

Effective Health Promotion Strategies to Reduce Sexually Transmitted Infections: A Rapid Review

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Key Messages

- There is sufficient evidence to suggest that interactive computer-based interventions (ICBIs) for sexual health promotion have a small positive effect on reducing sexually transmitted infections, increasing self efficacy and increasing condom use. Interventions that are tailored specifically for gender-specific individuals or groups have been shown to be more efficacious.
- Mass media campaigns have been shown to be effective for promotion of immediate voluntary HIV testing and counselling, however long term effects were not shown.
- One-to-one interventions (abstinence plus, school-based, peer-to-peer) have been shown to increase sexual health knowledge related to HIV and STIs, but have not shown an effect on behavioural change.
- Most studies did not conduct cost-benefit analyses.
- Two of the systematic reviews focused specifically on interventions that showed an outcome of improved HIV knowledge and testing; however, this does not necessarily indicate that these interventions will be effective for all STIs, especially Chlamydia and gonorrhoea which disproportionately affect youth ages 15-24 in Peel.
- Although ICBIs appear to be the most effective interventions to promote safer sex behavioural change, another rapid review is required to determine which specific computer-based interventions are most effective for youth 15-24.

Executive Summary

Purpose

The Healthy Sexuality Program has examined the most effective health promotion strategies to reduce sexually transmitted infections (STIs) among youth ages 15 to 24. The program intends to use this evidence to guide program planning decisions to ensure that resources are utilized to implement the most effective initiatives.

Research Question

Among 15-24 year olds, what health promotion strategies are effective in reducing sexually transmitted infections (STIs)?

Context

The Health Promotion Team within the Healthy Sexuality program provides a range of interventions to address STIs in youth in the Region of Peel. Through strategies such as education, outreach and social marketing, the team aims to provide information and support for youth, as well as promote the Region's Healthy Sexuality clinics. These health promotion initiatives encourage youth to make informed decisions, practice safer sex, and increase access to sexual health clinical services.

Before deciding which initiatives will best guide program planning, it was important to:

- Utilize the EIDM approach to find the highest quality evidence regarding effective health promotion strategies for reducing STIs among youth 15-24.
- Narrow down the large number of health promotion strategies available.
- Decide the best way to make use of our limited resources (funding and staff).
- Determine a specific strategy that addressed the magnitude of the health issue in Peel youth—the high rates of Chlamydia and rising rates of gonorrhea.

Synthesis of Key Findings

Six high quality systematic reviews were utilized for this rapid review. Overall findings suggest:

- Interactive computer-based interventions (ICBIs) have both a small effect on the reduction of STI rates, condom use and self efficacy; and have shown to be effective if tailored for a specific gender or group of individuals.
- Mass media interventions are effective for immediate voluntary HIV testing; however, for long term effects were not assessed.
- One-to-one interventions with youth through peer-to-peer, school-based, or abstinence plus programs increase sexual health knowledge, but do not lead to behaviour changes related to safer sex practices.
- A second rapid review focused on ICBIs is recommended to explore which specific interventions have been shown to be most effective. A cost-benefit analysis review is also essential to determine necessary funding and staff resources.

1 Issue

The Healthy Sexuality Program has undergone a rapid review to determine the most effective health promotion strategies to reduce sexually transmitted infections (STIs) among youth in Peel. With a number of health promotion strategies from which to choose, ensuring use of the most effective strategies are utilized is essential.

The Region of Peel's Comprehensive Health Status Report 2008 reported that the incidence of both Chlamydia and gonorrhoea were highest among those 15-24 years old (Region of Peel, 2008a). Chlamydia incidence has steadily increased in Ontario and Peel with a 143% increase in incidence in the overall Peel population since 1997 (Peel Public Health, 2012). Among 15-24 year olds in Peel, the rate for Chlamydia in 2010 was 982 per 100,000 which is an increase in incidence of 120% since 1991 (Peel Public Health Surveillance Unit Data, 2011). Incidence rates for gonorrhoea are also on the rise in Peel, similar to Ontario (Peel Public Health, 2012). While the 2010 rates of gonorrhoea among 15-24 year olds in Peel demonstrate a 29% decrease since 1991 gonorrhoea rates are again on the rise (Peel Public Health Surveillance Unit Data, 2011).

It is unclear what proportion of the increase in Chlamydia and gonorrhoea rates is attributable to the introduction of nucleic acid amplification testing (NAAT) versus increased overall testing or an increase in prevalence and related transmission (Peel Public Health, 2012). When considering Peel's total youth population (15-24 years) of 192,115 individuals (Region of Peel, 2011), it is important to note the ethnic and cultural diversity of Peel with 49% of Peel's population defined as new immigrants; 10% having arrived within only the past five years. Any health promotion

strategies chosen for implementation would need to consider the heterogeneity of this population group (Region of Peel, 2008b).

Furthermore, the 2005 Peel School Health Survey revealed that one in four youth in grades nine through 12 in Peel had engaged in sexual intercourse (Region of Peel, 2005). While the younger teens were less likely to engage in sexual activity compared to their older counterparts, those who reported being sexually active were also less likely than older youth to use condoms during sex, putting them at increased risk for contracting an STI.

2 Context

2.1 Background

The Health Promotion Team within the Healthy Sexuality Program has provided information to the community through a variety of health promotion strategies, such as social marketing campaigns, education and resource creation and community outreach. In the past, the program focused health promotion resources on the development and implementation of a social marketing campaign consisting of three phases, which included focus groups for the development and testing of concepts, a website, and a media campaign delivered in movie theatres, buses and bus shelters, fitness clubs and resto-bars. The goals of the campaign were to increase awareness of sexual health issues among Peel youth, increase awareness of the health risks associated with unprotected sexual activity as a serious issue affecting youth, and promote the use of Peel Public Health's Healthy Sexuality Clinics.

The Healthy Sexuality program is seeking to guide future health promotion programming targeted to youth based on the best evidence available to ensure limited resources are allocated in

accordance with the most appropriate and effective strategies available to reduce STIs. The available front-line staff resources for the program consists of two full-time Health Promotion Officers, one full-time Research and Policy Analyst and one full-time Public Health Nurse. The annual health promotion budget, excluding salaries, ranges from \$75,000-\$150,000. For 2011 the total budget for the Healthy Sexuality Health Promotion, Education and Outreach team was approximately 1.1 million dollars (including operating costs and supplies to operate the Region's Needle Exchange Program, as well as salaries and benefits for 7.5 FTE, not all of which are dedicated to health promotion programming).

In December 2009, a literature review was conducted by Healthy Sexuality Health Promotion staff, and a draft briefing note was developed to explore the direction of implementing a school based peer education model. While the peer education model was well researched, the literature review did not examine all possible health promotion strategies available for the target age group. In Fall 2010, an examination of the broader range of health promotion strategies was initiated using the rapid review process.

2.2 Anecdote

In 2008, the Healthy Sexuality Program produced a cinema-style 30 second movie trailer, the "Spelling Bee" which had been shown before movies rated PG-13, AA and R in Peel cinemas over several four-week runs between 2008 and 2010. In late 2010, a small surplus of funds became available to the Health Promotion team, with the stipulation that the money was to be used within a short time frame. The feedback received on the movie trailer had been very positive, however largely anecdotal. Without having any evidence on the effectiveness of this type of intervention, the program decided to re-run the same trailer, as the product was readily available.

3 Research Question

The research question examined in this rapid review was: “Among 15- 24 year olds, what health promotion strategies are effective in reducing sexually transmitted infections (STIs)?” A conceptual model for the PICO question is outlined in Appendix A.

3.1 PICO Question

P (Population)	15 – 24 year olds
I (Intervention)	Health promotion strategies including but not limited to: social marketing campaigns, peer to peer programs, school based, abstinence plus, internet/computer based interventions
C (Comparison)	No health promotion strategy
O (Outcome)	Reduction in rates of sexually transmitted infections

3.2 Search Strategy

Iterative scoping searches were conducted to refine the search strategy. Following this, final search terms were identified and the search was refined to include research studies from 2007 or later. The databases included were *Medline*, *psychINFO*, *Cochrane*, and *Health Evidence*. In addition to searching databases electronically, staff contacted the authors of two “in-progress” Cochrane systematic reviews to determine if interim results were available to include in the rapid review. Results were still being compiled, as such, they were not included. In addition, grey literature from the National Institute for Health and Clinical Excellence and the National Collaborating Centre for Infectious Diseases searched.

At the point of the final search, inclusion criteria were limited to systematic reviews, published from the year 2007 onward, examining a sexual health promotion strategy/intervention targeting 15 to 24 year olds, and English language publications. Exclusion criteria were refined to exclude

abstinence only programs and study settings that were dissimilar from an urban Ontario setting. The search terms are shown in Appendix B.

3.3 Search Results

In total, the search strategy yielded 88 results—one guideline, one overview of reviews, and 86 systematic reviews. Eleven systematic reviews were selected for critical appraisal, based on removal of duplicates, inclusion/exclusion criteria and relevancy assessment. The final results are outlined in Appendix C.

4 Critical Appraisal

4.1 Critical Appraisal Tools and Strategy

The critical appraisal of the systematic reviews took place between January and June 2011, using the Health Evidence Quality Assessment Tool (Health Evidence). Ratings for each article were confirmed by four reviewers.

4.2 Critical Appraisal Results

Six of the 11 systematic reviews were of strong methodological quality (rated an 8 or above using the quality assessment tool) and were selected for data extraction. The remaining three moderately ranked systematic reviews and two weak systematic reviews (as determined during critical appraisal) were excluded.

4.3 Description of Interventions in Included Systematic Reviews

Of the six systematic reviews:

- **Two examined computer based interventions** (Noar, Black, & and Pierce, 2009) and (Bailey et al., 2010)
 - Noar et al. defined computer based interventions as those interventions which were implemented using an on site computer (6 studies), delivered over the internet (3 studies), or through computer generated print materials (1 study);
 - Bailey et al. defined interactive computer based interventions as programs that provide information together with support for decision making, behaviour change and/or emotional needs related to health issues. For example, interventions that utilize packages that require contributions from the user (such as entering personal data, making choices that alter pathways within programs and feedback that is relevant to computer users);
- **One explored peer-led interventions**, which were defined as interventions that employ the teaching or sharing of information, values and behaviours by members of similar age or status groups to that of their audience/intended target (Kim & Free, 2008);
- **One reviewed school-based skills building behavioural interventions**, which included only studies that took place in a school/college setting (with two studies also taking place in the community), and involved interventions such as skills building, and/or educational components (Shepherd et al., 2010);
- **One examined abstinence-plus interventions**, which were defined as interventions that included a planned effort to encourage sexual abstinence or return to abstinence as the best means of HIV prevention while also increasing safer sex behaviours such as condom use (Underhill, Operario, & Montgomery, 2009);

- **One examined mass media**, specifically promoting HIV testing, which was defined as specific or general mass media campaigns targeted at a population level or specific target group. Examples of delivery modes/medium include radio, television, print, billboards, films/documentaries or a combination of those interventions (Vidanapathirana, Randeniya, & Operario, 2009).

5 Synthesis of Findings

This paper will summarize the results in two different ways; a summary of findings and magnitude of effect by intervention type (Table 1) and a synthesis of the results of interventions by outcome measures.

5.1 Summary of Findings and Magnitude of Effect by Intervention Type

Table 1 is a summary of the overall findings and magnitude of effect (where known) for all six systematic reviews, presented by intervention type. The six systematic reviews measured outcomes using Odds Ratios, Standard Mean Differences, or differences. The Odds Ratios (OR) is used to assess the likelihood of having an outcome as the result of an intervention compared to no intervention, or a comparison intervention. The Standard Mean Difference (SMD) or difference (d) measures the difference in outcomes between two groups as the result of an intervention. Refer to Appendix D for additional detail on interpreting statistical results.

Table 1: Summary of Findings by Intervention*, **

Intervention	Author, Year, Title, and number of articles included in review	Main Findings and Magnitude of Effect
Abstinence Plus	Underhill et al., (2009). Abstinence-plus programs for HIV infection prevention in high-income countries. <i>39 studies; RCTs or quasi-experimental RCTs</i>	-Out of 39 studies, 24 examined knowledge improvement, with 20/24 showing statistically significant positive effects were found for improving HIV knowledge. -No evidence that abstinence-plus programs can positively affect sexually transmitted infection incidence.
Interactive Computer Based Interventions (ICBIs)	Noar et al., (2009). Efficacy of computer technology-based HIV prevention interventions: a meta-analysis. <i>12 studies; all RCTs</i>	-12/12 studies on computer-based interventions examined improving condom use and showed a statistically significant effect (d = 0.259, 95% CI 0.201 to 0.317). -Computer-based interventions directed at gender specific groups were more efficacious than those directed at both genders together. - 3/12 studies examined STI incidence and found a small positive effect on the impact of computer-based interventions in reducing STIs (d= 0.140, 95% CI 0.035 to 0.245). -Interventions were more efficacious when individual tailoring, intervention sessions, and Stages of Change model were utilized.
	Bailey et al., (2010). Interactive computer-based interventions for sexual health promotion. <i>15 studies described in 17 papers; all RCTs</i>	-Moderate effects on sexual health knowledge were found in 6/15 studies (SMD 0.72, 95%CI 0.27 to 1.18); and moderate effects on behaviour were found in 4/15 studies (OR 1.75, 95% CI 1.18 to 2.59). -6/15 studies found a small effect on self efficacy (SMD 0.17, 95% CI 0.05 to 0.29). -3/15 studies found a small effect on safer sex intention (SMD 0.16, 95% CI 0.02 to 0.30).
Mass Media	Vidanapathirana et al., (2009). Mass media interventions for promoting HIV testing. <i>14 studies; 2 RCTs, 3 non-RCTs, 9 interrupted time series</i>	- Based on 2 Randomized Control Trials, 3 Controlled Clinical Trials, and 9 Interrupted Time Series studies, there was sufficient evidence to support using mass media for promotion of voluntary HIV counselling and testing, however no long term effects were found. -Mass media interventions for the promotion of HIV testing showed significant immediate effect (Estimated mean=5.487, 95% CI=2.370 to 8.650) and overall effect (Estimated mean= 6.095, 95% CI= 1.812 to 10.378).
Peer Led Approaches	Kim et al., (2008). Recent evaluations of the peer-led approach in adolescent sexual health education: A systematic review. <i>13 studies; 4 RCTs, 9 quasi-experimental RCTs</i>	- No clear evidence suggesting peer-led sex education promotes condom use or reduced odds of pregnancy or of having a new partner. - 1/13 studies reported statistically significant reduction in Chlamydia incidence among African American females (OR 0.17, 95%CI 0.03 to 0.92), and another showed an increase in odds that female participants would be more likely to refrain from engaging in their first sexual experience (OR 1.88 95%CI, 1.02 to 3.47). - Most studies found positive effects on measures of knowledge, attitudes and intentions, but not always clear on number of variables measured and consistency among studies.
School Based Behavioural Interventions	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. <i>15 studies; all RCTs</i>	- Statistically significant positive effect on improving knowledge found in 10/12 studies. - Few significant differences between interventions and comparators regarding sexual behaviour outcomes (such as sexual risk taking behaviour or STI rates). - Some mixed results on improving self-efficacy (defined as participants' belief in their own abilities to perform certain skills) from 5/15 studies that looked at this outcome: 3/5 studies showed positive effect on self-efficacy among participants receiving behavioural interventions and no intervention; 2/5 found no difference between behavioural interventions and standard sex education.

*Findings are ordered alphabetically by intervention, not by the strength of the evidence due to the large number of outcomes with varied effect sizes.

**Where statistical data is not provided, the systematic review was a narrative synthesis.

5.2 Summary of the Results of Interventions by Outcome Measures:

Overall, the reviews assessed a large number of outcomes. The following outcomes were selected to be included in this rapid review as sufficient data were provided to allow synthesis of the findings and inform practice, and because the outcomes were specifically related to the PICO question. The outcomes included are: i) disease outcomes, ii) HIV testing, iii) condom use, iv) sexual behaviour, v) self efficacy, vi) safer sex intentions, vii) knowledge improvement and viii) attitudes. For a full list of outcomes and results, please refer to the data extraction tables in Appendix E. Below is an overall summary of the main findings.

i) Disease Outcomes (reduction in incidence of STIs)

Noar et al. (2009) included 12 studies, three of which explored computer-based interventions to reduce the incidence of STIs. The three studies found a small positive effect on the impact of computer-based interventions in reducing STIs ($d = 0.140$, 95% CI 0.035 to 0.245).

Bailey et al. (2010) included two studies that attempted to measure the disease outcomes of Interactive Computer Based Interventions (ICBIs), compared to minimal interventions such as usual practice or leaflets, but found that there were insufficient data to draw conclusions.

Comparing ICBIs to face-to-face interventions, showed no effect.

The systematic review by Kim et al. (2008) found one study that demonstrated peer-led interventions led to a reduction in the risk of testing positive for Chlamydia, which was specifically among African-American females (OR 0.17, 95%CI 0.03 to 0.92), while a second study in Kim et al found no effect on STI incidence.

Underhill et al. (2009) included three studies that examined whether abstinence plus programs resulted in fewer participants reporting STIs or resulted in more participants receiving treatment for STIs and found no positive effect¹ .

ii) HIV Testing

One systematic review by Vidanapathirana et al. (2009) examined the impact of mass media on rates of HIV testing among a number of different populations of both youth and adults. Based on analysis of 14 studies (Randomized Control Trials, Controlled Clinical Trials, and Interrupted Time Series Studies), there is evidence to support that mass media interventions can increase individuals' likelihood of being tested for HIV. Significant effects were shown immediately after the interventions (Estimated mean=4.487, 95% CI= 2.370 to 8.605) and overall (Estimated mean=6.095, 95% CI= 1.812 to 10.378); however, there were no statistically significant longer term effects measured on the impact of mass media strategies.

iii) Condom Use

Four of the six systematic reviews measured the effect of interventions to promote condom use (Kim & Free, 2008; Noar et al., 2009; Shepherd et al., 2010; Underhill et al., 2009). Noar et al. (2009) conducted a meta-analysis of 12 studies which examined the effectiveness of computer-based interventions in improving condom use among youth and adults and found that there was a

¹ Analysis on Underhill et al systematic review also included Health Evidence summary statement by Greco, L., McRae, L., Dobbins, M. (2010). Abstinence-plus HIV prevention programs in high-income countries: Evidence and implications for public health. Hamilton, ON: McMaster University. Retrieved July 11, 2011, from *health-evidence.ca*: http://www.health-evidence.ca/documents/17228/Underhill__2007__Summary_Statement_-_English.pdf

statistically significant small effect among those who received computer-based interventions compared to those who received no intervention ($d = 0.259$, 95% 0.201 to 0.317).

Underhill et al. (2009) reviewed the effectiveness of abstinence-plus programs on improving condom use among youth and young adults. Among the 26 studies that measured condom use, mixed results on the efficacy of abstinence-plus interventions were found. Fourteen studies found a statistically significant positive effect in the number of participants using condoms at follow up compared to no treatment, usual care, or other types of interventions, while the other 12 studies found no effect.

The third systematic review that measured condom use was Shepard et al. (2010). This systematic review examined school-based behavioural interventions among youth 13-19 years of age in the number of studies and found no statistically significant positive effect on condom use (OR 1.07 95% CI 0.88 -1.30).

Kim et al. (2008) examined peer-led approaches in 7 studies focusing on youth populations, and found that there was no statistical significance on condom use among participants receiving peer-led interventions.

iv) Sexual Behaviour

Five of the six systematic reviews examined various sexual behaviour outcomes including number of partners, initiation of sexual intercourse, frequency of sexual intercourse, and incidence of sexual activity (Bailey et al., 2010; Kim & Free, 2008; Noar et al., 2009; Shepherd

et al., 2010; Underhill et al., 2009). Noar et al (2009) found that three of 12 studies examined the effect of computer-based interventions on the frequency of sexual behaviour. These three studies showed a positive effect on reducing the frequency of sexual behaviour (SMD 0.427 95% CI 0.251 to 0.602). However, while there was a statistical significance, the number of studies was small and the confidence interval was wide, so results should be interpreted cautiously. In addition, Noar et al (2009) found that two of the 12 studies included in the systematic review measured the number of sexual partners and showed a statistically significant positive effect (SMD 0.422, 95% CI 0.116 to 0.728). As previously noted, results should be interpreted cautiously based on the width of the confidence interval and small number of studies.

Bailey et al. (2010) found that based on four studies, ICBI's compared to minimal interventions showed a statistically significant positive effect on sexual behaviour, measured by a reduction in sexual victimisation and increased condom use among steady partners in the last three months (OR 1.75, 95% CI 1.18 to 2.59). However there were no statistically significant effects when comparing participants receiving ICBI to face-to-face interventions or other computer-based interventions.

Underhill et al. (2009) examined abstinence-plus programs on a variety of behavioural outcomes (incidence and frequency of various types of sex including oral, anal or vaginal sex). Results varied, with some studies showing positive effects while others showed no statistically significant effects. For example, of 21 studies that examined whether there was a reduction in the incidence of protected or unprotected vaginal sex, five studies found abstinence-plus programs significantly reduced the incidence among participants, compared to no treatment or treatment that involved a program equal in format and duration without an abstinence plus approach.

Conversely, 16 studies found no significant positive effect on abstinence-plus programs in reducing the overall incidence of protected or unprotected vaginal sex. Underhill et al. also found that among two studies examining the incidence of casual sex, no statistically significant positive effect was determined. A complete list of outcomes in Underhill et al. can be found in Appendix D.

Shepherd et al. (2010) concluded that among school-based behavioural interventions, there was no statistical difference among behavioural interventions and control groups regarding initiation of sexual intercourse (OR 1.03, 95% CI 0.74 to 1.43). In addition, Shepherd et al. examined the frequency of sexual intercourse and among eight studies found no statistically significant positive effects, with the exception of one study. A meta-analysis to compare results was not possible due to heterogeneity of the groups and outcomes, in addition to incomplete data. Shepherd et al. also looked at the impact of school-based behavioural interventions on the number of sexual partners, and determined that among six studies, only one found a statistically significant positive effect, specific to those involving men who have sex with men (MSM), but not among heterosexual sex partners.

In Kim et al. (2008), one study found peer-led strategies increased the likelihood that female adolescents had not engaged in sex (OR 1.88, 95% CI 1.02 to 3.47), but this effect did not hold true for males (Bailey et al., 2010; Kim & Free, 2008; Shepherd et al., 2010). Kim et al also found that participants who received peer-led interventions did not have fewer new partners as a result of the intervention.

v) Self Efficacy

Self efficacy is defined as the participant's belief in their own abilities to perform safer sex behaviours. Two of the six systematic reviews reported measures of self efficacy (Bailey et al., 2010) (Shepherd et al., 2010). Bailey et al (2010) found that ICBI compared to minimal interventions had a small effect on self-efficacy (SMD 0.17, 95% CI 0.05 to 0.29). However when ICBI were compared to face-to-face interventions or to other computer interventions, there was no statistical difference between groups in improving self efficacy, except for one study among men who had a new steady partner, which showed a statistically significant positive effect on negotiated safety (OR 3.47, 95% CI 1.45 to 8.31).

Shepherd et al (2010) reviewed five studies that examined behavioural interventions; three studies showed positive effects on self-efficacy among participants receiving behavioural interventions compared to no intervention; two studies found no difference between behavioural interventions and standard sex education.

vi) Safer Sex Intentions

Safer sex intentions refer to participants' plans or intent to practice safer sex before actually engaging in sexual activity. Three of the six systematic reviews reported on safer sex intentions (Bailey et al., 2010; Kim & Free, 2008; Shepherd et al., 2010). Bailey et al. (2010) found that among three studies, there was a slight positive effect on safer sex intention (SMD 0.16, 95% CI 0.02 to 0.30) comparing ICBI with minimal interventions, but no effect comparing ICBI with face-to-face interventions or other computer-based interventions.

Kim et al. (2008) discovered that 10 of 13 studies examining the impact of peer-led programs on safer sex intentions found positive effects, however no outcome data were presented and therefore no effect size summaries could be calculated.

Shepherd et al. (2010) discovered that six of the 15 studies measured behavioural intentions. Three of the six studies found no statistical significance comparing behavioural interventions to standard sex education. The remaining three studies found statistically significant positive effects when comparing behavioural interventions to control groups who received no intervention.

vii) Knowledge Improvement

Four of the six systematic reviews examined knowledge of STIs and/or HIV (Bailey et al., 2010; Kim & Free, 2008; Shepherd et al., 2010; Underhill et al., 2009). Bailey et al. (2010) found that based on six studies, ICBI compared to minimal interventions such as usual practice or leaflets resulted in a statistically significant improvement in sexual health knowledge (SMD 0.72, 95% CI 0.27 to 1.18). In addition, two studies in Bailey et al. comparing ICBI with face-to-face interventions also found a small positive effect (SMD 0.36, 95% CI 0.13-0.58).

Shepherd et al. (2010) found that 10 of the 15 studies on school-based behavioural interventions showed a statistically significant positive effect on improving knowledge among those who received a behavioural intervention, however longer term (over one year) retained knowledge was not measured.

Underhill et al. (2009) found that of the 24 studies which examined the effect of abstinence-plus programs on knowledge improvement, 20 studies showed an improvement in knowledge of HIV/AIDS among participants compared to participants receiving other types of programs, while the other four studies showed no effect.

Kim et al. (2008) found that 10 of the 12 studies on peer led approaches found positive effects on improving participants' knowledge on topics such as information on STI symptoms, types of contraceptives, and STI transmission and prevention.

viii) Attitudes

The systematic review by Shepherd et al. (2010) which examined school-based behavioural interventions included eight studies which assessed attitudes, six of which focused on participant's attitudes towards risky sexual behaviour or sexual intercourse, and the other two focused on attitudes towards waiting to have sex. Four studies in Shepherd et al. found statistically significant positive effects: Coyle et al.(1999) found a positive effect on attitudes towards condom use; Jemmott et al. (1992) found a positive effect on attitudes towards risky sexual behaviour immediately following the intervention, but this effect was lost after the 3 month follow up; Klepp et al. (1997) found a positive effect on attitudes towards people with AIDS; and Roberto et al. (2007) reported a positive effect on participants' attitudes towards waiting to have sexual intercourse among the intervention group compared to the control group (as cited in Shepherd et al., 2010). Studies that had a control group (receiving no intervention) rather than a comparison group (such as teacher-led education) were more likely to show a statistical significance in attitude outcomes.

5.3 Summary Statement and Recommendation:

Overall, the evidence suggests that computer-based interventions show the most promising results for positive outcomes such as improving condom use, safer sexual behaviour and sexual health knowledge, compared to the other interventions examined in this rapid review. Mass media interventions have demonstrated improvements in immediate HIV testing rates. Mass media interventions may be most appropriate in the event of an outbreak or dramatic rise in STI rates. School-based, abstinence-plus, and peer-led interventions have been shown to improve sexual health knowledge only; therefore they may not be the most effective strategies to reduce STI rates.

6 Applicability and Transferability

The applicability and transferability meeting, facilitated by the knowledge broker, was attended by the lead EIDM AMOH, the divisional director, two program managers, two program supervisors, one RPA, and two HPOs. Two health promotion interventions were the focus of the meeting: ICBIs and mass media. Discussion focused on the political and social acceptability of these two interventions.

Overall, there was a consensus that use of ICBIs and mass media would likely be politically acceptable. Despite the controversial nature of sexual health issues, Regional Council has supported mass media campaigns in the past, and Council supports the EIDM process, Health Services does not anticipate a change in the level of support. Previous mass media initiatives (such as the “Hard to Spell, Easy to Catch” campaign which included a bus shelter ad and movie trailer geared toward youth) and the current Healthy Sexuality Program websites have sparked

little public or political concern. Moreover, computer-based interventions may be viewed as less controversial than mass media as information can be accessed in a private setting rather than in a public format. Most youth have broad access to computers and other wireless technology (such as at home, school, libraries and through the use of cell phones/smart phones), and would have the autonomy to pick and choose when and where they access sexual health information. Peel Public Health would be able to reach youth on a level that has not previously been attempted, decreasing barriers to sexual health information and services that have been traditionally limited to in-person or over the phone counselling during weekday business hours.

The social implications of ICBI and mass media could be positive if the information and language is culturally appropriate and easily accessible to the ethnically and sexually diverse youth of Peel. Youth already have access to a great deal of information about the Healthy Sexuality program from the current program websites and past mass media campaigns.

Utilizing ICBI or mass media would not “single out” an individual in front of his or her peers or families. Both of these interventions can be accessed in either a public or private space providing youth with the independence to decide when and if to explore the sexual health information further. Parents of youth may take issue with the messages presented with ICBI and mass media as sex can be a taboo subject for different households, cultures, genders and ethnicities. The program and health department as a whole has information and supports in place to address parental concerns, which would continue to be available should complaints be received.

Implementing ICBIs requires an examination of what personal health information is appropriate (if any) to be collected from the user, and if so, how this data would be used and shared. ICBIs would need to adhere to PHIPA principles to ensure client/user confidentiality. The collection of any information from youth could be potentially detrimental to the success of ICBIs, as youth may regard this as an intrusion of privacy. It would be essential to explore all types of ICBIs and their specific ramifications, including downloading applications to phones, texting and through email.

The creation and launch of new ICBIs and mass media would require upfront resources. Both funding and staff resources must be made available to support the creation, implementation and evaluation of the interventions. Technology and youth culture is constantly changing; interventions need to remain up-to-date and fresh in their messaging, information and mass appeal.

The Healthy Sexuality program currently has 4 full time staff to oversee this programming. In order to maximize the efficiency and effectiveness of available resources, it is recommended that the Region's program planning and evaluation (PPE) process be utilized throughout. It is recommended that program staff use the Peel Public Health Communicable Diseases Report 2006-2010 to better understand the rising rates of Chlamydia and gonorrhea to guide program tailored interventions for youth based on surveillance data.

Currently in Peel Public Health there are already program areas within other divisions that have been exploring ICBIs and alternative health promotion programming for youth. There is the

possibility for collaboration with the Family Health and Chronic Disease and Injury Prevention Divisions around issues affecting youth, such as sex, alcohol, drugs, and preconception health. Organizational support and capacity building would also be enhanced by conducting a “NIPS and RIPS” presentation on the findings from this rapid review.

7 Final Recommendations

Utilizing this current rapid review as a “scoping review,” and considering the applicability and transferability of the current findings on interactive computer-based interventions, it is recommended that ICBI should be thoroughly explored.

Through the applicability and transferability meeting, the following steps were identified in order to move forward with developing specific interventions to reduce STIs among 15-24 year olds in Peel:

1. Conduct a follow up rapid review focusing on ICBI to determine the specifics of these types of interventions in order to make program planning decisions and applicable.
2. Identify possible collaborations or partnerships within other Public Health divisions where similar messaging is desired and cost sharing of resources may be available.
3. Utilize the department’s PPE process in order to:
 - Conduct a cost-benefit analysis of ICBI, including staff resources, IT support and technology required.
 - Work with Peel Public Health Communicable Disease Report 2006-2010 to understand recent surveillance data, in order to tailor interventions for youth.

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Appendices

Appendix A: Conceptual Model

Appendix B: Final Search Strategy

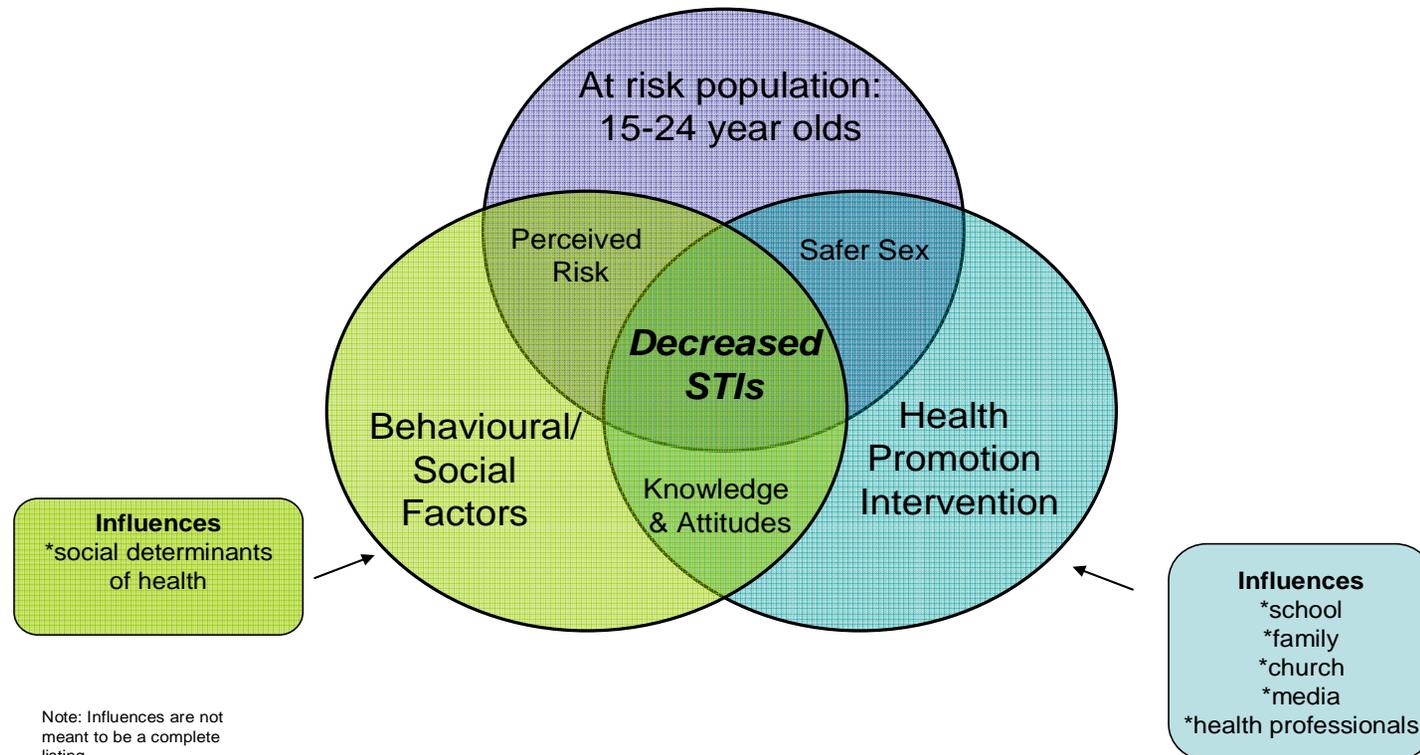
Appendix C: Overall Search Process and Results

Appendix D: Understanding Standardized Mean Difference (SMD)

Appendix E: Data Extraction Tables

Appendix A: Conceptual Model

What health promotion strategies are effective in reducing sexually transmitted infections in 15-24 year olds?



Appendix B: Final Search Strategy

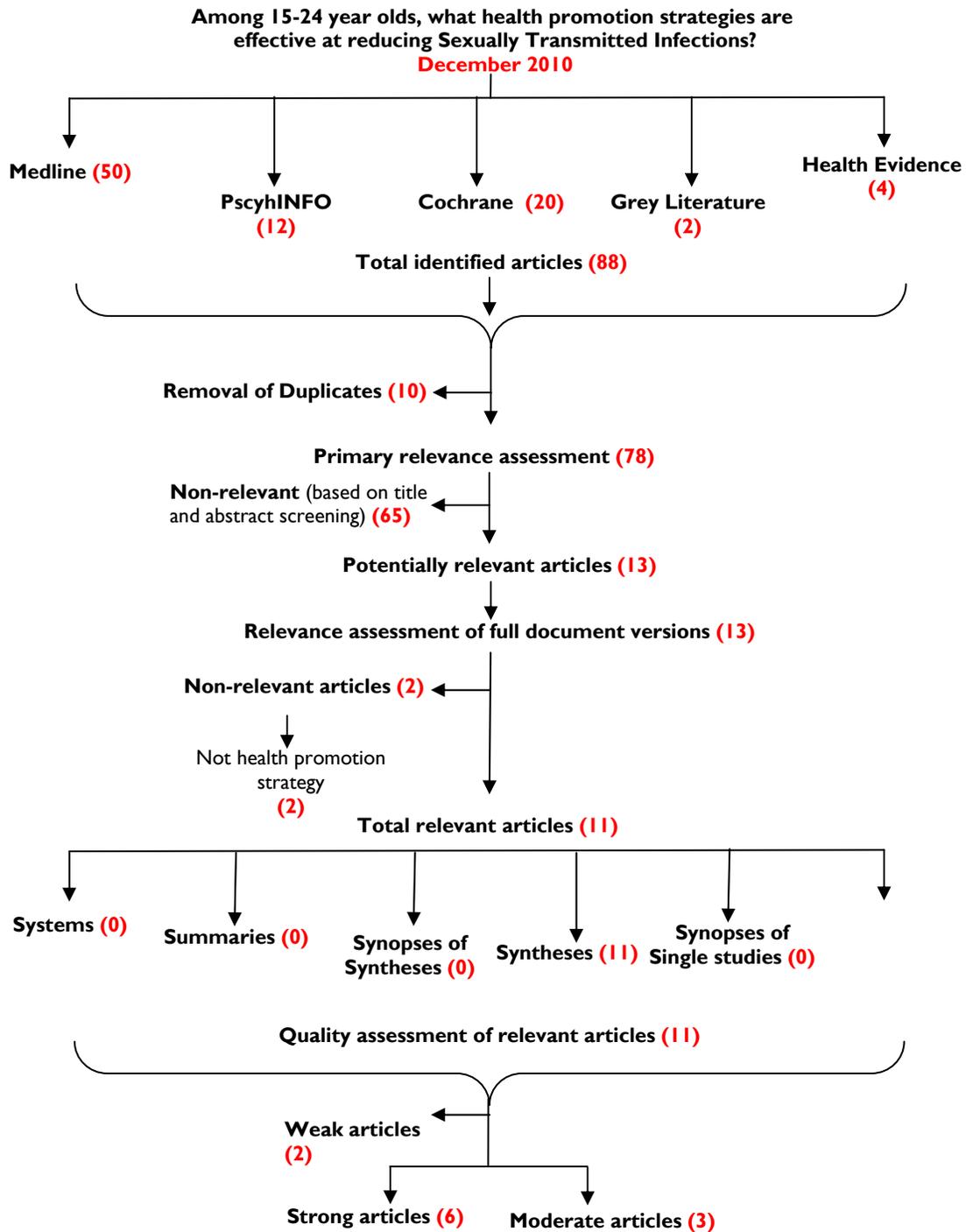
December 9, 2010	Medline	<ol style="list-style-type: none"> 1 Adolescent/ (1401002) 2 Young Adult/ (124314) 3 adolesc\$.tw. (127447) 4 young adult\$.tw. (42641) 5 university student\$.tw. (5035) 6 exp Health Promotion/ (41272) 7 health promotion.tw. (13849) 8 strateg\$.tw. (383847) 9 social marketing.tw. (922) 10 communic\$.tw. (129708) 11 exp Health Education/ (119174) 12 outreach.tw. (5704) 13 social media.tw. (69) 14 risk reduction.tw. (8163) 15 risk reduction behavior/ (4287) 16 exp Chlamydia Infections/ (15845) 17 exp Gonorrhea/ (11437) 18 chlamydia.tw. (17567) 19 gonorrhea.tw. (4891) 20 exp Syphilis/ (19946) 21 syphilis.tw. (15732) 22 6 or 7 (46652) 23 meta-analysis.mp,pt. (44254) 24 (search or systematic review or medline).tw. (141778) 25 cochrane database of systematic reviews.jn. (7458) 26 23 or 24 or 25 (169137) 27 "marketing of health services"/ or social marketing/ (14567) 28 Sex Education/ (7245) 29 intervention\$.tw. (374481) 30 post secondary student\$.tw. (13) 31 college student\$.tw. (9400) 32 1 or 2 or 3 or 4 or 5 or 30 or 31 (1503818) 33 exp Sexually Transmitted Diseases/ed, ep, pc, tm [Education, Epidemiology, Prevention & Control, Transmission] (85620) 34 6 or 7 (46652) 35 6 or 29 (407399) 36 16 or 17 or 18 or 19 or 20 or 21 or 33 (129275) 37 14 or 15 (11620) 38 policy.tw. (80052)
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		<p>39 policies.tw. (33106) 40 education.tw. (214014) 41 community development.tw. (895) 42 advocacy.tw. (6206) 43 prevention.tw. (267698) 44 6 or 7 or 8 or 9 or 10 or 11 or 12 or 13 or 14 or 15 or 27 or 28 or 29 or 38 or 39 or 40 or 41 or 42 or 43 (1374716) 45 16 or 17 or 18 or 19 or 20 or 21 or 33 (129275) 46 32 and 44 and 45 (10130) 47 26 and 46 (116) 48 limit 47 to yr="2007 -Current" (56) 49 Developing Countries/ (55319) 50 exp "Africa South of the Sahara"/ (116734) 51 49 or 50 (162732) 52 48 not 51 (45) 53 sexually transmitted infection\$.tw. (4557) 54 45 or 53 (130455) 55 32 and 44 and 54 (10431) 56 26 and 55 (124) 57 56 not 51 (101) 58 limit 57 to yr="2007 -Current" (50)</p>
December 9, 2010	Psychinfo	<p>1 exp Health Promotion/ (6886) 2 health promotion.tw. (5497) 3 strateg\$.tw. (89470) 4 social marketing.tw. (468) 5 communic\$.tw. (52085) 6 exp Health Education/ (4697) 7 outreach.tw. (2074) 8 social media.tw. (93) 9 risk reduction.tw. (1550) 10 exp Risk Management/ (1869) 11 exp Sexual Risk Taking/ (2934) 12 policy.tw. (35891) 13 policies.tw. (15442) 14 education.tw. (86475) 15 community development.tw. (577) 16 advocacy.tw. (4010) 17 prevention.tw. (34022) 18 exp Sexually Transmitted Diseases/ (13490) 19 sexually transmitted infection\$.tw. (1331) 20 chlamydia.tw. (338) 21 exp Gonorrhea/ (54)</p>

		<p>22 gonorrhoea.tw. (128) 23 exp Syphilis/ (154) 24 syphilis.tw. (369) 25 exp Social Marketing/ (253) 26 exp Sex Education/ (830) 27 exp Intervention/ (28532) 28 intervention\$.tw. (98114) 29 exp College Students/ (17710) 30 college student\$.tw. (14185) 31 post secondary student\$.tw. (51) 32 university student\$.tw. (5983) 33 young adult\$.tw. (11242) 34 adolescen\$.tw. (59733) 35 29 or 30 or 31 or 32 or 33 or 34 (92570) 36 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 or 10 or 11 or 12 or 13 or 14 or 15 or 16 or 17 or 25 or 26 or 27 or 28 (323292) 37 18 or 19 or 20 or 21 or 22 or 23 or 24 (13997) 38 35 and 36 and 37 (1318) 39 meta analysis.tw. (5671) 40 (search or systematic review or medline).tw. (22378) 41 39 or 40 (26766) 42 38 and 41 (22) 43 limit 42 to yr="2007 -Current" (13) 44 exp Developing Countries/ (1727) 45 43 not 44 (12)</p>
December 10, 2010	Cochrane Database	<p>1 sexually transmitted infection\$.mp. [mp=title, short title, abstract, full text, keywords, caption text] (52) 2 sexually transmitted disease\$.mp. [mp=title, short title, abstract, full text, keywords, caption text] (63) 3 intervention\$.tw. (6409) 4 health promotion.tw. (159) 5 risk reduction.tw. (446) 6 strateg\$.tw. (6355) 7 social marketing.tw. (21) 8 education.tw. (1232) 9 social media.tw. (1) 10 outreach.tw. (102) 11 policy.tw. (1342) 12 policies.tw. (315) 13 communic\$.tw. (1316) 14 community development.tw. (9) 15 advocacy.tw. (65)</p>

		16 prevention.tw. (2505) 17 3 or 4 or 5 or 6 or 7 or 8 or 9 or 10 or 11 or 12 or 13 or 14 or 15 or 16 (6519) 18 1 or 2 (90) 19 17 and 18 (90) 20 limit 19 to last 4 years (75) 21 intervention\$.kw. (941) 22 health promotion.kw. (21) 23 21 or 22 (949) 24 20 and 23 (20)
January 2011	Health Evidence	- "Search Articles" - Subject headings of "adolescent health", "sexual health", and "sexually transmitted infections-STIs" - Results were hand searched based on relevant titles

Appendix C: Overall Search Process and Results



Source: Health-evidence.ca. *Keeping Track of Search Results: A Flowchart*. [Retrieved January 13, 2010]

Appendix D: Understanding Standardized Mean Difference (SMD)

SCENARIO

You are asked to review a meta-analysis aimed to determine if an intervention (an interactive computer-based program) is an effective tool to learn about sexual health. Results of the meta-analysis found a statistically significant standardized mean difference (SMD) of 0.72 (95% CI: 0.27 to 1.18).

How do we interpret the SMD?

BACKGROUND:

Why Do Studies Use the Standardized Mean Difference (SMD)?

- The SMD is common when continuous data are presented and when results from more than one individual study are being combined, such as in systematic reviews.
- If studies have similar outcomes of interest (e.g. sexual health knowledge) but are measured using different scales, the results cannot be combined directly.
- Instead, we use a standardized mean difference measure to convert all outcomes to a common scale, measured in units of standard deviation (Cochrane Collaboration, 2002).
- In such circumstances, the result of each individual study can be standardized by calculating the SMD. The treatment effect in each study is expressed in standard units (instead of the original units).

Key message: The effects of a treatment are standardized so that they have a similar meaning across scales.

How is SMD calculated?

- The standardized mean difference (SMD) is the difference in treatment and control means divided by the pooled standard deviation (Norman & Streiner, 2008).
- The measure is a ratio and its value does not depend on the measurement scale.

What does SMD actually measure?

- SMD measures the number of standard deviations between the means (Cochrane Collaboration, 2002).
- The value of a SMD depends on both the size of the effect (the difference between means) and the standard deviation of the outcomes (the inherent variability among participants) (Cochrane Collaboration, 2002).

INTERPRETING SMD RESULTS:

How do you interpret SMD Values?

- SMD calculates the difference between two groups (the effect size estimate) and is expressed in standard deviation units. That is, if the SMD is 1.0, it means that the difference between the intervention and control group is one standard deviation (Norman & Streiner, 2008), (Cohen, 1988; Norman & Streiner, 2008).

Using Cohen's Criteria:

- Cohen (1988) proposed general definitions for interpreting effect size estimates:

Size of effect	Effect Size Estimate <i>(also called "d" or "Cohen's d")</i>
Small	0.20
Medium	0.50
Large	0.80

- Cohen intended these to be a "rule of thumb" and emphasized that they should not be applied blindly but only in relation to what is known in a specific field and the importance of the finding (Norman & Streiner, 2008).

Interpreting the Scenario Estimate:

Let's return back to the standardized mean difference presented in the scenario above. The meta-analysis found the SMD to be 0.72 (95% CI: 0.27 to 1.18) for sexual health knowledge.

The results show that the intervention and control group differ by 0.72 standard deviations. There is a statically significant positive effect since the confidence interval is greater than 0 and does not cross the line of no effect. Using Cohen's criteria, an SMD with a value 0.72 is considered a medium effect size estimate.

Results in Plain Language: Results indicate a statistically significant moderate effect of computer based interventions on increased sexual health knowledge compared to controls.

Appendix E: Data Extraction Tables

1. Author, Year, Title: Bailey J.V, Murray E, Rait G, Mercer C.H, Morris R.W, Peacock R, Cassell J, Nazareth I., (2010). Interactive computer-based interventions for sexual health promotion. London, England. (Review).

Quality Rating: Strong (Reviewers = 10, Health Evidence = 10)

Objectives of Review: To determine the effects of interactive computer-based interventions (ICBI) for sexual health promotion, considering cognitive, behavioural, biological and economic outcomes.

Number of Primary Studies Included: 15 studies described in 17 papers

Types of Studies: All were randomized controlled trials

Databases/Years Searched: All databases searched their start date up until November 2007. Cochrane registers of trials, Cochrane Library, medical databases (MEDLINE, EMBASE, CINAHL, British Nursing Index), social science databases (HMIC, PsychINFO), education databases (ERIC, Campbell Collaboration databases, British Education Index), public health databases (DoPHER, TRoPHI, Centers for Disease Control and Prevention), other databases (AIDSLINE, HIV/AIDS Prevention Research Synthesis Project Compendium of Evidence-based Interventions, POPLINE). Grey literature and clinical trials also searched.

Inclusion & Exclusion Criteria:

Inclusion: RCTs (both individual and cluster randomized), studies which compared ICBI with minimal exposure, non-interactive forms and face-to-face educational sessions; studies comparing 2 or more types of ICBI; studies of multi-component interventions where it was possible to separately identify the effect; any type of economic evaluations of ICBI. Studies involved users of any age, gender, sexual orientation, ethnicity, nationality.

Exclusion: Simple information packages with no interactive elements; non-interactive mass media interventions such as TV advertisements; interventions designed to be used with other's help; targeted for health professionals or teachers; computer-mediated delivery of individual healthcare advice; electronic history-taking or risk assessments with no sexual health interactive elements; treatment decision aids, interventions designed to optimize sexual health care by clinicians; interventions designed to facilitate provider-user communication.

Descriptions of Interventions, Settings & Study Sample

Interventions: Interactive strategies were defined as those which "required contributions from users to produce tailored material and feedback that is personally relevant (Bailey et al., 2010, p.1). They may include providing information, decision support, behaviour change support, and/or emotional support for health issues. Three studies were conducted online, and 12 studies

had some face-to-face contact with researchers. Eight interventions focused on HIV prevention, three on STIs including HIV, two on preventing unwanted pregnancy, one on responsible sexual behaviour and one on preventing sexual assault and enhancing positive dating experiences.

Settings: USA, delivered to individuals

Population: 6 studies researched adolescents, 4 researched adult men who have sex with men (MSM), 3 studies researched college/university students, 1 researched male soldiers, and 1 researched adults at risk for HIV (including MSM and intravenous drug users). Participants were recruited through schools, colleges/universities, social service programs, medical centres or online.

Main Comparisons, Outcome Measures & Summary of Analysis conducted:

Comparisons:

ICBI with:

- 1) Minimal intervention (usual practice, waiting list, leaflets/books)
- 2) Non-computerized, face-to-face sexual health education such as lectures/group learning, and face-to-face counselling
- 3) Two different designs of computerized sexual health intervention such as non-tailored intervention for sexual health promotion and, no use of risk-based messages, combination of feedback messages with face-to-face counselling

Outcome measures:

- 1) Cognitive outcomes of a) knowledge, b) self-efficacy, c) intention, and d) attitudes
- 2) Behavioural outcomes (e.g., measures of condom use) and
- 3) Biological outcomes (e.g., HIV serology, Chlamydia diagnosis)
- 4) Economic outcomes
- 5) Adverse effects

Analysis: Separate meta analysis conducted on a variety of interventions with comparators

Main Findings of Review

1) Comparing ICBI to minimal interventions such as usual practice or leaflets

Among those who received ICBI:

- Six studies showed that there was a statistically significant positive effect on sexual health knowledge (SMD 0.72, 95% CI 0.27 to 1.18)
- Six studies showed a statistically significant slight positive effect on self efficacy (belief in their capacity to carry out a specific action) (SMD 0.17, 95% CI 0.05 to 0.29)
- Three studies showed there was a slight positive effect on safer sex intention (SMD 0.16, 95% CI 0.02 to 0.30)
- Four studies combined showed a positive effect on sexual behaviour (OR 1.75, 95% CI 1.18 to 2.59)
- Two studies showed insufficient data on biological outcomes and no effect could be measured

2) Comparing ICBI to face-to-face interventions:

Among those who received ICBI:

- Two studies showed there was a statistically significant small positive effect of improving sexual health knowledge using ICBI compared to face-to-face interventions effect (SMD 0.36, 95% CI 0.13-0.58)
- There was no effect on self-efficacy, intention, sexual behaviour and biological outcomes

3) Comparing ICBI to other computer-based interventions

Among those who received ICBI:

- There was no effect on self efficacy or intention to practice negotiated safety directly following interventions
- However, at six months, among males who had a new steady partner, the intervention had a significantly positive effect on negotiated safety (OR 3.47, 95% CI 1.45 to 8.31)

Comments/Study Limitations: N/A

2. Author, Year, Title: Kim, C. R., & Free, C. (2008). Recent Evaluations of the Peer-Led Approach in Adolescent Sexual Health Education: A Systematic Review. London, England.

Quality Rating: Strong (Reviewers = 9, Health Evidence = 8)

Objectives of Review: To conduct a systematic review and methodological appraisal of peer-led sex education interventions; and to determine the extent to which Harden's (1998) previous recommendations on peer-led development and evaluation have been addressed.

(Recommendations included: the health needs and views of target group be assessed; specific boundaries of working partnerships with young people be established and roles of researchers and youth be clearly defined; evaluation of effects that peer education has on peer educators; qualitative and quantitative methods of evaluation; how peer educators are recruited; young people's views, including negative, be reported).

Number of Primary Studies Included: 13

Types of Studies: Randomized (4) and quasi-experimental (9) controlled trials

Databases/Years Searched:

1998-2005, EMBASE, ERIC, PubMed, International Bibliography of Social Science, PsycINFO, specialized bibliographic registers, DoPHER, and Cochrane Central Register of Controlled Trials. Researchers, reference lists and hand searches were also conducted.

Inclusion & Exclusion Criteria:

Inclusion: peer-led intervention intended to promote adolescent sexual health in any setting; published between 1998-2005; high/middle/low income countries; interventions and control groups; adolescents 10-19 years; English; 4 methodological criteria (control or comparison with

similar social and demographic characteristics to intervention group, pre-intervention data for all groups, post-intervention data for all groups, report all outcomes).

Exclusion: Unpublished works

Descriptions of Interventions, Settings & Study Sample:

Interventions: educational sessions ranging from 1 session to 7 sessions, varying length of times (short sessions 45 minutes to single session of 105 minutes, some not specified) assessing topics such as condom use at last intercourse (8 studies), contraceptive use and in most cases condom use (11). All 13 studies assessed knowledge, attitudes or intentions.

Settings:

- School settings (9) and community settings (4)
- Eight of 13 studies were conducted in developed countries. The studies were conducted in the following settings:
USA (4), Zambia (1), Italy (1), Ghana/Nigeria (1), Canada (1), Belize (1), UK (2), Turkey (1), Cameroon (1)

Population: Youth aged 10-19

Main Comparisons, Outcome Measures & Summary of Analysis conducted:

Comparisons: Social and demographic characteristics similar to those of intervention

Outcome Measures: Occurrence of pregnancy or STD, age at first intercourse, contraceptive use, condom use, behavioural outcomes (number of partners, sexual activity). Secondary outcomes: measures of knowledge of sexual health services, behavioural interventions regarding sex and attitudes about sexual health.

Analysis: Narrative analysis with meta-analysis

Main Findings of Review:

- There were no statistically significant positive effects on outcomes measured, therefore this systematic review found no clear evidence that peer-led education promotes condom use, reduces odds of pregnancy, or of having a new partner.

- Among studies included in this review, one study by DiClemente et al (2004) showed a reduction in the risk of testing positive for Chlamydia among African American females (OR 0.17, 95% CI 0.03 to 0.92), however another article by Smith et al (2000) found no impact on STI incidence (OR .98, CI 95% 0.29 to 3.26).

- One study by Aarons et al (2000) found that peer led interventions increased the likelihood that female adolescents delayed onset of engaging in sex, but this did not hold true for males (OR 1.88, CI 95% 1.02 to 3.47).

- All 13 studies examined knowledge, attitudes, or intentions, of which 10 found positive effects on improving knowledge, attitudes and intentions. However, statistical data in this systematic review was not presented and therefore it is not possible to determine effect sizes.

Comments/Study Limitations: Only one reviewer for data extraction; not all studies fulfilled quality criteria (3 out of 13 met all 10 quality criteria and another 2 met 9 of the quality criteria); only published studies were reviewed; not enough studies using the same outcome measures; methodological quality of studies generally poor, random allocation in 10 trials.

3. Author, Year, Title: Noar S, M., Black, H.G., and Pierce L. B. (2009). Efficacy of computer technology-based HIV prevention interventions: a meta-analysis. AIDS (23) 107-115.

Quality Rating: Strong (Reviewers = 9, Health Evidence = 9)

Objectives of Review: To conduct a meta-analysis of computer based HIV prevention behavioural interventions aimed at increasing condom use among a variety of at-risk populations.

Number of Primary Studies Included: 12

Types of Studies: Randomized control trials

Databases/Years Searched: To March 2008. Medline, PsycINFO, unpublished studies, contact lists

Inclusion & Exclusion Criteria: Inclusion: 1) test the efficacy of an HIV prevention behavioural intervention focused on changing sexual risk behaviours in individuals of HIV negative or unknown serostatus 2) measure condom use or unprotected sex as a dependent variable 3) use computer technology in the development or delivery of the intervention 4) utilize experimental design in which individuals were randomized to conditions.

Descriptions of Interventions, Settings & Study Sample

Interventions:

- Computer based targeted by group (3), individually tailored (6), virtual decision making (2), group and virtual decision-making (1)
- Through internet (3), on-site computer screens (8), computer generated print material (1)

Settings: 11 in USA, 1 in Netherlands

Population: 10 heterosexually active, 2 MSM. Of those, 6 were mixed male/female, 4 female-only, 2 male-only

Main Comparisons, Outcome Measures & Summary of Analysis conducted:

Comparisons: computer-based information, peer counselling, no treatment control and usual care

Outcome Measures:

- 1) Frequency of condom use or unprotected sex with partners
- 2) Frequency of sexual behaviour
- 3) Number of sexual partners
- 4) Incidence of STIs

Analysis: meta-analysis

Main Findings of Review

- Computer-based interventions show a statistically significant effect on the increase of condom use. All 12 studies reported outcomes on condom use, and people who received the computer-based interventions showed an increase in condom use compared to those not receiving the intervention (difference = 0.259, 95% CI 0.201 to 0.317).
- Three of the 12 studies reported on frequency of sexual behaviour. These three studies showed a positive effect on sexual behaviour (difference = 0.427, 95% CI 0.251 to 0.602), showing that while there was a statistical significance, the number of studies was small with a wide Confidence Interval (CI).
- Three of the 12 studies also reported on incidence of STIs, and found a small positive effect on the impact of ICBI on reducing STIs (difference = 0.140, 95% CI 0.035 to 0.245), but also had a small number of studies and wide CI.
- Two of the 12 studies examined the effect that ICBI had on number of partners and showed a statistically significant effect (difference = 0.422, 95% CI 0.116 to 0.728). This again shows that while there was a positive effect, there was also a broader CI and a smaller number of studies.

Additional findings based on examining heterogeneity of groups studied showed:

- Interventions directed at single sex groups (males or females) were more efficacious than those directed at both sexes together.
- Computer-based interventions were more efficacious when individual tailoring was utilized, coupled with intervention sessions.
- Computer-based interventions were more efficacious when they utilized a Stages of Change model.

Comments/Study Limitations

- While the article received a strong rating of 9/10 during critical appraisal, it should be noted that the one area of the Health Evidence form where it lost marks was under the methodological quality of primary studies (question 6) such as research design, study sample, sources of bias etc which appears to be an important area in deciding the quality of an article. This gave the group less confidence that the article was methodologically sound, despite the high rating it received.
- Target population was not specific to youth only, and focus was specifically on HIV.

4. Author, Year, Title: Shepherd, J., Kavanagh, J., Picot, J., Cooper, K., Harden, A., Barnett-Page, E., Jones, J., Clegg, A., Hartwell, D., Frampton, G.K., 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. UK.

Quality Rating: Strong (Reviewers = 10, Health Evidence = 10)

Objectives of Review: To assess the effectiveness and cost-effectiveness of school-based skills building behavioural interventions to encourage young people to adopt and maintain safer sexual behaviours and to prevent them from acquiring STIs.

Number of Primary Studies Included: 15

Types of Studies: Randomized control trials

Databases/Years Searched: MEDLINE, EMBASE, PsycINFO, ERIC, CINAHL, CCRCT, TRoPHI, SOCABS, and POPLINE. Most searched from 1985-March 2008. ASSIA was searched from 1987-March 2008. Google Scholar was searched from 1989-2007, and UNAIDS and CDC were searched from 1998-2007.

Inclusion & Exclusion Criteria:

Inclusion: young people 13-19 years, RCTs, behavioural interventions based in school setting, evaluate a sexual behaviour intervention and report a sexual behaviour outcome.

Exclusion: No exclusion criteria were identified

Descriptions of Interventions, Settings & Study Sample

Interventions:

Components: Skills training (15), Education/information (15), professional training (3), provision of resources and services (3), mass media (2), incentives (1), other (5)

Providers: behavioural interventions delivered by a variety or combination of teachers (8), peers (6), health care professional (2), community worker (1), computer (1), parent/caregiver (1), social worker (1), other (5)

Settings:

- All took place in schools/colleges, with 2 being a mix of school/college/community (USA)
- USA (8), Africa (3), Europe (2), UK (2)

Population: 13-19 year olds, general population

A few studies focused on or identified African American populations, and/or low socioeconomic status (SES) participants, whereas other studies did not identify the ethnicity or SES of the population being studied.

Main Comparisons, Outcome Measures & Summary of Analysis conducted:

Comparisons: The majority of studies used “standard” sex education as a comparator (5 standard sex education, 5 attention control, 2 delayed intervention, 1 no intervention control, 2 teacher led versus peer led).

Outcome Measures: behavioural outcomes included: abstinence from sexual activity or delaying onset of sexual activity, condom use, number of sexual partners, age at first intercourse

Analysis:

Main Findings of Review

1. Sexual Behaviour

a) Initiation of sexual intercourse

- No statistical difference with an effect size/OR of 1.03 (95% CI 0.74 to 1.43) among 4 studies

b) Condom use

- No statistical difference with an effect size of 1.07 (95% CI 0.88 to 1.30) among 6 studies

c) Sexual intercourse

- Among eight studies, three reported on the frequency of sexual intercourse, and two reported on abstinence. Three studies also examined the use of alcohol prior to or during sexual intercourse. There was no statistical significance in any of the studies, except for one study by Jemmott et al (1999) which showed a positive effect on the intervention compared to the control group. Results varied among the six studies, and a meta analysis was not able to be done due to the heterogeneity of the types of outcomes reported and incomplete data.

d) Contraception and pregnancy

- Four studies measured contraception use, two of which included a pregnancy outcome and one reported on abortions. Of the four studies, one study by Coyle et al (1999) showed a statistically significant effect on preventing pregnancy (measured by use of condoms, oral contraceptives, or both).

- A meta analysis was not able to be done due to the heterogeneity of the types of outcomes reported and incomplete data.

e) Sexual partners

- Six studies assessed the effect of the intervention related to number of sexual partners. One study by Jemmott et al (1999) studied the effect of the intervention on the number of anal sex partners among participants, and found a statistically significant positive effect on the number of sex partners among men who have sex with men (MSM) but not among those engaging in heterosexual sex at a six month follow up.

f) Other behavioural outcomes

- Among four studies measuring additional behavioural outcomes, there were no statistical differences in behavioural outcomes, except for two studies (Jemmott et al, 1999 and Jemmott et

al, 1992) which used a risk behaviour index as an outcome measure. Jemmott et al (1992) found participants engaged in significantly less risky sexual behaviour at 3 month follow up than the control group, and Jemmott et al (1999) found that participants displayed no significant difference at 3 month follow up, but at 6 month follow up young people displayed significantly less HIV risk-associated sexual behaviour.

Overall: Interventions resulted in few statistically significant positive effects on sexual behaviour

2. Skills and Self Efficacy

- All 15 studies included a skills component in their intervention (such as focusing on communication and negotiation, decision making, and condom use), and most studies had two (4 studies) or three (4 studies) skill components.
- Two of the three studies (Karnell et al, 2006 and Zimmerman et al, 2008) comparing a behavioural intervention with standard sex education found no statistically significant effects. Coyle et al (1999) did report a statistically significant positive effect on condom use self efficacy and Karnell et al (2006) found a statistically significant positive effect for refusal self efficacy for the subgroup of young women in their study.
- Three studies compared behavioural interventions with no intervention and found statistically significant positive effects. Jemmott et al (1999) found a statistically significant positive effect on condom self efficacy immediately following the intervention as well as at 3 and 6 month follow ups compared to the control group receiving no intervention. Roberto et al (2007) reported on four self efficacy outcomes and found statistically significant positive effects on condom negotiation and situational self efficacy but not on condom use or refusal self efficacy.
- Two studies compared peer with teacher-led interventions, one of which reported statistically significant positive effects on improving prevention skills such as communication and negotiation skills, however there was no difference between the groups, showing that both peer-led and teacher-led interventions were effective. The other study, conducted by Stephenson et al (2004) also reported no statistically significant effects, except for girls at the 18 month follow up who became more confident about using condoms after receiving peer-led interventions rather than teacher- led.

3. Knowledge

- Most studies examined the knowledge participants had of HIV or STIs including HIV.
- 10 of 15 studies showed a statistically significant positive effect on improving knowledge among those who received the intervention, however most studies examined knowledge for up to 12 months, so whether longer term knowledge was sustained was not able to be determined.

4. Attitudes

- Eight studies measured attitudes, with six focusing on participant's attitudes towards risky sexual behaviour or sexual intercourse, and the other two focused on attitudes towards waiting to have sex. Four studies found statistically significant positive effects: Coyle et al (1999) found a positive effect on attitudes towards condom use; Jemmott et al (1992) found a positive effect on attitudes towards risky sexual behaviour immediately following the intervention, but this effect was lost after the 3 month follow up; Klepp et al (1997) found a positive effect on attitudes

towards people with AIDS; and Roberto et al (2007) reported a positive effect on participants attitudes towards waiting to have sexual intercourse among the intervention group compared to the control group. Studies that had a control group (receiving no intervention) rather than a comparison group (such as teacher-led education) were more likely to show a statistical significance in attitude outcomes.

5. Behavioural Intentions

- 6 of the overall 15 studies in this systematic review measured behavioural intentions. Studies that had a control group rather than a comparison group were more likely to show a statistical significance in behavioural intention outcomes. Three of the studies showed no statistical significance comparing the intervention to standard sex education, except for Levy et al (1995) who found a positive effect on participants' intention to use condoms with foam. The remaining three articles found statistically significant positive effects when comparing interventions to no intervention. Jemmott et al (1992) found a statistically significant positive effect on intention to engage in risky sexual behaviour. Jemmott et al (1999) found a statistically significant positive effect on intention to use condoms, and Klepp et al (1997) found a statistically significant positive effect on intention to have sex, as participants in the intervention group had a reduced intention to have sex compared to the control group.

6. STI Infection Rates

- None of the 15 studies reported on rates of STI infection, therefore there is no data for analysis.

Overall:

Schools-based education and skills development interventions were limited in encouraging safer sexual behaviour among young people. There were greater statistically significant differences for outcomes such as improved knowledge and self efficacy.

Comments/Study Limitations

- Short follow up time for students (10 of 15 studies followed up with participants for less than one year) when many young people were becoming sexually active.
- In addition, nine of 15 studies conducted process evaluations which were also included in the study. Studies showed that factors including, but not limited to, school culture, school administration, teacher's enthusiasm, expertise and autonomy all may impact the level of fidelity for program implementation.
- Teacher-led interventions may be more cost effective due to less frequent need for training.

5. Author, Year, Title: Underhill K, Montgomery P, Operario D., (2009). Abstinence-plus programs for HIV infection prevention in high-income countries. UK. (Review)

Quality Rating: Strong (Reviewers = 10, Health Evidence = 9)

Objectives of Review: To assess the effects of abstinence-plus programs for HIV prevention in high-income countries (abstinence-plus aims to prevent, stop or decrease sexual activity, promote condom use and other safer sex strategies).

Number of Primary Studies Included: 39

Types of Studies: randomized and quasi-randomized controlled trials

Databases/Years Searched: 1980 to Feb 2007

ADOLEC, AIDSLINE, AMED, ASSIA, BiblioMap, BIOSIS, BNI, Catalog of US Government Publications, CENTRAL, CHID, CINAHL, DARE, EMBASE, ERIC, EurasiaHealth Knowledge Multilingual Library, HealthPromis, HMIC, PAIS, PsycINFO, Pub Med, RCN, SCISEARCH, SERFILE, SIGLE, TRoPHI, various abstracts, libraries, hand searching and personal communication

Inclusion & Exclusion Criteria:

Inclusion: Intervention was a planned effort to encourage sexual abstinence or return to sexual abstinence as the best means of HIV prevention; specific outcomes were presented; HIV prevention was goal of intervention; program promoted condom use, partner reduction or other safer-sex behaviours as alternate to abstinence; high-income countries.

Exclusion: Studies that involved participants who were already HIV positive.

Descriptions of Interventions, Settings & Study Sample

Interventions: any planned efforts intended to increase rates of abstinence as best means of HIV prevention, as well as increase safer-sex behaviours such as condom use, partner reduction, and/or decreased frequency of unprotected sex.

Settings:

- Schools (10), community facilities (24), both school & community facilities (2), healthcare facilities (2), family homes (1)
- in USA (37), Canada (1), Bahamas (1)

Population: Adolescents or young adults in high income countries, the majority focused on pre-secondary school youth (37 urban settings, 1 rural setting).

Main Comparisons, Outcome Measures & Summary of Analysis conducted:

Comparisons: no intervention; interventions equal in format and time but targeted HIV-unrelated behaviour (e.g., gang membership); interventions that did not encourage abstinence as a primary outcome (e.g., condoms); abstinence-only programs; enhanced and non-enhanced versions of same program; usual care.

Outcome Measures: Biological (HIV, STI, pregnancy incidence); and behavioural outcomes (incidence and frequency of unprotected vaginal, oral, anal sex, any vaginal/oral/anal sex, number of sex partners, use of male and female condoms, duration of abstinence post-

intervention, abstaining if no condoms used, return to abstinence for those previously sexually active, incidence of sexual initiation).

Analysis:

Main Findings of Review (summary based on Underhill et al in addition to summary statement by Greco et al)

Disease Outcomes:

Abstinence-plus programs to prevent STIs

- Of three studies, two studies assessed whether participants in abstinence-plus programs compared to participants receiving knowledge-only program were likely to report fewer STI diagnoses by a doctor or nurse. Results from studies measuring between 0 to 6 months after intervention showed that there was no statistically significant positive effect (OR 1.15, 95% CI 0.07 -18.68) and (OR 0.15, 95% CI 0.01-2.98). In addition, after a longer follow up there was still no statistical significance (6-12 months OR 0.15 95% 0.01-2.98, and at over 12 months OR 0.80 95% CI 0.21-3.00).

The third study assessed whether participants in abstinence-plus programs were less likely to receive treatment for STIs, but found that participants were in fact just as likely as those participants receiving knowledge-only programs at six month follow up (OR 0.11 95% CI 0.01-1.09).

Behaviour outcomes:

- A total of 39 studies explored whether abstinence-plus programs reduced sexual risk behaviour

Abstinence-plus programs to reduce incidence of vaginal sex

- Incidence of unprotected vaginal sex: Three studies examined the incidence of unprotected vaginal sex among those who received abstinence-plus compared to other programs. One study showed no effect, and two studies found a decrease at 1 year follow up. However, at 12 month follow up, the two studies showed the incidence of unprotected vaginal sex had decreased; one showed a significant reduction in lifetime incidence of unprotected vaginal sex and the other showed a reduced incidence of unprotected sex within the previous 3 months only among participants who were sexually experienced at baseline.

- Incidence of any (protected or unprotected) vaginal sex: Of 21 studies that examined whether there was a reduction in any vaginal sex, five studies found abstinence-plus programs significantly reduced the incidence among participants, compared to no treatment or treatment that involved a program equal in format and duration without an abstinence-plus approach. 16 studies found no significant positive effect on abstinence-plus programs in reducing overall incidence of protected or unprotected vaginal sex.

Abstinence-plus programs to reduce frequency of unprotected vaginal, anal and/or oral sex

- Vaginal sex: Of 12 studies examining the impact of abstinence-plus programs on reducing the frequency of vaginal sex, there was a significant effect on reducing the frequency of unprotected sex compared to participants who received a control program of a similar duration among six studies, and one study found reduced frequency of unprotected vaginal sex among participants who reported sexual experience at baseline. Six studies found no effect on the frequency of unprotected vaginal sex among participants who took part in abstinence-plus programs.

- Anal and/or oral sex: Two studies examined the reduction of anal or oral sex. One study conducted at a juvenile centre found no effect compared to those who received another type of program. The second study completed in a community based organization found there was a statistically significant positive effect over a 14 month follow up period compared to those participants who received a separate program that did not include an abstinence-plus approach.

- Oral sex: One study examined the impact of abstinence-plus programs in reducing incidence of oral sex and found that there was no statistically significant positive effect on the reduction of oral sex based on a 7 month follow up

Abstinence-plus programs to reduce incidence and frequency of anal sex

- Anal sex: Three studies measured incidence of anal sex in the past 3 months compared to controls. Of the three, one found a reduced incidence of anal sex at 6 month follow up and a second study showed a reduced frequency at 6 month follow up. The third showed no statistical significance in reducing incidence and frequency of anal sex.

Abstinence-plus programs to reduce the frequency of recent vaginal sex

- Of 13 studies, five studies found that abstinence-plus programs resulted in a reduction of frequency of recent vaginal sex among participants compared to participants who attended a similar program with no abstinence-plus focus or usual care.

Abstinence-plus programs to reduce incidence of any recent oral, anal or vaginal sex

- Of four studies, two found significantly reduced incidence of recent oral, anal or vaginal sex among participants at five month follow up compared to usual care, and at 14 month follow up compared to a non-abstinence-plus program. On the other hand, two other studies found no reduction in any recent oral, anal or vaginal sex.

Abstinence-plus programs to reduce incidence of casual sex

- Two studies examined this outcome and neither found statistically significant results at 3.5 or 7 month follow up

Abstinence-plus programs to reduce number of sexual partners

- Of 13 studies, four found a statistically significant positive effect in the reduction of number of partners among participants who received abstinence-plus programs compared to participants who received a non-enhanced program (1 study), usual care (1 study), or no intervention (2 studies). However, nine studies found no reduction/statistically significant positive effect.

Abstinence-plus programs to reduce number of sexual partners with whom participants had unprotected sex

- Two studies examined whether abstinence-plus programs resulted in a lower number of sexual partners where participants engaged in unprotected sex among school based programs. One study found a significant reduction in the number of sexual partners with whom participants reported unprotected sex at 19 months and 31 months follow up compared to participants who received information about HIV. The second study found no reduction.

Abstinence-plus programs measuring condom use

- Of the 26 studies measuring condom use, 14 found a statistically significant positive effect in the number of participants using condoms at follow up compared to no treatment, usual care, or other types of programming and education.

Abstinence-plus programs and the absolute number of times participants used condoms

- One study examined this outcome and found no difference in condom use among participants who attended abstinence-plus, abstinence-only or safer-sex programs compared to a no-treatment control group.

Abstinence-plus programs measuring sexual initiation

- Of the 19 studies, four studies found evidence that participants who received abstinence-plus programs had a later sexual initiation compared to participants receiving other types of programs or usual care. Fifteen studies found no delay in sexual initiation.

Abstinence-plus programs and HIV/AIDS knowledge

- Of 24 studies that examined knowledge improvement, 20 studies found that abstinence-plus programs improved knowledge of HIV/AIDS compared to programs not including an abstinence-plus approach. One study found at a 3 month follow up that participants who did not have peer counselling showed greater knowledge than participants in other types of programs that did not use an abstinence-plus approach. Four of the 24 studies showed no statistically significant results on increasing HIV/AIDS knowledge.

Cost benefit or cost-effectiveness information

- None included

Comments/Study Limitations

-Homogeneity of trial population
-Methodological limitations of evidence

6. Author, Year, Title: Vidanapathirana, J., Abramson, M.J., Forbes A., Fairley C. (2009). Mass media interventions for promoting HIV testing. (Review).

Quality Rating: Strong (Reviewers = 9, Health Evidence = 9)

Objectives of Review: To assess the effect of mass media interventions and the most effective form of mass media intervention at a general population level or in a specific target population, in relation to changes in voluntary HIV testing and counselling, compared with a control group or with pre-intervention levels.

Number of Primary Studies Included: 14

Types of Studies: 2 randomized controlled trials, 3 non-randomized controlled trials and 9 interrupted time series

Databases/Years Searched: Cochrane Central Register of Controlled Trials, MEDLINE (1966-April 2004), EMBASE (1980-April 2004), NLM Gateway, CINAHL (1982-April 2004), AIDSearch (1980- April 2004),PsycINFO (1974-April 2004), Sociological abstract (1982-April 2004), and Communication studies (SAGE 1982-April 2003).

Inclusion & Exclusion Criteria:

Inclusion: RCTs including cluster-randomized trials that compared either multimedia interventions, or one type of media strategy with a control; CCTs that compared either multimedia interventions, or one type of media strategy with a control; interrupted time series analyses in which there were at least 3 points of data collection before and after the interventions, to assess the effect of mass media against no media or an alternative intervention. Specific or general mass media targeted at population or specific target groups that aim to increase voluntary testing such as radio, TV, print, film, documentary, billboards.

Exclusion: uncontrolled before-and-after studies, interventions targeted to health care providers

Descriptions of Interventions, Settings & Study Sample:

Interventions: participatory education and didactic education with skill training (1), videos (1), multimedia (press, TV, radio) (3), “Grim reaper” multimedia education campaign (2), TV educational program on AIDS (1), multimedia (posters, tabloid newspapers, leaflets) (1), mass media with press releases, radio, TV, leaflets, posters) (1), leaflets (2), mass media “Magic Johnson” disclosure (1), multimedia AIDS publicity campaign (1)

Settings: Australia (2), Israel (1), Canada (1), UK (7), USA (3)

Population: women (2), low income ethnic minority women (1), general public (8), prostitutes (1), gay and bisexual men (1), blood transfused recipients (1), pregnant mothers (2)

Main Comparisons, Outcome Measures & Summary of Analysis conducted:

Comparisons: Control groups with no intervention or pre-intervention levels of HIV testing

Outcome Measures: Change in the rate of persons tested for HIV in the general population or specific target population after the mass media intervention compared to the pre-intervention or control group; as well as changes in the HIV seropositive prevalence status of the general

population or specific target population who were tested for HIV after the mass media intervention were also compared to the pre-intervention levels or control groups.

Analysis: Meta-analysis

Main findings of Review:

-Mass media interventions for the promotion of HIV testing showed significant effects after interventions (Estimated mean= 5.487, 95% CI= 2.370 to 8.605) and overall (Estimated mean= 6.095, 95% CI= 1.812 to 10.378).

Two Randomized Control Trials (RCTs)

- One study by Simpson et al (1998) compared the effectiveness of two types of leaflets that were offered using four methods compared to no intervention and found that participants who received leaflets were 6.29 times more likely to get tested for HIV.
- A second study by Apanovitch (2003) showed that among low income ethnic women who received gain-framed or loss-framed video tapes, more women (38%) were likely to get tested for HIV compared to those who viewed loss-frame videos which had an increase in testing of 26%. Gain-framed messages focused on attaining a desirable outcome or avoiding an undesirable outcome, whereas loss-framed message focused on undesirable outcomes or failure to attain a desirable outcome.

Three Clinical Control Trials (CCTs)

- A study by McOwen (2002) showed positive uptake of HIV testing with multimedia campaigns targeted to gay and bisexual men compared to a control group, with men who received the intervention 4.55 times more likely to seek HIV testing.
- A study by Amero (2001) compared two types of educational programs (participatory education and didactic education with skills training) and found that only didactic with skills training was more likely than the control group to improve the uptake of HIV testing among participants, with participants being 2.50 times more likely to seek testing. However, at three month follow up there was no statistically significant effect on rates of testing.
- A study by Simpson (1999) showed an increase in HIV testing among pregnant women following the distribution of leaflets. Pregnant women who received the leaflets were 15.96 times more likely to seek testing than the pregnant women who received no intervention.

Nine Interrupted Time Series

- All nine studies found that mass media had a significant initial impact on increasing individuals' likelihood of seeking HIV testing. Three studies had both short-term and long-term impacts, two studies had initial impacts with decline in testing rates over time and four studies had only an initial impact.
- Sufficient evidence to support using mass media for promotion of voluntary counselling and testing, however no long term effects were found.

Comments/Study Limitations:

No long term effects may have been due to short duration of campaigns. Strong methodological quality of controlled trials strengthens the case for effectiveness. Nine time series also found positive impact on HIV testing after mass media interventions.

- Studies did not focus on youth specifically, many target populations identified.