

Australian
Research Centre
in Sex, Health
& Society



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**Australian Institute
for Primary Care & Ageing**

Rapid Review:
***Reducing Sexually Transmissible
Infections in Young People***

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and

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Implications for Practice

- The findings in this rapid review are based on systematic reviews published in peer reviewed journals. A lack of published research for a particular type of intervention does not necessarily mean it is not effective; rather there is insufficient published research to determine its efficacy.
- Limited evidence should not be a reason to stifle innovation. For any interventions where evidence of effectiveness is scarce, a robust process and impact evaluation is crucial.
- The review consistently found that regardless of the type of intervention, interventions are less effective in isolation than when part of an integrated multi-level systems approach.
- To reduce health disparities, interventions that are universal in approach need to be supplemented with targeted programs for high risk, minority or at-risk groups. In addition, universal approaches need to consider gender differences in uptake of message or behaviour change.
- Behaviour change occurs on a continuum such as increased knowledge, attitude change, skill development, self-efficacy, access to resources and services, and social reinforcement. When choosing an intervention for a particular population group, consider where along the continuum intervention is needed.
- Much of the evidence refers to impacts such as; increased knowledge, behavioural intention, attitudes, and self-efficacy. These are important precursors to behaviour change. Not all effective interventions can be measured by a reduction in the incidence of STI.
- Successful interventions require both evidence based models and good implementation. Ensure planning and implementation takes into account the critical success factors identified in the review and be aware of organisational and systemic barriers and enablers.

Executive Summary

This rapid review was commissioned to provide a synthesis of available evidence on public health interventions that are most effective in reducing sexually transmissible infections in young people. The review analysed evidence for identified public health intervention settings (e.g. school, primary care, community, structural and multi-level), types of interventions (e.g. social marketing and mass media, computer-mediated, communication technology and social media interventions) or socio-demographic groups (e.g. at-risk or minority youth). Young people were defined as those aged under 30 years. The evidence base was limited to existing systematic reviews, meta-analyses and economic evaluations.

Review questions were:

Based on available evidence, what types of public health interventions are most effective in reducing sexually transmissible infections (STI) in young people?

Of the effective interventions, identify where possible (listed in order of importance):

- Those that are more effective with specific sub-groups of young people (e.g. age range, gender-specific, low socio-economic status, non-English speaking young people, Indigenous young people)
- Critical success factors for each of the effective interventions (or mix of interventions)
- Which have the greatest impact on reducing health inequalities
- Which are the most cost-effective
- Any best practice program/project models.

The inclusion and exclusion criteria for the rapid review followed the PICOS format outlined on page 6.

Overview of reviewed research quality and quantity

The level and type of evidence on which this review could draw varied significantly across intervention setting, type and target group. For example, evidence about interventions based within institutions such as schools and primary care included the highest proportion of randomised control trials and quasi-experimental studies. However, combining results from trials of different types of programs working across different institutional settings and client groups in different education or health systems was challenging. Whereas interventions that operate at broader community-wide or structural levels, in which it is difficult or inappropriate to conduct controlled experimental contexts, needed to rely on adapted or non-experimental methodologies. As well, due to the complexity of sexual health interventions operating across different health promotion levels at the individual, group, community and structural or system level, it can be difficult to determine the relative impact of a particular intervention from the combined impact of other related interventions.

Key findings – public health interventions that are most effective in reducing sexually transmissible infections (STI) in young people

Across all settings there was evidence that programs were most effective in increasing protective behaviours for STI when they:

- Were skills-based, self-efficacy-based and motivation-based programs rather than knowledge-based programs

- Targeted multiple components of young people's lives, the context in which they live, and addressed multiple domains across interpersonal, social and structural levels
- Were explicitly based on recognised behavioural and social theories.

Most evidence showed that no single public health intervention had a sustained long-term impact on the sexual health of young people and young adults. Overwhelmingly this pointed towards multi-level programs based within broader interpersonal, social and system level behavioural theories.

For example, comprehensive school-based sexual health programs were likely to have the broadest reach with a reasonable impact, and so have the greatest impact in prevention in the short term for the majority of young people. However, integrated primary care-, community-, and media- based strategies are required to maintain or enhance program impacts, reach young people who did not benefit from school-based initiatives, and support STI testing and help-seeking behaviours. Evidence indicated that programs were most effective in increasing protective behaviours for STI when they combined levels of interventions at the individual, group, community and structural level.

The following provides a summary of key findings for specific settings, intervention types or target groups.

School-based programs

Evidence was strong that comprehensive, well-supported school-based sexual health programs, supported within a broader school community approach, had the strongest impact on delaying sexual behaviour, increasing awareness and knowledge around STI prevention, and increasing protective behaviours. Evidence that they reduced STI among young people was good. Evidence was also good that skills-, self-efficacy- and motivation-based programs were more effective than knowledge-based programs in increasing safe sexual behaviours. This finding is consistent with the health-promoting schools model utilised in other public health initiatives.

Primary care-based programs

Evidence was strong that universal approaches which established a systematic way of offering testing to young people aged 16–24 were the most effective in increasing screening rates in primary care. Opportunistic screening was not as effective and efficient as proactive and systematic screening.

There was strong evidence that one-to-one structured counselling interventions with sexually active young people can be effective in behaviour change and can also be cost-effective. However, evidence was also good that such programs are more likely to be effective when they target those identified as high risk, and when they emphasise motivation, self-efficacy, and factors that underlie risk-taking and are implemented as part of a broader STI prevention program.

There was good evidence that a range of technology-based testing or appointment reminder mechanisms were effective in increasing testing rates in young people attending primary care services, and good evidence that home-based testing for re-screening or repeat testing may be an effective option to offer young people.

Evidence was moderate that targeted outreach screening formats (community programs and non-GP health services) show high acceptance and participation in STI screening, but was inconclusive about cost-effectiveness.

Social marketing and mass media

There was moderate evidence that mass media could impact on awareness, knowledge, behavioural intentions and increase STI testing in the short term. However, there is little evidence that mass media can achieve changes in behaviour in isolation to other programs.

Computer-mediated, communication technology and social media programs

There was moderate evidence that sexual health education through the use of computer-mediated technology or communication technology may improve young people's sexual health knowledge and attitudes. There was some evidence that social networking sites were being utilised within STI health promotion and generally as part of larger mass media or community services initiatives; however, few have been evaluated to determine impact.

Programs targeted to at-risk or minority youth

There was good evidence that targeted and tailored programs for at-risk or minority youth can be effective in increasing knowledge, attitudes, and motivations, and moderate evidence that these programs resulted in changes in behaviour and improved health outcomes. There was moderate evidence that programs which take a broad social context and self-efficacy approach including health literacy, confidence, communication, and life aspirations—with a focus that is not exclusively sexual health—can be more effective with at-risk or minority youth than programs focused on sexual health alone.

Community, structural and multi-level programs

There was limited evidence in the reviews concerning the effectiveness of community, structural, or multi-level programs. However, there was moderate evidence that programs which incorporate multiple-level interventions—individual, community and structural—achieve better outcomes than those that operate at a single level.

What interventions were shown to be ineffective?

There was strong evidence that programs focused on abstinence only, in any setting, were ineffective in reducing risk or delaying sexual behaviour and indicative evidence that they may increase risk.

There has been little success in increasing STI screening rates in general practice contexts, in particular for chlamydia, and both practice and structural impediments may need to be reviewed in more detail to find an effective approach.

Where are the research gaps?

At a general level across intervention settings and contexts, the following research gaps were identified:

- Programs as part of a broader combination or system of STI prevention programs; for example, what is the effectiveness of mass media campaigns in reinforcing the impact of other interventions at the school level or sustaining testing practices at the primary care level? Targeted research that evaluates multi-level programs at a system or combined impact level is needed.
- Across most settings and intervention types need exists to develop improved approaches for evaluating the theory that drives the program, ways of measuring behavioural outcomes, and strategies for achieving longer follow-up timeframes. Increased evidence about what works in Victoria and Australia, including why it works and in what context/s, and within what system of interventions, is needed.
- There is a need to increase the evaluation rigour of Victorian and other Australian investments in STI prevention where possible, to enable them to contribute more effectively to the identified gaps in the evidence base. In particular in:
 - Programs targeting at-risk or minority youth (namely Aboriginal youth, culturally and linguistically diverse youth, and youth in the justice system); and
 - Non-school-based programs that target all youth (including mass media, social media, and youth event-based promotion and generalised youth outreach).

1.0 Introduction

The rapid review was commissioned to provide a brief synthesis of available research evidence related to the effectiveness of public health interventions to reduce sexually transmissible infections in young people. Young people were defined as those aged under 30 years. The evidence base was limited to “best available evidence”, as is the nature of any rapid review. Hence, the research evidence was drawn from existing systematic reviews, meta-analyses and economic evaluations.

This report provides a summary of the method used to conduct the rapid review, an overview of the evidence of effectiveness within each of the identified public health intervention settings (e.g. school, primary care, community, structural and multi-level), types of interventions (e.g. social marketing and mass media, computer-mediated, communication technology and social media interventions) or socio-demographic groups (e.g. at-risk or minority youth). Concluding comments draw on the review as a whole.

2.0 Method

The review questions were:

Based on available evidence, what types of public health interventions are most effective in reducing sexually transmissible infections (STI) in young people?

Of the effective interventions, identify where possible (listed in order of importance):

- Those that are more effective with specific sub-groups of young people (e.g. age range, gender-specific, low socio-economic status, non-English speaking young people, Indigenous young people)
- Critical success factors for each of the effective interventions (or mix of interventions)
- Which have the greatest impact on reducing health inequalities
- Which are the most cost-effective
- Any best practice program/project models.

Systematic literature reviews and meta-analyses for review were identified through searching the following databases: Embase, PsychInfo, Medline, Scopus, Science Direct, CINAHL, Cochrane Library, Campbell Library, ProQuest Central, Web of Science, Sociological Abstracts, and Pub Med.

Key searches used combinations of the words adolescent, young, teenage or youth; STI, STD, sexual, prevention, reduction, promotion, intervention, testing or treatment; as well as review or meta-analysis. We also used the terms HPV, papilloma, chlamydia, trichomoniasis, gonorrhoea, herpes, and syphilis, as these diseases disproportionately affect young people in Australia (Kang, Skinner, & Usherwood, 2010).

The following online depositories of systematic reviews were also searched to ensure no relevant studies had been missed through the above search: Centre for Reviews and Dissemination Databases (DARE), Effective Public Health Practice Project, Evidence for Policy and Practice Information and Coordinating Centre (EPPI-Centre), Health Evidence Canada, Centres for Disease Control USA (including TheCommunityGuide.org), and SAX Institute. Searches were conducted up until May 2012.

The inclusion and exclusion criteria for the rapid review followed the PICOS format

Participants:	Young people (less than 30 years old).
Interventions:	All types of public health interventions including, but not limited to: education, all forms of health promotion, screening programs, health workforce education and incentives.
Comparisons:	Compare to no intervention, another intervention, current practice.
Outcomes:	Including, but not limited to a reduced incidence of STI, increased awareness, changes to health-seeking behaviour and/or changes to health risk behaviour, increases in uptake of screening/testing.
Study types:	Systematic reviews and meta-analyses, economic evaluations, grey literature including unpublished evaluations that can be provided by the department or non-government organisations.
Exclusion criteria:	Interventions exclusively HIV-related. Interventions in cultures and societies vastly different from Australia's (e.g. sub-Saharan Africa, South East Asia).

Anything published prior to 2000.

Studies on infants and toddlers (e.g. chlamydial conjunctivitis in newborns).

A matrix was developed and populated to identify what interventions had been investigated by the reviews identified as well as what interventions had not been investigated, or investigated to a lesser extent. The final matrix used to categorise the interventions is provided in Appendix B.

Summary of the identified literature

The review initially found 322 relevant articles. Based on titles of these articles, they were reduced to 98 systematic literature reviews, meta-analyses and economic evaluations. Two members of the research team read each abstract to reduce this further, to 36 articles, utilising the above inclusion and exclusion criteria as well as removing duplicate or superseded articles. Differences in opinion were resolved by discussion and consensus within the research team (See Figure 1).

The 36 reviews were each rated using an adapted R-AMSTAR grading (Kung et al., 2010) to assess the quality of the review, and determine what emphasis to place on its analysis. Findings were compared to other reviews (see Appendix B).

The articles were then categorised by two members of the research team into three groups according to their generality and coverage. The three groups were systematic reviews, meta-analyses or economic evaluations that covered:

1. A broad range of settings and intervention types for programs targeting all young people (n=4);
2. STI prevention interventions for a particular group of young people or a particular setting (n=5); or
3. An aspect of adolescent sexual health promotion within the studies reviewed, although the review may not have been exclusively focused on STI prevention¹ (n=27).

A table of reviews included is presented in Appendix A, describing relevant information such as purpose of review, review design, range of interventions reviewed, and authors' conclusions.

¹ Some STI prevention interventions for young people and some systematic reviews have been funded as a result of policy considerations in other countries; for example, in the USA many youth sexual health programs are funded by HIV prevention policies and priorities, whereas many youth sexual health programs in the UK are funded from a reproductive health and unplanned pregnancy prevention priority. However, the actual interventions reviewed included within their aims the reduction of STI and sexual risk behaviour and were consistent with the aims of this rapid review.

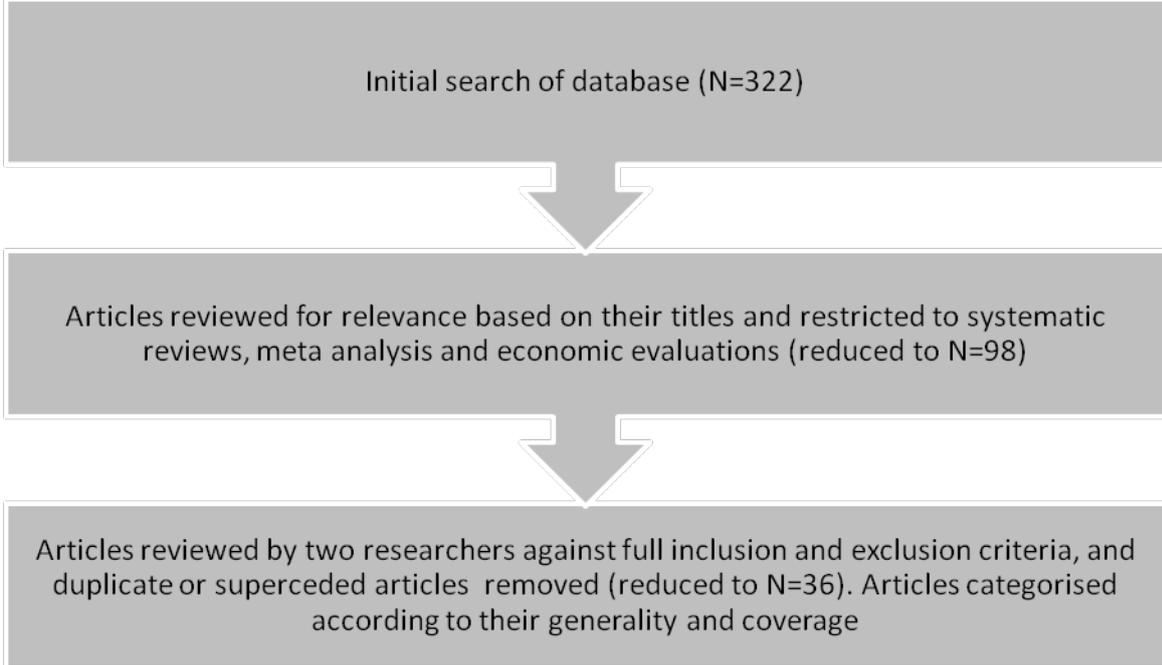


Figure 1: Summary of Rapid Review Method

3.0 Analysis of Reviews

This chapter provides a summary of the effectiveness of interventions across the range of intervention categories. These categories were: school-based programs and interventions; primary care-based programs and interventions; programs using social marketing and mass media; programs using computer-mediated, communication technology and social media interventions; programs targeted to at-risk or minority youth; and community, structural and multi-level programs (identified in appendix A).

Each section briefly provides a general overview of the research quality and quantity, identifies the systematic reviews used in the section, summarises the reviews and evidence, and describes key findings. Each key finding has been graded on the basis of the strength of the evidence, drawn from across the systematic reviews, which supports that finding. This grading has the following terms and definitions and their relationship to the relevant NHMRC evidence levels (NHMRC, 2008):

Strong evidence: Key finding is obtained from one or more systematic reviews of multiple randomised controlled trials. Relates to NHMRC evidence Level 1.

Good evidence: Key finding is obtained from at least one randomised controlled trial described and assessed within a systematic review. Relates to NHMRC evidence Level 2.

Moderate evidence: Key finding is obtained from quasi-experimental or non-randomised trials, cohort studies, time series or matched case-control studies, assessed within a systematic review. Relates to NHMRC evidence Level 3.

Weak evidence: Key finding is obtained from non-experimental evaluation studies or case reports, or inferred results across studies, assessed within a systematic review. Relates to NHMRC evidence Level 4.

Very weak evidence: Key finding is obtained from opinions of respected authorities, based on descriptive studies or reports of expert committees, assessed by a systematic review. Relates to NHMRC evidence Level 5.

No Evidence Described: No evidence was described in any of the systematic reviews included in this rapid review to draw any key finding.

Each systematic review was also graded for its methodological quality using an adapted R-AMSTAR grading (for results see Appendix A). The results of this methodological grading did not result in any amendments to the above evidence strength rating. In other words, the moderate, good and strong evidence was all drawn from medium and high quality systematic reviews, reinforcing confidence in their findings.

3.1 School-based programs and interventions

Overview of reviewed research quality and quantity

Numerous randomised control trials and quasi-experimental studies were conducted on STI prevention and related programs in schools; most in the USA. However, the systematic reviews were challenged by trying to combine the results of a range of curriculum-based and classroom-conducted multi-session education programs across different years and age groups. There was little evidence of 'whole-of-school' approaches or combined school and community organisation approaches. There was little evidence concerning at-risk or minority groups relevant to an Australian context. The emphasis for most reviews was on identifying what intervention types were effective, with less

emphasis on why one program might work better than another, or what broader system or structural factors contribute to its success.

Systematic reviews in this section cover the following programs:

- General sexual health interventions with adolescents in schools (Chin et al., 2012; Kang et al., 2010; Lazarus, Sihvonen-Riemenschneider, Laukamm-Josten, Wong, & Liljestrand, 2010; Shepherd et al., 2010).
- STI and HIV prevention focused on sexual risk behaviour (Johnson, Scott-Sheldon, Huedo-Medina, & Carey, 2011; Kirby, Laris, & Rolleri, 2007).
- Interventions focused on positive youth development, such as decision-making skills, life skills, general self-efficacy and connectedness (Gavin, Catalano, David-Ferdon, Gloppen, & Markham, 2010).
- Abstinence-only education² (Chin et al., 2012; Underhill, Montgomery, & Operario, 2007).
- Comprehensive sexual health education³ (Chin et al., 2012; Underhill, Operario, & Montgomery, 2007).
- Sexual health within the context of other risk behaviours such as alcohol and drug use (Jackson, Geddes, Haw, & Frank, 2011; Peters, Kok, Ten Dam, Buijs, & Paulussen, 2009).
- Effectiveness of peer-led and teacher-led programs within schools (Kim & Free, 2008).

Awareness, knowledge and attitudes

Kang et al. (2010) systematic review is the only one that assessed sexual health interventions with young people in Australia. Although the authors identified schools as a key site for educating young people about STI, only five of 43 interventions they reviewed were school-based. Generally there were increases in knowledge and awareness; however, two of these five were focused on attitudes to people living with HIV and attitudes towards, knowledge about, and vaccination completion rates for hepatitis B virus (HBV). Kang et al. (2010) called for more research into the impact of educational interventions in Australian secondary schools to assess not only increases in knowledge and attitudes, but behavioural change in relation to STI and HIV (including condom use and accessing health care).

By contrast, in the review by Lazarus et al. (2010) of the effectiveness of sexual health interventions with young people in the European Union, school-based interventions comprised 13 of the 19 interventions reviewed. Of the 13 that were school-based, 11 showed an increase in young people's sexual health knowledge indicators.

Shepherd et al. (2010) reviewed behavioural interventions in schools with adolescents aged 13-19 years to reduce STI. Based on data of 12 randomised control trials, their review included meta-analysis where possible as well as narrative summaries. The interventions took place mostly in the

² Abstinence-only education has as its focus the promotion of abstinence from sexual activity (either delayed initiation or abstinence until marriage) as the primary protection to unplanned pregnancy and STI. Mutually faithful, monogamous relationship in the context of marriage is promoted as the expected standard of sexual activity.

³ Comprehensive sexual health education promotes a rights-, respect- and responsibilities-based approach to relationships and informed sexual choices and promote behaviours that prevent or reduce risk of pregnancy and STI, including but not limited to delayed sexual activity.

US—a small number were conducted in Africa and Europe—and ranged from a single session to a program lasting two years. Most participants were 16 years and under, and almost all interventions were with students of both sexes. The majority were conducted by teachers or peer educators. All interventions in the Shepherd et al. (2010) review included education about STI and HIV, and most promoted sexual risk reduction. Other components included in the interventions were communication and negotiation, condom use, and self-efficacy. They were compared to standard sex education or a non-sexual health program of similar characteristics.

The non-behavioural outcomes that were measured in the Shepherd et al. (2010) review were knowledge, attitudes, skills, efficacy, and intentions. Ten of the 12 studies successfully increased students' knowledge about STI and HIV, and a small number that were possible to analyse showed an improvement in self-efficacy. Inclusive, co-ordinated multi-component interventions, which aimed to influence young people by targeting many of the contexts in which they live (e.g. wider-school environment, home and community) were found to be generally more successful than interventions that focused primarily on curricula and knowledge.

Kang et al. (2010), Lazarus et al. (2010) and Shepherd et al. (2010) all questioned the assumption that knowledge alone led to behaviour change. They recommended a greater focus on behaviour change.

Self-efficacy, confidence and skills

Johnson et al. (2011) conducted a meta-analysis of behavioural interventions from 1985 to 2008 aimed at reducing risk behaviours in adolescents. Sixty-seven studies were included: 87% were US studies and 73% involved interventions in school or community settings. Johnson et al. (2011) found that behavioural interventions with adolescents aimed at reducing HIV were able to significantly improve safer sex communication skills. Interventions were most likely to improve use of condoms when they contained a substantial component of skills training around use of condoms, and when they had a motivational training component. The authors noted that even brief interventions which focused on motivation and skills were effective.

In the 2010 review by Shepherd et al., all studies included a skills component but only two in three reported on self-efficacy in the evaluation. These findings were mixed, showing effects for some outcomes and some participants.

Gavin et al. (2010) looked at the impact of broader positive youth development programs on young people's sexual health. The authors reviewed programs for young people below the age of 20 years with at least 50 per cent of the content related to positive youth development (such as decision-making skills, life skills, and self-efficacy and connectedness) and assessed a sexual or reproductive health outcome. Programs were classed as "effective" if they showed significant improvement in at least one sexual health outcome, regardless of whether or not the program included specific sexual health education within its broad youth development curriculum. Of the 30 programs that the authors reviewed, 15 were categorised as effective. Six of these had no specific sexual health education content. The programs identified as being effective covered a range of age groups that included pre-school, primary and secondary school years. The authors noted that the two studies they reviewed which involved pre- and elementary school children had the strongest and most lasting effects. Half of the effective programs had the goals of encouraging cognitive, social and emotional competence, pro-social bonding, participants' self-determination, and belief in the future. The authors noted that none of the studies controlled for sexual health education but suggested that positive youth development programs may provide motivation for using knowledge and skills gained in sexuality education.

Sexual behaviour and other health outcomes

No Australian-focused reviews provided findings about behavioural change from school curriculum-based programs. The review by Kang et al. (2010) described programs in schools to promote

chlamydia testing alongside outreach testing services. These are described in the Primary Care interventions section on page 21.

Three reviews that focused on curriculum-based programs (Chin et al., 2012; Johnson et al., 2011; Underhill, Montgomery, et al., 2007; Underhill, Operario, et al., 2007) were related to the USA debates about abstinence versus comprehensive sexual health education—a debate not present in most other western countries.

Abstinence-only programs were evaluated in the review conducted by Underhill, Operario et al. (2007), of 13 randomised controlled interventions with adolescents and young adults. All were based in the US, and all but two were school-based. Four trials assessed frequency of vaginal intercourse, and eight assessed number of sex partners, but none showed reduction in either sexual partner or frequency. The authors concluded that abstinence-only interventions did not reduce, but also did not exacerbate, sexual behaviour. They found the programs to be ineffective in promoting abstinence and in reducing sexual activity. Of the seven that reported diagnoses of STI, none found evidence of benefit of abstinence-only interventions in the short or long term, and one found negative effects at three months. Similarly, in the trials that evaluated self-reported conception, none found positive effects, and one found adverse effects at a 17-month follow-up.

Underhill, Montgomery et al. (cited in Underhill, Operario, et al., 2007) found that many comprehensive programs appear to reduce short-term and long-term sexual risk behaviour among youth participants in high-income countries and none showed any increased sexual behaviour risk. The review found no conclusive evidence from the study designs that showed comprehensive programs affected STI incidence; however, the direction of findings consistently favoured comprehensive programs over any controls.

Chin et al. (2012) conducted two meta-analyses of group-based comprehensive risk reduction and abstinence-based programs in the US. Their review included the effectiveness of these approaches to reduce sexual risk behaviours for comprehensive risk reduction, and reducing sexual activity in the case of abstinence education, both with the overarching aim of preventing STI and pregnancy in adolescents. They reviewed 66 comprehensive risk-reduction interventions, and 33 abstinence-only interventions. The comprehensive programs were heterogeneous in population covering a range of ages, ethnicities, and sexual experience. Most participants in the abstinence education review were aged 10–14 and had no sexual experience. The programs occurred in school and community settings that included health care settings. The outcomes for comprehensive programs which measured sexual activity, frequency of sexual activity, number of partners, use of protection, and diagnosis of STI all showed they were effective. However, the authors pointed out that most of the evidence for reduction in STI came from interventions in community settings with adolescents at high risk for STI and may not be applicable to general school-based interventions. Chin et al. found that abstinence programs had inconsistent findings across studies that varied by study design and could not draw conclusions on the effectiveness of group-based abstinence education.

The review by Johnson et al. (2011) of 68 comprehensive HIV behavioural interventions indicated they were effective in reducing frequency of sex and number of sex partners, promoting abstinence or delayed intercourse and promoting condom use. Programs most likely to reduce number of sexual encounters were those that did not emphasise abstinence, and which involved more intervention sessions. Comprehensive interventions (such as those including skills, self-efficacy and motivation) were more successful at reducing number of sexual partners and frequency of sex than those that attempted to promote abstinence. Programs that focused on institutionalised high-risk adolescents (such as detainees, young people in shelters) achieved larger behaviour changes than those targeting adolescents in general.

In a systematic review of STI prevention behavioural studies for 13–19 year olds that included 12 high quality studies conducted in school settings, seven reported a significant effect on at least one behavioural outcome (Shepherd et al. 2010). However, three of these occurred only in a subset of

participants, and in all these seven, some or all of the other behavioural outcomes showed no effect. The authors conducted a meta-analysis of a subset of studies and found no statistically significant effects. The authors suggest this could be because the majority of follow-ups occurred after less than a year, and some of the participants were not yet sexually active.

Kirby et al. (2007) looked at the impact of curriculum-based sex and STI education programs on young people's sexual behaviour. Their review included 83 studies involving interventions from around the world with youth up to 25 years of age. Programs were included if they had an experimental or quasi-experimental design, had a control group, collected pre- and post-intervention participant data, and assessed at least one sexual behaviour outcome. Kirby et al. found that curriculum-based sexual health and STI/HIV education was effective, with no evidence of any harmful effects. Of the 83 studies they included, 65 per cent showed effectiveness in at least one area of sexual behaviour, and a third in at least two. However, skills-based programs were more likely to be successful in changing young people's behaviour than knowledge-based programs. The review showed these interventions were effective across socio-demographic groups.

In their review of a broad range of intervention types, Lazarus et al. (2010) found that few studies reported any behavioural change. However, the two school-based studies that demonstrated behaviour change (a teacher-led HIV intervention that used multiple methods including role-play, homework, group discussion, and videos; and a randomised control trial of a peer-led program involving the use of activities and participatory learning in which all facilitators had received training) were consistent with the general finding of the above reviews about comprehensive and skill-based interventions being effective.

In addition to their review of impact of studies, Shepherd et al. (2010) conducted a parallel synthesis of process evaluation. They found that interventions were not always implemented in their entirety. Time-consuming aspects such as role-plays were more likely to be skipped over than were knowledge-based components. How supportive the school culture was, as well as facilitator's enthusiasm and expertise, affected the likelihood of successful implementation. Characteristics that could affect students' engagement included facilitator characteristics, the relevance of the content to their needs, how comfortable they were discussing sexual health at school, and gendered norms operating in mixed or single-sex groups. They highlighted an American intervention that stood out in terms of its impact on sexual behaviour. Apart from the usual elements of a sexual health intervention, this study also included the formation of a school health promotion council, students in leadership roles, parent-child sexual health homework tasks, and establishing links with community health services. Shepherd et al. concluded that interventions which addressed multiple domains of young people's social worlds were likely to have more of an impact than those focused only on curriculum.

Sexual behaviour in the context of other risk behaviour

Two studies looked at other health behaviours in relation to sexual health. Jackson et al. (2011) reviewed studies aimed at reducing risk behaviour and that reported on both substance use and sexual risk-taking. The review included 18 experimental studies (14 RCTs, four controlled trials), which addressed multiple domains and had outcome measures for both substance use and sexual risk behaviour. Interventions that targeted children from 5 to 25 years of age were included, and were confined to programs taking a universal rather than targeted approach. Of the 18 studies included, 12 were US-based, two South African, and one each in Australia, Canada, Namibia, and the UK. The Australian study was the Melbourne-based "Gatehouse Project" (Bond et al cited in Jackson et al., 2011). Most interventions were located in schools, and a small number occurred in community settings or at the individual and familial levels. The review conducted by Jackson et al. (2011) did not find studies that had a significant impact on both substance use and sexual behaviour overall. Three studies out of the 18 reviewed had impact on one substance use and one sexual health outcome. The

programs that had some impact on both substance use and sexual behaviours were complex interventions that targeted more than one domain of risk.

Along a similar vein, Peters et al. (2009) reviewed evaluations of programs that addressed three domains: substance use; sexuality; and nutrition. These were chosen as they were programs most commonly offered in Dutch schools. Their aim was to assess the evidence for integrative programs that tackle multiple behaviours in young people, given the evidence that certain behaviours co-occur and have similar determinants. Peters et al. grouped the reviews according to their quality into strong, moderate, and weak categories; they used evidence of effectiveness from strong and moderate reviews. Studies that were covered in the reviews were school-based, included adolescents from 12 to 18 years of age, covered at least one area of risk, and were conducted in western countries. Of the reviews that covered multiple domains, all covered at least sexual behaviour and substance abuse.

Effective interventions were more likely to: have a basis in theory, especially social cognitive theory; address cognitive behavioural skills; correct unhelpful social norms or support protective ones; and be complex interventions that addressed multiple components. Support for the effectiveness of parental involvement, and the benefit of a larger number of sessions, was tentative.

Peer-led versus teacher-led facilitation

Kim and Free (2008) reviewed randomised controlled and quasi-experimental multi-session group-based peer-led workshops with young people across a range of settings, although most were school-based. They looked at 13 relevant studies; eight were conducted in developed countries and these were based predominantly in the UK and US. Nine studies involved interventions in a school setting. The remainder were carried out in community settings. While peer-led interventions did lead to an increase in sexual health knowledge, attitudes and intentions, the review found limited impact of peer-led interventions in changing behaviour. They showed no benefit for condom use or reduction of number of partners. One intervention showed a reduced risk of Chlamydia infection in the intervention group but this was countered by another study that indicated no benefit for rates of STI. However, study results were highly heterogeneous, suggesting there may be real differences in the effects of different interventions included in the review. The reviewers found significant methodological flaws in many of the studies. They identified previously developed recommendations specifically for the evaluation of peer-led sexual health interventions;⁴ none of the trials met the majority of these recommended criteria. The authors concluded there was little overall evidence from randomised controlled and quasi-randomised trials that peer-led interventions improve sexual health outcomes among young people.

In a study of systematic reviews, Peters et al. (2009) found more inconsistent results relating to the greater or lesser effectiveness of peer-led or teacher-led programs within school contexts, concluding there was little evidence that one was more effective than the other. However, they did find one element of the programs that was consistently reported by strong reviews in all domains to have a positive contribution to effectiveness: the level and quality of training of the facilitator.

Shepherd et al. (2010) recommended that careful consideration be given to the choice of intervention provider. For programs to achieve their effectiveness, providers needed to be enthusiastic and credible, with considerable expertise in classroom management and the delivery of skill-building activities. Providers also needed expertise in handling sensitive discussions about sex and relationships, and an appreciation of how wider socio-cultural norms can influence sexual health. The authors suggested that teachers or peers alone may not possess all these skills and qualities (Shepherd et al.).

⁴. Harden A, Weston R, & Oakley A, A. Review of the Effectiveness and Appropriateness of Peer-Delivered Health Promotion Interventions for Young People. London: Social Science Research Unit, Institute of Education, University of London, 1999.

Economic evaluation

Shepherd et al. (2010) conducted a review of economic evaluations of STI prevention programs. Five studies (four based in the USA) were identified; however, four were focused on HIV prevention, which, the authors reasoned, were likely to have underestimated the benefits of interventions as they did not take into account other benefits such as STI prevention or reduction of unplanned pregnancy. Three studies were school-based, and only one study included STI and unplanned pregnancy in its assessment (this study was conducted in the mid-1990s). Shepherd et al. found that few studies which have estimated the cost effectiveness of interventions to prevent STI used estimates of quality-adjusted life-year (QALY). Rather, they used other outcome measures such as cost per major outcome averted or cost per case avoided. Due to limitations of the studies in assessing economic value for STI prevention, it was difficult for Shepherd et al. to come to many conclusions. Two findings, however, may be of use here.

First, in comparing the costs of peer-led and teacher-led programs within schools, Shepherd et al. (2010) estimated that school-based peer-led interventions cost £80,782 per QALY compared to £20,223 for teacher-led interventions. This was based on the assumption that peer educators were trained yearly, and teachers, five-yearly.

Second, sensitivity analyses of the economic analysis model used by Shepherd et al. (2010) found the results were most sensitive to: the size of the intervention effect; the STI transmission probability; and the number of sexual partners in the base-case analysis. In other words, the more the program targeted young people most at risk of acquiring an STI and the more effective the program, the more likely it was the program would be cost-effective.

In their review of comprehensive risk reduction programs, Chin et al. (2012) found that studies which took into account benefits of these interventions beyond sexual health indicated they were of positive economic value. However, the authors noted that youth development aspects of interventions were often difficult to quantify.

Key Findings – School-based interventions and programs

The following is a summary of key findings for school-based programs in relation to the rapid review questions

Primary Question	Key Finding	Strength of evidence on which the finding is based	Key References
Based on available evidence, what types of interventions in schools are most effective in reducing sexually transmissible infections (STI) in young people?	Comprehensive school-based sexual health education programs have the strongest impact on preventing STI among young people during school years	Strong	(Chin et al., 2012; Kang et al., 2010; Kirby et al., 2007; Lazarus et al., 2010; Shepherd et al., 2010)
	School-based programs increase awareness and knowledge around STI and prevention	Strong	(Chin et al., 2012; Kang et al., 2010; Lazarus et al., 2010; Shepherd et al., 2010),
	Skills, self-efficacy and motivation-based programs are more effective than knowledge-based programs in increasing safe sexual behaviours	Good	(Chin et al., 2012; Underhill, Operario, et al., 2007)
	<i>NOTE: 'Abstinence only' programs were <u>not</u> effective in reducing risk or delaying sexual behaviour</i>	Strong	(Chin et al., 2012; Underhill, Montgomery, et al., 2007)

Of the most effective	Key Finding	Strength of evidence on which the finding is based	Key references
Which are more effective with specific sub-groups of young people?	Unable to comment	No evidence reported in reviews	
What are the critical success factors for each of the effective interventions?	The quality of facilitator training and skills are a key factor in achieving sexual health education outcomes, regardless of whether they are teacher-led or peer-led programs	Good	(Kim & Free, 2008; Peters et al., 2009; Shepherd et al., 2010)
	Interventions that address multiple domains across the interpersonal, social and structural levels are more likely to be successful	Moderate	(Gavin et al., 2010; Jackson et al., 2011; Peters et al., 2009)
	Effective programs are usually based on social and behavioural theories and include skills-building, role-playing, and broader structural school community strategies	Moderate	(Jackson et al., 2011; Peters et al., 2009; Shepherd et al., 2010),

What are the critical success factors for each of the effective interventions?...continued	Key Finding	Strength of evidence on which the finding is based	Key references
	Broader youth development goals can have impact on sexual health outcomes and some evidence that peer-led programs may contribute to broader youth development goals	Moderate	(Jackson et al., 2011; Peters et al., 2009)
	Program facilitators that are enthusiastic and credible, have considerable expertise in classroom management and the delivery of skill-building activities, have expertise in handling sensitive discussions about sex and relationships, and an appreciation of how wider socio-cultural norms are more effective in influencing sexual health attitudes and behaviour	Moderate	(Chin et al., 2012; Kang et al., 2010; Kim & Free, 2008; Lazarus et al., 2010; Shepherd et al., 2010)
Which have the greatest impact on reducing health inequalities?	Unable to comment	No evidence reported in reviews	
Which are the most cost-effective?	Teacher-led programs were more cost effective than peer-led programs ⁵	Good	(Kim & Free, 2008)
Any best practice program/project models.	Unable to comment about any specific project models within the above findings	No evidence reported in reviews	
What are the identified research gaps?	Improved and more diverse methods of measuring behavioural outcomes, as well as longer follow-up timeframes, are needed, as are systematic reviews of best practice programs and models		

⁵ Note: this cost analysis assumed similar sexual health outcome effectiveness of teacher- and peer-led approaches, but did not take into account other non-sexual health benefits of peer-based and youth development programs.

3.2 Primary care-based programs and interventions

Overview of reviewed research quality and quantity

In this section, we cover reviews that include interventions conducted in primary care settings. Reviews relating to primary care settings included the largest proportion of RCT-based evidence compared to reviews described in other sections of this report. Generally, interventions were health system focused or individual patient focused, primarily due to the nature of the service and context. Systematic reviews tried to combine results of a broad range of one-on-one interventions working across different primary care settings and client groups. There was also little evidence about linkages between the primary care-based interventions and interventions in other settings and contexts, such as concurrent STI testing campaigns. However, primary care outreach contexts were included in some reviews.

Five reviews focused on STI testing (all Australian):

- Interventions aimed at increasing chlamydia screening and rescreening (Guy et al., 2011; Guy et al., 2012; Kang et al., 2010; Low, Bender, Nartey, Shang, & Stephenson, 2009)
- Home-based STI screening (Shih, Graseck, Secura, & Peipert, 2011).

Four reviews looked at primary care interventions with specific target groups:

- Shepherd et al. (2011) looked at interventions that would reduce HPV infection and cervical cancer in women (the majority of which occurred in health care settings)
- Scott-Sheldon et al. (2010) focused on interventions for patients at STI clinics
- Denno et al. (2012) reviewed sexual and reproductive health interventions to reach marginalised young people that schools and health services do not reach
- Owen et al. (2010) reviewed sexual health services that were based in, or conducted at, outreach to schools.

Screening, testing and treatment

Chlamydia screening in primary care was found to be low in Australia even though it plays a central role in chlamydia management (Guy et al., 2011). Australian reviewers Guy et al. looked at interventions aimed at increasing chlamydia screening and re-screening in primary care. Fifteen papers were selected covering 16 interventions; five were Australian studies, and the rest were based in developed western countries. The majority of interventions (n=10) focused on females, five on both females and males and one on males. Eleven of these 16 were randomised controlled trials.

Six of 15 interventions involving females significantly increased screening. The strategy that showed the biggest increase involved an initial analysis of the gap between existing and ideal screening rates, development of a clinic flowchart and performance indicators, regular meetings to discuss and address the barriers to screening, and implementing a standard urine collection for all adolescents visiting the clinic.

Significant though smaller increases were seen in two interventions in Australia. The first, linking screening to pap smears (although these were not in the age group most commonly affected), and the implementation of computer alerts for participating clinics' patients in the 16–24 age range. Small increases in screening were also seen in a UK study involving a workshop for clinic staff promoting screening, and a US study making use of internet-based education for GPs. The most

successful intervention found for males was a Danish study that implemented universal screening of 16–24-year-old patients, using a urine sample. The authors concluded that universal approaches which established a systematic way of offering testing to young people aged 16–24 were the most effective in increasing screening rates. They noted that these studies looked only at young people who access primary care services. None of the studies addressed the role that other clinic staff might play.

In their review of Australian interventions, Kang et al. (2010) identified general practitioners as an under-used resource for chlamydia screening. While a sizable majority of young people visit a GP at least once a year (Hocking et al cited in Kang et al., 2010) and studies have shown that young people are willing to be tested by GPs (Zakher et al and Pavlin et al cited in Kang et al., 2010), the interventions in this review that were based in general practice had a testing rate of under 10 per cent. The authors recommended a specific Medicare item for chlamydia testing and GP education around chlamydia testing.

In a review of the effectiveness of chlamydia screening initiatives, Low et al. (2009) made a distinction between register-based and opportunistic screening. Opportunistic screening involved offering tests to eligible patients when they attended a clinic. Register screening involved a register to send invitations and reminders about screening to a target population. The review included six systematic reviews, as well as five RCTs, and a comparative and time trend study. Outcomes reviewed to determine effectiveness included the incidence and prevalence of chlamydia, infertility, pelvic inflammatory disease and associated pregnancy and neonatal complications. The authors found that while opportunistic screening of people younger than 25 years of age was the recommended approach in most high-income countries, there was an absence of evidence indicating its effectiveness. By separating opportunistic and register-based screening, Low et al. (2009) found that results indicating the effectiveness of screening programs applied only to register-based screening.

While it is currently recommended that anyone diagnosed with chlamydia be re-tested within three months of treatment, rates of re-testing remain low (Guy et al., 2012). Guy et al. (2012) reviewed interventions with patients aimed at increasing re-testing for chlamydia. Eight studies were identified comprising 12 interventions: four RCTs and four controlled observational studies. All were based in the US. The majority of interventions were based in STI clinics, two each in family planning and primary care clinics. Interventions included phone, email, letter and postcard reminders, mailed screening kits, motivational interviewing, patient incentives, as well as guidelines for clinicians.

Reminders and mailed screening kits, as well as a combination of the two, were the most effective. Mailed screening kits have been shown to be more cost-effective than in-person screening. Most reminder interventions were carried out by phone. The authors noted that while phone and mail have been shown to be effective, phone was the most effective but also the most expensive (Jacobson et al cited in Guy et al., 2012). They argued that SMS reminders may be an alternative, although this method has not yet been tested as a strategy to improve chlamydia re-testing. Use of SMS to increase STI testing and follow-up testing is discussed in section 3.4 below (Computer-mediated, communication technology and social media interventions). The authors noted that medical alerts reminding clinicians about re-testing patients, as well as automated phone calling systems, had also been shown to be effective but had not yet been evaluated in the context of chlamydia re-screening.

Aiming to assess the potential for home-based STI screening, Shih et al. (2011) reviewed studies that compared these with clinic screening. They included five studies in the review; three US-based, and one each from South Africa and Brazil. The authors concluded that home-based STI testing was a promising mode of screening as it had a high level of acceptance and was preferred in many instances. They argued that it may be particularly effective with young people who have limited access to clinics.

Sexual behaviour and other health outcomes

No reviews described evidence of benefit from opportunistic health promotion or education by general practitioners to reduce STI risk in young people, although Kang (2010) suggested further research is required. However, structured behaviour change interventions in primary care settings such as clinics were found to have positive impact, as described below.

Scott-Sheldon et al. (2010) conducted a meta-analysis of behavioural interventions with patients at STI clinics in the US. The effectiveness of interventions was measured through use of condoms, number of sex partners, and the incidence of STI including HIV. The meta-analysis showed moderate benefits in intervention groups compared to controls in condom use and number of sexual partners. Incidence of STI was significantly lower in the medium to long term. These interventions were most successful with young people, and targeted interventions were more successful at improving condom use. The authors concluded that behavioural interventions could reduce the risk of future infection in patients attending STI clinics. Interventions were more successful at promoting condom use and reducing STI incidence in the intermediate and longer term, when the intervention content was targeted to specific sub-groups, included a theory-based motivational component, and delivered in longer doses.

Shepherd et al. (2011) reviewed randomised controlled trials of behavioural interventions that would reduce HPV infection and cervical cancer for young women up to the age of 25 years that included, among other things, information provision about the transmission and prevention of STI. Trials had to measure behavioural outcomes (e.g. condom use) and/or biological outcomes (e.g. incidence of STI, cervical cancer). Twenty-three studies were reviewed, with the majority (n=17) in primary health care settings. The remaining interventions were carried out in community settings, colleges and universities, and one in a school. Ten studies had participants from a broad range of ethnicities; seven predominantly African American, three Caucasian, and two Hispanic. In 13 interventions, only sexually active women and girls were included, while three were pregnant or young mothers. Most of the studies (n=20) included programs that provided at least an educational component as well as skills development. None of the studies reviewed were aimed at HPV or cervical cancer prevention. The authors found that although some behavioural interventions improved condom-related behaviour, trials have been conducted predominantly in US health care settings, and were too different to enable the most effective type of intervention to be identified.

Shepherd et al. (2011) identified three studies as exemplars for programs in primary care. The characteristics of these included social and cultural relevance to the targeted women; provision of information as well as skills development for communication and negotiation in sexual encounters; and emphasis on a variety of risk reduction messages, including effective communication with partners to ensure safer sexual behaviours in general and the importance of consistent condom use.

Lin et al. (2008) reviewed interventions that involved behavioural counselling within primary care settings aimed at preventing STI. Evidence from interventions with adults indicated that behavioural counselling was effective with at-risk populations. Four RCTs that looked at the effect of behavioural counselling on STI incidence among adolescents were included in the study. Three interventions showed moderate success in reducing STI with sexually active youth, while an intervention that included young people who were not yet sexually active showed no effect.

Killoran et al. (2010) also conducted a review of one-to-one interventions to prevent STI and under-18 pregnancies from a UK perspective. Recommendations from effective interventions included the use of behaviour change theories to structure discussions with those considered at high risk, and to emphasise motivation, self-efficacy, and factors that underlie risk-taking. Interventions with vulnerable youth should provide information and advice regarding sexual health. Killoran et al. noted that the focus of these interventions was narrow, and their success depended on integration within a comprehensive approach to sexual health.

Primary care interventions in community settings

Kang et al. (2010) reviewed 23 studies that were categorised as facilitating direct access to STI/HIV testing for asymptomatic people. Most (n=13) of these interventions were implemented in non-health community settings such as football clubs, entertainment venues, schools or communities defined by geographical boundaries. Health services other than general practices were also popular for delivering this type of intervention (n=8) and included settings such as youth health services, antenatal clinics and outreach clinics established by sexual health services.

The highest reported rates of participation in testing was in sports clubs among young men, with three separate studies reporting rates of between 87 per cent and over 95 per cent. Studies in schools, entertainment venues and other non-health care settings achieved participation rates of between 20 and 40 per cent. Whereas the two studies conducted in general practice achieved very low rates of testing (between 6% and 10%).

Denno et al. (2012) reviewed reproductive health and STI services for young people conducted 'out of facility'; referring to services conducted in the community rather than in a hospital or health service facility. The authors reasoned that out-of-facility interventions were useful in reaching marginalised young people and those not reached through schools and health services. Successful interventions in developed countries included condom distribution through street outreach, and mail-out chlamydia testing. Many of the interventions, while focused on health services, also provided education. The authors point out that while knowledge was an important factor in sexual health outcomes, only one study of the 20 reviewed considered the impact of multiple components. They concluded that out-of-facility approaches showed promise, but more robust evaluation designs were needed to understand which strategies were most effective.

Owen et al. (2010) reviewed school-based sexual health services with young people aged 11–18 years, including studies from 1985 onwards. Thirty papers comprising 26 studies were reviewed. Most were US studies; one was based in Brazil, and one in the UK. The authors noted that findings from the US studies needed to be interpreted with caution due to differences between the US health system and other countries' health systems. The authors grouped the studies into higher-quality and lower-quality studies. As there were no RCTs, studies with controlled before and after designs were grouped as higher quality. The studies relied on secondary outcomes that included condom use, sexual activity, and use of oral contraception. There is good quality evidence that sexual health services conducted in school settings do not lead to increases in sexual activity or lowering of age of first sexual intercourse. While the review identified consistent findings about service features that matter to young people and achieved high acceptability, the review found no high-quality evidence that sexual health services in school settings led to higher contraceptive use, and no evidence that they had an impact on unintended pregnancy. Few studies, and none of high quality, reported STI rates, and the results were inconclusive.

Overall, reviews found that interventions need to be tailored to patient needs and preferences, with emphasis on meeting diverse needs of males and females, adolescents and young adults (Guy et al., 2012) and that there was demonstrated potential for high participation in STI screening-based initiatives conducted through or in partnership with youth-related organisations (e.g. Denno et al., 2012; Guy et al., 2011; Kang et al., 2010).

Economic evaluations

None of the reviews described cost–benefit or economic evaluation of screening programs across the different models.

Barham et al. (2007) conducted an economic evaluation of primary care- or health service-based one-to-one interventions to reduce STI generally as well as teenage pregnancy. Studies that involved interventions delivered individually for a majority of the time, and based in Europe, the US, Canada or Australia, were included. Fifty-five studies were reviewed. Of these, 29 pertained to screening for

chlamydia. Overall, the studies found one-to-one interventions to be cost-effective. They noted that an intervention for one particular STI could have an impact on others as well. Similarly, the review of Killoran et al. (2010) of one-to-one interventions to prevent STIs found that they were cost-effective. However, Barham et al. and Killoran et al. warned the majority of studies that made up the evidence base for one-to-one interventions were US-based, and advised caution when applying the findings to other contexts.

Key Findings – Primary care-based interventions

The following is a summary of key findings for interventions based in primary care in relation to the rapid review questions.

Primary Question	Key Findings	Strength of evidence on which the finding is based	Key references
Based on available evidence, what types of primary care-based interventions are most effective in reducing sexually transmissible infections (STI) in young people?	Universal approaches ⁶ that established a systematic way of offering testing to young people aged 16–24 were the most effective in increasing screening rates	Strong	(Guy et al., 2011; Guy et al., 2012; Kang et al., 2010; Low et al., 2009)
	One-to-one structured counselling interventions with sexually active young people can be effective in behaviour change, can be cost-effective	Strong	(Scott-Sheldon et al., 2010)
	Home-based testing for re-screening or repeat testing may be an effective option to offer young people	Good	(Shih et al., 2011)
	A range of technology-based testing or appointment reminder mechanisms have been found to be effective in increasing testing and re-testing rates in young people attending primary care services	Good	(Guy et al., 2011; Guy et al., 2012; Kang et al., 2010; Low et al., 2009)
	Targeted outreach screening formats (community programs and non-GP health services) show high acceptance and participation in STI screening but inconclusive evidence about cost-effectiveness	Moderate	(Denno et al., 2012; Owen et al., 2010)
	<i>NOTE: Evidence of the impact of sexual health services in schools on incidence of STI is contradictory</i>	Moderate	(Owen et al., 2010)
	Potential exists for high participation in STI screening-based initiatives conducted through or in partnership with youth related organisations	Moderate	(Denno et al., 2012; Guy et al., 2011; Kang et al., 2010)

⁶ Universal refers to approaches that offer a screening test to all eligible clients regardless of the health reason for which they have attended the clinic or practice.

Sub-question		Strength of evidence on which the finding is based	Key References
Which are more effective with specific sub-groups of young people?	Approaches that took into account gender, patient needs and preferences were recommended. However there were few generalizable findings regarding which approaches may be more effective on the basis of gender	Moderate	(Guy et al., 2012; Shih et al., 2011)
What are the critical success factors for each of the effective interventions?	In regard to universal approaches to offering testing, proactive and systematic screening such as register-based approaches were more effective and efficient than opportunistic screening	Good	(Low et al., 2009)
	One-to-one structured counselling interventions are more likely to be effective when they target those identified as high risk and to emphasise motivation, self-efficacy, and factors that underlie risk-taking and are implemented as part of a broader program	Good	(Killoran & McCormick, 2010; Lin et al., 2008)
	To be most effective, programs in primary care settings need to include social and cultural relevance, provision of information as well as skills development for communication and negotiation in sexual encounters, and emphasis on a variety of risk reduction messages	Moderate	(Savage, 2009; Shepherd Jonathan et al., 2011)
	Young people will respond positively to an offer from a clinician or GP for an STI test and many would prefer this to having to initiate the request	Good	(Kang et al., 2010)
	<i>NOTE: There has been little success in increasing STI screening rates in general practice due to structural and practice barriers to offering STI screening</i>	Good	(Kang et al., 2010)
Which have the greatest impact on reducing health inequalities?	Unable to comment	No evidence reported in reviews	
Which are the most cost-effective?	Unable to comment	No evidence reported in reviews	
Any best practice program/project models	Unable to comment	No evidence reported in reviews	
Research Gaps	<p>None of the RCTs reviewed included assessment of the role of non-clinical staff in primary care in a clinical or outreach context.</p> <p>Evaluation designs that are able to incorporate multiple strategies and settings were needed to understand which combination of strategies, including those in primary care, were most effective.</p>		

3.3 Programs using social marketing and mass media

Overview of reviewed research quality and quantity

Most evidence relating to the role and impact of social marketing and mass media in public health comes from non-sexual health-related public health campaigns, such as those for tobacco and alcohol. The majority of STI mass media campaigns conducted in Australia and other similar countries have only been funded to assess campaign reach and recall and few have been published in the peer reviewed literature. Social marketing campaigns need to be developed with close attention to local context and culture, and adapted and reoriented during implementation. This makes experimental trial methodologies difficult to implement and achieve results that are more specific than good social marketing practice and can be translated to different contexts. Therefore, there are few high quality studies of STI prevention social marketing campaigns on which systematic reviews could draw and identify specific campaign characteristics that may contribute to campaign success.

Although social marketing includes the use of all the tools of marketing and market engagement to create social change at the individual, social and structural level (Donovan, 2011), the three systematic reviews included in this section limited their review of social marketing to paid advertising campaigns (such as TV, radio, print) and non-interactive websites.

Reviews in this section include:

- Kang et al. (2010), who, in their evaluation of Australian sexual health interventions with young people, reviewed four studies of before and after assessments of sexual health media campaigns aimed at young people.
- Delgado et al. (2007), who evaluated systematic reviews of sexual health interventions targeted at young people through print and broadcast mass media (as well as internet-based interventions [covered in the following section]).
- Savage's (Savage, 2009) review of STI programs relevant to Aboriginal youth, which included descriptive evaluations of Australian programs and drew on the broader literature regarding minority youth.

Note: It may be useful to complement the reading of this section with the Victorian Department of Health's commissioned rapid review on mass media in public health. This can be found at:

http://www.health.vic.gov.au/healthpromotion/downloads/mass_media_final_es.pdf

Awareness, knowledge and attitudes

Kang et al. (2010) concluded that media campaigns that target young people in order to improve knowledge, attitudes and behaviour are promising. This was supported by more rigorous evaluation of HIV-related media campaigns, such as a review of randomised control trials and quasi-experimental evaluations across 23 countries that showed improvements in knowledge and behavioural intentions (Noar cited in Kang et al., 2010).

Screening, testing and treatment

In the review by Kang et al. (2010), three of the STI-specific media campaigns were focused on young people and chlamydia; of these, two demonstrated a significant increase in testing post-campaign. The authors noted that the unsuccessful campaign promoted condom use and not testing for

chlamydia. There was limited assessment of key success factors with so few campaigns, other than the importance of campaigns being well-targeted and implemented.

Sexual behaviour and other health seeking behaviour

None of the reviews provided evidence of the impact of STI-focused campaigns on sexual behaviour. However, the following studies of HIV-focused campaigns targeting young people do provide *some* insight. In a review of HIV-related media campaigns in Africa, Asia and Latin America (Betrand, 2006 cited in Delgado & Austin, 2007), seven out of eight campaigns showed a reduction in high-risk sexual behaviours. These included a mix of different media including TV and radio and print. Delgado et al. (2007) suggested that targeting parents through media campaigns may also be a useful strategy. In a US study, exposure to a public media campaign encouraging parents to talk to their children about sex was positively associated with the frequency that parents talked to children about safe sex (Durant et al, 2006 cited in Delgado & Austin, 2007).

Mass media campaigns targeting all youth may have some impact on raising awareness with sub-groups of young people but there is evidence that complementary targeted initiatives achieve higher levels of acceptability and engagement and so may be more effective at promoting attitude and behaviour change (Savage, 2009). Consistent with good social marketing practice, reviewers advocated that multichannel and theory-based media campaigns should be linked with other STI-related health promotion strategies in schools, communities and health services (Delgado & Austin, 2007; Savage, 2009).

Key Findings – Social marketing and mass media

Primary Question	Key Finding	Strength of evidence on which the finding is based	Key references
Based on available evidence, what types of social marketing and mass media interventions are most effective in reducing sexually transmissible infections (STI) in young people?	Mass media can have an impact on STI awareness, knowledge and uptake of STI testing in the short term	Moderate	(Delgado & Austin, 2007; Kang et al., 2010; Savage, 2009)
	There is little evidence that mass media can achieve sustained changes in behaviour in isolation from other programs	Moderate	

Sub-question	Key Finding	Strength of evidence on which the finding is based	Key references
Which are more effective with specific sub-groups of young people?	Mass media campaigns targeting all youth may have some impact on raising awareness with sub-groups of young people but there is evidence that targeted complementary initiatives achieve higher levels of acceptability and engagement and so may be more effective at promoting attitude and behaviour change	Weak	(Savage, 2009)
What are the critical success factors for each of the effective	Multichannel and theory-based media campaigns should be linked with other STI-related health promotion strategies in schools, communities and health services	Weak	(Delgado & Austin, 2007; Savage, 2009)

interventions?			
Sub-question	Key Finding	Strength of evidence on which the finding is based	Key references
Which have the greatest impact on reducing health inequalities?	Unable to comment	No Evidence Described	
Which are the most cost-effective?	Unable to comment	No evidence reported in reviews	
Any best practice program/project models	Unable to comment	No evidence reported in reviews	
Research Gaps	<p>No evidence was found that describes and guides the role of STI mass media campaigns within an integrated program of STI prevention across primary care, educational institutions and community</p> <p>No evidence was found regarding effectiveness of STI campaign sponsorship or outreach strategies at youth events such as community events and music festivals</p> <p>Little evidence was found about the key success factors related to theory, development and implementation process, or development of best practice guidelines that would improve the impact of STI social marketing campaigns</p> <p>No evidence was found regarding the long-term impact and cost-effectiveness of sustained STI campaigns over multiple years</p> <p>Little evidence was found of the application of findings from HIV-related social marketing research to STI prevention contexts</p>		

3.4 Programs using computer-mediated, communication technology and social media interventions

Overview of reviewed research quality and quantity

The technology and context of young people’s use of computer-mediated communication technology and social media interventions changes rapidly. Results of interventions based on technology and use more than five years ago have very limited applicability. This provides a challenge for the development, implementation and publication of randomised control trials and quasi-experimental trials, and the application of their findings.

In this section, we report on six reviews that cover:

- Computer- and web-based programs (Bailey Julia et al., 2010; Delgado & Austin, 2007; Noar, Pierce, & Black, 2010).
- Interventions using text messaging (Lim, Hocking, Hellard, & Aitken, 2008).
- Social networking websites (Gold et al., 2011).

- Interactive computer-based media (Guse et al., 2012).

Not all these reviews were limited to interventions for young people, but all focused on media that was especially relevant to young people at the time the studies were conducted. Only Delgado et al. (2007) looked specifically at interventions that targeted young people. None of the social networking site studies used randomised control trials or quasi-experimental trial methods and few social networking site initiatives are published in peer-reviewed literature.

Awareness, knowledge and attitudes

Bailey et al. (2010) reviewed interactive computer-mediated interventions concerning sexual health. Although the review was not confined to interventions with young people, of 15 studies reviewed, six interventions were with adolescents and three with college and university students. Recruitment was through schools, colleges, universities, medical centres, social service programs, and online. Eight were targeting HIV prevention, three targeted STI, two targeted pregnancy, one targeted sexual assault. The programs included feedback based on knowledge and experience, practising real world decision-making and other cognitive strategies and skills. Only interventions that could be done without the help of facilitators were included. Bailey et al. found that interactive computer-based interventions had significant positive effects on sexual health knowledge, and small significant effects on intentions to practice safer sex and self-efficacy around sexual health. These effects occurred in the short term as follow-up was conducted at a maximum of six months after intervention. In assessing their effectiveness compared to face-to-face interventions, the authors were only able to do meta-analyses of effects relating to knowledge. They found that interactive computer-based interventions were as effective as face-to-face interventions in increasing knowledge. Bailey et al. (2010) noted there was insufficient data for them to comment on health outcomes, and no data on cost-effectiveness.

Noar et al. (2010) conducted a meta-analysis of what the authors referred to as “Computer - mediated Interventions” (CMIs). They looked at factors that mediate safer sex, according to behavioural theories commonly used in HIV prevention. These included knowledge, attitudes, self-efficacy, perceptions of susceptibility, and intentions. Focusing on these factors, the authors aimed to assess the efficacy of CMIs, whether these were as effective as face-to-face interventions, and what moderated the effectiveness of CMIs. The review consisted of 18 articles comprising 20 studies. Most of the studies (n=13) had samples of mixed gender. The majority were heterosexual; just three involved interventions among men who have sex with men. The mean age across the studies was 21 years. Fourteen were based in developed countries, the majority (n=11) in the United States. Over half the interventions were internet-based, and most others were conducted using a computer at a site such as a community centre. The authors reported significant effects for all the reported effects except one (refusal self-efficacy). The three most commonly reported outcomes were HIV knowledge, combined sexual/condom attitudes, and condom self-efficacy. Interventions that made an impact on sexual/condom attitudes were more likely to be individually tailored, and to be delivered online. Those that were focused on HIV/AIDS knowledge were less likely to increase knowledge. Interventions targeting men who have sex with men were more successful in addressing sexual and condom attitudes than those targeting heterosexuals. Noar et al. (2010) noted that programs making use of social cognitive theory were the most successful. The authors suggested that interventions using risk perception attitude framework in which participants were grouped according to their beliefs (Rimal et al, 2009 cited in Noar et al., 2010) may be a possible foundation for computer-mediated interventions.

In their review, Gold et al. (2011) described the use of social networking sites (SNS) in promoting sexual health. They were unable to assess the effectiveness of these interventions. Due to their recent development and the unique methodological difficulties they present, studies assessing the impact of SNSs are few and far between. Most of the interventions were US-based, and most

targeted young people. Apart from impact on health knowledge, attitudes and behaviour, the authors suggested that evaluations of SNSs should take into consideration user characteristics, the quantity and quality of interactions, the spread of the message through shares and re-tweets. They found the most popular health promotion activities had thousands of end-users, with regular posts by owners and end-users each week. They concluded that social networking sites are an important mode of health promotion, particularly among young people, as they had potential to reach an unprecedented number of people as well as sub-groups.

The review by Guse et al. (2012) covered all these areas, looking at interventions to improve adolescent sexual health using “new digital media”; what the authors define as “user-driven interactive forms of communication” encompassing internet, social media and text messaging. Studies were included if at least 50 per cent of participants were aged between 13–24 years. Ten studies were selected, seven of which were based in the United States. The remaining three took place in developing countries. Guse et al. (2012) found that while these technologies were emerging as important ways of promoting adolescent sexual health, more rigorous research is needed to evaluate their impact. Overall, across all 10 studies that were included, the authors noted that significant impacts were most often seen in knowledge outcomes. The authors reasoned this could have been because of the short follow-up time in most of the studies.

Generally, computer-based interventions were seen to compare well to face-to-face interventions. Noar et al. (2010) found that while the effects were smaller than face-to-face interventions for HIV knowledge, condom self-efficacy and intention outcomes, they were equal or larger for perceived susceptibility, sexual and condom attitudes, and condom communication outcomes. Bailey et al. (2010) also found interactive computer-based interventions to be as effective as face-to-face interventions for increasing sexual health knowledge. Interactive interventions are potentially more effective because they could be tailored to individuals (Noar et al., 2010), provided immediate feedback (Delgado & Austin, 2007), and could provide personalised experiences relevant to young people’s developmental stage and sexual experience (Guse et al., 2012). Furthermore, despite shortcomings in some areas, because of their reach they are likely to have greater impact (Noar et al., 2010).

Screening, testing and treatment

Australian reviewers Lim et al. (2008) looked at the use of short-message service (SMS) or text messaging in sexual health. In the studies outlined, SMS was used for reminders of appointments and medication, dissemination of test results, as well as health promotion. Lim et al. (2008) found that a small number of non-RCT studies indicated SMS could increase awareness of campaigns, was considered favourably, successfully targeted hard-to-reach populations, reduced missed appointments and shortened time to treatment.

Due to the popularity of SMS among young people, its low cost and convenience, and the capacity to allow young people to ask questions anonymously about their sexual health, the authors suggested that SMS could be a good way for health promotion to be conducted. However, much of the evaluation has been process-focused and most interventions have not been rigorously evaluated. The only RCT the authors were aware of was their own (Lim et al., 2007), which was in progress at the time of writing their review.

Sexual behaviour and other health-seeking behaviour

Of the seven US studies using new digital media that Guse et al. (2012) reviewed, five aimed to improve sexual health knowledge and change sexual behaviour. The remaining two had more specific aims, namely compliance with HAART treatment regimens for HIV-positive youth, and encouraging young people to remove references to sex from their MySpace pages. Of these five, all made use of web-based interactive programs. Two of these five had a significant impact on youth sexual behaviour. Both were school-based RCTs using an interactive computer game. One of these included

other components such as parent–child homework assignments, journaling and group work. In both cases, students in the intervention group were less likely to have initiated sex in the follow-up timeframe.

Most of the reviews cited the need for more rigorous research into their behavioural effectiveness and the need for innovation when dealing with the methodological challenges posed (Bailey Julia et al., 2010; Guse et al., 2012; Lim et al., 2008).

While Delgado et al. (2007) argued that internet and computer-based interventions had an advantage over other forms of mass media as participants could be randomised and tested, others pointed out that programs which prove effective in RCTs can be out of date by the time these results are available (Bailey Julia et al., 2010), and cannot keep up with rapidly changing youth technological cultures (Bailey Julia et al., 2010; Guse et al., 2012).

Key Findings – Programs using computer-mediated, communication technology and social media interventions

Primary Question	Key Finding	Strength of evidence on which the finding is based	Key references
Based on available evidence, what types of computer-mediated technology or communication technology are most effective in reducing sexually transmissible infections (STI) in young people?	Sexual health education through the use of computer-mediated technology or communication technology may improve young people’s sexual health knowledge and attitudes	Moderate	(Bailey Julia et al., 2010; Delgado & Austin, 2007; Noar et al., 2010)
	Social networking sites are being utilised within STI health promotion and generally as part of larger mass media or community services initiatives. Few have been evaluated to determine impact	Weak	(Gold et al., 2011; Guse et al., 2012)

Sub-question	Key Finding	Strength of evidence on which the finding is based	Key references
Which are more effective with specific sub-groups of young people?	Social networking sites have potential for accessing sub-groups of young people	Weak	(Gold et al., 2011; Guse et al., 2012)
What are the critical success factors for each of the effective interventions?	Interactive programs can be tailored to individual experiences and characteristics and this improves the intervention impact	Moderate	(Bailey Julia et al., 2010; Delgado & Austin, 2007; Guse et al., 2012; Noar et al., 2010)
	SNS and other new technologies that are based on a user-created content approach need to be able to engage with and allow user-created and even user-driven content and posts	Weak	(Gold et al., 2011; Guse et al., 2012)

Sub-question	Key Finding	Strength of evidence on which the finding is based	Key references
Which have the greatest impact on reducing health inequalities?	Unable to comment	No evidence reported in reviews	
Which are the most cost-effective?	Computer-mediated interventions are potentially more cost-effective than face-to-face interventions to improve knowledge and attitudes	Moderate	(Bailey Julia et al., 2010)
Any best practice program/project models	Unable to comment	No evidence reported in reviews	
Research Gaps	<p>Evaluation methodologies need to be developed that can determine the effectiveness of interventions in environments where the technology and context changes rapidly and so the interventions need to continuously change</p> <p>Evidence is required to guide the development and implementation of STI health promotion using social networking sites and other technology that can incorporate cultures of user-created and driven content in an effective and safe way</p>		

3.5 Programs targeted to at-risk or minority youth

Overview of reviewed research quality and quantity

Most systematic reviews that included programs targeted to at-risk or minority youth highlighted the paucity of randomised control trials or quasi-experimental trials conducted outside institutional settings. Studies that were conducted in community youth organisations or other community outreach contexts were usually single-group studies or descriptive process evaluations. Barriers to measuring impact for these community programs included the changing life circumstances for many at-risk young people, the nature of community interventions working with minority youth, and funding constraints of programs. However, as discussed below, due to the health circumstances of some groups of at-risk young people, larger changes in health outcomes can sometimes be demonstrated through programs targeting all youth.

Reviews in this section include:

- Shepherd et al. (2010), Gavin et al. (2010) and Chin et al. (2012), who included within their broader reviews analyses of studies that targeted young people at higher risk of STI
- Downing et al. (2011), who reviewed the use of targeted family and parent- / youth-focused interventions with young people
- Shepherd et al. (2011), Lazarus et al. (2010) and Tolou-Shams et al. (2010), who included reviews of the role of peer-led programs with at-risk youth
- In relation to particular socio-demographic groups, Savage (2009) reviewed programs with Aboriginal youth, Tolou-Shams et al. (2010) programs with juvenile offenders, and Romero et al. (2011) programs targeting at-risk African–American youth.

Positive youth and family development

As studies such as Shepherd et al. (2010) and Chin et al. (2012) show, effectiveness of programs can sometimes be better demonstrated among specific sub-groups of young people who are at increased risk of STI. In the 2010 review by Gavin et al. (2010) of positive youth development interventions (covered in the Schools section), 12 of the 15 shown to be effective were targeted interventions with at-risk youth (7 of the 10 school-based and all 5 of the community settings programs). The most common program goals targeted by the effective positive youth development programs were: pro-social bonding; cognitive competence; social competence; emotional competence; belief in the future; and self-determination. Approximately one-third of the programs targeted behavioural competence, moral competence, self-efficacy, and pro-social norms. One-quarter of the effective programs attempted to help youth develop a clear and positive identity. All but one program aimed to strengthen the family, school, or community context. These programs demonstrated a wide range of improvements in adolescent sexual and reproductive health behaviours and outcomes, and the impact for some programs extended into adulthood (Gavin et al., 2010).

Downing et al. (2011) looked at the effectiveness of parent and family interventions on young people's sexual health outcomes. Seventeen studies were included; all were US-based and most occurred with African-American or other minority groups. Interventions were categorised as "family-based" if they included both youth and parent. Studies were included if they assessed either sexual behavioural outcomes or communication with parents about sex. Findings show little evidence for the effectiveness of family-based programs and limited evidence for the effectiveness of parent-based programs. Parent interventions showed inconsistent positive effects on young people's sexual health outcomes, although they appeared to improve parent and child communication. Downing et al. also compared parent and family interventions that addressed multiple health behaviours with those that focused only on sexual health. Those addressing multiple behaviours had greater impact on health outcomes, including on sexual health.

Peer-led approaches

The evidence for effectiveness of peer-led and peer-based sexual health programs is strongest among young people at increased risk of HIV infection, such as young men who have sex with men, in many randomised controlled trials (Lazarus et al., 2010). However, quasi-experimental and non-experimental studies of peer-based programs among young people at increased risk of STI have generally had similar results. Peer-led programs with juvenile offenders were effective in improving knowledge, self-efficacy, and providing motivation for change (Tolou-Shams et al., 2010). Similar results were found by the programs reviewed by Savage (2009) among Aboriginal youth. Shepherd et al. (2011) reviewed interventions that would reduce HPV infection and cervical cancer in women. Of three interventions they highlighted as exemplars, two were targeting African-American women and involved African-American health and peer educators.

Programs targeted to Aboriginal or Torres Strait Islander youth

Savage (2009) conducted a review of sexual health interventions with Indigenous young people in New South Wales, focusing on the effectiveness and cultural acceptability of these programs. Savage was able to describe a range of interventions implemented in NSW and elsewhere in Australia that had indications of success, although none had the resources or the methodological context to be able to implement experimental or quasi-experimental trials. Savage (2009) stressed the importance of more rigorous evaluative documentation and the need for background research. She noted a lack of baseline evidence for young Aboriginal people's sexual health, as well as evidence to guide interventions in rural and remote settings.

Taking into account the lack of experimental-level evidence, Savage (2009) concluded that a range of services nationally and internationally held promise for Aboriginal adolescents, highlighting that the focus should not be solely on sexual and reproductive health, but integrated with other issues to

improve health literacy, confidence, communication, and life aspirations. Savage presented a number of features that were important in the development and implementation of such programs: community consultation; collaborative development and tailoring of interventions; and considering multidisciplinary and interagency approaches.

Programs targeted to juvenile offenders / youth in detention

Tolou-Shams et al. (2010) conducted an exploratory non-meta-analytic review of HIV risk behaviour prevention interventions with juvenile offenders. Sixteen studies were included, and between- and within-group effect sizes were calculated for 12 studies for which data were available. The majority were US-based; two were Canadian. Most of the interventions were conducted in detention facilities (n=12) and the rest occurred in residential, rehabilitation, and alternative school settings. Participants were aged between 7 and 19 years with a mean age of 16.

Five of nine studies that assessed sexual risk-taking post-release showed a reduction in risk behaviour. All but one of the 13 studies that measured knowledge and attitudes showed some improvements. The authors noted that the greater impact on knowledge over behaviour is consistent with research among other youth populations. The findings showed that regulating emotion and mood can have an impact on sexual risk behaviour. One study showed that participants in an anger management program only showed similar reductions in sexual risk-taking as those who took part in an HIV prevention program. Programs that also included motivational training in the context of substance use had similar effects. The review also found that interventions which continue post-release had more long-lasting impact. Tolou-Shams et al. (2010) pointed out a lack of family interventions, that none of the programs addressed issues of relevance to different ethnic groups, sexualities, and genders and despite evidence that sexual risk behaviour is related to mental health and substance use, few programs addressed co-occurring risk factors.

Programs targeted to African–American youth

Romero et al. (2011) conducted a review of factors that affect sexual behaviour in African–American youth, and compared these with evidence-based HIV prevention interventions with African–American youth. Seven studies were identified: six designed specifically for African–American youth, and one had 53 per cent African–American participation.

Environmental variables that increased risk were socioeconomic status and neighbourhood, influence of the media, and opportunities for sexual activity. Factors that were protective included parental and familial connectedness and parental communication about sex, and perceived parental monitoring. Perceived norms that increased risk were perception of peers' sexual activity, substance use and delinquent behaviour, while positive peer support was protective.

The evidence-based HIV/STI prevention interventions reviewed only partially included perceived norms and environment. Despite well-established evidence that knowledge is necessary but insufficient in HIV/STI prevention, most of the time was spent on improving knowledge. Skills were the next most prominent focus in the interventions. All seven had a significant skills building component. However, the literature review of risk factors indicates that only decision-making and communication skills were found to be protective. The authors suggested that positive youth development strategies may be effective with African–American young people. They cited the AIM program (Clark et al, 2005 cited in Romero et al., 2011) that effectively changed risk behaviours. This was not a traditional HIV prevention program; rather, it focused on young people's future goals. They also recommended further research into multi-level interventions that include family and community factors.

Youth-related organisations and events

The systematic reviews also identified a broad range of interventions based within youth-oriented or youth-targeted organisations or institutions outside schools and primary care contexts. This ranged from sporting clubs and entertainment venues, to youth- or street-based outreach organisations, to juvenile detention centres. Across the reviews were three consistent findings:

- As reported in the earlier Primary Care section, there was potential for high participation in STI screening conducted through or in partnership with youth-related organisations (e.g. Denno et al., 2012; Guy et al., 2011; Kang et al., 2010).
- Peer-based initiatives targeting at-risk youth in or through youth-related organisations showed good evidence of high levels of engagement with at-risk youth, good evidence of improved levels of knowledge, skills, and behavioural intentions, and moderate evidence of changes in behaviour (Chin et al., 2012; Denno et al., 2012; Jackson et al., 2011; Shepherd et al., 2010).
- No evidence in any of the systematic reviews about the cost-effectiveness of interventions in these contexts.

There was no evidence presented in the systematic reviews about the effectiveness of peer-led STI initiatives aimed at improving knowledge, skills or behaviour which targeted young people at community or youth festival events.

Key Findings – Programs targeted to at-risk or minority youth

Primary Question	Key Findings	Strength of evidence on which the finding is based	Key References
Based on available evidence, what types of programs targeted to at-risk or minority youth are most effective in reducing sexually transmissible infections (STI) in young people?	Targeted and tailored programs for at-risk or minority youth can be effective in increasing knowledge, attitudes, and motivations	Good	(Chin et al., 2012; Gavin et al., 2010; Shepherd et al., 2010)
	This results in changes in behaviour and improved health outcomes	Moderate	
	Programs that focus on self-efficacy, health literacy, confidence, communication, and life aspirations, and not focus exclusively on sexual health, can be more effective with at-risk or minority youth than programs focused on sexual health alone	Moderate	(Gavin et al., 2010)
	Potential exists for high participation in STI screening-based initiatives conducted through or in partnership with youth-related organisations (as per Primary Care Key Findings in section 3.2 above)	Moderate	(Denno et al., 2012; Guy et al., 2011; Kang et al., 2010)

Sub-questions		Strength of evidence on which the finding is based	
Which are more effective with specific sub-groups of young people?	Programs for Aboriginal youth that follow good cultural practice such as community consultation and ownership; collaborative development and tailoring of interventions; and considering multidisciplinary and interagency approaches are more likely to be acceptable and effective	Moderate	(Savage, 2009)
What are the critical success factors for each of the effective interventions?	Skills, self-efficacy and motivation-based programs are more effective than knowledge-based programs in increasing protective behaviours	Good	(Chin et al., 2012; Gavin et al., 2010; Lazarus et al., 2010; Shepherd et al., 2010; Shepherd Jonathan et al., 2011; Tolou-Shams et al., 2010)
	Peer-led interventions and youth development interventions with at-risk young people and minority youth are effective in increasing knowledge, attitudes, and motivations	Good	(Chin et al., 2012; Denno et al., 2012; Jackson et al., 2011; Lazarus et al., 2010; Shepherd et al., 2010; Tolou-Shams et al., 2010).
	This may result in a reduction in sexual risk behaviour	Weak	Shepherd et al., 2010; Tolou-Shams et al., 2010).
	Moderate evidence that effective programs are based on theories such as social cognitive theory and other behaviour and interaction theories.	Moderate	(Gavin et al., 2010).
Which have the greatest impact on reducing health inequalities?	Unable to comment	No evidence reported in reviews	
Which are the most cost-effective?	Unable to comment	No evidence reported in reviews	
Any best practice program/project models	Unable to comment	No evidence reported in reviews	
Research Gaps	<p>Paucity of published well-documented and evaluated programs working with Aboriginal or Torres Strait Islander young people, and with culturally and linguistically diverse young people</p> <p>No evidence found in the systematic reviews concerning the effectiveness of peer-led initiatives aimed at improving knowledge, skills or behaviour which targeted youth people at sub-cultural youth festival or community events.</p>		

3.6 Community, structural and multi-level programs

Overview of reviewed research quality and quantity

The section reviews evidence for STI prevention programs that operate at a community or structural level and are usually implemented with a combination of strategies across different health promotion levels. As raised in previous sections, sexual health interventions are complex; it can be difficult to determine the relative impact of a particular intervention from the combined impact of other related interventions.

Community-level interventions often employ theories such as diffusion of innovation and community organising or development, and use combined approaches such as social marketing, peer outreach and community mobilisation to shift or modify social norms that may influence health behaviours. Due to the types of interventions employed to target communities, more time is generally required for implementation and to observe the impact, making evaluation within limited timeframes challenging.

Structural interventions draw on an understanding of social determinants of health, and the context in which risk and prevention practices are produced and reproduced, with the aim of leveraging the social and infrastructural drivers of STI transmission. The broader structural and social factors that can increase people's vulnerability to STI include education, employment, income and job security, as well as access to health services, safe sex resources such as condoms, social exclusion and stigma. Structural interventions typically involve: regulation, funding and policy initiatives to enhance the availability, acceptability and accessibility of prevention; changing laws or policy to address human rights, social injustice and inequality; developing partnerships with sectors beyond health; and shifting harmful social norms and bringing about political change. However, the use of structural approaches in STI prevention have been evaluated far less than other intervention levels even though they can be a major contributor to the success or failure of a program.

STI prevention interventions at multiple levels (such as individual, community and structural), or that take a combined or system approach across levels are difficult to design, implement, and evaluate. In addition, to utilise experimental methodologies such as RCTs that randomise at the community level is logistically challenging, time-consuming, and generally very expensive. As a result, few experimental trials of multilevel or system-level prevention interventions have been conducted.

Systematic reviews that contributed to this section were:

- Cardoza et al. (2012), who conducted a social ecological review of interventions for US Latino adolescents
- Gavin et al. (2010) review of positive youth development interventions
- Charania et al. (2011) review of structural-level condom access
- DiClemente et al. (2007) and Killoran and McCormick (2010) reviews and critiques of STI prevention programs.

Note: It may be useful to complement the reading of this community, structural and multi-level programs section with the Victorian Department of Health's commissioned rapid review on community-based multi-level programs in public health. This can be found at: http://www.health.vic.gov.au/healthpromotion/downloads/cbi_full_report_final.pdf

Sexual behaviour and other health-seeking behaviour

Cardoza et al. (2012) took a social ecological perspective to assess the effectiveness of sexual health behaviour interventions for US Latino adolescents at the individual level, interpersonal level, community level and at the societal / policy (or structural) level. The studies they reviewed were conducted in various settings in schools and within communities. Apart from community organisations, community settings included clinics and health agencies, street corners and participants' homes. One of the strengths they identified was that interventions often combined different social ecological levels; however, these were almost always confined to the individual and interpersonal levels. They argued that interventions should address community- and societal- or policy-level issues, and were opportunities for capacity building within the Latino community when conducted in partnership with existing community structures.

In the review of positive youth development interventions by Gavin et al. (2010), strengthening family was the most common focus, followed by school, then community. The authors noted that all successful programs fostered what they called "supportive environments" through promoting school success and providing teachers and parents with skills in childhood behaviour management. Effective programs were significantly more likely to provide supportive environments and to work on strengthening the school context compared to the programs identified as ineffective. Two of the programs reviewed compared interventions with young people only with interventions involving family, school and community. Those involving only young people did not improve sexual health outcomes.

Charania et al. (2011) reviewed structural-level condom access and distribution interventions. They noted that many sexual health interventions were individual-, group- or community-focused, and, while effective, they did not address contextual social system issues. Structural-level condom distribution programs aim to address availability, accessibility, and acceptability of condoms. Charania et al. conducted a meta-analysis of programs that met these requirements and that assessed STI risk behaviours. Twenty-one studies were identified, of which eight were youth-specific; half of these were based in the US and the rest in developing countries. The reviewers found that interventions which had a structural aspect were effective but those that combined a structural approach with individual, group and community activities were more effective. The authors noted these interventions worked particularly well with sub-groups, including youth.

DiClemente et al. (2007) argued that although individual-level behavioural interventions may show success in the short term, sustaining effects in the long term may require a broader ecological perspective incorporating community and structural contexts. However, data that demonstrate the effectiveness of this combination approach is lacking. Research into interventions that take advantage of "synergy" between different levels of interventions is required. The authors cite a study by Voisin (2002) that measured ecological variables of sexual risk behaviour among detained female adolescents; it showed that, in addition to micro-level variables (such as individual knowledge or skills), meso- (such as settings and environments) and macro-level variables (such as cultural factors and structures) played a significant role. Killoran and McCormick (2010), in their review of one-to-one interventions, highlighted that their effectiveness is likely to be dependent on their integration within a comprehensive strategy for prevention of STI. For example, individually based risk reduction consultations need to be complemented by improved condom distribution and information on accessing services (Killoran & McCormick, 2010). Shepherd et al. (2010) found in their review of school-based interventions that, at an implementation level, a broader supportive school culture that included 'buy in' from senior management was required to facilitate full intervention implementation. Programs without this broader systems-level support were more likely to omit key evidence-based components of skills-based interventions, reducing programs to less effective knowledge-based interventions.

Most of the reviews identified gaps in the published evidence concerning multi- or system-level interventions, or the combined impact of integrated interventions across different settings. The limited evidence that was described, however, was consistent with specific setting findings that programs which target multiple components of young people’s lives and the contexts in which they live, and that are based within broader interpersonal, social and system level behavioural theory, were found to be more effective.

Key Findings – Community, structural and multi-level programs

Primary Question	Key Finding	Strength of evidence on which the finding is based	Key references
Based on available evidence, what types of Community, Structural and multi-level programs are most effective in reducing sexually transmissible infections (STI) in young people?	Interventions that incorporate multiple-level interventions across individual, community and structural levels achieve better outcomes than interventions that operate at a single level	Weak	(Cardoza et al., 2012; Charania et al., 2011; DiClemente et al., 2007; Gavin et al., 2010; Killoran & McCormick, 2010; Shepherd et al., 2010)

Sub-questions	Key Finding	Strength of evidence on which the finding is based	Key references
Which are more effective with specific sub-groups of young people?	Tailored programs, in combination with education strategies, that reduce structural barriers for groups of at-risk or minority youth and enhance access to services and supportive environments are likely to be more effective than education strategies or structural strategies alone	Weak	(Charania et al., 2011; DiClemente et al., 2007; Gavin et al., 2010)
What are the critical success factors for each of the effective interventions?	Programs that target multiple components of young people’s lives at a broader interpersonal, social and structural level were found to be more effective	Moderate	(Gavin et al., 2010)
Which have the greatest impact on reducing health inequalities?	Unable to comment	No evidence reported in reviews	
Which are the most cost-effective?	Unable to comment	No evidence reported in reviews	

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Any best practice program/project models?	Unable to comment	No evidence reported in reviews
Research Gaps	Research that evaluates multi-level programs at a systems and integrated impact level is required	

4.0 Summary and Conclusions

This section summarises key findings from across the above settings and intervention contexts and draws these together into overall findings.

4.1 Summary findings by setting and intervention context

School-based programs

Evidence was strong that school-based sexual health programs which were comprehensive, well-facilitated and supported within a broader school community approach had the strongest impact on delaying sexual behaviour, increased awareness and knowledge around STI prevention, increased protective behaviours; and good evidence that they reduced STI among young people. There was also good evidence that skills, self-efficacy and motivation-based programs were more effective than knowledge-based programs in increasing safe sexual behaviours. This finding is consistent with the health-promoting schools model utilised in other public health initiatives.

Other findings related to the sub-questions included:

- In school settings, there was little evidence that peer-led initiatives were more or less effective than teacher-led programs; however, there was good evidence that peer-led programs have higher sustainability costs.⁷ Evidence was also good that facilitation training and skills were a key factor in achieving outcomes of programs regardless of whether they are teacher-led or peer-led.

There was moderate evidence that:

- Interventions which address multiple domains across the interpersonal, social and structural levels are more likely to be successful.
- Effective programs are usually based on social and behavioural theories and include skills-building, role-playing, and broader structural school community strategies.
- Program facilitators who are enthusiastic and credible, have considerable expertise in classroom management and the delivery of skill-building activities, have expertise in handling sensitive discussions about sex and relationships, and an appreciation of wider socio-cultural norms are more effective in influencing sexual health attitudes and behaviour.
- Broader youth development goals can have impact on sexual health outcomes and some evidence that peer-led programs may contribute to broader youth development goals.

Identified research gaps included:

- Improved and more diverse methods of measuring behavioural outcomes, as well as longer follow-up timeframes
- Systematic review of best practice programs and models.

⁷ Note: this cost analysis does not take into account other non-sexual health benefits of peer-based and youth development programs.

Primary care-based programs

There was strong evidence that universal approaches which established a systematic way of offering testing to young people aged 16–24 were the most effective in increasing screening rates in primary care. Opportunistic screening was not as effective and efficient as proactive and systematic screening.

There was strong evidence that one-to-one structured counselling interventions with sexually active young people can be effective in behaviour change, and can be cost-effective. However, there was also good evidence that such programs are more likely to be effective when they target those identified as high-risk, emphasise motivation, self-efficacy, and factors that underlie risk-taking and are implemented as part of a broader STI prevention program.

There was good evidence that a range of technology-based testing or appointment reminder mechanisms were effective in increasing testing rates in young people attending primary care services, and good evidence that home-based testing for re-screening or repeat testing may be an effective option for young people.

There was moderate evidence that targeted outreach screening formats (community programs and non-GP health services) show high acceptance and participation in STI screening but inconclusive evidence about cost-effectiveness.

There has been little success in increasing screening rates in general practice, in particular for chlamydia, despite evidence that young people in Australia are open to being offered screening in general practice. Both practice and structural impediments may need to be reviewed in more detail.

Other findings related to the sub-questions included:

- Programs in primary care settings were more likely to be effective if they were: of social and cultural relevance; provided information as well as skills development for communication and negotiation in sexual encounters; and emphasised a variety of risk reduction messages.

Research Gaps

- None of the randomised control trials reviewed included assessment of the role of non-clinical staff in primary care in a clinical or outreach context.
- Evaluation designs that are able to incorporate multiple strategies and settings were needed to understand which combination of strategies, including those in primary care, were most effective.

Social marketing and mass media

There was moderate evidence that mass media could impact on awareness, knowledge, behavioural intentions and increased STI testing in the short term. Other than some evidence in regard to increased STI testing, there is little evidence that mass media can achieve changes in behaviour in isolation to other programs.

Other findings related to the sub-questions included:

- There was evidence that, although at a weak level, mass media campaigns which target all youth may have some impact on raising awareness with sub-groups of young people. However, there is some evidence that targeted complementary initiatives achieve higher levels of acceptability and engagement and so may be more effective at promoting attitude and behaviour change.

- There was evidence, though at a weak level, that multichannel and theory-based media campaigns linked with other STI-related health promotion strategies in schools, communities and health services are more effective.

Identified research gaps included:

- There was no evidence that described the role of STI mass media campaigns within an integrated program of STI prevention across primary care, educational institutions and community.
- No evidence was found regarding effectiveness of STI campaign sponsorship or outreach strategies at youth events such as community events and music festivals.
- Little evidence was found about key success factors related to theory, development and implementation processes, or development of best practice guidelines that would improve the impact of STI social marketing campaigns.
- No evidence was found regarding the long-term impact and cost-effectiveness of sustained STI campaigns.
- There was little evidence of the application of findings from HIV-related social marketing research to STI prevention contexts.

Computer-mediated, communication technology and social media programs

There is moderate evidence that sexual health education through the use of computer-mediated technology or communication technology may improve young people's sexual health knowledge and attitudes. There was evidence that social networking sites were being utilised within STI health promotion and generally as part of larger mass media or community services initiatives; however, few have been evaluated to determine impact.

Other findings related to the sub-questions included:

- There was moderate evidence that interactive programs could be tailored to individual experiences and characteristics and this improved the intervention impact, and that computer-mediated interventions are potentially more cost-effective than face-to-face interventions to improve knowledge and attitudes.
- There was evidence, though at a weak level, that social networking sites have potential for accessing sub-groups of young people and that interventions using these and other new technologies within Web 2 contexts need to engage with and allow user-created and even user-driven content and posts if they are to be effective.

Identified research gaps included:

- Evaluation methodologies need to be developed that can determine the effectiveness of interventions in environments where the technology and context change rapidly.
- Evidence is required to guide the development and implementation of STI health promotion using social networking sites and other technology that can incorporate cultures of user-created and user-driven content in an effective and safe way.

Programs targeted to at-risk or minority youth

There was good evidence that targeted and tailored programs for at-risk or minority youth can be effective in increasing knowledge, attitudes, and motivations, and moderate evidence that these programs resulted in changes in behaviour and improved health outcomes. There was moderate

evidence that programs which take a broad social context and self-efficacy approach including health literacy, confidence, communication, and life aspirations—with a focus that is not exclusively sexual health—can be more effective with at-risk or minority youth than programs focused on sexual health alone.

There was good evidence that STI screening-based initiatives conducted through or in partnership with youth-related organisations can achieve high participation from at-risk or minority youth.

Other findings in relation to sub-questions included:

- Moderate evidence that programs for Aboriginal youth which follow good cultural practice such as community consultation and ownership, collaborative development and tailoring of interventions, and included multidisciplinary and interagency approaches, are more likely to be acceptable and effective.
- Good evidence that skills, self-efficacy and motivation-based programs, and moderate evidence that programs are based on theories such as social cognitive theory and other behaviour and interaction theories, were more effective than knowledge-based programs in increasing protective behaviours.
- Good evidence that peer-led interventions and youth development interventions with at-risk young people and minority youth were effective in increasing knowledge, attitudes, and motivations, but only weak-level evidence that this results in a reduction in sexual risk behaviour.

Identified research gaps included:

- Published well-documented and evaluated programs for Aboriginal or Torres Strait Islander and culturally and linguistically diverse young people.
- The effectiveness of peer-led initiatives aimed at improving knowledge, skills or behaviour which targeted young people at sub-cultural youth festivals or community events.

Community, structural and multi-level programs

There was limited evidence in the reviews concerning the effectiveness of community-level, structural, or multi-level programs.

However, there was moderate evidence that programs which incorporate multiple-level interventions across individual, community and structural levels achieve better outcomes than those that operate at a single level.

Other findings in relation to sub-questions included:

- Moderate evidence that tailored programs which, in combination with education strategies, reduce structural barriers for groups of at-risk or minority youth and enhance access to services and supportive environments are likely to be more effective than education strategies or structural strategies alone.
- Moderate evidence that programs which target multiple components of young people's lives at a broader interpersonal, social and structural level were more effective.

Identified research gaps included

- Evaluations of multi-level programs at a systems and integrated impact levels.

4.2 Overall Findings and Conclusions in response to rapid review questions

Primary Question: Based on available evidence, what types of public health interventions are most effective in reducing sexually transmissible infections (STI) in young people?

Across all settings there was evidence that programs were most effective in increasing protective behaviours for STI when they:

- Were skills-, self-efficacy- and motivation-based programs rather than knowledge-based programs
- Targeted multiple components of young people's lives and the context in which they live, and addressed multiple domains across the interpersonal, social and structural level
- Were explicitly based on recognised behavioural and social theories.

Most evidence showed that no single public health intervention had a sustained long-term impact on the sexual health of young people and young adults. Overwhelmingly this pointed towards programs that target multiple aspects of young people's lives and context and were based within broader interpersonal, social and system-level behavioural theories.

For example, comprehensive school-based sexual health programs were likely to have the broadest reach with a reasonable impact, and so have the greatest impact in prevention in the short term for the majority of young people. However, integrated primary care-, community-, and media-based strategies are required to maintain or enhance program impacts, reach young people who did not benefit from school-based initiatives, and support STI testing and help-seeking behaviours. The evidence indicated that programs were most effective in increasing protective behaviours for STI when they combined levels of interventions at the individual, group, community and structural level.

The authors note that use of recognised behavioural and social theories may assist to operationalise these multiple components of a sophisticated intervention in a more rigorous way, and discourage a focus on knowledge as the basis of a program. Therefore, it may be that systematically engaging with any well-developed behavioural or social theory will increase the effectiveness of programs to some extent. However, there was indicative evidence that effective sexual behaviour programs were generally based on interpersonal or social theories (social cognitive theory was the most commonly cited theory across the studies reviewed) rather than individual-focused behavioural theories (such as the health belief model).

Many of the reviews identified gaps in the published evidence concerning multi- or system-level interventions, or the combined impact of integrated interventions across different settings, and so not yet able to provide conclusive recommendations on the best mix of interventions within a multi-level systems approach.

What interventions were shown to be ineffective?

- Strong evidence that programs focusing on abstinence-in any setting were ineffective in reducing risk or delaying sexual behaviour and indicative evidence that they may increase risk.
- Little success in increasing STI screening rates in general practice contexts, in particular for chlamydia; both practice and structural impediments may need to be reviewed in more detail to find an effective approach.

Where are the research gaps?

The following research gaps were identified at a general level across the intervention settings and contexts:

- Little research evaluated programs that are part of a broader combination or system of STI prevention programs. For example, what is the effectiveness of mass media campaigns in reinforcing the impact of other interventions at the school or sustaining testing practices at the primary care level? There is a need for targeted research that evaluates multi-level programs at a system or combined impact level.
- Across most settings and intervention types there is a need to develop improved approaches for evaluating the theory that drives the program, ways of measuring behavioural outcomes, and strategies for achieving longer follow-up timeframes. There is a need to increase the evidence about what works in Victoria and Australia, including why it works and in what context/s, and within what system of interventions.
- There is a need to increase the evaluation rigour of Victorian and other Australian investments in STI prevention where possible, to enable them to contribute more effectively to the identified gaps in the evidence base. In particular in:
 - Programs targeting at-risk or minority youth; namely Aboriginal youth, culturally and linguistically diverse youth, and youth in the justice system
 - Non-school-based programs targeting all youth (including mass media, social media, and youth event-based promotion and generalised youth outreach).

Appendix A: Summary of key components of published systematic reviews

Quality of described method for systematic review assessed by adapted R-AMSTAR review (Kung et al., 2010): low (score of 11–22) medium (score of 23–33) and high (score of 34–44)

RCT: Randomised controlled study – includes individual and cluster randomisation

REVIEW	Title of Review	Study interventions and methods, included in review	Population characteristics included in search (Age, gender, ethnicity)	Countries included in search	Publication dates searched	Number of studies included	Quality of described Systematic Review process (R-AMSTAR)	Findings and conclusions
Bailey et al. (2010)	Interactive computer-based interventions for sexual health promotion	RCTs of interactive computer-based interventions for sexual health promotion. Meta-analysis of effect size	All ages All genders	Any country	Database start date to Nov 2007	15 RCT studies	High	Interactive computer-based interventions are effective and show good results on self-efficacy, intentions and behaviour.
Barham et al. (2007)	One to one interventions to reduce sexually transmitted infections and under the age of 18 conceptions: a systematic review of economic evaluations	Economic evaluation of one-to-one interventions to reduce STI Reviewed major outcomes averted, life years, quality adjusted life years (QALY)	Adolescents or includes adolescents	Australia Europe North America	1990–2006	55 economic evaluations	medium	Majority found interventions were cost-efficient or cost-saving. Most used static modelling that does not consider re-infection. Most studies US-based and may not apply to other contexts.
Cardoza et al. (2012)	Sexual Health Behaviour Interventions for U.S. Latino Adolescents: A Systematic Review of the Literature	All published behavioural interventions with Latino American adolescents Descriptive review Articles classified into social ecological levels of individual, interpersonal, community, societal	Latino participants aged between 11–21 years	USA	1998–2011	15 studies 5 RCT 3 single group pre/post) 7 qualitative and/or process non experimental evaluation studies	medium	Descriptive review. Articles classified into social ecological levels of individual, interpersonal, community, societal. Studies strengths: addressed most important sexual health issues, used multiple approaches, social ecological approaches, intervention in areas with largest Latino population. More research is needed to produce new or validate existing, age-specific, and culturally-sensitive sexual health interventions for Latino male and female adolescents.

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REVIEW	Title of Review	Study interventions and methods, included in review	Population characteristics included in search (Age, gender, ethnicity)	Countries included in search	Publication dates searched	Number of studies included	Quality of described Systematic Review process (R-AMSTAR)	Findings and conclusions
Charania et al. (2011)	Efficacy of Structural-Level Condom Distribution Interventions: A Meta-Analysis of U.S. and International Studies, 1998–2007	Multi-level condom distribution programs addressing condom availability, accessibility, or acceptability, with either behavioural or biological outcome intervention effects were evaluated	Any age and gender	Any country 7 studies in USA, rest in developing countries	1988–2007	21 studies: 4 RCTs 6 non-randomised CTs 11 pre/post cross-sectional samples	High	Interventions increasing the availability of or accessibility to condoms or including additional individual, small-group or community-level components along with condom distribution were shown to be efficacious in increasing condom use behaviours. Significant effects found for lowered incidence of STI, delayed sexual initiation, condom carrying and acquisition, and condom use. Interventions were effective with youth.
Chin et al. (2012)	The effectiveness of group-based comprehensive risk-reduction and abstinence education interventions to prevent or reduce the risk of adolescent pregnancy, HIV, and STI: Two systematic reviews for the guide to community preventive services	Group-based comprehensive risk-reduction and abstinence-only education (two systematic reviews) Meta-analysis on identified outcomes including sex frequency, partners, use of protection, biological outcomes	Adolescent age All genders	Any country	1988–2007	83 control trial studies (either RCT or Control pre/post) comprehensive risk reduction – 62 articles, (82 study arms: 50 RCT, 32 quasi experimental) abstinence only –21 articles, (23 study arms 10 RCT, 13 quasi experimental)	High	Comprehensive risk reduction found to effectively reduce STI and pregnancy. Uncertainty about effects estimates of abstinence education due to small number of studies and inconsistent results.
Delgado et al. (2007)	Can media promote responsible sexual behaviours among adolescents and young adults?	Media interventions promoting sexual health to young people Literature on recent US and non-US media interventions	Adolescents Any gender	Any country	2002–2006	14 Studies 1 systematic review 7 quasi-experimental trial primary studies 6 theoretical or expert opinion papers	low	Review of reviews, non-systematic, narrative overview. Media interventions can successfully improve knowledge and attitudes and promote responsible behaviour. Are more effective when multiple strategies used.

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REVIEW	Title of Review	Study interventions and methods, included in review	Population characteristics included in search (Age, gender, ethnicity)	Countries included in search	Publication dates searched	Number of studies included	Quality of described Systematic Review process (R-AMSTAR)	Findings and conclusions
Denno et al. (2012)	Reaching Youth With Out-of-Facility HIV and Reproductive Health Services: A Systematic Review	Interventions using out-of-facility approaches to reach marginalised youth Qualitative analysis of evaluation studies Systematic qualitative analysis of included studies	10–24 years or age-specific results of studies provided	Any country	Any dates prior to March 2010	20 studies 10 quasi-experimental 10 non-comparison evaluations	High	Out-of-facility interventions are important ways to reach marginalised youth. More research needed into best approaches. Most promising interventions included mail-based chlamydia screening, street outreach condom distribution, over-the-counter emergency contraception.
DiClemente et al. (2007)	A review of STI/HIV preventive interventions for adolescents: Sustaining effects using an ecological approach	Review of interventions with adolescents aimed at preventing STI with focus on ecological perspectives Narrative overview of interventions	11–24 years	Any country	Not stated	Over 150 articles including social, epidemiological, theoretical and intervention studies. Details not consistently stated	Low	Most interventions have been focused on individual level. Need for research that looks at multiple levels of intervention.
Downing et al. (2011)	A systematic review of parent and family-based intervention effectiveness on sexual outcomes in young people	Parent and family interventions for young people's sexual health outcomes	Parents and Families with children aged 5–19 years	United Kingdom, Western Europe, Australia, New Zealand, Canada or USA	1990–2009	17 studies 14 RCT (11 family, 6 parent),	High	Parent interventions had greater impact on parent-child communication than family interventions. Interventions can have impact on sexual health communication. Evidence is mostly US-based.
Gavin et al. (2010)	A Review of Positive Youth Development Programs That Promote Adolescent Sexual and Reproductive Health	Effect of positive youth development (PYD) programs on sexual health Included if at least one PYD goal addressed; at least 50% of program content was PYD; experimental or quasi-experimental design. Odds ratio calculated for each study	Below 20 years of age any gender	Any country	1985–2007	30 studies, 20 RCT 10 quasi-experimental	Medium	PYD programs can promote adolescent sexual health and should be part of comprehensive approach. More research needed into successful program characteristics.

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REVIEW	Title of Review	Study interventions and methods, included in review	Population characteristics included in search (Age, gender, ethnicity)	Countries included in search	Publication dates searched	Number of studies included	Quality of described Systematic Review process (R-AMSTAR)	Findings and conclusions
Gold et al. (2011)	A systematic examination of the use of Online social networking sites for sexual health promotion	Prevalence of use of social networking sites (SNS) for sexual health promotion Included if used at least one SNS, was related to sexual health, and involved health promotion	Any ages All genders	Any country	All dates till November 2010	178 health promotion activities	Medium	SNSs are being used for in sexual health promotion. Most activities are not reported in scientific literature. Need for studies of characteristics of successful programs and how to measure success.
Guse et al. (2012)	Interventions Using New Digital Media to Improve Adolescent Sexual Health: A Systematic Review	Use of new interactive digital media to promote young people's sexual health Included if evaluated impact on knowledge, attitudes or behaviour Odds ratios calculated to assess effect 7 of 10 in the USA	13–24 years of age	Any country	2000–2011	10 studies 6RCT 2 quasi-experimental 2 pre/post evaluation	Medium	Use of new digital media in sexual health is a rapidly emerging and changing field that shows promise. Controlled studies with longer follow-up times that are able to assess behavioural change are needed.
Guy et al. (2011)	Efficacy of interventions to increase the uptake of chlamydia screening in primary care: a systematic review	Interventions to increase chlamydia screening Meta-analysis of effect size 5 Australian, 5 USA	All genders	Any country	All dates till Sept 2010	16 studies 11 RCT 5 quasi-experimental	High	Greatest impact from intervention promoting universal offer of chlamydia screening to young people.
Guy et al. (2012)	Interventions to increase rescreening for repeat chlamydial infection	Interventions to increase chlamydia re-screening Meta-analysis All US-based	All genders	Any country	All dates till Sept 2010	12 Studies 8 RCTs 4 quasi-experimental	High	Mailed screening kits most effective. Use of reminders is promising. Motivational interviewing warrants further investigation.
Jackson et al. (2011)	Interventions to prevent substance use and risky sexual behaviour in young people: A systematic	Interventions aimed at reducing risky substance use and sexual behaviour among adolescents	All genders 5–25 years of age	Any country	All dates till August 2010	18 studies 14 RCT 4 quasi-Experimental	High	Some evidence that programs aiming to reduce multiple risk behaviours can be effective. Most effective interventions addressed multiple domains and were implemented in

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REVIEW	Title of Review	Study interventions and methods, included in review	Population characteristics included in search (Age, gender, ethnicity)	Countries included in search	Publication dates searched	Number of studies included	Quality of described Systematic Review process (R-AMSTAR)	Findings and conclusions
	review					Evidence-based on 13 studies with medium or strong rating		mid-childhood years.
Johnson et al. (2011)	Interventions to Reduce Sexual Risk for Human Immunodeficiency Virus in Adolescents: A Meta-analysis of Trials, 1985-2008	Interventions to reduce risk of HIV in adolescents Included if they measured sexual risk behaviour, gave sufficient information for effect size to be assessed	11–19 years	Any country	1985–2008	67 studies 40 RCT 27 quasi-experimental trials	High	Comprehensive behavioural interventions able to reduce risky behaviour and STI, and more successful than abstinence only. Initial risk reduction depended on intervention sample. Intensive interventions more effective.
Kang et al. (2010)	Interventions for young people in Australia to reduce HIV and sexually transmissible infections: A systematic review	Australian interventions to reduce STI in young people	12–25 years of age	Australia	2000–2010	42 studies 6 RTC 32 uncontrolled evaluations 3 process and qualitative evaluations 1 series of cross-sectional prevalence surveys	High	Promoting STI testing in non-clinical settings is effective in increasing testing rates. General practice still important site of testing and need to improve rates. New media technologies are useful additions to interventions. Media campaigns can be effective in increasing testing.
Killoran et al. (2010)	Towards an integrated approach to sexual health services: The contribution of NICE guidance on one-to-one interventions to prevent STI and under 18 conceptions	All interventions and evaluations Evidence based guidelines on one-to-one interventions to prevent STI and teenage pregnancy Screening for chlamydia in young women and men;	All ages and genders	Any country	1990–2005	Summary of 4 systematic reviews conducted simultaneously Included a total 248 studies (14 systematic reviews, 64 RCT,	4 Individual systematic reviews – high Summary-medium	Structured one-to-one discussions with young people at high risk of STI can be effective and cost-efficient. Essential strategy even though focus is narrow.

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REVIEW	Title of Review	Study interventions and methods, included in review	Population characteristics included in search (Age, gender, ethnicity)	Countries included in search	Publication dates searched	Number of studies included	Quality of described Systematic Review process (R-AMSTAR)	Findings and conclusions
		partner notification; economic evaluations.				15 quasi-experimental, 65 non-controlled evaluations		
Kim et al. (2008)	Recent Evaluations of the Peer-Led Approach in Adolescent Sexual Health Education: A Systematic Review	Randomised and quasi-experimental studies of peer-led sexual health education with young people	10–19 years of age	Any country	1998–2005	13 studies 4 RCT 9 quasi-experimental	High	<p>Most of the studies of multi-session group-based peer-led workshops found positive effects on measures of knowledge, attitudes and intentions. No evidence, however, of impact on sexual health outcomes.</p> <p>None of the studies fulfilled most of the identified recommendations for peer education evaluation.</p> <p>Recommend greater emphasis on details of intervention design, when creating, implementing and evaluating future peer-led programs.</p>
Kirby et al. (2007)	Sex and HIV Education Programs: Their Impact on Sexual Behaviors of Young People Throughout the World	<p>Curriculum-based sex and HIV education</p> <p>Experimental or quasi-experimental design, measure impact on sexual behaviour</p>	9 to 24 years	Any country (56 studies from USA)	1990–2005	83 RCT or quasi-experimental studies (breakdown unclear)	Medium	<p>Strong evidence that programs do not promote earlier sexual initiation.</p> <p>Effective programs include common characteristics regarding aims and objectives, content, strategies, and implementation.</p>
Lazarus et al. (2010)	Systematic review of interventions to prevent the spread of sexually transmitted infections, including HIV, among young people in Europe	<p>Interventions in the European Union aimed at preventing STI among young people</p> <p>RCT or pre/post intervention analysis; reporting behavioural, biological, or psychosocial outcomes</p> <p>Meta-analysis of effect size</p>	Participants aged 10–24 years.	Europe only	1995–2005	<p>19 studies</p> <p>8 RCT</p> <p>4 quasi-experimental</p> <p>7 non controlled intervention evaluations</p>	Medium	<p>Most of the prevention interventions reviewed did not demonstrate changes in sexual risk behaviour. A range of methodology limitations identified. Most studies based on information / education models.</p> <p>Young people more accepting of peer-led approaches.</p> <p>Peer-led approaches shown to increase knowledge, but no evidence that they change behaviour.</p>

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REVIEW	Title of Review	Study interventions and methods, included in review	Population characteristics included in search (Age, gender, ethnicity)	Countries included in search	Publication dates searched	Number of studies included	Quality of described Systematic Review process (R-AMSTAR)	Findings and conclusions
Lim et al. (2008)	SMS STI: A review of the uses of mobile phone text messaging in sexual health	Use of short message service (SMS) texting in clinical management or sexual health education Meta-analysis calculation of effect sizes	All ages All genders	Any country	Not stated	9 studies 1 RCT 3 cross-sectional surveys 5 process evaluation or not stated	Low	SMS has been used in communication with clinic patients, as reminders, partner notification, contact tracing, health promotion and education. Few studies evaluating effectiveness of use.
Lin (2008)	Behavioral Counseling to Prevent Sexually Transmitted Infections: A Systematic Review for the U.S. Preventive Services Task Force	Use of behavioural counselling to reduce STI Both sexually and non-sexually active adolescents; interventions in primary clinics; reported behavioural or biological outcomes Mixed method synthesis of quantitative data on effectiveness and qualitative data on user and professional views	Adolescents and adults All genders	Any country	1988–2007	17 studies 15 RCT 2 control trial	High	Strong evidence that multiple sessions of behavioural counselling are effective with adolescents considered to be at high risk of STI.
Low et al. (2009)	Effectiveness of chlamydia screening: Systematic review	Effectiveness of chlamydia screening Studies looking at biological outcomes of chlamydia screening with women and men	Adults All genders	Any country	1990–2007	6 systematic reviews, 5 RCT 1 quasi-experimental study 1 time trend.	High	Lack of evidence that supports opportunistic screening in general population of young people below age 25 years. Significant methodological problems in studies identified
Noar et al. (2010)	Behavioural interventions to reduce HIV-related sexual risk behaviour: Review and synthesis of meta-	Impact of computer-based interventions on safe sex mediators RCT or quasi-experimental studies that measured	Adolescents and adults All genders	Any country	All dates till August 2009	20 studies (18 articles) 9 RCT 9 quasi-	High	Effect sizes for computer interventions are comparable to face-to-face interventions. Few significant moderating variables found.

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REVIEW	Title of Review	Study interventions and methods, included in review	Population characteristics included in search (Age, gender, ethnicity)	Countries included in search	Publication dates searched	Number of studies included	Quality of described Systematic Review process (R-AMSTAR)	Findings and conclusions
	analytic evidence	theoretically STI outcome variable Meta-analysis of effect sizes				Experimental		
Owen et al. (2010)	School-linked sexual health services for young people (SSHYP): a survey and systematic review concerning current models, effectiveness, cost-effectiveness and research opportunities	School based/linked sexual health services Assessed biological, behavioural outcomes, or stakeholder views Mixed method synthesis of quantitative data on effectiveness and qualitative data on user and professional views	11–18 years of age All genders	Any country	1985–2008	46 studies 26 contributed to effectiveness review (16 quasi-experimental studies; 10 uncontrolled evaluations) 25 contributed to review of qualitative studies evidence (5 contributed to both)	High	School-based/-linked sexual health services not linked to earlier sex or increased sexual activity. Some, mostly US-based, evidence for positive impact on biological outcomes. Some evidence that holistic services not confined to sexual health have greater uptake as they provide confidentiality.
Peters et al. (2009)	Effective elements of school health promotion across behavioral domains: a systematic review of reviews	School health promotion interventions addressing multiple behavioural domains (including sexual behaviour) Systematic review of reviews School-based health interventions in substance use, sexual health, and/or nutrition	School aged young people (5 to 17 years of age)	Any country	1995–2006	55 reviews 36 rated strong 6 moderate 13 weak (incl. 17 reviews on sexual behaviour)	High	Strong evidence that effective programs include multiple components, have trained facilitators, tackle social norms, teach cognitive-behavioural skills, are theory-based. Integrative school health promotion is feasible.
Romero et al. (2011)	HIV prevention among African American youth: how well have evidence-based interventions	Cultural relevance of HIV prevention interventions with young African Americans All interventions were multi-	under 19 years at least 50% of	US-based, participants	1995–2007	7 RCT	Medium	Better assessment of link between skill development and HIV risk behaviours among African-American youth needed. More attention needed to behavioural change constructs identified when designing

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REVIEW	Title of Review	Study interventions and methods, included in review	Population characteristics included in search (Age, gender, ethnicity)	Countries included in search	Publication dates searched	Number of studies included	Quality of described Systematic Review process (R-AMSTAR)	Findings and conclusions
	addressed key theoretical constructs?	session group-based interventions	participants African American					interventions for African-American youth.
Savage (2009)	Aboriginal adolescent sexual and reproductive health programs: a review of their effectiveness and cultural acceptability	Effective interventions to improve sexual health outcomes of Aboriginal young people in NSW International and Australian published and grey literature; social/behavioural interventions to prevent pregnancy and STI; clinical interventions with social/behavioural component included	All ages All genders Aboriginal Australian, Maori, Canadian Aboriginal	Australia, New Zealand, Canada	All dates till October 2009	11 descriptive and process evaluations of interventions with Aboriginal and Maori populations Summary of general intervention and good practice studies considered to have possible applicability to Aboriginal communities	Medium	Lack of good quality studies assessing effectiveness of interventions with Aboriginal youth. Some evidence for effective intervention strategies that may be applicable to Aboriginal young people.
Scott-Sheldon et al. (2010)	Sexual Risk Reduction Interventions for Patients Attending Sexually Transmitted Disease Clinics in the United States: A Meta-Analytic Review, 1986 to Early 2009	Interventions to reduce sexual risk behaviour with patients attending STI clinics in the USA RCT or quasi-experimental studies only Meta-analysis of studies	Adults attending STI clinics in USA	USA	1986 to February 2009	48 interventions (32 papers)	High	Behavioural interventions with patients at STI clinics are effective. Such interventions should be made a public health priority.

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REVIEW	Title of Review	Study interventions and methods, included in review	Population characteristics included in search (Age, gender, ethnicity)	Countries included in search	Publication dates searched	Number of studies included	Quality of described Systematic Review process (R-AMSTAR)	Findings and conclusions
Shepherd et al. (2010)	The effectiveness and cost-effectiveness of behavioural interventions for the prevention of sexually transmitted infections in young people aged 13–19: a systematic review and economic evaluation	RCT effectiveness and cost-effectiveness studies of behavioural interventions to prevent STI in young people	Young people ages 13–19 years	Any country	1985–2008	15 RCT	High	School-based behavioural interventions have positive effects on knowledge and self-efficacy. Little evidence of behaviour change. Teacher-led interventions are cheaper than peer-led interventions. Cost-effectiveness may increase over time as greater proportion of participants become sexually active.
Shepherd et al. (2011)	Interventions for encouraging sexual behaviours intended to prevent cervical cancer	Interventions that addressed sexual behaviours linked cervical cancer prevention Most US-based and in health care settings	Young women up to 25 years	Any country	1990 to January 2010	23 RCTs measuring behavioural or biological outcome	High (Cochrane review)	Limited effects on STI. Some interventions improve condom-related behaviour. HPV not addressed and range of interventions too broad for characteristics of effective studies to be identified.
Shih et al. (2011)	Screening for sexually transmitted infections at home or in the clinic?	RCT studies comparing uptake of home and clinic screening for STI. Most based in US (5) or UK(3)	Adults All genders	Any country	2007– 2010	11 RCTs	Medium	Home-based screening can improve testing rates. Useful strategy for targeting young at-risk population with poor access to clinics.
Tolou-Shams et al. (2010)	A review of HIV prevention interventions for juvenile offenders	HIV prevention interventions with juvenile offenders HIV or sexual risk reduction interventions with; evaluated behavioural or attitudinal outcomes.	13- to 18-years old involved with the juvenile justice system	USA and Canada	All dates up to 2009	16 studies 8 RCT 8 quasi-Experimental	Medium	Modest effect sizes for sexual risk reduction. HIV risk links to substance use, family issues and mental health not addressed. More work to develop evidence base needed.
Underhill, Operario et al. (2007)	Sexual abstinence plus programmes to prevent HIV infection in high income countries: Systematic review	Abstinence plus interventions in high-income countries Evaluated behavioural or biological outcomes. Excluded	All ages All genders (but mostly school-aged-	High income countries (World Bank Definition)	1980 February 2007	39 studies (37 papers) 34 RCT 5 quasi-	High	23 of the 39 9 trials found a protective effect on at one or more sexual behaviour outcomes. None found negative effects. Results for biological outcomes were limited by floor effects. Three trials assessed self-reported diagnosis or treatment of

Rapid Review: Reducing Sexually Transmissible Infections in Young People

REVIEW	Title of Review	Study interventions and methods, included in review	Population characteristics included in search (Age, gender, ethnicity)	Countries included in search	Publication dates searched	Number of studies included	Quality of described Systematic Review process (R-AMSTAR)	Findings and conclusions
		HIV positive All studies from USA, Canada, Bahamas	based programs)			experimental		sexually transmitted infection; none found significant effects.
Underhill, Montgomery et al.(2007)	Sexual abstinence only programmes to prevent HIV infection in high income countries: Systematic review	Abstinence-only interventions in high-income countries Excluded programs that explicitly promoted condom use or safer sex All studies from USA	All ages All genders (but mostly school-aged-based programs)	High income countries (World Bank Definition)	1980 to February 2007	13 randomised, controlled trials	High	No programs affected incidence of unprotected vaginal sex, number of partners, condom use, or sexual initiation. Adverse effects were inconsistent and most not statistically significant.

Appendix B: Diagram of the Matrix (simplified)

✓ = some evidence available and included in rapid review

x = evidence not available

Evidence of effectiveness setting or program type	Awareness, Knowledge and attitudes	Self-efficacy, Confidence and skills	STI testing and Screening	Sexual Behaviour and other health outcomes	Sexual Behaviour in the context of other risk behaviour	Cost-effectiveness / economic analysis
School-based programs	✓	✓	✓	✓	✓	✓
Primary Care	✓	x	✓	✓	x	✓
Social Marketing and Mass Media	✓	x	✓	✓	x	x
Computer-mediated, communication technology and social media	✓	x	✓	✓	x	x
Programs targeting at-risk or minority youth	✓	✓	✓	✓	✓	x
Community, structural and multi-level	x	x	✓	✓	x	x

References

- Bailey, Julia, V., Murray, E., Rait, G., Mercer Catherine, H., Morris Richard, W., Peacock, R., Nazareth, I. (2010). Interactive computer-based interventions for sexual health promotion. *Cochrane Database of Systematic Reviews*, (9).
<http://www.mrw.interscience.wiley.com/cochrane/clsystrev/articles/CD006483/frame.html>
doi:10.1002/14651858.CD006483.pub2
- Barham, L., Lewis, D., & Latimer, N. (2007). One to one interventions to reduce sexually transmitted infections and under the age of 18 conceptions: A systematic review of the economic evaluations. *Sexually Transmitted Infections*, 83(6), 441-447.
- Cardoza, V. J., Documet, P. I., Fryer, C. S., Gold, M. A., & Butler, J. (2012). Sexual Health Behavior Interventions for U.S. Latino Adolescents: A Systematic Review of the Literature. *Journal of Pediatric and Adolescent Gynecology*, 25(2), 136-149.
- Charania, M., Crepaz, N., Guenther-gray, C., Henny, K., Liau, A., Willis, L., & Lyles, C. (2011). Efficacy of Structural-Level Condom Distribution Interventions: A Meta-Analysis of U.S. and International Studies, 1998-2007. *AIDS and Behavior*, 15(7), 1283.
- Chin, H. B., Sipe, T. A., Elder, R., Mercer, S. L., Chattopadhyay, S. K., Jacob, V., . . . Santelli, J. (2012). The effectiveness of group-based comprehensive risk-reduction and abstinence education interventions to prevent or reduce the risk of adolescent pregnancy, human immunodeficiency virus, and sexually transmitted infections: Two systematic reviews for the guide to community preventive services. *American Journal of Preventive Medicine*, 42(3), 272-294.
- Delgado, H. M., & Austin, S. B. (2007). Can media promote responsible sexual behaviors among adolescents and young adults? *Current Opinion in Pediatrics*, 19(4), 405-410.
- Denno, D. M., Chandra-Mouli, V., & Osman, M. (2012). Reaching Youth With Out-of-Facility HIV and Reproductive Health Services: A Systematic Review. *Journal of Adolescent Health*.
- DiClemente, R. J., Salazar, L. F., & Crosby, R. A. (2007). A review of STD/HIV preventive interventions for adolescents: Sustaining effects using an ecological approach. *Journal of Pediatric Psychology*, 32(8), 888-906.
- Donovan, R. J. (2011). The role for marketing in public health change programs. *Australian Review of Public Affairs*, 10(1), 23-40.
- Downing, J., Jones, L., Bates, G., Sumnall, H., & Bellis, M. A. (2011). A systematic review of parent and family-based intervention effectiveness on sexual outcomes in young people. *Health Education Research*, 26(5), 808-833.
- Gavin, L. E., Catalano, R. F., David-Ferdon, C., Gloppen, K. M., & Markham, C. M. (2010). A Review of Positive Youth Development Programs That Promote Adolescent Sexual and Reproductive Health. *Journal of Adolescent Health*, 46(3 SUPPL.), S75-S91.
- Gold, J., Pedrana, A. E., Sacks-Davis, R., Hellard, M. E., Chang, S., Howard, S., . . . Stooove, M. A. (2011). A systematic examination of the use of Online social networking sites for sexual health promotion. *BMC public health*, 11.
- Guse, K., Levine, D., Martins, S., Lira, A., Gaarde, J., Westmorland, W., & Gilliam, M. (2012). Interventions Using New Digital Media to Improve Adolescent Sexual Health: A Systematic Review. *Journal of Adolescent Health*.
- Guy, R., Ali, H., Liu, B., Poznanski, S., Ward, J., Donovan, B., . . . Hocking, J. (2011). Efficacy of interventions to increase the uptake of chlamydia screening in primary care: a systematic review. *BMC infectious diseases*, 11(1), 211.

- Guy, R., Hocking, J., Low, N., Ali, H., Bauer, H. M., Walker, J., . . . Kaldor, J. M. (2012). Interventions to increase rescreening for repeat chlamydial infection. *Sexually Transmitted Diseases*, *39*(2), 136-146.
- Jackson, C., Geddes, R., Haw, S., & Frank, J. (2011). Interventions to prevent substance use and risky sexual behaviour in young people: A systematic review. *Addiction*, *107*(4), 733-747.
- Johnson, B. T., Scott-Sheldon, L. A. J., Huedo-Medina, T. B., & Carey, M. P. (2011). Interventions to Reduce Sexual Risk for Human Immunodeficiency Virus in Adolescents A Meta-analysis of Trials, 1985-2008. *Archives of Pediatrics & Adolescent Medicine*, *165*(1), 77-84. doi: 10.1001/archpediatrics.2010.251.
- Kang, M., Skinner, R., & Usherwood, T. (2010). Interventions for young people in Australia to reduce HIV and sexually transmissible infections: A systematic review. *Sexual Health*, *7*(2), 107-128.
- Killoran, A., & McCormick, G. (2010). Towards an integrated approach to sexual health services: The contribution of NICE guidance on one-to-one interventions to prevent STIs and under 18 conceptions. *Health Education Journal*, *69*(3), 297-310.
- Kim, C., & Free, C. (2008). Recent Evaluations of the Peer-Led Approach in Adolescent Sexual Health Education: A Systematic Review. *Perspectives on Sexual and Reproductive Health*, *40*(3), 144.
- Kirby, D. B., Laris, B. A., & Rolleri, L. A. (2007). Sex and HIV Education Programs: Their Impact on Sexual Behaviors of Young People Throughout the World. *Journal of Adolescent Health*, *40*(3), 206-217.
- Kung, J., Chiappelli, F., Cajulis, O., Avezoa, R., Kossan, G., Chew, L., & Maida, C. (2010). Systematic Reviews to Clinical Recommendations for Evidence-Based Health Care: Validation of Revised Assessment of Multiple Systematic Reviews (R-AMSTAR) for Grading of Clinical Relevance. *The Open Dentistry Journal*, *4*, 84-91.
- Lazarus, J. V., Sihvonen-Riemenschneider, H., Laukamm-Josten, U., Wong, F., & Liljestrand, J. (2010). Systematic review of interventions to prevent the spread of sexually transmitted infections, including HIV, among young people in Europe. *Croatian Medical Journal*, *51*(1), 74-84.
- Lim, M. S. C., Hocking, J. S., Aitken, C. K., Jordan, L., Fairley, C. K., Lewis, J. A., & Hellard, M. E. (2007). 16. A RANDOMIZED CONTROLLED TRIAL OF THE IMPACT OF EMAIL AND TEXT (SMS) MESSAGES ON THE SEXUAL HEALTH OF YOUNG PEOPLE. *Sexual Health*, *4*(4), 290-290. doi: <http://dx.doi.org/10.1071/SHv4n4Ab16>
- Lim, M. S. C., Hocking, J. S., Hellard, M. E., & Aitken, C. K. (2008). SMS STI: A review of the uses of mobile phone text messaging in sexual health. *International Journal of STD and AIDS*, *19*(5), 287-290.
- Lin, J. M. M., Whitlock, E. M. M., O'Connor, E. P., & Bauer, V. M. (2008). Behavioral Counseling to Prevent Sexually Transmitted Infections: A Systematic Review for the U.S. Preventive Services Task Force. *Annals of Internal Medicine*, *149*(7), 497.
- Low, N., Bender, N., Nartey, L., Shang, A., & Stephenson, J. M. (2009). Effectiveness of chlamydia screening: Systematic review. *International Journal of Epidemiology*, *38*(2), 435-448.
- NHMRC. (2008). NHMRC additional levels of evidence and grades for recommendations for developers of guidelines: Pilot Program. Canberra: National Health and Medical Research Council.
- Noar, S. M., Pierce, L. B., & Black, H. G. (2010). Can Computer-Mediated Interventions Change Theoretical Mediators of Safer Sex? A Meta-Analysis. *Human Communication Research*, *36*(3). doi: 10.1111/j.1468-2958.2010.01376.x
- Owen, J., Carroll, C., Cooke, J., Formby, E., Hayter, M., Hirst, J., . . . Sutton, A. (2010). School-linked sexual health services for young people (SSHYP): a survey and systematic review concerning current models, effectiveness, cost-effectiveness and research opportunities. *Health technology assessment (Winchester, England)*, *14*(30), 1-228, iii-iv.
- Peters, L. W. H., Kok, G., Ten Dam, G. T. M., Buijs, G. J., & Paulussen, T. (2009). Effective elements of school health promotion across behavioral domains: a systematic review of reviews. *BMC public health*, *9*. doi: 182 10.1186/1471-2458-9-182

- Romero, L. M., Galbraith, J. S., Wilson-Williams, L., & Gloppen, K. M. (2011). HIV prevention among African American youth: how well have evidence-based interventions addressed key theoretical constructs? *AIDS Behav*, *15*(5), 976-991. doi: 10.1007/s10461-010-9745-5
- Savage, J. (2009). Aboriginal adolescent sexual and reproductive health programs: a review of their effectiveness and cultural acceptability. Sydney: Sax Insitute.
- Scott-Sheldon, L. A. J., Fielder, R. L., & Carey, M. P. (2010). Sexual Risk Reduction Interventions for Patients Attending Sexually Transmitted Disease Clinics in the United States: A Meta-Analytic Review, 1986 to Early 2009. *Annals of Behavioral Medicine*, *40*(2), 191-204. doi: 10.1007/s12160-010-9202-8
- Shepherd, J., Kavanagh, J., Picot, J., Cooper, K., Harden, A., Barnett-Page, E., . . . Price, A. (2010). The effectiveness and cost-effectiveness of behavioural interventions for the prevention of sexually transmitted infections in young people aged 13-19: a systematic review and economic evaluation. *Health Technology Assessment*, *14*(7), 1-230. doi: 10.3310/hta14070
- Shepherd Jonathan, P., Frampton Geoff, K., & Harris, P. (2011). Interventions for encouraging sexual behaviours intended to prevent cervical cancer. *Cochrane Database of Systematic Reviews*, (4).
<http://www.mrw.interscience.wiley.com/cochrane/clsysrev/articles/CD001035/frame.html>
doi:10.1002/14651858.CD001035.pub2
- Shih, S. L., Graseck, A. S., Secura, G. M., & Peipert, J. F. (2011). Screening for sexually transmitted infections at home or in the clinic? *Current Opinion in Infectious Diseases*, *24*(1), 78-84. doi: 10.1097/QCO.0b013e32834204a8
- Tolou-Shams, M., Stewart, A., Fasciano, J., & Brown, L. K. (2010). A review of HIV prevention interventions for juvenile offenders. *J Pediatr Psychol*, *35*(3), 250-261. doi: 10.1093/jpepsy/jsp069
- Underhill, K., Montgomery, P., & Operario, D. (2007). Sexual abstinence only programmes to prevent HIV infection in high income countries: Systematic review. *British Medical Journal*, *335*(7613), 248-252.
- Underhill, K., Operario, D., & Montgomery, P. (2007). Systematic review of abstinence-plus HIV prevention programs in high-income countries. *PLoS Medicine*, *4*(9), 1471-1485.