and Holmes (2005) and Ward et al. (2005) also commented on the potential for publication bias in their reviews.

***Recommendations: There is a need for more rigorous evaluations of UK-based STI prevention interventions. It is necessary for researchers to clearly report the methodology that they use, including their methods for randomisation. Future research should include appropriate comparison groups and should consider longer follow-up periods. In these cases research should report: levels of attrition, intent-to-treat analysis, and effect sizes. There is also a need for primary studies to be standardised in their reporting.***

### **5.1.4 Methodological issues: limitations and gaps in the evidence**

In the reviews included in this evidence briefing update we found many of the same limitations and gaps as those reported in the original Evidence Briefing (Ellis and Grey, 2004). As such the limitations we highlight here should not be considered as an exhaustive list but should be considered in conjunction with those of the original review.

The main issues we found with the current review level evidence are stated below. For implications of the limitations, inconsistencies and gaps in the evidence see the Conclusions and recommendations for research section (5.2).

There was a dearth of UK-based evidence on intervention effectiveness. Thus, one of the main limitations we found was the lack generalisability to the UK population. We found that much of the literature included

in the reviews focused upon adolescents with only very little review-level evidence concentrated on interventions with adults. Specifically, there was a lack of evidence relating to commercial sex workers (CSWs), men who have sex with men (MSM) and other high-risk groups in the UK.

It is also clear from the evidence that there is a lack of evidence relevant to community-based interventions (see section 4.3). To this gap in the evidence, we add that there is a lack of review-level evidence relating to the cost-effectiveness of STI prevention interventions in all areas including, for example, clinics, schools and youth services.

There is also a dearth of information regarding the impact of interventions on inequalities or interventions addressing socio-political issues. In particular, there is a lack of evidence addressing the impact of interventions on socio-economic status and on vulnerable groups (e.g. looked after children).

***Recommendations: In addition to the recommendations from Ellis and Grey (2004), for example, to be more transparent about the process used; to include more details of the intervention delivery and; to publish null findings, we recommend that further research is needed on the cost-effectiveness of STI prevention interventions in different settings. There is also a need for further research aimed at vulnerable 'high-risk' groups in the UK such as CSWs and looked-after children. Finally, there is a need for further research to explore the effectiveness of interventions that aim to address inequalities and socio-political issues specific to target populations.***

### **5.1.5 Limitations of this review of reviews**

This update followed the same methodology as the original Evidence Briefing and therefore has all the same limitations reported by Ellis and Grey (2004). In addition to these limitations we add that although all efforts were made to retrieve shortlisted documents we were unable to obtain 8% of the literature, which may have resulted in some relevant paper being missed.

We also note that the reviews in this update will include many of the same primary studies that were included in the original Evidence Briefing. Our most recent Category 1 papers were published in 2005 (Manhart and Holmes, 2005; Ward et al., 2005), and the most recent primary studies presented within this level were published in 2004. This updates the evidence base of reviews by two years.

## **5.2 Conclusion and recommendations for research**

In this section we consider the findings based upon the evidence statements and examine their relevance to the UK population in order to inform our recommendations that follow each section. Where we have found no further evidence to inform additional recommendations we have stated that there is no change from the original Evidence Briefing (Ellis and Grey, 2004) and repeat the previous recommendation.

## **5.2.1 What works in STI prevention interventions**

### *5.2.1.1 Clinic-based sexual health promotion: conclusions and research recommendations*

As discussed in the Evidence section (4) there was **tentative review-level evidence** for the effectiveness of individual risk counselling.

Of the studies involving individual risk counselling (see section 4.1.1), only two studies (VCT Efficacy Study Group, 2000; EXPLORE Study Group, 2004) considered counselling in conjunction with HIV testing. In addition, all of the studies were either carried out in the US or Africa and not in the UK.

***Recommendations: No change from Ellis and Grey, 2004. We urgently need more UK-based evaluations of risk counselling interventions for STIs other than HIV. We urgently need more UK-based evaluations of skill-based training.***

### *5.2.1.2 Partner notification*

We found **sufficient review-level evidence** regarding the effectiveness of partner notification for detecting new infections.

***Recommendations: No change from Ellis and Grey, 2004. More research is needed to understand the consequences of partner notification for infected persons and their partners.***

### *5.2.1.3 Improved communication between parents and adolescents (parent/family intervention): conclusions and research recommendations*

Overall, we concluded that there was **insufficient review-level evidence** regarding the effectiveness of improved communication between parents and adolescents at reducing sexual risk behaviour. Although several authors commented upon the effectiveness of interventions such as parental monitoring, it must be noted that none of the studies examined were carried out in the UK.

DiClemente et al. (2002) recommended that as a method of intervention, families could be mobilised to communicate important values, model appropriate behaviours, monitor adolescents' behaviour, and encourage protective behaviours. The improvement of familial communication and skills may strengthen the family unit and encourage adolescents, as well as other family members, to adopt and maintain protective behaviours.

***Recommendations: We urgently need more UK-based evaluations of interventions that incorporate parental/adolescent communication/monitoring as a means to reduce sexual risk-taking behaviour.***

#### 5.2.1.4 Clinic-based interventions aimed at adolescents and general clinic attendees: conclusions and research recommendations

The evidence presented in sections (4.1.1) and (4.2.1) led us to conclude that there is **insufficient review-level evidence** of clinic-based interventions aimed at adolescents. We also found **tentative review-level evidence** for the effectiveness of clinic-based interventions, especially those that include skills training, for instance, to increase the levels of condom use.

However, only one study was carried out in a UK-based GUM clinic (Imrie et al., 2001) and the findings from this study showed that clinic-based interventions were ineffective at changing sexual risk behaviour. Although only one study, it shows that one cannot infer the transferability of studies from other countries. These findings suggest that there is a need for further rigorously evaluated primary studies in the UK. Studies should examine new interventions based on the format of those that have demonstrated effectiveness in US settings. In addition, studies should examine the effectiveness of behavioural interventions in GUM clinics, where new approaches to reducing infection rates are urgently needed (recommendations from Ward et al., 2004 and 2005).

***Recommendations: There is a need for more primary studies to evaluate the components of effective clinic-based interventions. When sufficient primary studies are available a methodologically sound review of UK clinic interventions should be carried out in order to inform the evidence base in the UK.***

#### Parental involvement in clinic-based interventions

We conclude that there is **insufficient review-level evidence** to support or discount the effectiveness of parent involvement in clinic-based interventions.

***Recommendations: More UK research is needed to discern the effectiveness of parent involvement in clinic-based interventions and the effects of counselling/education on parent/adolescent communication and the subsequent impact (if any) on sexual risk-taking behaviour.***

#### 5.2.1.5 Group work: conclusions and research recommendations

From the evidence presented in section (4.2.4) we conclude that there is **sufficient review-level evidence** to conclude that small-group work, especially that involving skills-building activities, can be effective. Interventions reporting increased condom use outcomes frequently used role-play, games and discussion.

However, only one study was carried out in the UK (Imrie et al., 2001) and thus the findings from these reviews are limited in their generalisability. Although group work can be resource intensive, DiClemente et

al. (2004) recommended that further research should be carried out involving group work with clinicians or healthcare workers and patients.

***Recommendations: More UK research is needed to discern the effectiveness of small group work relevant to specific target groups. It is imperative that evaluations of these interventions consider the cost-effectiveness and resource implications of this type of intervention compared to individual level interventions.***

#### 5.2.1.6 School-based sex education programmes: conclusions and research recommendations\*

Overall, there is **sufficient review-level evidence** to conclude that school-based sex education can be effective at delaying the onset of sex and encouraging condom use in those who are already sexually active (section 4.2.3).

School-based sex education programmes most frequently included elements such as role-play, discussion and skills-training. Some school-based interventions also involved the provision of condoms and clinic services.

Evidence of effectiveness is primarily based upon interventions carried out in the US and Africa. However, one study was carried out in The Netherlands and another was carried out in Scotland. This one UK-based intervention adds to the two others reported in the original evidence briefing (Ellis and Grey, 2004), all from Category 3 reviews. As such, there remains a dearth of review-level evidence regarding UK studies of school-based sex education programmes.

We examined the review-level evidence concerning the provision of condoms in schools (section 4.2.2). We conclude that there is **insufficient review-level evidence** that condom availability in schools can be effective at increasing condom use in sexually active young people. However, the reported studies took place only in the US and may have limited generalisability to the UK population. Schmiel et al. (2004) cited Cohen et al. (1999) who recommended that barriers to condom use be eliminated and condoms provided free of charge. They also stated that with the appropriate resources and support “school nurses [could] develop successful school-based condom disbursement programs that effectively reduce teen’s exposure to STDs and HIV “ (p.20).

Schaalma et al. (2004) also highlight the fact that health behaviour not only refers to individual behaviour but to the actions of groups and organisations also. Schaalma at al. (2004) stated that, “condom accessibility may depend on individual knowledge, motivation, and skills, but is also determined by the actions of legislators, health authorities, schools, and other decision-making groups. Therefore, interventions may be required at each of these levels if condom availability is to be increased among sexually active young people” (p260).

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\* See evidence briefing on teenage pregnancy and parenthood (Swann et al., 2003a).

**Recommendations:** *There is a need to address the practicality of providing clinic and condom services in schools. Evaluations of clinic services and condom distribution schemes in schools should also ensure that as well as addressing the effectiveness of condom distribution in schools, they address related issues of parental consent, motivation for sexual activity pre- and post-interventions, level of pubertal development and changing social norms as well as behavioural outcomes. Also, school-based interventions should be developmentally appropriate, and should use multiple strategies compatible with adolescents' cognitive ability, including managing emotions and risk perception (recommendation from Pedlow and Carey, 2004).*

Further conclusions regarding the effects of condom distribution and sex education on the sexual practices of young people and further views on elements of effective school interventions were also elicited from the reviews. We have addressed these points separately below.

### **Condom distribution in schools does not increase sexual activity**

We identified **insufficient review-level evidence** to conclude that condom distribution in schools does not increase sexual activity. One Category 3 review (Schmeidl, 2004) referred to several studies (Schuster et al., 1998; Wolk and Rosenbaum, 1995; Guffmacher et al., 1997; Kirby et al., 1999; Blake et al., 2003) and concluded that condom distribution does not increase sexual activity.

**Recommendations:** *Once there are sufficient primary studies a methodologically sound review will be needed to support or discount the tentative conclusion that school-based condom distribution does not increase sexual activity.*

### **Sex education should start early, prior to sexual initiation**

Overall, we conclude that there was **tentative review-level evidence** that sex education should start early and before sexual debut in an effort to delay the onset of sexual activity. However, further UK research is necessary to discern the most effective age and format of pre-adolescent sex education.

**Recommendations:** *Primary research is needed to evaluate school-based interventions and their effectiveness. In addition to the length, format and content of interventions, evaluations should consider effectiveness of interventions at different ages, gender, sexual experience and stage of pubertal development. When sufficient primary evidence is available a methodologically sound review should be carried out to inform the UK evidence base.*

### **Parental involvement in school interventions**

The evidence presented in section 4.2.3 (ii) leads us to conclude that there is **insufficient review-level evidence** for the effectiveness of parental involvement in school interventions that can reduce the number of partners and rate of pregnancy during adolescence.

Once again there no UK evidence identified to support this conclusion and further research is needed. Schaalma et al. (2004) recommended that, “health promotion planners could focus on mobilising parental support for comprehensive sex education” (p267).

***Recommendations: More research is needed to explore how parental involvement in sexual health interventions could complement school-based interventions and impact adolescents’ sexual risk taking behaviour.***

#### *5.2.1.7 Detached education and outreach by health professionals: conclusions and research recommendations*

Overall, we conclude that there is **tentative review-level evidence** for the effectiveness of detached education, including condom distribution. The studies we found primarily focused upon CSWs and their customers, however, none of the studies took place within the UK and as such the findings may be limited in their generalisability.

***Recommendations: More research is needed to explore the effectiveness of detached education and outreach for different target populations in the UK. Studies should also consider the effectiveness of individual intervention components and cost-effectiveness. Once sufficient primary studies are available a methodologically sound review of interventions ought to be undertaken.***

#### *5.2.1.8 Community level interventions: conclusions and research recommendations*

In section 4.3 we report on studies of community level interventions from two reviews. We conclude that there is **insufficient review-level evidence** for the effectiveness of community outreach.

***Recommendations: Further research is needed to determine the effectiveness of community-based interventions in the UK, such as condom provision and community empowerment schemes as well as the effects of mass media on risk taking behaviour. Also, research should explore the potential harms of mass media interventions with reference to specific target groups and the impact upon clinic services.***

#### *5.2.1.9 Socio-political interventions: conclusions and research recommendations.*

We found **insufficient review-level evidence** to support or discount the effectiveness of legislation, policy, equality work or regulation. We found two reviews that addressed skills-based sex education programmes available nationally in schools and we also found evidence of effective condom distribution policies. However, they do not refer to UK policies and are limited in their generalisability. Therefore, we conclude that there has been no change since the original evidence briefing and as such the previous recommendations remain.



***Recommendations: No change from Ellis and Grey (2004). We urgently need more UK evaluations – and in turn, reviews- of socio-political interventions or actions. As it is difficult to conduct controlled trials of most of these types of ‘interventions’, it is likely that observational research will be most useful in looking at the impact of policies, regulations, and strategies to tackle wider determinants of risk such as education, employment, poverty and discrimination. More specifically, research is needed on use, acceptability and sexual behaviour. As well as research on the interventions themselves, there is also a need for research to identify the structural determinants of sexual risk for difference populations, which are often (but not exclusively) addressed by socio-political interventions.***

#### 5.2.1.10 Features of effective interventions:<sup>\*</sup> conclusions and research recommendations

We examined the review-level evidence for features of effective interventions in section 4.5. We would like to emphasize that this does not constitute an exhaustive list of features within the reviews. However, they are features of successful interventions that have been specifically highlighted by the authors.

#### **Use of theoretical models**

We conclude that there is **sufficient review-level evidence** that theory-based interventions are effective at influencing sexual risk-taking behaviour. A number of reviews reported on the successful use of theoretical models (Manhart and Holmes, 2005; Ward et al., 2004; Ward et al., 2005; Pedlow and Carey, 2004; Schaalma et al., 2004). Although it is the case that studies are clearly reporting the theory used they do not explain the reason for their choice and why it is appropriate for the population under investigation.

Only one of the reviews (Pedlow and Carey, 2004) addressed issues for consideration regarding theoretical models. They argued that existing theoretical models should be modified and specifically aimed at young people.

***Recommendations: It is important that studies report the theoretical model they use and their reason for its use. Evaluations ought to consider the effectiveness of each theory and their components on different target groups.***

#### **Emphasis on risk reduction**

We conclude that there is **tentative review-level evidence** for the effectiveness of interventions that emphasise risk-reduction. There is **insufficient review-level evidence** to support or discount the effectiveness of school-based abstinence only approaches. DiClemente et al. (2004) concluded that interventions are more effective if they have an emphasis on risk reduction as opposed to abstinence alone.

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\* Also, see evidence briefing on teenage pregnancy and parenthood (Swann et al., 2003a).

It is important to note that the majority of these studies focused solely upon adolescents and as such this has impacted on the recommendations.

***Recommendations: In addition to the recommendation in the previous Evidence Briefing (Ellis and Grey, 2004) that 'We need a methodologically sound review of the effectiveness of risk-reduction interventions, compared with abstinence-only approaches, for young people. In particular, it may be timely for a good quality review into the effectiveness of school-based abstinence-only programmes compared with programmes which emphasise risk reduction', we add that that it is necessary for school-based evaluations to consider age, sexual knowledge and sexual experience. It is also imperative that further research is carried out to discern the effectiveness of risk reduction on other target groups.***

### **Use of behavioural skills training**

Overall, there is **sufficient review-level evidence** to conclude that behavioural skills training is an important and effective component of STI prevention interventions (see section 4.5.3). Pedlow and Carey (2004) recommended the inclusion of skills such as emotion management, risk perception, communication skills and negotiation skills.

***Recommendations: In addition to the previous Evidence Briefing recommendation that 'Research is needed to identify the most effective methods of behavioural skills training with different populations' we recommend that further rigorous research is needed to distinguish between the effectiveness of behavioural skills training specific to sexual health, behavioural skills that are more general 'social/life skills', and those skills that aim to increase adolescent***

### **Provide basic accurate information**

Evidence included in the original evidence briefing (Ellis and Grey, 2004) and in this update (see section 4.5.4) suggests that there is **sufficient review-level evidence** that information provided in a clear and accurate manner is likely to be effective in combination with, for example, behavioural skills-training.

***Recommendations: No change from Ellis and Grey (2004). Primary and secondary research needs to measure and report the impact upon health promotion outcomes such as knowledge and awareness. Research is needed to identify the effective elements of training and materials to support the providers of sexuality information (teachers, parents and peers). Research in this area should attempt to explore the interaction between, and relative importance of, the nature of the provider (including their comfort with the issues and their relationship with the student), and the nature of the training or materials.***

## Trained facilitator

Evidence in section 4.5.5 suggests that there is **tentative review-level evidence to conclude** that trained adult facilitators are effective at delivering interventions in a school environment.

***Recommendations: Further research is needed to support or discount the tentative finding that trained facilitators are effective at delivering school-based STI prevention interventions. Research is also needed to support or discount the effectiveness of teacher training on the delivery of sex education in schools.***

## Duration, length, and intensity

We identified **tentative review-level evidence** to conclude that extended delivery of an intervention is related to its effectiveness (see section 4.5.6). There is also **tentative review-level evidence** to support the use of 'booster' sessions to aid the extended delivery of interventions. Pedlow and Carey (2004) highlighted that extended interventions aimed at young people can allow researchers to explore transitional phases such as entering puberty and initiating sexual activity. Extended delivery, especially that using booster sessions allows researchers to reinforce the intervention months or years after the initial intervention has finished, thereby refreshing information and skills that may become more meaningful as sexual awareness and experience develops.

Robin et al. (2004) raised the difficulty of determining programme length, as multiple sexual risk-reduction interventions took place at the same time, thereby affecting the dosage received. They also reported on the failure of studies to state the duration and dose of interventions.

***Recommendations: We agree with the original recommendation from Ellis and Grey (2004) that, 'Research needs to report more specific variables about the intervention's duration and intensity, for example the amount of personal exposure to the facilitator and the number and length of 'sessions'. Longer-term follow-up (i.e. well beyond six months, ideally up to one year and beyond) should assess the durability of measured effects and determine whether re-inforcement, for example booster sessions, are necessary to sustain outcomes'. We also recommend that researchers use models such as Intervention Mapping or PRECEDE/PROCEED model to ensure, through educational diagnosis, that optimal circumstances prevail for implementing the interventions (e.g. that it does not overlap with other planned programmes).***

## Use of peers and community leaders

Overall, there was **tentative review-level evidence** to conclude that the use of peers and community leaders was effective. However, none of the studies that used peers or community leaders were carried out in the UK. Also, as evidence suggests that trained adult facilitators are effective at delivering STI prevention interventions in schools, more research is needed to support or discount these findings and clarify their effectiveness with different target groups and types of interventions.

***Recommendations: No change from Ellis and Grey (2004). We need methodologically sound primary research into the effectiveness of peer-led interventions and into the reasons for their success (or failure). A literature review should determine the availability of UK research for conducting a review of effectiveness in this area.***

### **Use of targeted and tailored interventions**

The evidence in section 4.5.8 leads us to conclude that there is **sufficient review-level evidence** for the effectiveness of targeted and tailored interventions.

Ward et al. (2005) explained that, “formative research seeks to identify the behaviours, motivations, and beliefs within the target population that lead to increased risk, and link these to the key elements of an interventions” (p.392). Ward et al. (2004; 2005) included studies that were based upon extensive formative research including work on cultural norms or sexual beliefs of different groups. Formative research can also include the use of needs assessments that gather information on cultural diversity and gender issues appropriate to target groups.

Pedlow and Carey (2004) highlighted some of the limitations of formative research targeting young people and stated that researchers have failed to “measure onset of menarche, a developmental transition with strong implications for sexual risk behaviour” (p.175). DiClemente et al. (2004) stated that studies need to be expanded to include other groups in addition to adolescents and consider their family and social environment (p.215).

***Recommendations: We agree with the recommendations from the previous Evidence Briefing that more needs assessments and formative research relative to specific populations are required and that authors should share their findings (Schaalma et al., 2004); that studies ought to report on how this research contributed to the interventions; the transferability of the formative research; and that reviews ought to report on needs assessments and formative research (Ellis and Grey, 2004). To this we add that further formative research targeting young people ought to focus upon pubertal development and ought to include measures of cognitive functioning, future-time perspective, and decision-making. We also suggest that future research should not consider young people alone, but ought to consider their wider social influences of peers and parents (recommendations from Pedlow and Carey, 2004).***

### **Multi-component and multi-level interventions**

From the evidence presented in section 4.6 we conclude that there is **sufficient review-level evidence** that multi-component interventions are effective. These interventions incorporate elements such as education, counseling and skills-building (e.g. communication and goal enactment). There is **insufficient review-level evidence** to support or discount the effectiveness of multi-level interventions.

**Recommendations: No change from Ellis and Grey (2004). We need further evaluations, and in turn reviews, of multi-component interventions. Research needs to investigate the relative contribution of the different components of interventions effectiveness. We also urgently need evaluations and reviews of multi-level interventions or programmes. Evaluations of multi-level interventions need to ensure that they capture all relevant health promotion outcomes (e.g. knowledge), peer norms, anti-discrimination policies alongside any intermediate health outcomes (e.g. behaviour) and health outcomes (e.g. STI incidence).**

### **5.2.2 What interventions are cost effective: conclusions and research recommendations**

Section 4.7 shows that we identified **no review-level evidence** relating to cost-effective interventions. Manhart and Holmes (2005), Ward et al. (2004) and Ward et al. (2005) all called for further research on the cost-effectiveness of STI prevention interventions to ensure that limited resources are effectively utilized.

**Recommendations: We agree with the recommendations of the previous review (Ellis and Grey, 2004) that more UK studies of cost-effectiveness should be carried out and followed by a review of the cost-effectiveness literature. To this we add that information is needed on the cost-effectiveness of interventions specific to different settings and estimates for the relative cost-effectiveness of altering approaches.**

### **5.2.3 What works to reduce inequalities in sexual health: conclusions and research recommendations**

As can be seen in section 4.8 there is **no review-level evidence** regarding interventions to reduce inequalities in sexual health. In particular, we found no review-level evidence relating to socio-economic status, sexuality, gender and ethnicity.

**Recommendations: No change from Ellis and Grey (2004). There is an urgent need to conduct evaluations of interventions to determine their effectiveness in addressing inequalities in sexual health; in particular, whether there is any differential impact of interventions according to the socio-economic and demographic characteristics (including sexuality, ethnicity, refugee status) of individuals within the population being targeted. All intervention research should therefore routinely record such socio-economic and demographic variables.**

#### **5.2.4 Implications for policy and practice**

Due to the limitations of the evidence identified (see section 5.1) we are unable to make recommendations for policy and practice. We have, however, made recommendations for research. We also emphasise that practitioners and policy makers should not consider this review of reviews alone, but in conjunction with other the original Evidence Briefing (Ellis and Grey, 2004), non-review evidence and other relevant source information.

## Appendix A. Example of a search strategy

### Medline search

- 1 meta-analysis/
- 2 review literature/
- 3 (meta-analy\$ or meta analy\$ or metaanaly\$).ti,ab.
- 4 (systematic\$ adj4 (review\$ or overview\$)).mp.
- 5 meta-analysis.pt.
- 6 review.pt.
- 7 review.ti.
- 8 review literature.pt.
- 9 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8
- 10 Case Report/
- 11 letter.pt.
- 12 historical article.pt.
- 13 review of reported cases.pt.
- 14 review, multicase.pt.
- 15 10 or 11 or 13 or 14
- 16 9 not 15
- 17 animal/
- 18 human/
- 19 17 not (17 and 18)
- 20 16 not 19
- 21 sexually transmitted diseases/
- 22 Sexually Transmitted Diseases, Bacterial/
- 23 Sexually Transmitted Diseases, Viral/
- 24 chancroid/
- 25 chlamydia infections/
- 26 lymphogranuloma venereum/
- 27 gonorrhea/
- 28 granuloma inguinale/
- 29 syphilis/
- 30 condylomata acuminata/
- 31 herpes genitalis/
- 32 chlamydia.ti,ab.
- 33 (gonorrhea or gonorrhoea).ti,ab.
- 34 syphilis.ti,ab.
- 35 (genital herpes or herpes genitalis).ti,ab.
- 36 chancroid.ti,ab.
- 37 lymphogranuloma venereum.ti,ab.
- 38 granuloma inguinale.ti,ab.
- 39 condylomata acuminata.ti,ab.

41 sexually transmitted disease\$.ti,ab.  
42 sexually transmitted infection\$.ti,ab.  
43 venereal disease\$.ti,ab.  
44 21 or 22 or 23 or 24 or 25 or 26 or 27 or 28 or 29 or 30 or 31 or 32 or 33 or 34 or 35 or 36 or 37 or  
38 or 39 or 40 or 41 or 42 or 43  
45 (hiv or aids).mp.  
46 45 not (44 and 45)  
47 44 not 46  
48 20 and 47  
49 limit 48 to english language  
50 limit 49 to english language  
51 limit 49 to yr=2001-2006



## Appendix B. CAT screening tool

The CAT is divided into two stages. The first stage assesses the strengths of the methods used to identify and select all of the available literature, since this is regarded as one of the most important factors in ensuring a balanced view of the evidence. If a paper passes this first stage, then the quality of its methodological analysis and the appropriateness of its conclusions are assessed.

Authors: _____			
Title: _____			
Source: _____			
Does this paper address your topic area?	Yes	No	Unsure
Circle whether the paper is a:			
• Systematic review	• Meta-analysis		
• Synthesis	• Literature review		
• Other review (please specify)			
Does it address (circle as appropriate):			
• Effectiveness (interventions and treatments)	• Causation		
• Monitoring and surveillance trends	• Cost		
• Other (please specify)			
Does the paper have a clearly focused aim or research question? (1)	Yes	No	Unsure
Consider whether the following are discussed:			
The population studied	Yes	No	Unsure
The interventions given	Yes	No	Unsure
The outcomes considered	Yes	No	Unsure
Inequalities	Yes	No	Unsure
Do the reviewers try to identify all relevant English language studies?	Yes	No	Unsure
Consider whether details are given for:			
Databases searched (2a)	Yes	No	Unsure
References followed up (2b)	Yes	No	Unsure
Experts consulted (2b)	Yes	No	Unsure
Grey literature searched (2b)	Yes	No	Unsure
Years searched (2c)	Yes	No	Unsure
Search terms specified (2c)	Yes	No	Unsure
Inclusion criteria described (2d)	Yes	No	Unsure
Is it worth continuing?	Yes	No	
Why / Why not? _____			
_____			

Do the authors address the quality (rigour) of the included studies? (3, 3d)	Yes	No	Unsure
Consider whether the following are used:			
A rating system (3b)	Yes	No	Unsure
More than one assessor (3c)	Yes	No	Unsure
If study results have been combined, was it reasonable to do so?	Yes	No	Unsure
Consider whether the following are true:			
Are the results of included studies clearly displayed? (4a)	Yes	No	Unsure
Are studies addressing similar research questions? (4b)	Yes	No	Unsure
Are the studies sufficiently similar in design? (4b)	Yes	No	Unsure
Are the results similar from study to study (test of heterogeneity)? (4b)	Yes	No	Unsure
Are the reasons for any variation in the results discussed?	Yes	No	Unsure
What is the overall finding of the review? Consider: How the results are expressed (numeric – relative risks, etc); whether the results could be due to chance (p-values and confidence intervals).			
_____			
_____			
Are sufficient data from individual studies included to mediate between data and interpretation/conclusions? (5)	Yes	No	Unsure
Does this paper cover all appropriate interventions and approaches for this field (within the aims of the study)?	Yes	No	Unsure
If no, what? _____			
Relevance			
Can the results be applied/are generalisable to a UK population/population group?	Yes	No	Unsure
Are there cultural differences from the UK?	Yes	No	Unsure
Are there differences in healthcare provision with the UK?	Yes	No	Unsure
Is the paper focused on a particular target group (age, sex, population sub-group etc)?	Yes	No	Unsure
Accept for inclusion in the evidence briefing?	Yes	No 1,2,3	Refer to 4,5 third party
Use to inform the review of effectiveness?	Yes	No	
Use to inform the background discussion?	Yes	No	
Additional comments: _____			
_____			

## **Appendix C. List of reviews by Category 1-5**

### **Category 1**

- DiClemente, R. J., Milhausen, R., Sales, J. M. et al. (2005). A programmatic and methodologic review and synthesis of clinic-based risk-reduction interventions for sexually transmitted infections: research and practice implications. *Seminars in Pediatric Infectious Diseases* 16 (3): 199-218.
- Manhart, L. E. and Holmes, K. K. (2005). Randomized controlled trials of individual-level, population-level, and multilevel interventions for preventing sexually transmitted infections: what has worked? *Journal of Infectious Diseases* 191 (Suppl 1): S7-24.
- Ward, D. J., Rowe, B., Pattison, H. et al. (2004). Behavioural interventions to reduce the risk of sexually transmitted infections in genitourinary medicine clinic patients: a systematic review. Birmingham, UK: West Midlands Health Technology Assessment Collaboration, Department of Public Health and Epidemiology, University of Birmingham.
- Ward, D. J., Rowe, B., Pattison, H. et al. (2005). Reducing the risk of sexually transmitted infections in genitourinary medicine clinic patients: a systematic review and meta-analysis of behavioural interventions. *Sexually Transmitted Infections* 81 (5): 386-393.

### **Category 2**

- Pedlow, C. T. and Carey, M. P. (2004). Developmentally appropriate sexual risk reduction interventions for adolescents: rationale, review of interventions, and recommendations for research and practice. *Annals of Behavioral Medicine* 27 (3): 172-184.
- Robin, L., Dittus, P., Whitaker, D. et al. (2004). Behavioral interventions to reduce incidence of HIV, STD, and pregnancy among adolescents: a decade in review. *Journal of Adolescent Health* 34 (1): 3-26.

### **Category 3**

- DiClemente, R. J., Crosby, R. A., and Wingood, G. M. (2002). Enhancing STD/HIV prevention among adolescents: the importance of parenteral monitoring. *Minerva Pediatrica* 54 (3): 171-177.
- Schaalma, H. P., Abraham, C., Gillmore, M. R. et al. (2004). Sex education as health promotion: what does it take? *Archives of Sexual Behavior* 33 (3): 259-269.
- Schmiedl, R. (2004). School-based condom availability programs. [Review] [23 refs]. *Journal of School Nursing* 20 (1): 16-21.
- Shrier, L. A. (2004). Sexually transmitted diseases in adolescents: biologic, cognitive, psychological, behavioral, and social issues. *Adolescent Medicine Clinics* 15 (2): 215-234.

### **Category 4 – see Reference for full details**

<b>Author (s)</b>	<b>Year</b>	<b>Reason for not including in Category 1-3</b>
Abdullah A.S., et al.	2004	Not a review, but points to gaps in the research
Gil A.G. & Tubman J.G.	2005	Not a synthesis. Includes relevant evidence.
Gott M.	2004	Not a synthesis, but points to gaps in the evidence
Irwin R.	2003	Not a review of prevention, but contains some information on evidence
Jackson, D. et al.	2004	Not a review of behavioural interventions
Kirby B.D.	2002	Not a synthesis, but contains information in Emerging Answers review
Mayaud, P. & Mabey D.	2004	Not a review of behavioural interventions, but has some useful information
Miller, K. E., et al.	2003	Not a review but has guidelines on prevention
Oberg C., et al.	2002	Not a review, but points to gaps in the research
Patel R.	2004	Not a synthesis, but contains recommendations
Rekart M.L.	2005	No risk behaviour included, includes preventative information
Reyna V.F.	2005	Not a review of prevention, but contains some information on evidence
Speizer I.S., et al.	2003	Developing countries
Zenilman J.M., et al.	2005	Not a review - includes some prevention programmes and theories

### **Category 5 – see Reference for full details**

<b>Author (s)</b>	<b>Year</b>	<b>Reason for not including in Category 1-3</b>
Anonymous	2002	Not a review
Bergk A., et al.	2005	Not a review of STI prevention interventions
Blair, M.	2004	Not STI prevention
Bonner K.	2001	Focused on HIV prevention (male circumcision).
Bonsu IK.	2005	Not a review
Casper C. & Wald A.	2002	Condom effectiveness, not an STI prevention review
Chorba T. et al.	2004	Not a review of STI prevention
Coetzee N., et al.	2003	Duplicates Mathews et al., 2002
Cothran M.M. & White J.P.	2002	Not a review of STI prevention
Dehne K.L. & Riedner G.	2001	STI services not prevention interventions
Dulmus C.N.E. & Rapp-Paglicci L.A.E.	2005	Not a review
Elwy A.R. et al.	2002	Included in previous Evidence Briefing.
Fenton K.A. & Hughes G.	2003	Not a review
Feroli K.L. & Burstein G.R.	2003	Not a review of STI prevention interventions
Fitch J.T.	2001	Not a review
Fortenberry J.D.	2002	Included in previous Evidence Briefing.
Genuis S.J. & Genuis S.K.	2005	Not a review
Gilson R.J. & Mindel A.	2001	Not STI prevention
Glik D. et al.	2002	HIV focus
Heinz M.	2004	Not a review. No prevention interventions.
Henderson Z. et al.	2005	Not a review of STI prevention interventions
Hingson R.W. & Howland J.	2002	HIV and pregnancy interventions - exclusion criteria
Holmes K.K., et al.	2004	Condom effectiveness not an STI prevention intervention review
Honey E., et al.	2002	Cost effectiveness - but screening
Jungmann E.	2005	Not a review. About treatment not prevention.
Kirby D., et al.	2002	Included in the original review (Cat 3)
Klein J.D. & Matos A.M.	2002	Not prevention
Kotchick B.A. et al.	2001	Not a synthesis of prevention interventions
Lee J.D. & Clarke J.	2004	Condoms and not a review
Leone P.	2005	Not a review. Treatment not prevention.

Low N.	2004	Not a review of STI prevention. Effects of treatment.
Marra C.M.	2004	Not a review
Mathews, C. et al.	2004	Not a synthesis
Mathews, C. et al.	2002	Included in the original review (Cat 4)
Mathews, C..et al.	2002	Duplicate
Mathews, C. et al.	2002	Duplicate
Mathews, C., et al.	2001	Publication of Cochrane review (included in the original Evidence Briefing (Cat 1))
McEvoy M. & Coupey S.M.	2002	Not a review
Meade & Ickovics	2005	Not a synthesis
Minnis A.M. & Padian N.S.	2005	Not a review of behavioural interventions
Moran J.	2005	Not a review. About treatment of STIs.
Myer L., et al.	2001	Protocol, not review
Oberdorfer A., et al.	2002	Protocol, not a review
Pozniak A.	2003	Not a review of prevention intervention
Roberts C.	2005	Not a review of prevention
Robin L., et al.	2004	Duplicate
Ross M. W. & Williams M.L.	2002	Included in the previous review
Sangani P. et al.	2001	HIV and treatment exclusion criteria
Sarkar N.N.	2001	Not a review
Scholes D. et al.	2003	Not a review of STI prevention
Serrant-Green L.	2005	Not STI prevention
Sitruk-Ware R.	2005	Exclusion criteria, not a review of prevention interventions
Smith C.	2003	Overview of service structures.
Steenbeck A.	2004	Not a relevant population to the UK.
Sternberg P. & Hubley J.	2004	Not STI prevention review, focuses on HIV prevention.
Suarez T. & Miller J.	2001	Not a review of STI prevention
Sulak P.J.	2004	Not a review
Teran S., et al.	2001	Not a review
Thachil A. & Bhugra D.	2006	Not about STI prevention intervention effectiveness
Tillett J.	2005	Not a review
Tobin J.M.	2002	Cost effectiveness, but screening.
Toroitich R, et al.	2001	Protocol for a Cochrane review (withdrawn)
Toups M.L. & Holmes W.R.	2002	Not a synthesis
Tripp J., & Viner R.	2005	Not a review of prevention interventions
Warner L., et al.	2006	Condom effectiveness not an STI prevention intervention review
Weller , S. & Davis Beaty , K.	2002	Protocol, not a review
Wilson M.M.	2003	Not a review

## Appendix D. In depth summaries of category one, two and three reviews

### Category one reviews

#### DiClemente R.J. et al. (2004) A programmatic and methodologic review and synthesis of clinic-based risk-reduction interventions for sexually transmitted infections: research and practical implications

<b>Data pool:</b>	
Population	Adolescents
Setting(s)	Clinic venues
Interventions	Clinic-based sexual risk-reduction interventions
Searches	Searches were conducted in: PubMed, Academic Search Premier, AltHealthWatch, MEDLINE, Health Source: Nursing/Academic Edition, PsycARTICLES, Cambridge Scientific Abstracts (Biological Sciences, AIDS and Cancer Research Abstracts), Lexis Nexis Health and Medical Journals, PsycInfo, Web of Science, Science Direct, Ingenta, and Journals at Ovid.
Selection/inclusion criteria	Studies were included if they were: (1) clinic-based (ie, the majority of sample had to be recruited from a medical clinic), (2) randomised controlled trials (RCTs) of interventions to decrease sexual risk-taking behavior among adolescents, and (3) published in peer-reviewed journals.
Quality assessment	16 methodological criteria were identified to assess the studies: (1) clear description of study site and sample; (2) specification of theoretical framework; (3) description of program implementation; (4) description of intervention content and behavior change techniques sufficiently detailed to permit replication; (5) description of content for control group treatment; (6) specification of length of follow-up; (7) use of blinding procedures to prevent bias; (8) specification of retention rates reported for each study condition; (9) adherence to intention-to-treat principles in the data analysis; (10) assessment of pretest equivalence on socio-demographic and behavioral factors between study conditions; (11) clear description of data analytic techniques; (12) specification of a measure of variability for the designated effect size; and (13) sample size justification.  In addition to these criteria authors also used the JAMA checklist.
Types of studies	Randomised controlled trials
Number of studies	9 studies
<b>Outcomes reported and/or used for assessing 'effectiveness'</b>	Sexual intercourse; number of partners; condom use
<b>Review findings:</b>	<ul style="list-style-type: none"> <li>• Only a few of the programmes included STI incidence as an outcome.</li> <li>• STI risk-reduction programs may not be of sufficient intensity or dosage to sustain</li> </ul>

	<p>health-promoting effects over the course of time.</p> <ul style="list-style-type: none"> <li>• There were many methodological limitations of the studies.</li> <li>• The authors state that 'Findings suggest that clinic-based STI risk-reduction programmes have not yet reached a level of success that should be considered satisfactory'.</li> </ul>
<b>Gaps and inconsistencies identified by the review:</b>	<ul style="list-style-type: none"> <li>• The authors report a plethora of methodological limitations such as sample size; lack of specified power analysis; the appropriateness of the control/comparison group; the absence of descriptive information regarding the randomisation process; the absence of appropriate follow up period; the absence of reporting rates of attrition; the absence of intention-to-treat.</li> </ul>
<b>Research recommendations:</b>	<ul style="list-style-type: none"> <li>• More rigorous studies of clinic-based risk reduction interventions to reduce sexually transmitted infections need to be undertaken.</li> <li>• Consider interventions based on paediatrician/healthcare worker group work with patients.</li> <li>• Supplemental programmes ought to be considered to promote longer-term effectiveness.</li> <li>• There is a need to improve research related to STI prevention technology.</li> </ul>

**Manhart L.E. and Homes K.K. (2005) Randomised controlled trials of individual-level, population-level and multilevel interventions for preventing sexually transmitted infections: What has worked?**

<b>Data pool:</b>	
Population	Any
Setting(s)	Any
Interventions	Behavioural interventions to reduce STIs
Searches	Searches were carried out in: MEDLINE, the Cochrane Central Register of controlled trials and unpublished presentations.
Selection/inclusion criteria	<p>Studies were included if they:</p> <ul style="list-style-type: none"> <li>• Used a randomised controlled trial.</li> <li>• Included biological markers of a prospectively measure objective STI outcome.</li> <li>• Were published in the English language.</li> <li>• Were Peer-reviewed literature or presentation at international conferences but not yet published.</li> </ul>
Quality assessment	See selection/inclusion criteria.
Types of studies	Randomised controlled trials
Number of studies	15 studies included behavioural interventions (41 studies overall)
<b>Outcomes reported and/or used for assessing 'effectiveness'</b>	STI rates; risky sexual behaviour
<b>Review findings:</b>	<p>The review found that:</p> <p>Individual level</p> <ul style="list-style-type: none"> <li>• Risk-reduction counselling was the most common intervention used. These interventions resulted in a reduction in the rate of STIs, but were not statistically significant.</li> <li>• One study that used ARRM and counselling without HIV testing showed no reduction in STI acquisition. However, it had low participation and follow-up rates.</li> <li>• One counselling intervention study showed a non-significant reduction in HIV acquisition and also showed a significant reduction in unprotected anal intercourse.</li> </ul> <p>Group level</p> <ul style="list-style-type: none"> <li>• Results of one study showed no difference in STI acquisition or risk behaviour between studies with a differing number of sessions.</li> <li>• The majority of studies using small group interventions showed reductions in (study 1) STI symptoms; incidence of gonococcal infection in men; (study 2) gonococcal and chlamydia infection in women; (study 3) new cases of STIs; (study 4) STIs and unplanned pregnancy. Only one study using small group interventions showed no difference between the intervention and comparison groups.</li> <li>• One using information as well as condom distribution showed no difference between intervention and comparison groups.</li> <li>• One study using information as well as male/female condom use showed a non-significant reduction in the incidence of STIs compared to the comparison group that had access to only male condoms.</li> </ul>



	<p>Community level</p> <ul style="list-style-type: none"> <li>• The mixed modality intervention results showed that those receiving IEC showed a reduction in the HSV seroconversion and those receiving IEC and treatment showed a reduction in the incidence of both syphilis and gonorrhoea. As well as an increase in condom use (all groups).</li> <li>• One study that used a four component random assignment to school-based sexual health and reproductive health education, enhanced reproductive health services for youth, condom distribution, and community activities. Results showed no difference between intervention and comparison groups.</li> </ul> <p>-----</p> <p>Non-RCT mentioned in the text, summary of findings show:</p> <p>Individual level (RCT)</p> <ul style="list-style-type: none"> <li>• Chart reviews, reported symptoms, and self-reported STIs all found no significant difference.</li> </ul> <p>Group level (RCT)</p> <ul style="list-style-type: none"> <li>• Decreased incidence of STIs were reported in group interventions using video and discussion, role-play and condom negotiation (successful with men only).</li> <li>• A cognitive behavioural intervention for MSM resulted in a non-significant reduction in unprotected anal sex, however it also showed a significant increase in STIs.</li> </ul> <p>(non-RCT)</p> <ul style="list-style-type: none"> <li>• A multi-behavioural intervention in Thai military men resulted in a greater than 80% reduction in STI recurrence.</li> <li>• Non-significant reductions were found in repeat attendances to clinics providing group discussion and condoms.</li> </ul> <p>Community level (non-RCT)</p> <ul style="list-style-type: none"> <li>• Findings showed that condom distribution among brothel based CSWs resulted in a reduction in HIV and STIs</li> <li>• Multi-component school-based interventions showed a decrease in self-reported STIs at aged 21 for the African American cohort.</li> </ul> <p>(RCT)</p> <ul style="list-style-type: none"> <li>• Partner notification strategies (Peru) by either patient or healthcare worker showed no difference.</li> <li>• Condom distribution in a hotel used by CSWs resulted in an increase in condom use.</li> </ul> <p>-----</p> <p>Summary</p> <ul style="list-style-type: none"> <li>• Overall no one theoretical framework was more successful than another.</li> <li>• No specific approach was more successful than another.</li> <li>• All counselling sessions used at least two sessions however the number of sessions did not affect the success of the intervention.</li> </ul>
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<b>Gaps and inconsistencies identified by the review:</b>	<ul style="list-style-type: none"> <li>• Study quality</li> <li>• Potential for publication bias</li> </ul>
<b>Research recommendations:</b>	<p>Due to the costs of intervention trials, criteria for prioritising and selecting intervention warranting evaluation are imperative.</p> <p>It is important to incorporate outcome and impact evaluations and cost-benefit analyses into future studies on effective interventions to ensure that limited resources are effectively utilised.</p>

**Ward D. J. (2004) Behavioural interventions to reduce the risk of sexually transmitted infections in Genitourinary Medicine Clinic patients: a systematic review**

<b>Data pool:</b>	
Population	Any
Setting(s)	Genitourinary medicine clinics (almost all in North America)
Interventions	Behavioural interventions
Searches	Searches were carried out in: MEDLINE, Cochrane database of systematic reviews, Database of abstracts of reviews of effectiveness (DARE), Health technology assessment (HTA), CINAHL, Embase, PsychINFO, Applied Social Sciences Index and Abstracts (ASSIA), Cochrane library of controlled clinical trials register (CCTR), National Research Register.
Selection/inclusion criteria	<p>Studies were included if they:</p> <ul style="list-style-type: none"> <li>• Used a randomised controlled trial.</li> <li>• Had a study population recruited from those attending a GUM clinic or equivalent (public clinic offering free services and self-referral for the screening, diagnosis and treatment of STIs).</li> <li>• Had a population that was not primarily recruited from those with known HIV infection or AIDS.</li> <li>• The intervention was behavioural and was aimed at reducing the future likelihood of acquiring an STI, but excluded the provision of HIV testing with or without counselling as the principle intervention.</li> <li>• Outcomes were related to clinically or laboratory diagnosed STI rates, self-reported STI rates, or to self-report of quantifiable behavioural changes (e.g. condom use, number of partners etc.), but not attitudinal or knowledge based measures alone, and not related to partner notification alone.</li> </ul>
Quality assessment	<p>See selection/inclusion criteria.</p> <p>The authors also used a Jadad scoring system and included the method of randomisation, concealment, blinding, completeness of follow-up and the use of intention-to-treat analyses.</p>
Types of studies	Randomised controlled trials
Number of studies	14 studies
<b>Outcomes reported and/or used for assessing 'effectiveness'</b>	STIs; Condom use; number of partners etc.
<b>Review findings:</b>	<ul style="list-style-type: none"> <li>• Four studies reported lower STI rates at follow-up in their intervention groups relative to the control group. The result was statistically significant for two of these studies.</li> <li>• No clear pattern of intervention format or number of sessions and reported effects were noted [enhanced vs. control RR 0.78 (95% CI 0.65, 0.95), brief vs. control RR 0.82 (95% CI 0.68, 0.99)].</li> <li>• Duration of intervention was also not significant.</li> </ul>

	<ul style="list-style-type: none"> <li>• One study (Kenya) presented statistically significant results in the reduction of STIs however, did not describe how they were found.</li> <li>• Results from self-reported STIs showed a non-significant reduction.</li> <li>• Mixed results were reported for the number of characteristics of sexual partners.</li> <li>• All but one study reported results that favoured increased consistent condom use among the intervention group and in two studies this is statistically significant (<math>p &lt; 0.05</math>).</li> <li>• Only one study indicated a clear relationship between the intervention and an increase in the proportion of protected sexual encounters.</li> <li>• Results show that those interventions using a theoretical framework based on social cognitive theory may have been more successful in increasing the rate of consistent condom use.</li> </ul> <p>Key point: “This review did not find that behavioural interventions consistently reduce STI rates in patients attending GUM clinics”.</p> <p>“This review did find evidence that behavioural interventions may alter certain aspects of behaviour in the population of interest”.</p>
<p><b>Gaps and inconsistencies identified by the review:</b></p>	<ul style="list-style-type: none"> <li>• Few studies of behavioural interventions were identified.</li> <li>• The results are limited in their generalisability, due to the population studied and the setting.</li> <li>• The applicability of study results to UK practice also relates to the feasibility of introducing the experimental interventions into a GUM clinic setting as current services are over stretched, overcrowded and under resourced.</li> <li>• The quality of identified studies was frequently poor.</li> <li>• There was also evidence of differential follow-up rates between study arms in five studies and many reported a low rate of intervention adherence.</li> <li>• Studies also showed low recruitment rates.</li> </ul>
<p><b>Research recommendations:</b></p>	<ul style="list-style-type: none"> <li>• There is a need for further research in this topic.</li> <li>• Future studies should aim to include patients who are representative of a UK GUM clinic and include groups who are most affected by STIs and suffer inequality in their sexual health.</li> <li>• Any proposed clinical trails should use rigorous methodology, including using a control arm that simulates typical current UK practice, minimising bias by improving methods of blinding, and including laboratory based or biological diagnoses.</li> <li>• Trial should also consider cluster-randomisation by clinic or another natural unit.</li> <li>• Future research should consider addressing both clinical and cost-effectiveness and consider the likely uptake of behavioural interventions in this setting.</li> </ul>

**Ward D.J. et al. (2005) Reducing the risk of sexually transmitted infections in genitourinary medicine clinic patients: a systematic review and meta-analysis of behavioural interventions**

<b>Data pool:</b>	
Population	Any
Setting(s)	Genitourinary medicine clinics (almost all in North America)
Interventions	Behavioural interventions
Searches	Searches were conducted in: MEDLINE, CINAHL, Embase, PsychINFO, Applied Social Sciences Index and Abstracts (ASSIA), Cochrane library of controlled clinical trials register (CCTR), National Research Register (1966 to January 2004).
Selection/inclusion criteria	Studies were included if: <ul style="list-style-type: none"> <li>• They were randomised controlled trials of behavioural interventions aimed to reduce the risk of STIs in patients attending GUM, or equivalent, clinics.</li> </ul>
Quality assessment	See selection/inclusion criteria. The authors also used a Jadad scoring system and included the method of randomisation, concealment, blinding, completeness of follow-up and the use of intention-to-treat analyses.
Types of studies	Randomised controlled trials
Number of studies	14 studies
<b>Outcomes reported and/or used for assessing 'effectiveness'</b>	STI rates; changes in risky sexual behaviour
<b>Review findings:</b>	<p>This study is a journal article using many of the 2004 Ward et al. report.</p> <ul style="list-style-type: none"> <li>• Four studies reported lower STI rates at follow-up in their intervention groups relative to the control group. The result was statistically significant for two of these studies. Pooled results do not indicate an overall effect (RR 1.00 (95% CI 0.81 to 1.23)). However, visual examination of the Forest plot and statistical testing suggest heterogeneity between trials, as such one ought not to rely heavily on the summary measures of effect. Also, funnel plot analysis suggests publication bias.</li> <li>• Trials reporting significant effects had the greatest adherence and follow up rates. They also reported more protective effects but pooled results were not significantly different.</li> <li>• Format and length of intervention was not significant.</li> <li>• Duration of intervention was found not to be significant.</li> <li>• Theoretical framework was related to effectiveness, although pooled results were not significant.</li> <li>• Four studies considered clinically diagnosed STIs. One study found no reduction and others observed increased rates of STIs in the intervention groups. Pooled results show an overall effect (RR 1.23 (1.01 to 1.50)) with no evidence of heterogeneity.</li> <li>• Studies considering self-reported diagnoses showed no significant effects.</li> <li>• Six out of seven trials reporting consistent condom use observed a greater increase</li> </ul>

	<p>in their intervention groups than controls.</p> <ul style="list-style-type: none"> <li>• Trials also reported increases (non-significant) in condom protected sexual encounters, inconsistent effects on refusing unsafe sex, and using condoms with recent partners.</li> <li>• Five out of seven trials reported fewer sexual partners among the intervention groups than controls. However, two also reported fewer partners among the control group.</li> </ul>
<b>Gaps and inconsistencies identified by the review:</b>	<ul style="list-style-type: none"> <li>• Trial quality was poor</li> <li>• Only RCTs were included</li> <li>• Publication bias was found for the laboratory confirmed infections (primary outcome).</li> </ul>
<b>Research recommendations:</b>	<ul style="list-style-type: none"> <li>• There is a need for research on behavioural interventions in a UK setting, where new approaches to reducing infection rates are urgently required.</li> <li>• Information is needed on the likely effect size, acceptability, and cost-effectiveness of introducing behavioural interventions into the UK GUM setting.</li> <li>• Future studies should develop new interventions based on those that have been successful in US settings.</li> </ul>

## Category two reviews

### Pedlow C.T. and Carey M.P. (2004) Developmentally appropriate sexual risk reduction interventions for adolescents: rationale review of intervention and recommendations for research and practice.

<b>Data pool:</b>	
Population	Adolescents
Setting(s)	Any
Interventions	Sexual risk reduction interventions to change behaviour
Searches	Searches were conducted using Medline, PsychINFO and Cinahl
Selection/inclusion criteria	Randomised controlled trials were included if they: Evaluated adolescent risk reduction interventions that were published before February 2003; included adolescents aged 11 to 18 years; used randomised controlled trial design; and measured sexual behaviour outcomes.
Quality assessment	None
Types of studies	Randomised controlled trials
Number of studies	24 studies
<b>Outcomes reported and/or used for assessing 'effectiveness'</b>	Biological, psychological and social outcomes
<b>Review findings:</b>	<ul style="list-style-type: none"> <li>• 11 studies delivered interventions to preadolescents (9-12 years old) or younger adolescents (13-15 years old). These studies showed that interventions with pre-adolescents were effective in delaying the onset of sex and improving condom use among sexually active youth. Studies with young adolescents were effective in increasing condom use, reducing unprotected sex and reducing the frequency of sex.</li> <li>• Only one study showed a limited effect of interventions aimed at promoting abstinence.</li> <li>• All studies that provided booster sessions were effective in reducing sexual risk behaviour later.</li> <li>• Nearly all the studies that showed improvements in risk perception also achieved reductions in sexual risk behaviour at follow up.</li> <li>• Strategies to manage emotion were also included in the interventions however, no differences were found at follow up and the authors acknowledged difficulty in establishing a valid measure of this construct. Although, these studies were effective at reducing the number of sexual partners at follow up.</li> <li>• Studies used cognitive restructuring techniques (replacing negative for positive thoughts). None measured the cognitive restructuring however, all three studies were effective at improving condom use and reducing the frequency of unprotected intercourse.</li> <li>• Interventions that recognised adolescent cognitive functioning through, for example goal-setting, decision-making skills, preparation for risky situations, were successful at reducing sexual activity, increasing condom use and delaying sexual initiation.</li> <li>• Youth who had higher cognitive complexity reported greater reduction in risk behaviour at follow up.</li> </ul>

	<ul style="list-style-type: none"> <li>• Improvements in condom application skills (observing the application) were not associated with increased condom use and non-significant findings for condom use skills were associated with risk reduction outcomes in another study.</li> <li>• Many studies provided appropriate communication skills training (21/25). Six studies measured sexual communication behavioural skills, all six demonstrated significant improvements at follow up and five of the six were also effective at reducing sexual risk behaviour.</li> <li>• Mixed results were reported for those studies that provided risk reduction information to peers as a means to reduce peer pressure for risky sex.</li> <li>• Studies measuring peer norms for condom use or abstinence showed improved peer norms. Studies with improved peer norms for sexual risk behaviour were also effective at delaying onset of sex and improving condom use.</li> <li>• A school-based intervention addressing social influences at home, in school and in the community still showed effects two and a half years later on improved teen-parent communication, attitudes to condom use, increased condom use and less unprotected sex.</li> <li>• Mixed results were observed in those interventions that considered parental influence.</li> </ul>
<p><b>Gaps and inconsistencies identified by the review:</b></p>	<ul style="list-style-type: none"> <li>• Literature failed to measure the onset of menarche and its implication on sexual activity.</li> <li>• Measurement for risk perception varied from study to study, greater use of standardised measures in the future will verify the importance of risk perception.</li> <li>• Only one third of interventions provided multiple intervention exercises that were cognitively appropriate for adolescents.</li> <li>• Only two interventions included exercises to assist teens in considering their risk behaviour.</li> <li>• Only one intervention illustrated abstract concepts with concrete real-life examples to be consistent with adolescents' limited ability to hypothesise.</li> <li>• Only one study measured a marker of cognitive development.</li> <li>• Although many risk reduction interventions for youth have been implemented, their outcomes have been inconsistent and few studies have been replicated.</li> <li>• Most of the theories applied were developed for adult interventions.</li> </ul>
<p><b>Research recommendations:</b></p>	<ul style="list-style-type: none"> <li>• Modifying existing theoretical models will advance intervention development, implementation and evaluation.</li> <li>• Researchers ought to use multiple strategies compatible with adolescent cognitive ability, including managing emotions associated with sexual risk reduction.</li> <li>• Researchers ought to include measures of cognitive functioning, future-time perspective, and decision-making in formative research.</li> <li>• Risk perception ought to be linked to actual behaviour and reporting findings for sexually inexperienced versus experienced youth.</li> <li>• The inclusion of communication skills and negotiation skills are encouraged.</li> <li>• It is important to provide multiple opportunities for skills training that are consistent with adolescents' cognitive level.</li> </ul>



	<ul style="list-style-type: none"><li>• Booster sessions may reinforce the skills acquisition as youth's relationships change.</li><li>• There is a need to develop new, more effective risk reduction interventions that address biological, psychological and social influences on sexual behaviour.</li><li>• Studies that compare different intervention strategies, identify effective components and measure process outcomes of developmental factors are needed.</li></ul>
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**Robin L. et al. (2004) Behavioural interventions to reduce incidence of HIV, STD and pregnancy among adolescents: A decade in review.**

<b>Data pool:</b>	
Population	Adolescents and ethnic minorities
Setting(s)	Any
Interventions	Behavioural interventions to reduce sexual risk-taking
Searches	Six electronic databases were searched: Medline, Psychlit, Popline, ERIC, Sociofile and CHID. Unspecified manual searches were also carried out.
Selection/inclusion criteria	<p>Studies (randomised control trials or quasi-experimental design with controls) were included if they:</p> <ul style="list-style-type: none"> <li>• Specified a theoretical basis for the intervention programme.</li> <li>• Provided information about the intervention (e.g. duration, content, facilitators).</li> <li>• Defined clear aims.</li> <li>• Random assignment or matched control groups using a quasi-experimental design that matched units through stratification of risk behaviours and demographic variables.</li> <li>• If researchers controlled statistically for any differences at baseline.</li> <li>• Studies were included if they had more than 16 participants per condition, followed participants for at least four weeks post-intervention, or had immediate pre- or post-test for interventions lasting four months or longer.</li> <li>• Had attrition rates of less than 40% at follow-up four weeks after the end of the intervention.</li> <li>• Studies were also included if they measured sexual intention for those 13 years or younger.</li> </ul>
Quality assessment	None
Types of studies	Randomised control trials or quasi-experimental design with controls.
Number of studies	24 studies
<b>Outcomes reported and/or used for assessing 'effectiveness'</b>	Abstinence; reduced sexual activity or number of sexual partners; less risky sexual behaviours; reduced number of pregnancy or repeat pregnancy; or reduced STD prevalence.
<b>Review findings:</b>	<ul style="list-style-type: none"> <li>• Most interventions were based on multiple theories however no clear pattern of study method presented itself, the most commonly used theories were: social cognitive theories; the Health Belief Model; social learning theories; and social influence theories.</li> <li>• Among commonly measured behaviours (8 out of 12 studies), condom use was affected most consistently, and delayed initiation of sexual intercourse was least affected (4 of 11 studies).</li> <li>• Among measures less commonly used, pregnancy or partner impregnation was recorded.</li> <li>• Three studies recorded negative results; increased likelihood of males engaging in sexual intercourse in the last month compared to the control group; increased reports of pregnancy and STDs; less contraceptive use at most recent sexual encounter for females who were sexually inexperienced at baseline or; less contraception efficiency among females in the intervention group.</li> </ul>

	<ul style="list-style-type: none"> <li>• Once studies were aggregated into the 17 programmes and variants, 10 programmes had positive effects, one had mixed effects and four had null effects and two had negative effects.</li> <li>• Studies with positive effects were published after 1995, included both males and females, targeted African American youth and took place in schools.</li> <li>• Programmes that produced positive effects used trained adult facilitators.</li> <li>• Effective programmes included content that was specific to reducing sexual risk behaviour (e.g. sexual refusal strategies and condom-use skills).</li> <li>• Effective programmes employed interactive and participatory educational strategies.</li> <li>• Programmes that emphasised skills to reduce specific behaviours, interventions more generally targeted toward increasing youth resiliency and competencies show promising approaches to reducing sexual risk behaviour.</li> </ul>
<p><b>Gaps and inconsistencies identified by the review:</b></p>	<ul style="list-style-type: none"> <li>• Limitations included differences among groups that were reported but not controlled for in the analysis, and the unit of randomisation not matching the unit of analysis.</li> <li>• Limits on the strength of effect sizes due to the differences in follow-up periods and possible limits on information available from the primary studies included.</li> </ul>
<p><b>Research recommendations:</b></p>	<p>Future programmes ought to focus upon appropriate skills, adapting programmes for length, being clear what constitutes a given programme and decide who ought to facilitate them</p> <p>Resiliency-based programmes ought to be further explored with regard to reducing the sexual risk behaviour of adolescents.</p> <p>Researchers should design studies that will clearly reveal which programme characteristics drive positive effects in sexual risk-reduction.</p>

## Category three reviews

### DiClemente R.J., et al., (2002) Enhancing STD/HIV prevention among adolescents: the importance of parental monitoring.

<b>Data pool:</b>	
Population	Adolescents (US)
Setting(s)	Any
Interventions	Parental interventions
Searches	Not specified
Selection/inclusion criteria	Observational studies of parental monitoring that report the impact on risk behaviour and clinic and community based STD/HIV interventions. No other criteria specified.
Quality assessment	Not specified
Types of studies	Observational studies
Number of studies	Unclear
<b>Outcomes reported and/or used for assessing 'effectiveness'</b>	Condom use; risky sexual behaviour
<b>Review findings:</b>	<ul style="list-style-type: none"> <li>• Health risk behaviours: At least two studies have shown that lack of parental monitoring has been associated with less contraceptive use.</li> <li>• Sexual risk behaviours: empirical investigations have found associations between lack of parental monitoring and 1) unprotected sexual activity, 2) earlier initiation of sexual activity, 3) sex with non-monogamous male partners among adolescent females. Also, noted was an increase in STDs, multiple sexual partners and risky sexual partners. Increased parental monitoring has been shown to help delay sexual initiation, report fewer sexual partners and less frequent sexual intercourse</li> <li>• Other family-related variables: One study of African American females showed lack of parental monitoring was associated with 1) less frequent communication between adolescents and parents, 2) lower levels of perceived family support, 3) a living arrangement that did not include both parents living in the same home.</li> <li>• Clinic-level interventions: counselling sessions with adolescents' parents have been recommended by two studies.</li> <li>• Community-level interventions – community based organisations (churches, agencies, schools) could provide programmes for both adolescents and parents together, as well as support groups and discussion.</li> </ul>
<b>Gaps and inconsistencies identified by the review:</b>	<ul style="list-style-type: none"> <li>• Reliance on the validity of adolescents self-reports for assessment of outcome measures.</li> <li>• Psychological interventions that target sexual risk behaviours of adolescents have failed to achieve lasting effects.</li> </ul>
<b>Research recommendations:</b>	<ul style="list-style-type: none"> <li>• Families can be mobilised to communicate important values, model appropriate behaviours, monitor adolescents' behaviours, and encourage protective behaviours.</li> <li>• Family-level interventions could be designed to provide parents with guidance for their adolescents.</li> </ul>

	Research should encourage strengthening the family unit as an intervention strategy designed to promote adolescents' adoption and maintenance of health protective behaviours.
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**Schaalma H. P. (2004) Sex education as health promotion: what does it take?**

<b>Data pool:</b>	
Population	Young people and sex education in schools
Setting(s)	Any
Interventions	School-based sex education programmes
Searches	Not specified
Selection/inclusion criteria	School-based sex education programmes, no other specified.
Quality assessment	Not specified
Types of studies	Not specified
Number of studies	Unclear
<b>Outcomes reported and/or used for assessing 'effectiveness'</b>	Condom use, risky sexual behaviour and abstinence
<b>Review findings:</b>	<ul style="list-style-type: none"> <li>• Interventions carried out within the ARRM framework have been shown to correlate with condom use and perceived control over behaviour (heterosexual studies). These results have also been found in studies applying theories of reasoned action, planned behaviour, and social cognitive theory. As such, 'education design must target psychological change beyond increases in knowledge', also, 'theories of sexual behaviour and sex education interventions demonstrates that despite the particularities of sexual behaviour, sexual health promotion should be informed by cognitive theories that have been successfully applied to a variety of other health-related behaviours'.</li> <li>• Social rehearsal on sexual negotiation ought to be learned through instruction and guided practice (SHARE and Long Live Love programmes). Long Live Love showed favourable effects on social-cognitive mediators of consistent condom use and risk-reduction behaviour</li> <li>• Reviews of abstinence programmes show that they have not succeeded in changing attitudes towards abstinence. However, very few abstinence programmes have been rigorously evaluated therefore results need to be interpreted cautiously.</li> <li>• Health promotion should be evidence-based, needs-driven, and ecological in its perspective.</li> <li>• In relation to the cognitive determinants of health behaviour, sexual health promotion draws on the same research base as other areas of health promotion.</li> <li>• Teaching social skills relevant to sexual behaviour in classroom settings requires specialist expertise both in programme design and delivery by teachers or facilitators.</li> </ul>
<b>Gaps and inconsistencies identified by the review:</b>	See Review findings
<b>Research recommendations:</b>	<ul style="list-style-type: none"> <li>• Researchers should continue to conduct and share the results of needs assessment research.</li> <li>• Researchers should target those who could potentially change the policy context in</li> </ul>

	<p>which sex education is designed.</p> <ul style="list-style-type: none"><li>• Schaalma concludes that, "To facilitate widespread adoption of effective sexual health promotion programmes, health promotion planners could focus on mobilising parental support for comprehensive sex education. This would involve designing community empowerment programmes that would be deemed effective if they prompted parents to act politically to demand comprehensive sex education (e.g. by writing to politicians, or schools and media advocacy)".</li></ul>
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**Schmiedl R. (2004) School-based condom availability programs**

<b>Data pool:</b>	
Population	Young people (US)
Setting(s)	School-based in US
Interventions	Condom distribution in schools; abstinence
Searches	Not stated
Selection/inclusion criteria	Not stated
Quality assessment	Not stated
Types of studies	Unclear
Number of studies	8 studies
<b>Outcomes reported and/or used for assessing 'effectiveness'</b>	Condom use; sexual initiation.
<b>Review findings:</b>	<ul style="list-style-type: none"> <li>• Findings from studies examining condom distribution on schools showed that condom availability was not associated with an increase in teen sexual activity.</li> <li>• Data also showed that most programmes indicated increased use of condoms by sexually active young people.</li> <li>• Parental consent is usually required for students to participate in school-based condom distribution schemes (passive or active).</li> <li>• Counselling teens prior to condom distribution has also been used in some schools.</li> <li>• The method of distribution is important to the success of the programme in schools, free distribution in baskets as opposed to vending machines resulted in more uptake.</li> <li>• The cost of condoms could be a barrier to condom use as one study showed a reduction in uptake when a charge was added to each condom (after is had been freely available). It also resulted in a decrease in the number of sites participating, and a decrease in reported condom use among individuals with two or more partners.</li> </ul>
<b>Gaps and inconsistencies identified by the review:</b>	None specified
<b>Research recommendations:</b>	<p>Recommend that barriers to condom use be eliminated and that condoms should be free of charge (Cohen et al, 1999).</p> <p>Schmiedl concludes that, "With the appropriate resources, support, and consideration of the factors reviewed, however, school nurses can develop successful school-based condom disbursement programs that effectively reduce teen's exposure to STDs and HIV and that decrease teen pregnancy".</p>



**Shrier L.A. (2004) Sexually transmitted diseases in adolescents: biologic, cognitive, psychologic, behavioural, and social issues.**

<b>Data pool:</b>	
Population	Adolescents
Setting(s)	Any (US)
Interventions	Parental monitoring
Searches	Not specified
Selection/inclusion criteria	Not specified
Quality assessment	Not specified
Types of studies	Uncertain
Number of studies	Unclear
<b>Outcomes reported and/or used for assessing 'effectiveness'</b>	Condom use; number of sexual partners; risky sexual behaviour
<b>Review findings:</b>	<ul style="list-style-type: none"> <li>• Parental monitoring, Parent-adolescent communication and perceived family support have been associated with safer sex cognitions and behaviour.</li> <li>• One study found that virginal adolescents who perceived maternal approval of birth control are more likely to initiate sexual activity over the following year. Those who perceive maternal disapproval are more likely to remain virgins, delay initiation, have less intercourse, use contraception, and not become pregnant.</li> <li>• Peer norms affect the sexual behaviour of young people.</li> <li>• Abstinence only programmes are not effective in delaying the onset of intercourse.</li> <li>• School-based condom availability may or may not increase condom use.</li> </ul>
<b>Gaps and inconsistencies identified by the review:</b>	None stated
<b>Research recommendations:</b>	Programmes designed to reduce sexually transmitted infections in adolescents should take a focused integrated approach that addresses the modifiable biological, cognitive, psychologic, behavioural, and social issues affecting adolescent sexual risk.

## Appendix E. Details of the primary studies included in each review.

**Table 2. Category 1 review. DiClemente et al, 2004.**

Author		Title					
DiClemente R.J. et al., 2004		A programmatic and methodologic review and synthesis of clinic-based risk-reduction interventions for sexually transmitted infections: research and practice implications					
	Type of intervention	Author	Study Design	Outcome	Theory	Duration	Target group
Individual level	Observational learning: audiotape risk-assessment and education with Dr follow-up	Boekeloo et al., (1999)	RCT	Condom use at last intercourse	SCT, TRA	One-time	Adolescents/mostly African American. Physician's office.
	Observational learning, direct feedback: culturally specific STD education, condom attitudes and skills	DeLameter et al., (2000)	RCT	Condom use knowledge/Self-efficacy and intent to use condoms with regular partner	SRMIB, SET	One-time	Adolescents/African American. STD clinic.
	Observational learning, direct feedback: STD education, condom efficacy, information on drug and needle use	Mansfield et al., (1993)	RCT	condom use; number of sexual partners; sexually active	None stated	One-time	multi-ethnic adolescents. Physician's visit.
	Tailored material	Scholes et al., (2003)	RCT	Condom use	SST	Twice	multi-ethnic adolescents. Postal.
	Observational learning, direct feedback:	Schrier et al., (2001)	RCT	Condom use; new partner	SCT, TTM	One-time	multi-ethnic adolescents. Clinic.
Group level	Observational learning, role play, direct feedback: Interactive group sessions focused on gender and ethnic pride, HIV, safe sex, healthy relationships	DiClemente et al., (2004)	RCT	Consistent condom use, new vaginal partner in last 30 days, self-reported pregnancy	SCT, TGP	Four consecutive Saturdays	Adolescents/African American. Community health agency.
	Observational learning, role play, direct feedback: STD/HIV education, favourable attitudes towards condoms and partner communication	Gillmore et al., (1997)	RCT	Safe sex behaviour; condom use; number of sexual partners	SCT, TRA	Two sessions	Adolescents/African American and Caucasian. STD clinic & juvenile detention centre.
	Observational learning, role play, direct feedback: decision-making skills, goal and social skills, acceptance of negative thoughts	Metzler et al., (2000)	RCT	Condom use; number of sexual partners	SCT, IMBST	Five sessions	Adolescents/ white. STD clinic.
	Observational learning, role play, direct feedback: STD education, condom negotiation and skills training, positive attitude towards condoms	Orr et al., (1996)	RCT	Condom use	HBM	One-time	Multi-ethnic adolescents. Family planning and STI clinic.
	Observational learning, role play, direct feedback: education and behaviour skills training, including condom use, assertion, refusal etc.	St. Lawrence et al., (1995)	RCT	Condom protected intercourse	SCT, IMBST	8 weekly meetings	Adolescents/African American. Health service.

**Table 3. Category 1 review. Manhart and Holmes, 2005.**

Author		Title					
Manhart L.E. and Holmes K.K., 2005		Randomised controlled trials of individual-level population-level, and multi-level interventions for preventing sexually transmitted infections: what has worked?					
	Type of intervention	Author	Study Design	Outcome	Theory	Duration	Target group
Individual level	Experimental, cognitive-behavioural intervention	Boyer et al. (1997)	RCT	STI acquisition	ARRM	Four sessions	Heterosexual men and women attending STI clinic
	Individual risk reduction counselling	Kamb et al. (1998)	RCT	Reduction in STI incident	TRA, SCT	Four sessions	Heterosexual HIV-negative men and women attending clinic
	Individual risk reduction counselling	Peterman et al. (2000)	RCT	Reduction in STI incident	TRA, SCT	Four sessions	Heterosexual HIV-negative men and women attending clinic
	Voluntary counselling and testing (VCT)	VCT Efficacy study group (2000)	RCT	Reduction in STI incident	Client-centred HIV counselling model	Not specified	Individuals and couples from Tanzania, Kenya and Trinidad
	Voluntary counselling and testing (VCT)	EXPLORE Study Group (2004)	RCT	HIV acquisition	None stated	10 sessions	MSM in the US
	Unclear	El-Bassel et al. (2003)	RCT	Behavioural	None stated	Not stated	Clinic based
	Unclear	James et al. (1998)	RCT	Behavioural	None stated	Not stated	Clinic based
	Observational learning, direct feedback:	Schrier et al. (2001)	RCT	Condom use; new partner	SCT, TTM	One-time	multi-ethnic adolescents. Clinic.
	Partner notification	Peterman et al. (1997)	RCT	Locating partners within 2 days	None stated	Not stated	People with syphilis
Group level	Small-group counselling	Branson et al. (1998)	RCT	Incident of gonorrhoea, chlamydia, HIV, syphilis infection	IMBSM	Five sessions (1 booster)	Men and women attending STI clinics
	Small-group risk reduction sessions focusing on attitudes, skills and strategies for behaviour change	NIMH multisite intervention group trial (1998)	RCT	STI incidence, condom use	None stated	Seven sessions	Men and women attending STI clinics
	Small-group risk reduction	Shain et al. (1999)	RCT	Infection rates, unsafe sex, number of partners	ARRM	Three session	Latina and AA women attending STI clinics
	Small-group risk reduction	Shain et al. (2002)	RCT	Infection rates, unsafe sex, number of partners	ARRM	Three session	Latina and AA women attending STI clinics
	Small-group sessions including communal mastery and negotiation skills as well as HIV and safe sex information	Hobfall et al. (2002)	RCT	Risky sexual behaviour	None stated	Six session	Women attending clinics

	Small-group skills training	Baker et al. (2003)	RCT	Reduction in STI incidence; risky behaviour	RP	16 sessions	Heterosexual women in clinics or organisations
	Group intervention	Boyer et al. (2003)	RCT	STIS and unplanned pregnancy	IMBSM	Not stated	Female military recruits
	Information education and communication and male and female condom distribution	Feldblum et al. (2001)	RCT	STI rates	None stated	Not stated	Women from plantations in Kenya
	Male or female condoms available in brothels	Fontanet et al. (1998)	RCT	Incidence of STIs	None stated	Not stated	Sex workers in Thailand brothels
	Video and discussion	O'Donnell et al. (1998)	RCT	Behavioural	None stated	Not stated	Minority ethnic men. In clinics.
	Instruction on condom use	Cohen et al. (1992a)	RCT	Behavioural	None stated	Not stated	Unclear. In clinics.
	Discussion and role play for condom negotiation	Cohen et al. (1992b)	RCT	Behavioural	None stated	Not stated	Unclear. In clinics
	Counselling in types of barrier method contraception	Gollub et al. (2000)	RCT	Behavioural	None stated	Not stated	Women in clinics
	Cognitive-behavioural intervention	Imrie et al. (2001)	RCT	Behavioural	None stated	Not stated	MSM in clinics
	Multi-component	Celentano et al., 2000	Quasi-experimental	Behavioural	None stated	Not stated	Thai army conscripts
	Clinic based group discussions	Cohen et al. (1991)	Quasi-experimental	Behavioural	None stated	Not stated	Clinics
Community level	4 component intervention; in schools SRE; reproductive services for youths; condom distribution; community activities	Hayes et al. (2003)	RCT	Incidence of STIs, knowledge and behaviour	None stated	Not stated	Individuals from 20 communities of youth in Mwanza, Tanzania
	Information education and communication (IEC); IEC plus management of STI	Kamali et al. (2003)	RCT	Incidence of STIs; condom use	None stated	Not stated	Individuals from 18 communities in Masaka, Uganda
	Condom distribution	Celentano et al. 1998	Non-RCT	Behavioural	None stated	Not stated	Thai army conscripts
	Multi-component intervention with young people	Lonczak et al. (2002)	Non-RCT	Behavioural	None stated	Not stated	Young people in schools
	Health ordinance condom distribution	Egger et al. (2000)	RCT	Behavioural	None stated	Not stated	Motels frequented by CSWs

**Table 4. Category 1 review. Ward et al., 2004.**

Author		Title					
Ward D.J. et al., 2004		Behavioural interventions to reduce the risk of sexually transmitted infections in genitourinary medicine clinic patients: a systematic review					
	Type of intervention	Author	Study Design	Outcome	Theory	Duration	Target group
Individual level	Individual risk reduction counselling	Kamb et al. (1998)	RCT	Cumulative incidence of gonorrhoea, chlamydia or HIV	TRA, SCT	Four sessions	Heterosexual HIV-negative men and women attending clinic
	Experimental, cognitive-behavioural intervention	Boyer et al. (1997)	RCT	STI acquisition	ARRM	Four sessions	Heterosexual men and women attending STI clinic
	Observational learning, direct feedback:	Schrier et al. (2001)	RCT	Condom use; new partner	SCT, TTM	One-time	multi-ethnic adolescents. Clinic
Group level	Small-group risk reduction sessions focusing on attitudes, skills and strategies for behaviour change	NIMH multisite intervention group trial (1998)	RCT	STI incidence, condom use	None stated	Seven sessions	Men and women attending STI clinics
	Group discussions and motivation; impediments to condom use	Balmer et al. (1998)	RCT	Number of new sexual partners and condom use with high-risk sexual contact	Unified theory	26 wkly 1 hr sessions	Men from STI clinic in Nairobi, Kenya
	Observational learning, role play, direct feedback: decision-making skills, goal and social skills, acceptance of negative thoughts	Metzler et al. (2000)	RCT	Condom use; number of sexual partners	SCT, IMBST	Five sessions	Male and female adolescents/ white. US STI clinics.
	Observational learning, role play, direct feedback: STD education, condom negotiation and skills training, positive attitude towards condoms	Orr et al. (1996)	RCT	Condom use	HBM	One-time	Female multi-ethnic adolescents. STI and FP clinics
	Small-group risk reduction	Shain et al. (2002)	RCT	Infection rates, unsafe sex, number of partners	ARRM	Three session	Latina and AA women attending STI clinics
	Enhanced group prevention programme. Mixed gender groups including video session with discussion.	Branson et al. (1998)	RCT	More than one sexual partner, condom use	IMBST	Four sessions and booster session	Men and women attending STI clinics
	Group workshop - including goal setting personal motivation, dealing with high-risk situations etc.	Imrie et al. (2001)	RCT	Proportion not engaging in unprotected anal intercourse; of those who are, number with partner of different or unknown serostatus	TTM (RP, SLT, MI)	Single one day session	MSM from a UK GUM clinic
	Culturally specific observational learning through video featuring information on living with HIV, rap music and comedy, condom use.	Kalichman et al. (1999)	RCT	Proportion always using condoms; refusing unsafe sex; number of unprotected acts of intercourse; proportion of sex acts with condom; number of sexual partner	IMBST	Two sessions	African American men from STI clinic

Behavioural training including assertion training, self-management, active listening skills, condom use. Social skills training including modelling behaviour or rehearsing behaviour.	O'Leary et al. (1998)	RCT	Condom use; number of sexual partners; number of risky acts	SCT	Seven sessions	Men and women from 7 STI clinics
Culturally specific observational learning through video featuring black Americans and coupons for condoms.	Solomon et al. (1989)	RCT	Mean number of condom coupons redeemed	Not theory based	Not stated	Men and women from a STI clinic

**Table 5. Category 1 review. Ward et al., 2005.**

Author		Title					
Ward D.J. et al., 2005		Reducing the risk of sexually transmitted infections in genitourinary medicine clinic patients: a systematic review and meta-analysis of behavioural interventions.					
	Type of intervention	Author	Study Design	Outcome	Theory	Duration	Target group
Individual level	Experimental, cognitive-behavioural intervention	Boyer et al. (1997)	RCT	STI acquisition	ARRM	Four sessions	Heterosexual men and women attending STI clinic
	Observational learning, direct feedback:	Schrier et al.(2001)	RCT	Condom use; new partner; number of unprotected episodes	SCT, TTM	One-time	Young women with cervicitis or PID from a children's hospital or inpatient unit . Clinic
	Negotiation	Maher et al. (2003)	RCT	Unclear	None stated	Three sessions	Black men attending clinics with definite or probable STIs
Group level	Small-group risk reduction sessions focusing on attitudes, skills and strategies for behaviour change	NIMH multisite intervention group trial (1998)	RCT	STI incidence, condom use	None stated	Seven sessions	Men and women attending STI clinics
	Group discussions and motivation; impediments to condom use	Balmer et al. (1998)	RCT	Number of new sexual partners and condom use with high-risk sexual contact	Unified theory	26 weekly sessions	Men from a STI clinic in Kenya
	Enhanced group prevention programme. Mixed gender groups including video session with discussion.	Branson et al. (1998)	RCT	More than one sexual partner, condom use	IMBST	Four sessions and booster session	Men and women attending STI clinics
	Group workshop - including goal setting personal motivation, dealing with high-risk situations etc.	Imrie et al. (2001)	RCT	Proportion not engaging in unprotected anal intercourse; of those who are, number with partner of different or unknown serostatus	TTM (RP, SLT, MI)	Single one day session	MSM from a UK GUM clinic
	Culturally specific observational learning through video featuring information on living with HIV, rap music and comedy, condom use.	Kalichman et al. (1999)	RCT	Proportion always using condoms; refusing unsafe sex; number of unprotected acts of intercourse; proportion of sex acts with condom; number of sexual partner	IMBST	Two sessions	African American men from STI clinic
	Observational learning, role play, direct feedback: decision-making skills, goal and social skills, acceptance of negative thoughts	Metzler et al. (2000)	RCT	Condom use; number of sexual partners	SCT, IMBST	Five sessions	Male and female adolescents/ white. STI clinic.

Behavioural training including assertion training, self-management, active listening skills, condom use. Social skills training including modelling behaviour or rehearsing behaviour.	O'Leary et al. (1998)	RCT	Condom use; number of sexual partners; number of risky acts	SCT	Seven sessions	Men and women from 7 STI clinics
Observational learning, role play, direct feedback: STD education, condom negotiation and skills training, positive attitude towards condoms	Orr et al. (1996)	RCT	Condom use	HBM	One-time	Multi-ethnic adolescents
Small-group risk reduction	Shain et al. (2002)	RCT	Infection rates, unsafe sex, number of partners	ARRM	Three sessions	Latina and AA women attending STI clinics
Culturally specific observational learning through video featuring black Americans and coupons for condoms.	Solomon et al. (1989)	RCT	Mean number of condom coupons redeemed	Not theory based	Not stated	Men and women from a STI clinic



**Table 6. Category 2 review. Robin et al., 2004.**

Author		Title					
Robin L. et al., 2004		Behavioral interventions to reduce incidence of HIV, STD, and pregnancy among adolescents: a decade in review					
	Type of intervention	Author	Study Design	Outcome	Theory	Duration	Target group
Individual level	Experimental, cognitive-behavioural intervention	Boyer et al. (1997)	RCT	STI acquisition	ARRM	Four sessions	Heterosexual men and women attending STI clinic
	Videos, printed materials providing supplementary information and additional suggestions for discussions and activities	Miller et al. (1993)	RCT	Teen sexual behaviour, intentions	None stated	Six video-tapes	Young people predominantly white. With their families.
	Individualised risk assessment for HIV, counselling on condom use, and HIV pamphlet, an offer of free condoms, a 20 minute counselling session with physician to discuss HIV prevention	Mansfield et al. (1993)	RCT	Ever had sex; condom use; number of partners	None stated	One-time	Clinic based sample of young people
Group level	Video games, interactive exercises, and role-play	Jemmott et al. (1992)	RCT	Sexual intent of risky behaviour; ever had sex; multiple partners; condom use; anal intercourse	PM	One-time	Adolescent convenience sample from school, YMCA and clinic
	Small-group discussion, videos, games, brainstorming, experimental analysis, role-play, skills building activities	Jemmott et al. (1998)	RCT	Condom use; unprotected sex; always use a condom	SCT	8 sessions	Community based, young female African Americans. Mean age 11.8 yrs.
	Small-group discussion, lectures, videos, games, role-play, acting storytelling, arts, crafts, community projects, "family tree" depicting relationships and situations, "graduation" ceremony	Stanton et al. (1996)	RCT	Intentions, behaviour (did vs. did not have sex) condom use	PM	7 sessions	Community based sample of young African Americans. Mean age 11.4 yrs.
	Small-group discussion, lectures, videos, games, role-play, acting storytelling, arts, crafts, community projects, "family tree" depicting relationships and situations, "graduation" ceremony	Stanton et al. (1997)	RCT	Intentions, behaviour (did vs. did not have sex) condom use	PM	7 sessions	Community based sample of young African Americans. Mean age 11.4 yrs.
	Small group discussions, role-plays, skills practice, brainstorming	Magura et al. (1994)	Quasi-experimental	Multiple partners; risk partners; anal sex; condom use for vaginal, oral, and anal sex.	PST	4 sessions	Sample from detention facility for young people mixed ethnicity and all male

Tasks in preventing drug/alcohol use, violence, and risky sexual behaviours	O'Donnell et al. (1999)	Quasi-experimental	Lifetime sexual experience; frequency of sex in past three months; recent condom use; recent contraceptive use' composite index of sexual risk	HBM	80 sessions	School based sample of young mixed ethnicity people.
Sexual decision-making, communication skills, emphasis on norms to avoid risky sex through abstinence or condom use, parent-adolescent communication	Kirby et al. (1991)	Quasi-experimental	Ever had sex; frequency of sex; birth control use at first and most recent intercourse; birth control use all or most of the time; unprotected sex; pregnant or caused pregnancy	SLT, SI, SBT	15 sessions	School based sample of young mixed ethnicity people. Mean age 15.3 yrs.
Knowledge and skills based curriculum plus peer resources, parent education school-community linkages to health services and other planned safer-sex promotion activities	Coyle et al. (1999)	RCT	Sexual initiation, frequency of unprotected intercourse, number of sexual partners, condom use at first and last intercourse	SCT, SI	20 sessions	School based sample of young mixed ethnicity people.
Family planning services, small group discussions, role-plays, writing, and videotaped skits, a healthcare and monitoring component	Bayne Smith et al. (1994)	RCT	Frequency of sex; frequency of contraceptive use	None stated	8 sessions	School based sample of young mixed ethnicity people.
Structured discussions, group exercises, role-play, guest speakers, informational presentations	Allen et al. (1997)	Quasi-experimental	Ever been pregnant or caused pregnancy (or since baseline)	None stated	1-3 times per week during academic year	School based sample of young mixed ethnicity people.
Lectures, small group discussions, role-play.	Walter et al. (1993)	RCT	AIDS risk behaviour index; sexual involvement; condom use; high risk partner; STD diagnosis	HBM, SCT, SI	6 sessions	School based sample of young mixed ethnicity people.
Skills-building, modeled skills, class discussion, small group discussion, role-plays, games and anonymous question box, homework including parents	Weeks et al. (1995)	RCT	Behavioural intentions to use condoms and to use condoms with foam, ever had sex, recent sex, age of debut, condom use at first and last sex, condom use with foam in last 12 mts, 30 days	SCT, TPB, SI	10 sessions	School based sample of young mixed ethnicity people.
Skills-building, modeled skills, class discussion, small group discussion, role-plays, games and anonymous question box, homework including parents	Levy et al. (1995)	RCT	Behavioural intentions to use condoms and to use condoms with foam, ever had sex, recent sex, age of debut, condom use at first and last sex, condom use with foam in last 12 mts, 30 days	SCT, TPB, SI	10 sessions	School based sample of young mixed ethnicity people.

Skills-building, modeled skills, class discussion, small group discussion, role-plays, games and anonymous question box, homework including parents	Weeks et al. (1997)	RCT	Behavioural intentions to use condoms and to use condoms with foam, ever had sex, recent sex, age of debut, condom use at first and last sex, condom use with foam in last 12 mts, 30 days	SCT, TPB, SI	10 sessions	School based sample of young mixed ethnicity people.
Small group discussion, videos, modelling skills, skills practice, role play, HIV+ speakers	St Lawrence et al. (1995)	RCT	Frequency of sex; frequency of contraceptive use; number of sexual partners	IMBS	est. 8 sessions	Health centre based sample of young African American people. Mean age 15.3 yrs.
Small group discussion, modeled skills, skills practice, videos, role plays	St Lawrence et al. (1999)	RCT	Frequency of sex; frequency of contraceptive use; number of sexual partners in last 3 months	IMBS	6 sessions	State Reformatory based sample young males mixed ethnic group.
Games, role play, large and small group activities, discussion, question and answer sessions, modeling of skills and skills practice	Kirby et al. (1997)	RCT	Delay of sexual onset, frequency of intercourse, condom use, birth control use, STD and pregnancy rate	SLT, HBM	8 sessions	School based young mixed ethnicity group.
Decision-making, human sexuality including family planning, videos, slide presentations, class discussion	Howard et al. (1992)	Quasi-experimental	Had sex; frequency of intercourse; contraceptive use; occurrence of pregnancy	SI	4 sessions	School/clinic young predominantly black people.
Decision-making, human sexuality including family planning, videos, slide presentations, class discussion	Howard et al. (1990)	Quasi-experimental	Had sex; frequency of intercourse; contraceptive use; occurrence of pregnancy	SI	4 sessions	School/clinic young predominantly black people.
Class discussions, group activities, videos, slide presentations, and role play	Kirby et al. (1997)	Quasi-experimental	Initiation of sex; frequency of sex; number of sexual partners; use of contraceptives; pregnancy rates; rates of reported sexually transmitted infections	None stated	4 sessions	Sample from schools, clinics and community based organisations.
Lectures, simulations, leader-guided discussions, role play, games and videos	Eisen et al. (1990)	Quasi-experimental	Ever had sex; contraceptive use at first and most recent sex; consistency of contraceptive use; index of contraceptive efficiency; occurrence of pregnancy	HBM, SLT	4 sessions	Sample from schools and family planning clinics. Young people mixed sex and ethnicity.

Shaded areas denote the same study design.

**Table 7. Category 2 review. Pedlow and Carey, 2004.**

Author		Title					
Pedlow C.T. and Carey M.P., 2004		Developmentally appropriate sexual risk reduction interventions for adolescents: rationale, review of interventions, and recommendations for research and practice.					
	Type of intervention	Author	Study Design	Outcome	Theory	Duration	Target group
Individual level	Individualised intervention	Shrier et al. (2001)	Not stated	Psychological; social	Not stated	Not stated	Female adolescents with an STI, median age 17.2 years. Clinic.
Group level	Video games, interactive exercises, and role-play	Jemmott et al. (1992)	RCT	Sexual intent of risky behaviour; ever had sex; multiple partners; condom use; anal intercourse	PM	one-time	Convenience sample from school, YMCA and clinic
	Small-group discussion, videos, games, brainstorming, experimental analysis, role-play, skills building activities	Jemmott et al. (1998)	RCT	Condom use; unprotected sex; always use a condom	SCT	8 sessions	Community based, young female African Americans. In schools.
	HIV intervention	Jemmott et al. (1999)	Not stated	Psychological; social	Not stated	Not stated	African American teens, mean age 13.2 years. In schools.
	Postponing sexual intercourse	Aarons et al. (2000)	Not stated	Biological; social	Not stated	Not stated	Males and females in school, mean age 12.8 years. From schools.
	Assess HIV/STD prevention	Boekeloo et al. (1999)	Not stated	Psychological; social	Not stated	Not stated	Males and females in school, 12-15 years
	Safer choices curriculum	Coyle et al. (2001)	Not stated	Biological; psychological; social	Not stated	Not stated	High school youth, 14-18 years
	Health educator intervention; videotape intervention	DeLamater et al. (2000)	Not stated	Psychological; social	Not stated	Not stated	African American teens, aged 15-19 years. In clinics.
	Intervention 1. Video and comic book. Intervention 2. Group skills training, video and comic book	Gilmore et al. (1997)	Not stated	Psychological; social	Not stated	Not stated	Sexually active teens, 1. 14-19 years, 2. 13-19 years. In detention centre.
	AIDS risk reduction and skills training intervention	Kipke et al. (1993)	Not stated	Psychological; social	ARRM	Not stated	Minority youth aged 12-16 years. In schools.
	Class discussions, group activities, videos, slide presentations, and role play	Kirby et al. (1997)	Quasi-experimental	Initiation of sex; frequency of sex; number of sexual partners; use of contraceptives; pregnancy rates; rates of reported sexually transmitted infections	Not stated	4 sessions	Sample from schools, clinics and community based organisations
	Youth AIDS prevention	Levy et al. (1995)	Not stated	Biological; psychological; social	Not stated	Not stated	African American youth. In schools.
AIDS education and counselling	Mansfield et al. (1993)	Not stated	Psychological	Not stated	Not stated	Adolescents with STD. In clinics.	

Monogamy, abstinence, condom choice	Metzler et al. (2000)	Not stated	Psychological; social	Not stated	Not stated	Sexually active teens. From clinics.
Tasks in preventing drug/alcohol use, violence, and risky sexual behaviours	O'Donnell et al. (1999)	Quasi-experimental	Lifetime sexual experience; frequency of sex in past three months; recent condom use; recent contraceptive use' composite index of sexual risk	HBM	80 sessions	School based sample of young mixed ethnicity people
Behavioural intervention	Orr et al. (1996)	Not stated	Psychological; social	Not stated	Not stated	Female adolescents with Chlamydia in clinics.
7 and 3 session HIV intervention	Rotheram-Borus et al. (1998)	Not stated	Psychological; social	Not stated	7/3 sessions	High risk minority youth. From social services.
Skills training intervention	Slonim-Nevo et al. (1996)	Not stated	Psychological; social	Not stated	Not stated	Delinquent and abused youth, mean age 14.7 years. From welfare centre.
Decision-making AIDS intervention	Stanton et al. (1996)	Not stated	Psychological; social	Not stated	Not stated	African American early youth aged 9-15 years. Housing development.
Lectures, small group discussions, role play.	Walter et al. (1993)	RCT	AIDS risk behaviour index; sexual involvement; condom use; high risk partner; STD diagnosis	HBM, SCT, SI	6 sessions	School based sample of young mixed ethnicity people.
Becoming a responsible teen	St. Lawrence et al. (1999)	Not stated	Psychological; social	Not stated	Not stated	Incarcerated male youth, mean age 15.8 years
Observational learning, role play, direct feedback: education and behaviour skills training, including condom use, assertion, refusal etc.	St. Lawrence et al. (1995a)	RCT	Condom protected intercourse	SCT, IMBST	8 weekly meetings	Adolescents/African American
Behavioural skills training	St. Lawrence et al. (1995b)	Not stated	Psychological; social	Not stated	Not stated	Youth in treatment for substance abuse. Age range 13-17 years
AIDS prevention curriculum	Walter and Vaughan (1993)	Not stated	Psychological; social	Not stated	Not stated	Urban minority youth. Aged 12-20 years. In schools.
HIV prevention	Workman et al. (1996)	Not stated	Psychological; social	Not stated	Not stated	Inner city minority female adolescents. In schools.

### Theory definitions

**SLT** – Social Learning Theory; **CLT** – Cognitive Learning Theory; **SRMIB** – Self-Regulation Model of Illness Behaviour; **CBT** - Cognitive Behavioural Therapy; **ARRM** - AIDS risk-reduction Method; **RP** - Relapse Prevention; **HBM** - Health Belief Model; **ME/I** - Motivational Enhancement/Interviewing; **IMBSM** – Information Motivation Behavioural Skills Model; **PST** - Problem Solving Therapy; **TRA** - Theory of Reasoned Action; **PM** - Protection Motivation; **SI** - Social Influence; **SET** – Self-efficacy Theory; **TTM** – Transtheoretical Model; **TPB** – Theory of Planned Behaviour. **SCT** –Social Cognitive Theory.

### Study design definitions

**RCT** – Randomised Controlled Trial; **RSC-NC** – Repeat cross-sectional study without a comparison group; **PS-NC** – Panel study without a comparison.

**Table 8. Cross over of primary studies for Category 1 and 2 reviews.**

Primary study	Category 1 and 2 reviews					
	DiClemente et al., 2004	Manhart L.E. & Holmes K. K., 2005	Ward D.J. et al., 2004	Ward D.J. et al., 2005	Robin L. et al., 2004	Pedlow C.T. & Carey M.P., 2004
<b>Individual level</b>						
Boekeloo et al., (1999)	✓					
Boyer et al. (1997)		✓	✓	✓	✓	
DeLameter et al., (2000)	✓					
El-Bassel et al. (2003)		✓				
EXPLORE Study Group (2004)		✓				
James et al. (1998)		✓				
Kamb et al. (1998)		✓	✓			
Maher et al. (2003)				✓		
Mansfield et al. (1993)	✓				✓	
Miller et al. (1993)					✓	
Peterman et al. (1997)		✓				
Peterman et al. (2000)		✓				
Scholes et al., (2003)	✓					
Schrier et al. (2001)	✓	✓	✓	✓		✓
VCT Efficacy study group (2000)		✓				
<b>Group level</b>						
Aarons et al. (2000)						✓
Allen et al. (1997)					✓	
Baker et al. (2003)		✓				
Balmer et al. (1998)			✓	✓		
Bayne Smith et al. (1994)					✓	
Boekeloo et al. (1999)*						✓
Boyer et al. (2003)		✓				
Branson et al. (1998)		✓	✓	✓		
Celentano et al., 2000		✓				
Cohen et al. (1991)		✓				
Cohen et al. (1992a)		✓				
Cohen et al. (1992b)		✓				
Coyle et al.					✓	

\* Boekeloo et al. (1999) was categorised as group level for Pedlow and Carey (2004) and individual level for DiClemente et al. (2004). The intervention used both group education and one-to-one doctor follow-up. Pedlow and Carey classed it as a school based intervention and DiClemente et al. (2004) focused upon the one-to-one intervention.

(1999)						
Coyle et al. (2001)						✓
DeLamater et al. (2000)						✓
DiClemente et al., (2004)	✓					
Eisen et al. (1990)					✓	
Feldblum et al. (2001)		✓				
Fontanet et al. (1998)		✓				
Gillmore et al., (1997)	✓					✓
Gollub et al. (2000)		✓				
Hobfall et al. (2002)		✓				
Howard et al. (1990)					✓	
Howard et al. (1992)					✓	
Imrie et al. (2001)		✓	✓	✓		
Jemmott et al. (1992)					✓	✓
Jemmott et al. (1998)					✓	✓
Jemmott et al. (1999)						✓
Kalichman et al. (1999)			✓	✓		
Kipke et al. (1993)						✓
Kirby et al. (1991)					✓	
Kirby et al. (1997a)					✓	
Kirby et al. (1997b)					✓	✓
Levy et al. (1995)					✓	✓
Magura et al. (1994)					✓	
Mansfield et al. (1993)						✓
Metzler et al. (2000)	✓		✓	✓		✓
NIMH multisite intervention group trial (1998)		✓	✓	✓		
O'Donnell et al. (1998)		✓				
O'Donnell et al. (1999)					✓	✓
O'Leary et al. (1998)			✓	✓		
Orr et al. (1996)	✓		✓	✓		✓
Rotheram-Borus et al. (1998)						✓
Shain et al. (1999)		✓				
Shain et al. (2002)		✓	✓	✓		
Slonim-Nevo et al. (1996)						✓
Solomon et al. (1989)			✓	✓		
St Lawrence et al. (1999)					✓	✓



St. Lawrence et al. (1995a)	✓				✓	✓
St. Lawrence et al. (1995b)						✓
Stanton et al. (1996)					✓	✓
Stanton et al. (1997)					✓	
Walter et al. (1993)					✓	✓
Walter & Vaughan (1993)						✓
Weeks et al. (1995)					✓	
Weeks et al. (1997)					✓	
Workman et al. (1996)						✓
<b>Community level</b>						
Celentano et al. 1998		✓				
Egger et al. (2000)		✓				
Hayes et al. (2003)		✓				
Kamali et al. (2003)		✓				
Lonczak et al. (2002)		✓				

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