The University of Sheffield
ScHARR School of Health and Related Research

A review of the effectiveness and cost effectiveness of contraceptive services and interventions to encourage use of those services for socially disadvantaged young people: Services and interventions in education settings.

Authors:
Lindsay Blank,
Nick Payne,
Louise Guillaume,
Sue Baxter,
Hazel Pilgrim.

School of Health and Related Research (ScHARR)
University of Sheffield
Regent Court,
30 Regent Street,
Sheffield,
S1 4DA,
UK

Contents

TABLES

EXECUTIVE SUMMARY

Introduction

This review was undertaken to support the development of NICE programme guidance on the NHS provision of contraceptive services for socially disadvantaged young people (SDYP) (up to the age of 25). For the purposes of this guidance, 'NHS provision' has been interpreted as including both direct provision and indirect provision (via funding in whole or in part). It provides a systematic review of the published literature on the effectiveness and cost effectiveness of interventions to encourage young people, especially socially disadvantaged young people, to use contraceptives and contraceptive services (including access to, and information about, contraceptive services) which are based on educational premises (excluding classroom based, curriculum only interventions as these will be covered by the public health programme guidance on school, college and community-based personal, social and health education [PSHE] focusing on sex and relationships and alcohol education (in development)).

Research questions

The primary research questions are:

- What is the effectiveness and cost effectiveness of interventions to encourage young people, especially socially disadvantaged young people, to use contraceptives and contraceptive services (including access to, and information about, contraceptive services)?

- What is the evidence of the effectiveness and cost effectiveness of contraceptive services for socially disadvantaged young people?

Inclusion and exclusion criteria

All of the retrieved literature was screened at title and abstract level for relevance as part of the previous mapping review, and those that were relevant were taken through to full paper appraisal. The application of pre-specified inclusion / exclusion criteria was undertaken as per the established methods (NICE, 2006).

Interventions conducted in residential care settings have been excluded from this review but will be included in a later review. The review also excludes interventions which consist solely of curriculum based interventions delivered by classroom teachers or health professionals (as these will be the subject of separate NICE guidance on PSHE, which focuses on sex and relationships education). Where curriculum interventions are reported alongside contraceptive services interventions the study has been included but the curriculum aspects of the intervention have not been included in any analysis.

Interventions were excluded when they were conducted with people aged 25 and older. Interventions which include both under 25s and over 25s were included, but those which focus solely on over 25s were not. Although a younger age cut off has not been explicitly stated, consideration will also be made to the Fraser guidelines for competence to consent.

Quality assessment criteria for effectiveness studies

The quality of effectiveness studies was assessed taking note of the criteria set out by NICE in the CPHE Methods Manual. Studies were graded in reference to their study design, type of intervention applicability and effectiveness.

Summary of study identification

All search results were downloaded to Reference Manager. Potentially relevant papers were identified through the initial searching (completed as part of the mapping review) and full papers were obtained. From these initial searches a list of key authors and programmes was devised to facilitate further searching. Citation searching of key papers as well as scrutinising reference lists was also carried out. Occasional papers were also suggested by experts. The 29 effectiveness papers were all identified through the database searches, with no additional papers identified through scrutinising reference lists and liaison with experts. We excluded 40 papers which were obtained as full papers but subsequently found to be outside of the scope of the review. In addition one paper considering cost effectiveness (also identified from the initial mapping searches) was included and a further four cost effectiveness papers obtained as full papers were excluded.

Quantity of the evidence available

The searches identified 29 studies which met the inclusion criteria. The Papers focused on preventing teenage pregnancy (7) or repeat pregnancy (6), multiple outcomes related to teenage pregnancy and sexual health (4), the effectiveness of school based sexual health care delivery (6), and contraceptive provision in a college environment (2). We also included additional studies which reported on education interventions which also had additional elements relevant to this review (4). The evidence all comes from the USA which may have implications for its applicability in England, as is discussed below.

Quality of the evidence available

As would be expected, those studies which employed a Randomised Control Trial (RCT) design scored best on the quality rating scale, all four scored [++] after making allowances for blinding etc (see above). The majority of the studies employed a Controlled Before and After (CBA) design and most of these scored [+] (16 out of 19 studies) with the remaining three CBA studies as well as all Interrupted Time Series (ITS) design studies scoring [-]. Each type of study design included a variety of types of intervention and the populations although all from the USA varied in terms of their ethnic mix (and therefore deprivation scores).

The studies have been grouped in terms of their primary objectives which were: preventing teenage pregnancy (7 studies) or repeat pregnancy (6 studies), multiple outcomes related to teenage pregnancy and sexual health (4 studies), the effectiveness of school based sexual health care delivery (6 studies), and contraceptive provision in a college environment (2 studies). We also included additional studies which reported on education interventions that also had additional elements relevant to this review (4). The individual studies are discussed in detail below.

Delivery of the intervention

Most of the papers drew little attention to who was responsible for the programme delivery, with the exception of a programme delivered by

culturally matched social workers (Key et al. 2001, 2008). Several other programmes were defined as being multi agency, and the remainder were delivered by social workers, nurses (school nurse, public health nurse and nurse practitioners, counsellors, school health centre personnel, sex educators, peer educators, or the researchers/project staff. A further two programmes did not make it clear who delivered the programme. Those which were in the "education plus" category were delivered primarily by classroom teachers with additional support from outside agencies.

Intervention impact

The heterogeneity of the interventions aims, designs and outcome measures preclude a meta-analysis of their results. We therefore completed a narrative synthesis of the data, primarily in terms of study impact, design, and type of intervention (see section 4.6)

Economic studies

The searches identified only one economic evaluation around none teacher-led school-based interventions. The paper by Key et al. (2005) was given a quality assessment of [-] (see Section 3.4.1 for assessment criteria). This paper assesses the cost-effectiveness of a secondary teen pregnancy prevention intervention that includes school-based social work services coordinated with comprehensive health care for teen mothers and their children. The cost-effectiveness of the intervention is calculated alongside the effectiveness study (Section 4.6.1). The results of the analysis are presented from a societal perspective based on a lifetime horizon using a discount rate of 5% and assuming an average life expectancy of 77.5 years. The cost per birth avoided is calculated based on the cost of the program within the study divided by the number of births avoided minus the societal cost savings per birth avoided. The paper provides no further details around the model assumptions or parameters, including how the societal cost savings per birth avoided have been estimated. The cost per birth avoided estimated by the analysis is -$19,097 which is approximately equal to -£13,750, suggesting that the program results in net cost savings. The paper does not provide an analysis of uncertainty or present evidence of validation or generalisability,

although the effectiveness data was based upon a study population of African-American US girls of mean age 16 years.

Summary of identified research

All the papers included in this review reported on studies conducted in the USA, frequently in populations with a high proportion of ethnicities not well represented in the UK population. We categorised the papers as those which aimed to address teenage pregnancy and repeat teenage pregnancy, studies to assess the effectiveness of school based health centres, those with primary objectives to address both sexual health and teenage pregnancy, interventions which were part of educational interventions and those which addressed contraceptive provision in college students. In addition one study of cost effectiveness was identified, but this was of poor quality.

There were limitations throughout the papers in terms of study quality (especially sample size) and poor reporting of results. Despite these limitations several evidence statements are presented here.

Research questions for which no evidence was identified

The main issues regarding addressing the subsidiary research questions were that many papers did not adequately describe the socio-economic status of their population, and therefore it is difficult to comment on the effectiveness of contraceptive services in reaching socially disadvantaged young people. The effectiveness of contraceptive service interventions with differing ethnic groups is also difficult to quantify as most papers, although describing the ethnic mix in their population did not report their results with a breakdown for different ethnic groups. Kirby et al. (2000) reported the greatest impact of the "Safer Choices" on Hispanic students rather than other ethnic groups but this is not particularly relevant in the UK context. There were also no papers which compared the effectiveness of interventions on young people who were already teenage parents with those who were not.

In terms of questions such as the influence of external factors (e.g. setting of targets, adequacy of guidance and support to service providers) along with

the facilitators and barriers to implementing effective contraceptive services and interventions it is hoped that the subsequent review on the views of young people (and others) will be better placed to address these questions.

Adverse or unexpected outcomes

Although no papers reported entirely adverse outcomes for the intervention groups in their study, three papers did report disadvantageous results for some outcome measures. In their effectiveness study of a School Based Health Centre (SBHC) by Kisker et al. (1996) more students reported having sex in the past month (from 22% at baseline to 49% at follow up), and also fewer reported using effective contraception at last intercourse than the national comparator (75% compared to 80% nationally). In a second study of SBHC effectiveness Bearss et al. (1995) reported that 13 students became pregnant and 49 (35%) were diagnosed with an STI. Reported partner switching (42%) was common, as was dropout from the programme (60%). Finally in an evaluation of the multi-component intervention STAND Smith et al. (2000) reported that 3 male STAND members were involved in pregnancies (compared with 2 controls).

Applicability in the UK context

Care must be taken when considering the potential applicability of the majority of these studies to the UK context. All the studies included in the review were conducted in the USA although some will be more applicable than others depending on the exact population studied. Differences in terms of school based culture, policy and context may be much more varied between countries and therefore caution is required when applying USA evidence to the UK.

Implications of the review findings

The literature in general is not well developed, especially in terms of good quality effectiveness and cost effectiveness studies (and no studies of effectiveness or cost effectiveness conducted in the UK were identified). The literature has a substantial bias towards interventions conducted in the USA and the number of studies conducted in populations with high numbers of

African Americans (and other ethic groups not frequently represented in the UK) will have further implications for applicability in the UK.

EVIDENCE STATEMENTS

Evidence statement 1:

Interventions to prevent repeat adolescent pregnancy

1a. Intensive care management

Strong evidence from two studies suggests that intensive case management interventions led by a culturally matched social worker are effective as part of multi component interventions (including peer education) in preventing repeat pregnancy. Three papers by Key et al. report the same intervention, but the populations vary due to "ongoing enrolment" throughout the project. The intervention was shown to significantly reduce the repeat birth rate compared to the control group (Key et al. 2001 CBA [+], Key et al. 2005 CBA [-],(Key et al. 2008 (CBA [+]). However, the third paper also showed that the intervention had no effect on overall contraception use (Key et al. 2008 (CBA [+]). In the second study, all the participants indicated that they chose and used a method of birth control, did not repeat an unplanned pregnancy (while known to the clinic) and remained at high school (significance not known) (Ziegler et al. 2004 ITS [-]).

1b. Public health nurse

Weak evidence from one study suggests that the daily presence of a public health nurse in school monthly pregnancy testing, health counselling and referral, and health education classes can be effective in preventing repeat pregnancy. Repeat adolescent pregnancy (during the year an individual was involved in the programme) declined significantly over the nine years of the programme (Schaffer et al. 2008. ITS [-]).

Evidence statement 2:

Interventions to prevent adolescent pregnancy

2a. Motivational interviewing

Moderate evidence from one study supports a brief intervention consisting of one session of motivational interviewing to reduce the risk of “alcohol exposed” pregnancy in female university students. At one month follow up significantly fewer control than intervention subjects used effective contraception, and significantly less intervention subjects remained at risk from alcohol induced pregnancy (measured by change in drinking habits) (Ingersoll et al. 2005 RCT [++]).

2b. Infant simulators

Moderate evidence from two studies is inconclusive as to the benefits of using infant simulators to prevent adolescent pregnancy, especially over the longer term. In the first study, after two days with the infant simulators, the intervention group were more able to acknowledge that failure to use contraceptives significantly increased risk of unplanned pregnancy, leading the authors to suggesting that they would be more like to use contraception in the future (Out et al. 2001 CBA [-]). In the second study, there were no significant differences between pre and post test measures for either the intervention or control groups suggesting that the infant simulator was not effective when a follow up of several weeks is conducted (Charyl et al. 2001 CBA [+]).

2c. Abstinence based programmes

Inconsistent evidence from three studies is unclear on the effectiveness of abstinence based programmes in preventing teenage pregnancy: weak evidence from two studies may support these programmes, however one further study of better quality demonstrated no effect on pregnancy rate. In the first study, pregnancy rates were shown to decline faster in the intervention than the control areas along with improvements in self reported attitudes and behaviours consistent with the programme's message of abstinence (no statistics) (Doniger et al. 2001 ITS [-]). In the second study, over the three years of the intervention the percentage of those referred for contraception who actually visited the clinic rose significantly and pregnancy rates decreased significantly (Tiezzi et al. 1997 ITS [-]). In the third study, there was no significant difference in intention to have sex, attitudes towards teenage pregnancy, condom use or pregnancy rate (Lieberman et al. 2000 CBA [+]).

2d. Multi-component interventions

Weak evidence from one study does not support the use of a large multi component intervention to prevent teenage pregnancy either through sexual behaviour or indirect factors. The presentation of the results in this papers were unclear (McBride et al. 2000 CBA [+]).

Evidence statement 3:

School based health centres

3a. On site dispensing

Strong evidence from four papers supports the direct provision of contraceptives dispensed on site from school based health centres on increasing contraceptive provision. However, the use of those contraceptives or any subsequent outcomes is unclear. In the first study, significantly more of the intervention cohort selected hormonal contraception at the first or second visit than the control, and were also significantly less likely to select no contraception (Zimmer-Gembeck et al. 2001 CBA [+]). In the second study, adolescents in the intervention group were significantly more likely to receive condom/HIV instruction, and significantly less likely to report lifetime or recent sexual intercourse. Sexually active adolescents in the intervention group were twice as likely to use condoms but less likely to use other contraceptives (Blake et al. 2003 CBA [+]). In the third study, direct provision saw the number of contraceptives prescribed, which were received by the young people increase significantly. The data analysis in this paper is poor giving only percentage increases, but it does appear to indicate that on site dispensing increases contraceptive provision (Schuster et al. 1997 ITS [-]).

3b. Assessment and counselling.

Moderate evidence from two papers does not support school based health centres which only offer health care assessments or counselling. In the first study levels of consistent contraceptive use improved over the evaluation period, but more students reported having sex in the past month. There were no effects on pregnancy or birth rates (Kisker et al. 1996 CBA [+]). In the second study, improvement in the level of contraceptive use and sexual abstinence was seen over the course of the year. However, 13 students became pregnant and 49 were diagnosed with an STI (comparative figures not given) (Bearss et al. 1995 ITS [-]).

Evidence statement 4:

Multi-component interventions with outcomes related to pregnancy and sexual health.

4a. "Safer Choices"

Strong evidence from three papers supports "Safer Choices" (a theory based multi component HIV, STI and pregnancy prevention programme) in changing knowledge and behaviour. From these papers it difficult to understand whether they represent the application of "Safer Choices" to three separate populations, or whether they are reporting on slightly different elements of the application of the intervention in the same population/schools. In the first study, knowledge and beliefs were improved, and the programme also significantly reduced risk behaviours including reduced frequency of intercourse without a condom in the last 3 months, increased use of condom at last intercourse, and increased use of selected contraceptives at last intercourse (Coyle et al. 1999 RCT [++]). In the second study the intervention students reported significantly reduced frequency of sex without a condom and number of unprotected sexual partners (Kirby et al. 2004 RCT [++]). The third study showed intervention students having sexual intercourse without a condom with fewer partners along with positive effects on psychosocial variables and school climate for both HIV/STI and pregnancy prevention. There was no effect on the prevalence of recent sexual intercourse (Basen-Engquist et al. 2001 RCT A [++]).

4b. "STAND"

Weak evidence from one paper may support the peer education programme "STAND" in improving knowledge and changing some behaviours relating to pregnancy STIs and contraceptive use, including increases in condom and no report of STIs. There is some doubt as to the accuracy of the calculations of significance (and therefore the validity of the paper) (Smith et al. 2000 CBA [+]).

Evidence statement 5:

Motivational interviewing (college students)

Moderate evidence from two studies supports motivational interviewing and other workshop style interventions to encourage contraceptive use in college students. In the first study motivational interviewing resulted in significant increases in (self reported) condom use. No control data is given (LaBrie et al. 2008 CBA [+]). In the second study four workshop style interventions increased contraceptive knowledge compared to the control, and those receiving the experimentally oriented intervention showed significantly more positive change in contraceptive attitudes and intention to use, and reported use of birth control than all other groups (Caron et al. 1997 CBA [+]).

Evidence statement 6:

Curriculum interventions with additional components

6a. Community outreach: "Teen Outreach" and "Reach for Health".

Strong evidence from three studies suggest curriculum interventions which include community outreach components can be effective in preventing teenage pregnancy and risky sexual behaviour. In the first study rates of pregnancy, along with school failure and academic suspension were significantly lower in the "Teen Outreach" group than the controls (Allen et al. 1997 CBA [+]). In the second study "Teen Outreach" was again show to be effective, especially for those who were already teen parents (Allen and Philliber 2001 CBA [+]). In the third study "Reach for Health" participants were significantly less likely than controls to report sexual initiation, or recent sex (O'Donnell et al. 2002 CBA [+]).

6b. Virtual world intervention.

Moderate evidence from one study suggests that a virtual world intervention was effective when associated with a curriculum based intervention regarding sexual risk behaviour. The intervention group had significantly better understanding than the controls of: how reproduction works and the possible consequences of sex, and the importance of enacting behaviours to limit sexual experience (Shegog et al. 2007 CBA [+]).

Evidence Statement 7:

Cost effectiveness.

Weak economic evaluation from one study (Key et al. 2008 (CBA [+]) reported on the cost-effectiveness of a secondary teen pregnancy prevention intervention that includes school-based social work services coordinated with comprehensive health care for teen mothers and their children within the USA compared with matched subjects from State data. The study suggested that the intervention is likely to result in net cost savings from a societal perspective, although little description of the economic evaluation was provided within the paper.

1. INTRODUCTION

1.1. Aims and objectives

This review was undertaken to support the development of NICE programme guidance on the NHS provision of contraceptive services for socially disadvantaged young people (SDYP) (up to the age of 25). For the purposes of this guidance, 'NHS provision' has been interpreted as including both direct provision and indirect provision (via funding in whole or in part). It provides a systematic review of the published literature on the effectiveness and cost effectiveness of interventions to encourage young people, especially socially disadvantaged young people, to use contraceptives and contraceptive services (including access to, and information about, contraceptive services) which are based on educational premises (excluding classroom based, curriculum only interventions as these will be covered by the public health programme guidance on school, college and community-based personal, social and health education [PSHE] focusing on sex and relationships and alcohol education (in development)).

This review was preceded by a mapping review to describe the available literature on the full range of interventions that aim to encourage young people, especially socially disadvantaged young people, to use contraceptives and contraceptive services. The aim of the mapping review was to identify key areas within the literature on which to focus the subsequent effectiveness and cost effectiveness reviews. The mapping review identified three key groups of studies according to the setting of interventions as follows:

- interventions delivered in educational setting
- interventions delivered in health care settings
- interventions delivered in community settings

The first of these settings is the focus of this review.

1.2 Research questions

The primary research questions for this programme are:

- What is the effectiveness and cost effectiveness of interventions to encourage young people, especially socially disadvantaged young people, to use contraceptives and contraceptive services (including access to, and information about, contraceptive services)?

- What is the evidence of the effectiveness and cost effectiveness of contraceptive services for socially disadvantaged young people?

Subsidiary research questions for this programme are:

- What is the short term and longer term success of contraceptive services for SDYP?
- What internal factors may have influenced the effectiveness of contraceptive services (e.g. content delivery, setting intensity)?
- What external factors may have influenced the effectiveness of contraceptive services (e.g. setting of targets, adequacy of guidance and support to service providers?)
- How does the effectiveness of contraceptive service interventions vary with factors such as age, teenage parenthood, drug use, school college attendance etc?
- How does the effectiveness of the contraceptive service interventions vary with factors such as ethnicity?
- How effective have contraceptive services been in reaching socially disadvantaged young people?
- What are the facilitators and what are the barriers to implementing effective contraceptive services and interventions?

2. BACKGROUND

2.1 Definitions and terminology

Fraser guidelines:

It is considered good practice for doctors and other health professionals to follow the criteria outlined by Lord Fraser in 1985, in the House of Lords' ruling in the case of Victoria Gillick v West Norfolk and Wisbech Health

Authority and Department of Health and Social Security. These are commonly known as the Fraser Guidelines:

- the young person understands the health professional's advice;
- the health professional cannot persuade the young person to inform his or her parents or allow the doctor to inform the parents that he or she is seeking contraceptive advice;
- the young person is very likely to begin or continue having intercourse with or without contraceptive treatment;
- unless he or she receives contraceptive advice or treatment, the young person's physical or mental health or both are likely to suffer;
- the young person's best interests require the health professional to give contraceptive advice, treatment or both without parental consent.

2.2 English government policy on contraceptive service provision

This guidance will specifically support the national service framework on children, young people and maternity services (Department of Health 2004) and will complement NICE guidance on preventing sexually transmitted infections and under 18 conceptions, looked after children and long-acting reversible contraception.

2.3 The need for guidance

The rate of teenage pregnancy in England and Wales remains the highest in Western Europe (Population Action International 2007) despite the decline in rates of both under 18 and under 16 conceptions over the last 20 years (Office for National Statistics 2007). The current targets to halve the under 18 conception rate by 2010 would require a considerable acceleration in progress in order to be met (Department for Education and Skills 2006).

In addition, there is significant variation in local area performance. In 2006, the under 18 conception rate in England was 40.4 conceptions per 1000 young women (Department for Children, Families and Schools 2008); but almost half of these conceptions (49%) occurred in the most deprived 20% of local authority wards (Department for Children, Families and Schools 2007).

Virtually every local authority includes hotspots where annual conception rates are greater than 60 per 1000 women aged 15-17 (Department for Education and Skills 2006) and approximately 20% of births conceived under the age of 18 are to women who are already teenage mothers (Department for Children, Schools and Families 2008).

Teenage pregnancies have a high cost implication for public funding. They place significant pressures on local authority social care, housing and education services. In 2006/7 local authorities spent £23 million on support services for teenage parents (Department for Children Schools and Families 2008). The cost to the NHS of induced abortions for women younger than 25 was £48,680,949 in 2006.

Access to contraceptive services is most problematic for people in disadvantaged communities. There is a six fold difference in teenage conception and birth rates between the poorest areas in England and the most affluent. Under 18 conceptions can lead to socioeconomic deprivation, mental health difficulties and lower levels of education. In addition, resulting children are at greater risk of low education attainment, emotional and behavioural problems, maltreatment or harm, and illness, accidents and injury (Department for Children, Schools and Families 2008).

3. METHODS

3.1 Search methods

Effectiveness reviews

A full systematic search of key health and medical databases was undertaken for the mapping review of literature which preceded this review. The search strategy was developed by the ScHARR information specialist and was agreed with the NICE information specialist. Full details of the search strategy (search terms and databases used) can be found in Appendix 4.

The search strategy included terms relating to young people, contraceptive services, family planning and pregnancy prevention. The only restrictions that were applied to this search were in terms of date (limited to 1995-2008 to predate the Teenage Pregnancy Strategy) and limiting the search to humans (to avoid animal studies relating to contraception). No restrictions were placed in terms of study type, language or place of publication.

The search results were downloaded into Reference Manager for sifting by the systematic reviewer. Following the sifting of papers for the mapping review, the systematic reviewer identified articles for inclusion in Review One.

Additional methods to identify evidence were undertaken as follows:

- Searching the reference list of included papers
- Searching the reference list of relevant systematic reviews
- Cited reference searches on all of the included studies in Google Scholar and Web of Science Cited Reference Search. No date, study type or language restrictions were placed on this search.
- Searches on two programmes identified as being potentially relevant to the review, “Baby Think It Over” and “Safer Choices”. These searches were undertaken in Medline and Web of Science C

Cost effectiveness review

The mapping review searches were not initially undertaken in economic databases. However, when the systematic reviewer sifted the results, any references that could potentially be relevant for the cost effectiveness review were identified (see Mapping Review Report). These identified references were sifted by the economic modeller.

In addition, the terms used in the mapping review search were searched for in Econlit and NHSEED. The same restrictions were applied to the search. The search results were downloaded into Reference Manager and sifted by the economic modeller.

Following these two stages, citation searching was undertaken on any relevant references identified, using Web of Science Cited Reference Search and Google Scholar. Additional searching will be undertaken at a later date for model parameters, should they be required.

3.2 Inclusion and exclusion criteria

All of the retrieved literature was screened at title and abstract level for relevance as part of the previous mapping review, and those that were relevant were taken through to full paper appraisal. The application of pre-specified inclusion / exclusion criteria was undertaken as per the established methods (NICE, 2006).

This first review focuses on interventions which are conducted on educational premises. This includes the following:

- Schools
- Further education colleges
- Higher education
- Pupil referral units.

Interventions conducted in residential care settings have been excluded from this review but will be included in a later review. The review also excludes interventions which consist solely of curriculum based interventions delivered by classroom teachers or health professionals (as these will be the subject of separate NICE guidance on PSHE, which focuses on sex and relationships education). Where curriculum interventions are reported alongside contraceptive services interventions the study has been included but the curriculum aspects of the intervention have not been included in any analysis.

Interventions were excluded when they were conducted with people aged 25 and older. Interventions which include both under 25s and over 25s were included, but those which focus solely on over 25s were not. Although a

younger age cut off has not been explicitly stated, consideration will also be made to the Fraser guidelines for competence to consent.

Several activities and interventions will not be covered by this (or any subsequent) review in this programme. These are:

- sexual health services that do not provide contraceptive services
- sterilisation, including vasectomy
- abortion (services which do not also provide contraception)
- use of contraceptive methods for non-contraceptive reasons, for example, for menorrhagia (heavy periods).

3.3 Data extraction strategy

Data relating to study design, outcomes, and quality were extracted by one reviewer and each extraction was independently checked for accuracy by a second reviewer. Disagreements were resolved by consensus and consulting a third reviewer where necessary. The data extraction tables are presented in appendix 1.

3.4 Quality assessment criteria for effectiveness studies

The quality of effectiveness studies was assessed taking note of the criteria set out by NICE in the CPHE Methods Manual. Studies were graded in reference to their study design, type of intervention applicability and effectiveness. The CPHE quality criteria for assessing studies include 12 points. These are:

1. The study addresses an appropriate and clearly focused question
2. The assignment of participants to intervention and control groups is reported as randomised (if RCT)
3. An adequate allocation concealment method is used (if appropriate)
4. Investigators are kept blind about intervention allocation
5. The intervention and control groups are similar at the start of the trial
6. The only difference between groups is the intervention under investigation

7. All relevant outcomes are reported using valid or tested scores
8. Percentage of participants or clusters recruited into each arm of the study dropped out before the study was complete- those with drop out rates higher than 30% were downgraded.
9. The use of intention to treat (ITT) analysis - if applicable
10. If the study was carried out at more than one site, are results comparable across sites.
11. Reporting the power of trials to detect a difference
12. Appropriate cluster analysis and subgroups pre-specified.

Owing to the complexity and diversity of study designs encountered in the public health literature, many of these points were not adequate in themselves for grading the type of studies identified. Therefore, an alternative method of scoring the CPHE criteria and therefore grading the studies was used in order to more objectively categorise the studies. Only the CPHE criteria appropriate to the particular study design in each case were considered. The studies were placed in one of three grades as follows:

Table 1. CPHE and additional criteria used for study grading.

Code	CPHE quality criteria	Alternative criteria
++	All or most of the criteria have been fulfilled. Where they have not been fulfilled the conclusions of the study or review are thought very unlikely to alter	At least 7 of the CPHE criteria are well covered- if this is appropriate for the study design Attrition rate less than 30%
+	Some of the criteria have been fulfilled. Those criteria that have not been fulfilled or not adequately described are through unlikely to affect conclusions	At least 5 of the CPHE criteria are well covered- if this is appropriate for the study design Attrition rate less than 50%
-	Few or no criteria fulfilled. The conclusions of the study are thought likely or very likely to alter	Less than 5 of the CPHE criteria are well covered Attrition rate more than 50%

3.4.1 Quality assessment criteria for cost effectiveness studies

Studies of cost effectiveness were given a quality rating according to the criteria outlined in Table 2. The Drummond criteria were also applied for data extraction (details in Appendix 1b).

Table 2. Criteria used in the quality assessment of cost effectiveness studies

Rating	Criteria
-	An economic evaluation is not carried out, or Modelling approach is insufficient
+	Scope of evaluation is relevant Modelling approach is reasonable Results and conclusions satisfy objective of evaluation
++	Model assumptions are reasonable A sensitivity analysis is conducted Is reasonably generalisable to the UK setting
+++	Modelling approach is robust A full probabilistic sensitivity analysis is carried out which tests key model assumptions Reasonable model validation is carried out

3.5 Classifications of the content of interventions

Effectiveness studies were grouped as to the content of the intervention and the mode of delivery and intended outcome measure. These were grouped as follows:

- Teenage pregnancy
- Repeat teenage pregnancy
- Multiple outcomes related to teenage pregnancy and sexual health
- The effectiveness of school based sexual health care delivery
- Contraceptive provision in a college environment

The impact of the interventions was coded for effectiveness in terms of their outcome measures:

A. Positive impact - all or most measures provided significantly positive in favour of intervention

B. Possible positive impact - less than half of the measures provided significantly positive in favour of the intervention
C. Impact unlikely - no statistically significant findings in favour of the intervention
D. Negative impact - the intervention was harmful compared to the control

3.6 Summary of study identification

All search results were downloaded to Reference Manager. Potentially relevant papers were identified through the initial searching (completed as part of the mapping review) and full papers were obtained. From these initial searches a list of key authors and programmes was devised to facilitate further searching. Citation searching of key papers as well as scrutinising reference lists was also carried out. Occasional papers were also suggested by experts. The 29 effectiveness papers were all identified through the database searches, with no additional papers identified through scrutinising reference lists and liaison with experts (table 3). We excluded 40 papers which were obtained as full papers but subsequently found to be outside of the scope of the review. A list of these papers and the reasons for their exclusion is given in the appendix 3. In addition one paper considering cost effectiveness (also identified from the initial mapping searches) was included and a further four cost effectiveness papers obtained as full papers were excluded.

Table 3. Summary of study identification.

Source	Number of hits	Papers included
Mapping review searches	5379	29
Additional targeted searches	21	0
Economic searches	84	1
Citation searches of included papers and systematic reviews	230	0
Reference list of included papers	14	0
Expert liaison	0 (at this point)	0

4. RESULTS OF THE EFFECTIVENESS REVIEW

4.1. Quantity of the evidence available

The searches identified 29 studies which met the inclusion criteria. The Papers focused on preventing teenage pregnancy (7) or repeat pregnancy (6), multiple outcomes related to teenage pregnancy and sexual health (4), the effectiveness of school based sexual health care delivery (6), and contraceptive provision in a college environment (2). We also included additional studies which reported on education interventions which also had additional elements relevant to this review (4). The evidence all comes from the USA which may have implications for its applicability in England, as is discussed below.

In terms of study design, there were 4 RCTs, 19 CBA studies, and 6ITS.

4.2 Populations and settings

This review was restricted to interventions conducted in educational settings. The majority (26/29)of the included studies were conducted in state run, mainstream middle and high schools in the USA, with a further two conducted in colleges (LaBrie 2008; Caron 1997) and one in a university setting (Ingersoll 2005). Although descriptions of study populations were not always comprehensive, and did not describe socio-economic status, several studies were conducted within locations where the majority of children were from a particular population subgroup such as African American (Key 2008, Key 2005, Key 2001, Shegog 2007), Black (Allen 1997), Hispanic (Tiezzi 1997), or a combination of these (Kirby 2004, Ziegler 2004, Sidebottom 2003, Lieberman 2000, Coyle 1999, Schultzer 1997, O'Donnell 2002, Basen-Engquist 2001); also including Latino. Ethnic groupings (such as African American, Latino) are often used as a proxy for socio-economic status in literature from the USA.

4.3 Quality of the evidence available

Details of the study quality assessments are shown in table 4. below. Criteria 3 (an adequate allocation concealment method is used), 4 (investigators are kept blind about the intervention), and 9 (the use of ITT analysis), have been

shaded out as they were not addressed in any of the included studies. Blinding is not usually practical for the types of interventions considered here.

Table 4. Quality rating of included papers.

Details of the number headings are given in section 3.4.

****** Well covered. * Adequately covered. 0 Poorly covered/not addressed/not stated. n/a not applicable to study design.

Trial	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**Quality rating**
Key 2008	**	n/a			**	**	*	**		n/a	0	n/a	+
Schaffer 2008	**	n/a			n/a	n/a	0	n/a		n/a	0	n/a	-
Ingersoll 2005	**	**			**	**	**	*		n/a	*	*	++
Kirby 2004	**	**			**	**	*	0		**	*	**	++
Kisker 1996	**	n/a			**	**	*	n/a		**	0	n/a	+
Bearss 1995	**	n/a			n/a	n/a	0	n/a		n/a	0	n/a	-
Zimmer-Gembeck 2001	**	n/a			**	**	*	**		**	0	n/a	+
Key 2001	**	n/a			**	**	*	**		n/a	0	n/a	+
Sidebottom 2003	*	n/a			**	**	0	0		*	0	n/a	-
Blake xxxx	**	n/a			**	**	*	**		**	0	n/a	+
Out 2001	*	n/a			**	**	0	0		*	0	n/a	-
Charyl 2001	**	n/a			**	**	*	**		**	0	n/a	+
LaBrie 2008	**	n/a			**	**	*	**		**	0	n/a	+
Lieberman 2000	**	n/a			**	**	*	**		**	0	n/a	+
McBride 2000	**	n/a			**	**	*	**		*	0	n/a	+
Smith 2000	**	n/a			**	**	*	*		*	0	n/a	+
Key 2005	*	n/a			**	**	0	0		n/a	0	n/a	-
Amin 2004	**	n/a			**	**	*	**		**	0	n/a	+
Tiezzi 1997	**	n/a			**	**	0	0		n/a	0	n/a	-
Coyle 1999	**	**			**	**	**	*		n/a	0	**	++
Schuster 1997	**	n/a			n/a	n/a	0	n/a		n/a	0	n/a	-
Ziegler 2004	*	n/a			**	**	0	0		n/a	0	n/a	-
Caron 1997	**	n/a			**	**	*	**		**	0	n/a	+
Doniger 2001	*	n/a			**	**	0	0		n/a	0	n/a	-
Allen 1997	**	n/a			**	**	0	*		**	0	n/a	+
O'Donnell	**	n/a			**	**	*	**		**	0	n/a	+

2002													
Basen-Engquist 2001	**	**			**	**	**	*		n/a	0	**	++
Allen 2001	**	n/a			**	**	0	*		**	0	n/a	+
Shegog 2007	**	n/a			**	**	*	**		n/a	0	n/a	+

4.3.1 Limitations of study quality

The main limitations of study quality at RCT level were:

1. Blinding: For studies of health promotion interventions it is impossible to blind the participants and there are many practical challenges to blinding the assessors. None of these studies discussed blinding in their study design.

2. Randomisation/Analysis: In the vast majority of RCTs included randomisation was done at the level of classroom or school (cluster RCT), but the consideration given to cluster design in the analysis of these studies was generally poor.

3. Control groups: These RCT studies used "no intervention" as their control category.

Other types of studies are fundamentally limited in their design but several also had issues with small samples and short follow up as is discussed in more detail below.

4.4 Outcome measures

Table 5. shows the type of outcome measure used by the included studies. The majority of outcomes related to pregnancy rates, sexual behaviour, or use of contraceptives, or condoms specifically. For the latter two of these groups the majority of data was obtained using self reported measures. Pregnancy rates were generally taken from local data, although some were self reported.

Table 5. Outcome measures of included studies.

Outcome type	Papers	No.
Sexual behaviour: (Self reported change in sexual behaviour; Reducing risky sexual behaviour; Rates of sexual activity; Developing abstinence/refusal skills)	Kisker 1996 Bearss 1995 Zimmer-Gembeck 2001 Charyl 2001 Lieberman 2000 Smith 2000 Coyle 1999 Kirby 2004 Basen-Engquist 2001 O'Donnell	10
Pregnancy rates: (Rates of conception under 16; Rates of unintended conception 16-25; Rates of conception 12-18; Rates of conception 13-19; Adolescent birth rate; Adolescent pregnancy rate; Repeat pregnancy)	Key 2008 Schaffer 2008 Ingersoll 2005 Kisker 1996 Key 2001 McBride 2000 Key 2005 Tiezzi 1997 Doniger 2001 Ziegler 2004 Allen 1997 Allen 2001	11
Effective contraception/condom use	Key 2008 Ingersoll 2005 Kisker 1996 Bearss 1995 Zimmer-Gembeck 2001 Charyl 2001 Amin 2004 Coyle 1999 Schuster 1997 Caron 1997 Kirby 2004 Basen-Engquist 2001	12
Knowledge of contraception methods	Out 2001 Caron 1997	2
Intention to use condoms/contraception	LaBrie 2008 Amin 2004 Caron 1997	3
Knowledge of STIs/risk	Smith 2000	1
Service provision/access/use	Kisker 1996 Sidebottom 2003 Blake 2003	3
Parental support	Bearss 1995 Lieberman 2000	2
Psychosocial outcomes	Lieberman 2000 Coyle 1999 Kirby 2004 Basen-Engquist 2001 Shegog 2007	5
Knowledge of conception risk	Smith 2000	1
Socio-demographic	All papers	29
Use of intervention	Schuster 1997	1
Abortions and repeat abortions under 25	Ziegler 2004	1

4.5 Interventions

Interventions were coded in terms of their typology, impact, applicability and quality score as discussed in the methods and appendix (table 6).

Table 6. Typology, impact, applicability and quality score of included papers.

**Typology: Pregnancy (Preventing teenage pregnancy) Repeat (preventing repeat pregnancy), Multi (multiple outcomes related to teenage pregnancy and sexual health), SBHC (effectiveness of school based sexual health care delivery), Contraception (Contraceptive provision/use), Education plus (education interventions with additional elements).

*Impact: A (Positive impact); B (Possible positive impact) C (Impact unlikely) D: (Negative impact).

Study design (n)	Paper (1st author, date)	Typology**	Impact*	Applicability	Quality
RCT (4)	Ingersoll 2005	Pregnancy	A	USA White (70%)	++
	Coyle 1999	Multi	B	USA mixed	++
	Kirby 2004	Multi	B	USA mixed	++
	Basen-Engquist 2001	Multi	B	USA mixed	++
CBA (19)	Key 2008	Repeat	B	USA A. American	+
	Kisker 1996	SBHC	C	USA no details	+
	Zimmer-Gembeck 2001	SBHC	A	USA 58% white	+
	Key 2001	Repeat	A	USA A American	+
	Sidebottom 2003	SBHC	A	USA White/A Am	-
	Blake 2003	SBHC	A	USA no details	+
	Out 2001	Pregnancy	B	USA no details	-
	Charyl 2001	Pregnancy	C	USA white	+
	LaBrie 2008	Contraception	A	USA 76% White	+
	Lieberman 2000	Pregnancy	B	USA 66% Black	+
	McBride 2000	Pregnancy	C	USA no details	+
	Smith 2000	Multi	C	USA no details	+
	Key 2005	Repeat	A	USA A American	-
	Amin 2004	Repeat	A	USA no details	+
	Caron 1997	Contraception	A	USA 91% White	+
	Allen 1997	Education plus	A	USA 67% Black	+
	O'Donnell 2002	Education plus	A	USA A Am/Latino	+
	Allen 2001	Education plus	A	USA no details	+
	Shegog 2007	Education plus	A	USA 50% A Am	+
ITS (5)	Schaffer 2008	Repeat	A	USA no details	-
	Ziegler 2004	Repeat	A	USA Mixed	-
	Bearss 1995	SBHC	C	USA no details	-
	Tiezzi 1997	Pregnancy	A	USA 81% Hispanic	-
	Doniger 2001	Pregnancy	A	USA no details	-
	Schuster 1997	SBHC	A	USA mixed	-

As would be expected, those studies which employed an RCT design scored best on the quality rating scale, all four scored [++] after making allowances for blinding etc (see above). The majority of the studies employed a CBA designed and most of these scored [+] (16 out of 19 studies) with the remaining three CBA studies as well as all ITS design studies scoring [-]. Each type of study design included a variety of types of intervention and the populations although all from the USA varied in terms of their ethnic mix (and therefore deprivation scores).

The studies have been grouped in terms of their primary objectives which were: preventing teenage pregnancy (7) or repeat pregnancy (6), multiple outcomes related to teenage pregnancy and sexual health (4), the effectiveness of school based sexual health care delivery (6), and contraceptive provision in a college environment (2). We also included additional studies which reported on education interventions which also had additional elements relevant to this review (4). The individual studies are discussed in detail below.

4.5.1 Delivery of the intervention

Most of the papers drew little attention to who was responsible for the programme delivery, with the exception of a programme delivered by culturally matched social workers (Key et al. 2001, 2008). Several other programmes were defined as being multi agency, and the remainder were delivered by social workers, nurses (school nurse, public health nurse and nurse practitioners, counsellors, school health centre personnel, sex educators, Peer educators, or the researchers/project staff). A further two programmes did not make it clear who delivered the programme. Those which were in the "education plus" category were delivered primarily by classroom teachers with additional support from outside agencies.

4.6 Intervention impact

The heterogeneity of the interventions aim, design and outcome measures used preclude a meta-analysis of their results. We have therefore completed

a narrative synthesis of the data, primarily in terms of study impact, design, type of intervention and outcome.

4.6.1. Interventions to prevent repeat adolescent pregnancy

We identified six papers by four authors which reported on high school based interventions to prevent repeat adolescent pregnancy, four of CBA design and two ITS studies. The three papers by Key et al. (2008, 2005, 2001) describe the same intervention conducted in slightly different populations due to ongoing recruitment during the course of the study (information obtained by author communication).

The most recent of these Key et al. (2008) (CBA, B+, USA) consisted of a course of intensive care management, delivered by a culturally matched school based social worker over at least 24 months, which included home visits. The intervention included intensive care management along with weekly school based peer education and comprehensive medical care for the teen mother and her child with co-ordination between the social worker and physician. It was delivered to 63 pregnant or parenting girls (mean age 16) attending one high school who were mostly African American (99%) and had a matched comparison group of 252 who received no intervention. All participants were in receipt of free school meals and Medicaid and therefore could be described as socially disadvantaged. The intervention was shown to be effective in reducing subsequent teen births by 16% (p= 0.05) over the 30 month follow up, but had no effect on overall contraception use.

A previous paper Key et al. (2005) (CBA, A-, USA) delivered the same intervention entitled the "Second Chance Club" described in this case as a peer support and education programme delivered via weekly facilitated group meetings, health care for mother and baby including contraception (provided at a young mother baby clinic via a local ambulatory hospital centre), and social work services (including individual case management, home visits and counselling). It is only in this report that the intervention is given a specific name. At this stage, the intervention included 35 girls per year over four years of the intervention who were age 15 to 17 years, African American and from

low income families. The rate of repeat teenage pregnancy in the zip codes covered by the intervention was compared with the annual state rate and a significant decrease was show in the intervention area (p=0.017). The rate in the intervention areas also began to increase again after the programme was discontinued. The authors state that the programme appears to be effective but it is not possible to make causal links from the correlation with declining pregnancy rates (which may be no more than co-incidental).

A third paper by the same authors (Key et al. 2001) (CBA, A+, USA) again detailed the same intervention, conducted in one high school with pregnant or parenting, African American, teenage girls (n=50) with a mean age of 15.8 years. Again these participants were compared to a matched control group (n=255) who received no intervention. The intervention, again was effective in reducing the repeat birth rate compared to the control group over a three year period (p=0.05). The study is particularly limited by its small sample size at this stage.

The fourth CBA study (Amin and Sato 2004) (CBA, A+, USA) involved 371 pregnant or parenting teens age 13 to 20 years attending one high school, along with 506 comparator teens from a second high school. This programme employs the "Paquin School Programme" to provide education and support as well as obstetric and other reproductive services through an agreement with the local hospital. Although focusing on preventing repeat teenage pregnancy this study does not have an outcome related to repeat pregnancy, instead it is shown to have a positive effect on contraceptive use (current use of any contraceptive and "ever use" of depo-provera).

Schaffer et al. (2008) (ITS, A-, USA) conducted a nine year ITS study based at one alternative school, (for students for whom mainstream schooling is not successful) but gave very little detail about the participants (including no details on their pregnancy or parenting status), other than to say that the numbers ranged between 38 and 57 per year. Participants were all involved in the programme for one year, which consisted of the daily presence of public health nurses in the school, monthly pregnancy testing, health counselling

and referral, and health education classes. Repeat adolescent pregnancy (during the year an individual was involved in the programme) declined from 25% the year before the intervention to a mean of 4.7% over the nine years of the programme. There was no further follow up after the intervention. This study gives only a very poor description of its population and methodology.

Finally, Ziegler et al. (2004) (ITS A-, USA) conducted an ITS intervention with 17 girls aged 14-17 years in one high school. They were of mixed ethnic origin (6 African American, 6 Caribbean, and 5 Latina) but no measure of their socio-economic status is given. The intervention consisted of short term (3 month) post abortion groups conducted in an adolescent mental health clinic sited with a school health clinic. The groups which were run by a social worker and nurse practitioner met for 50 minutes each week to discuss birth control and receive a medical check, and full up subsequent to participation in the group ranged from 5 months to 3 years. All the participants indicated that they chose and used a method of birth control, did not repeat an unplanned pregnancy (while known to the clinic) and remained at high school. This paper again is poorly reported, especially in terms of data analysis.

Overall, the papers identified as addressing repeat adolescent pregnancy are poorly reported. The exception to this is the interventions reported by Key et al. (2001/2008/2005) which are of much better quality and suggest that an intensive case management intervention conducted by a culturally matched school based social worker (along with other components including peer education) can be effective in preventing repeat adolescent pregnancy, at least for the duration of the intervention. However these papers report small sample sizes and are conducted in African American populations which may have some impact on their applicability in the UK context.

Evidence statement 1:

Interventions to prevent repeat adolescent pregnancy

1a. Intensive care management

Strong evidence from two studies suggests that intensive case management interventions led by a culturally matched social worker are effective as part of multi component interventions (including peer education) in preventing repeat pregnancy. Three papers by Key et al. report the same intervention, but the populations vary due to "ongoing enrolment" throughout the project. The intervention was shown to significantly reduce the repeat birth rate compared to the control group (Key et al. 2001 CBA [+], Key et al. 2005 CBA [-],(Key et al. 2008 (CBA [+]). However, the third paper also showed that the intervention had no effect on overall contraception use (Key et al. 2008 (CBA [+]). In the second study, all the participants indicated that they chose and used a method of birth control, did not repeat an unplanned pregnancy (while known to the clinic) and remained at high school (significance not known) (Ziegler et al. 2004 ITS [-]).

1b. Public health nurse

Weak evidence from one study suggests that the daily presence of a public health nurse in school monthly pregnancy testing, health counselling and referral, and health education classes can be effective in preventing repeat pregnancy. Repeat adolescent pregnancy (during the year an individual was involved in the programme) declined significantly over the nine years of the programme (Schaffer et al. 2008. ITS [-]).

4.6.2. Interventions to prevent adolescent pregnancy

We identified seven papers, again all conducted in the USA with a primary focus on preventing adolescent pregnancy. These papers were varied and in turn focus on promoting contraceptive use (one RCT), infant simulator programmes (two CBA), sexual abstinence (two CBA, one ITS), and one large multi-component intervention (CBA).

Contraceptive use.

The first, a US based cluster RCT study conducted by Ingersoll et al. (2005) (RCT A++, USA) aimed to reduce the level of alcohol exposed pregnancy in 94 female University students aged 18 to 24 years old (70% White, 16% African American) identified as being at risk of alcohol induced pregnancy and considered at risk of alcohol exposed pregnancy and contraceptive use. The study also has a matched control group of 105 individuals who were not exposed to the intervention. The intervention known as BALANCE (Birth control awareness, negotiating choices effectively) was conducted over 1 month and consisted of a single session of personal feedback and motivational interviewing. At one month follow up significantly fewer control (48%) than intervention (64%) subjects used effective contraception ($p<0.03$), significantly less intervention subjects remained at risk from alcohol induced pregnancy (OR 2.9 [1.49-5.45]) measured by change in drinking habits (highest number of drinks per day, number of binges in 3 months).

Infant simulator

Out et al. (2001) (CBA B-, USA) measured attitudes, behaviours and knowledge related to contraception and fertility in an infant simulator intervention with 114, 11th grade students (mean age 16.2 years, SD 1.02) (53 in the intervention group, 61 in the "no intervention" control group) in the USA. After two days with the infant simulators, the intervention group were more able to acknowledge that failure to use contraceptives significantly increased risk of unplanned pregnancy ($p<0.001$), leading the authors to suggesting that they would be more like to use contraception in the future.

In a similar intervention in the USA, Charyl et al. (2001) (CBA C+, USA) measured sexual and contraceptive behaviours. These were measured using the Sex Knowledge and Attitudes Test for Adolescents, which includes two separate constructs; taking with others about sexual topics, and overt sexual behaviours activities. Additional questions included perception of peers' sexual activity, personal sexual experimentation, plans for first sexual intercourse, contraceptive use during sexual activity, age at first intercourse,

total number of sexual partners, and desired age of first pregnancy. The population consisted of 151, 16 year old, White, middle class teenagers from three high schools (with a control group of 62). The intervention again involved caring for the infant simulator for three days and two nights in this case the post test measure took place 10 to 12 weeks later. There were no significant differences between pre and post test measures for either the intervention or control groups (and non significant changes were not reported) suggesting that the infant simulator was not effective when a follow up of several weeks is conducted.

Abstinence

Although described as abstinence based programmes these three interventions had additional primary outcome measures not directly related to sexual abstinence:

Lieberman et al. (2000) (CBA, B+, USA) conducted a three month abstinence based pregnancy prevention intervention (followed up at one year) with 312, 6/7/8th grade students (intervention group n=125) of different ethnic groups (66% Black/Caribbean, 20% Latino,) and mean age 12.9 years (standard deviation or age range not given). The small group intervention was led by social workers based at a multi-service agency and consisted of 12 to 14 sessions of 45 minutes. Topics included anatomy, understanding pressure to have sex, coping with peer pressure and pressure from the media, risk of early sexual involvement, and STIs including HIV. Contraceptives are discussed but abstinence is emphasised as the "best choice". At one year follow up intervention students had significantly better scores in terms of locus of control (p=0.01), and for boys only, attitudes towards the appropriateness of teenage sex (p=0.01). However, there was no difference in intention to have sex, attitudes towards teenage pregnancy, condom use or pregnancy rate, which may be considered the more relevant outcome measures in this study.

A second abstinence based programme was conducted by Doniger et al. (2001) (ITS, A-, USA) in 18 school districts in one county (9 intervention, 9

control) over 3 years. A total of 4835 young people aged 15 to 17 were involved in the intervention, with the county pregnancy rate over the three years used as a control measure. The "Not Me, Not Now" intervention was developed by a multi agency team including the health department, youth service, an advertising agency and a communications department, and used a mass communications approach including TV, billboards, posters, process guides in schools, educational materials for parents, and an educational series presented in schools and community settings. Pregnancy rates were shown to decline faster in the intervention than the control areas along with improvements in self reported attitudes and behaviours consistent with the programme's message of abstinence. However, the authors fail to discuss the diffusion effect of their mass media approach.

A third intervention (Tiezzi et al. 1997) (ITS, A-, USA) also aimed to prevent teenage pregnancy by promoting abstinence. This paper reports on an ITS study with 100 mostly Hispanic (81%) young people, mean age 12.9 years (standard deviation or age range not given) who were identified by a screening survey to identify sexual activity or correlated activities. The "In Your Face" programme aims to reduce the risk of pregnancy by promoting sexual abstinence including providing information, counselling, support and referral to health care, group and individual education, and other special events and projects. The project was supported by an interdisciplinary team of social workers, medical providers and psychiatrists. This study is confusing as its main aim is to reduce pregnancy by abstinence and yet, its main outcome is in terms of contraception referral. Over the three years of the intervention the percentage of those referred for contraception who actually visited the clinic rose from 11% to 76%, pregnancy rates decreased by 34% over 4 years. Although this is an ITS study a quasi control group was created by one school which was unable to continue the programme in the final year. At this school the pregnancy rate was three times that of the intervention schools (16.5 per thousand verses 5.8 per thousand female students). This suggests that this type of intensive risk identification and case management approach may be effective in preventing pregnancy in very young adolescents.

Multi component

McBride et al. (2000) (CBA, C+, USA) reported on a large CBA intervention to reduce teenage pregnancy which included seven separate projects. Three of these projects were designated as "youth" and included 1,042 nine to thirteen year olds (549 in the intervention group), and four were designated as "teenage" and included 690 fourteen to seventeen year olds (371 intervention). The split between the project was made in terms of their objectives to address sexual behaviours directly (teenagers) or via indirect factors thought to affect teenage pregnancy (youth). The interventions themselves included a wide variety of services tailored to individual need including counselling, mentoring and advocacy and were delivered by sexuality educators, social workers and counsellors. The presentation of the results in this papers were unclear but it appears that only individual sites had impact on any of the outcomes with one (out of three) youth site reducing intention to have intercourse, one (out of four) teenage site reducing sexual behaviour and contraception use, and one (out of four) teenage site reducing sexual intentions and intention to use contraceptives. It is therefore difficult to draw meaningful recommendations from this paper.

We identified several interventions with generic outcome measures to prevent teenage pregnancy but most were of poor quality or had at least some negative outcomes. The only study of good quality to score A for effectiveness was a brief intervention consisting of a single session of motivational interviewing, but this was conducted in a population of university students, not a school aged population (as is the case for most of the interventions presented here).

Evidence statement 2:

Interventions to prevent adolescent pregnancy

2a. Motivational interviewing

Moderate evidence from one study supports a brief intervention consisting of one session of motivational interviewing to reduce the risk of “alcohol exposed” pregnancy in female university students. At one month follow up significantly fewer control than intervention subjects used effective contraception, and significantly less intervention subjects remained at risk from alcohol induced pregnancy (measured by change in drinking habits) (Ingersoll et al. 2005 RCT [++]).

2b. Infant simulators

Moderate evidence from two studies is inconclusive as to the benefits of using infant simulators to prevent adolescent pregnancy, especially over the longer term. In the first study, after two days with the infant simulators, the intervention group were more able to acknowledge that failure to use contraceptives significantly increased risk of unplanned pregnancy, leading the authors to suggesting that they would be more like to use contraception in the future (Out et al. 2001 CBA [-]). In the second study, there were no significant differences between pre and post test measures for either the intervention or control groups suggesting that the infant simulator was not effective when a follow up of several weeks is conducted (Charyl et al. 2001 CBA [+]).

2c. Abstinence based programmes

Inconsistent evidence from three studies is unclear on the effectiveness of abstinence based programmes in preventing teenage pregnancy: weak evidence from two studies may support these programmes, however one further study of better quality demonstrated no effect on pregnancy rate. In the first study, pregnancy rates were shown to decline faster in the intervention than the control areas along with improvements in self reported attitudes and behaviours consistent with the programme's message of abstinence (no statistics) (Doniger et al. 2001 ITS [-]). In the second study, over the three years of the intervention the percentage of those referred for contraception who actually visited the clinic rose significantly and pregnancy rates decreased significantly (Tiezzi et al. 1997 ITS [-]). In the third study, there was no significant difference in intention to have sex, attitudes towards teenage pregnancy, condom use or pregnancy rate (Lieberman et al. 2000 CBA [+]).

2d. Multi-component interventions

Weak evidence from one study does not support the use of a large multi component intervention to prevent teenage pregnancy either through sexual behaviour or indirect factors. The presentation of the results in this papers were unclear (McBride et al. 2000 CBA [+]).

4.6.3. Interventions which report on the effectiveness of school based health centres

We identified six interventions (four CBA, two ITS) based on the delivery of services at a school clinic or health centre which focused on use and effectiveness of the school based service and compared outcomes to "normal" health care provision, or to the school before the intervention was implemented .

Kisker et al. (1996) (CBA, C+, USA) reported on School Based Health Centre (SBHC) provision at 19 schools compared to normal health care provision (national sample of urban youths n=859). The SBHC were staffed by a nurse practitioner and medical aide, with support from part time physicians, social workers and health educators. The CBA study included 3050 9th and 10th grade (age not stated) students who reported on SBHC utilisation, use of other health care providers, knowledge of key health facts, sexual activity, contraceptive use, pregnancies, births and health status. In the "time to graduation", (actual time not stated), 52% of students reported visiting the SBHC. Levels of consistent contraceptive use improved over the evaluation period (from 41% at baseline to 58% at follow up), but more students reported having sex in the past month (from 22% at baseline to 49% at follow up), and also fewer reported using effective contraception at last intercourse than the national comparator (75% compared to 80% nationally). There were no effects on pregnancy or birth rates. Therefore although the authors claim that student access to health care was improved, the effects of the SBHC on risky behaviours was, at best, inconsistent.

Zimmer-Gembeck et al. (2001) (CBA, A+, USA) conducted CBA study comparing contraceptive use at a SBHC able to dispense contraception on site and compared this to off site referral for contraceptive provision. The

population included two cohorts of sexually active female students the year before (n=355), and the year after (n=1378) implementation of on site dispensing at six high schools. The students had a mean age of 16.3 (SD 1.2 years) and were 58% White, 36% Black, 7% Asian, 5% Hispanic, 2% Native American and 3% Other. More of the second cohort (72%) selected hormonal contraception at the first or second visit than cohort one (59%) [p<0.001], and cohort two were also significantly less likely to select no contraception. Previous use of hormonal contraception was not considered. The authors suggest that onsite dispensing lead to "some what more consistent hormonal contraceptive use" when dispensed on site at the SBHC; although in reality they may only be reliably measuring contraceptive provision rather than use, as sexual behaviour was self reported.

Sidebottom et al. (2003) (CBA, A-, USA) conducted a very similar CBA study which compared onsite provision of contraceptives (included types not clearly defined) at a SBHC (dispensed by the SBHC staff) to a previous voucher system for off-site dispensing. The intervention included two year groups (age not stated) at five high schools before and after onsite dispensing commenced. The sample included 302 students who were 79% female and of various ethnicities (including 39% White, 37% African American). Under the original voucher system 41% of students received all the contraceptives they were prescribed compared with 99% under direct distribution. Under the voucher system 25% of prescribed condoms and 50% of prescribed oral contraceptives were received, this increased to 100% in both cases under direct distribution. The data analysis in this paper is poor giving only percentage increases, but it does appear to indicate that on site dispensing increases contraceptive provision, it does not however say anything about the use of those contraceptives or any subsequent outcomes.

Blake et al. (2003) (CBA, A+, USA) again considered onsite provision but in this case compared schools that made condoms available to those where they were not available. They conducted a CBA study in 59 schools including a total of 4166 students (865 in nine schools with a condom programme) who were mostly White (75.4%) and aged 12 to 18 years. The programmes made

condoms available to students within the SBHC and this was accompanied by community discussion and involvement. In schools where condoms were available adolescents were more likely to receive condom/HIV instruction (OR 1.7 p<0.0001) and less likely to report lifetime or recent sexual intercourse (OR 0.8 p=0.037). Sexually active adolescents in those schools were twice as likely to use condoms (OR 2.1 p<0.0001) but less likely to use other contraception (OR 0.526 p<0.01).

Bearss et al. (1995) (ITS, C-, USA) conducted at ITS study in six SBHC over one year and considered outcomes related to contraceptive use, pregnancy, STI risk, sexual behaviour and parental support for contraceptive use. The lack of a control group in this study means they were not able to compare SBHC provision with normal health care. The study population included 36 middle school and 103 high school female students aged 12 to 19 years who self selected to be involved in the programme. The intervention included monthly reproductive health care assessments and counselling related to the programme outcomes delivered by a nurse practitioner. Improvement in the level of contraceptive use (increased from 11% to 50%) and sexual abstinence (up from 17% to 37%) was seen over the course of the year, condom use remained constant at 30%. However, 13 students became pregnant and 49 (35%) were diagnosed with an STI. Reported partner switching (42%) as common, as was drop out form the programme (60%). Although self reported contraceptive use and sexual abstinence rates increased the programme does not seem to have been particularly effective in terms of preventing pregnancy or STIs, although it is difficult to comment on this without a control group for reference.

In a study of ITS design, Schuster et al. (1997) (IT'S, A-, USA) conducted a survey of condom use and knowledge one year after the implementation of a condom availability programme in one high school with 1112 racially and socially diverse 9th grade students (no age given) (along with a baseline survey at onset). Fifty nine percent of eligible students completed the survey. The intervention involved the provision of plastic packs containing two male condoms, an instruction sheet and a message card advocating abstinence

which were made available outside four classrooms and the nurses' office and were available to the whole school population. The results are presented as percentages only and show that; 48% of those 9th grade students who completed the survey reported that they had personally taken condoms and 5% got them via someone else: 54% had used them for sexual activity. Only 13% agreed that "having condoms available at school makes it harder for someone who doesn't want to have sex to say no". Condoms were also used for exploration without having sex. 62% agreed that having condoms available at school makes it easier to talk with your sexual partner about using them. The intervention therefore led to widespread use of school condoms for both sexual activity and exploration to familiarise students with condoms.

School based health centres appear to be most effective when contraception provision is made available on site, either comprehensively (Kisker et al. 1996, Zimmer-Gembeck et al. 2001, Sidebottom et al. 2003) or as a condom availability programme (Schuster et al. 1997).

Evidence statement 3:

School based health centres

3a. On site dispensing

Strong evidence from four papers supports the direct provision of contraceptives dispensed on site from school based health centres on increasing contraceptive provision. However, the use of those contraceptives or any subsequent outcomes is unclear. In the first study, significantly more of the intervention cohort selected hormonal contraception at the first or second visit than the control, and were also significantly less likely to select no contraception (Zimmer-Gembeck et al. 2001 CBA [+]). In the second study, adolescents in the intervention group were significantly more likely to receive condom/HIV instruction, and significantly less likely to report lifetime or recent sexual intercourse. Sexually active adolescents in the intervention group were twice as likely to use condoms but less likely to use other contraceptives (Blake et al. 2003 CBA [+]). In the third study, direct provision saw the number of contraceptives prescribed, which were received by the young people increase significantly. The data analysis in this paper is poor giving only percentage increases, but it does appear to indicate that on site dispensing increases contraceptive provision (Schuster et al. 1997 ITS [-]).

3b. Assessment and counselling.

Moderate evidence from two papers does not support school based health centres which only offer health care assessments or counselling. In the first study levels of consistent contraceptive use improved over the evaluation period, but more students reported having sex in the past month. There were no effects on pregnancy or birth rates (Kisker et al. 1996 CBA [+]). In the second study, improvement in the level of contraceptive use and sexual abstinence was seen over the course of the year. However, 13 students became pregnant and 49 were diagnosed with an STI (comparative figures not given) (Bearss et al. 1995 ITS [-]).

4.6.4. Multi component interventions (pregnancy and sexual health)

We identified four multi component interventions with outcomes related to both pregnancy and sexual health (three RCT, one CBA). The three RCT studies were by the same group of authors and involved implementation of the "Safer Choices" intervention.

In the first study, Coyle et al. (1999) (RCT, A++, USA) conducted a cluster RCT at 20 high schools (10 intervention) involving 3,677 9th grade students of various ethnicities (30% White, 27% Hispanic, 18% Pacific Islander, 17% African American, 1% American Indian). "Safer Choices" is a theory based, multicomponent, school based HIV, STI and pregnancy prevention programme. It focuses on school-wide change and the influence of the total school environment on student behaviour; and consists of five primary components: school organisation, curriculum and staff development, peer resources and school environment, parent education and school-community linkages (further details are not given in this paper). At seven month follow up students completed an evaluation questionnaire and the programme was shown to enhance 9 of 13 variables including knowledge ($p<0.005$), self efficacy for condom use (p,0.005), normative beliefs and attitudes regarding condom use ($p=0.05$), perceived barriers to condom use ($p=0.00$), risk perceptions ($p<0.005$) and child-parent communication ($p=0.03$). The programme also reduced risk behaviours including frequency of intercourse without a condom in the last 3 months ($p=0.03$), increased use of condom at last intercourse ($p=0.02$), and increased use of selected contraceptives ($p=0.03$) at last intercourse. These results are not broken down by school, gender ethnicity etc.

A second cluster RCT was also conducted by the same team (Kirby et al. 2004) (RCT, A++, USA), again involving 20 high schools (10 intervention) with random assignment to the "Safer Choices" intervention. This second population included 3659 9th grade students (aged 13 to 17 at baseline (no mean or range given)), again of mixed ethnicity and the intervention had a longer follow up of 31 months. The intervention did not significantly delay onset of sex, but did improve condom use. The students reported reduced

frequency of sex without a condom (p=0.02), reduced number of unprotected sexual partners (p=0.04) and increased condom use (p=0.02). In this case the intervention had the greatest impact on males and Hispanic students (in terms of preventing initiation of sex), and on those who had previously initiated sex.

The third "Safer Choices" RCT paper (Basen-Engquist et al. 2001) (RCT, A++, USA) again reported follow up at 31 months in 10 intervention schools and showed intervention students reported having sexual intercourse without a condom with fewer partners along with positive effects on psychosocial variables and school climate for both HIV/STI and pregnancy prevention. There was no effect on the prevalence of recent sexual intercourse.

From these papers it difficult to understand whether they represent the application of "Safer Choices" to three separate populations each consisting of ten intervention schools, or whether they are reporting on slightly different elements of the application of the intervention in the same population/schools.

Additionally, Smith et al. (2000) (CBA, B+, USA) conducted a CBA study of a peer education programme ‘STAND’ (Students Together Against Negative Decision) with outcomes related to behaviours and knowledge related to pregnancy, STIs and contraceptive use. The stand group included 10 male and 11 female 10^{th} grade students (aged 14 to 17, mean 15.8). Control students (n=65, mean age 15.6) under took either a 22 hour leadership training course or 36 hours of after school instruction over 4 months. At one year all STAND members reported talking with friends about birth control, condoms or STIs in the past 3 months, with increase in risk behaviour knowledge (4 times greater than comparison). Their own risk behaviours also improved including increases in condom use (16.1%, compared to a 1.2% decline in controls). No STAND members were diagnosed with an STI which the paper reports as significantly better than the 7% of control subjects ($p<0.01$), although there is some doubt as to the accuracy of this calculation of significance (and therefore the validity of the paper). Additionally 3 male STAND members were involved in pregnancies (compared with 2 controls). It appears that the intervention was effective in promotion communication and

therefore knowledge between teens about sexual risk and risk reduction but ineffective in terms of some behavioural outcomes.

These interventions demonstrate that multi-component interventions with objectives related to pregnancy and sexual health such as "Safer Choices and "STAND" are effective. The evidence for these type of interventions is better developed than is the case for most of the other types of intervention we have identified.

Evidence statement 4:

Multi-component interventions with outcomes related to pregnancy and sexual health.

4a. "Safer Choices"

Strong evidence from three papers supports "Safer Choices" (a theory based multi component HIV, STI and pregnancy prevention programme) in changing knowledge and behaviour. From these papers it difficult to understand whether they represent the application of "Safer Choices" to three separate populations, or whether they are reporting on slightly different elements of the application of the intervention in the same population/schools. In the first study, knowledge and beliefs were improved, and the programme also significantly reduced risk behaviours including reduced frequency of intercourse without a condom in the last 3 months, increased use of condom at last intercourse, and increased use of selected contraceptives at last intercourse (Coyle et al. 1999 RCT [++]). In the second study the intervention students reported significantly reduced frequency of sex without a condom and number of unprotected sexual partners (Kirby et al. 2004 RCT [++]). The third study showed intervention students having sexual intercourse without a condom with fewer partners along with positive effects on psychosocial variables and school climate for both HIV/STI and pregnancy prevention. There was no effect on the prevalence of recent sexual intercourse (Basen-Engquist et al. 2001 RCT A [++]).

4b. “STAND”

Weak evidence from one paper may support the peer education programme "STAND" in improving knowledge and changing some behaviours relating to pregnancy STIs and contraceptive use, including increases in condom and no report of STIs. There is some doubt as to the accuracy of the calculations of significance (and therefore the validity of the paper) (Smith et al. 2000 CBA [+])

4.6.5. Interventions to increase contraceptive provision and use

The two interventions reported here (two CBA) aim to increase access to contraceptive provision with or without additional measures relating to actual use in college students. They do not clearly state any objectives relating to either pregnancy and/or sexual health and due to this and their older populations of study they have been categorised separately.

LaBrie et al. 2008 (CBA, A+, USA) conducted a CBA study looking at increasing motivation and behaviour regarding condom us in a population of high risk heterosexual college men (average age 20.56 years, SD 2.87, 76% Caucasian). Three hundred and fifteen students completed a screening questionnaire for alcohol use and sexual behaviour and were randomly assigned to receive either a safer sex intervention or an alcohol targeted intervention (control). The safer sex intervention consisted of a motivational interviewing style conversation around the reasons for using a condom at every sexual event. A 30 day behavioural log was then completed. Significant increases in (self reported) condom use were shown for the intervention group at 30 day post test. Condom usage increased significantly from 41% (SD 29.42) at pre-test to 70% ($p<0.001$). Also condom use with new partners and condom use with regular partners increased (but not significantly). No control data is given. These results provide preliminary support for the intervention in the short term.

Caron et al. (1997) (CBA, A+, USA) conducted a second CBA study of an intervention to promote contraceptive use among college students that aimed

to increase knowledge, improve attitudes and increase use of (and intention to use) contraception. Three hundred and sixty two first year (aged 18 years) college students (51% female, 91% White) were randomly placed in the control group (no intervention) or completed one of four workshops utilising different approaches to providing information about sexuality and contraceptive use (1. information only (half hour presentation, n=79), 2. information plus cognitively orientated intervention (discussion of beliefs, n=76), 3. information plus experimentally oriented intervention (reflection and imagining situations n=73), 4. information plus both interventions (n=77). All four interventions increased contraceptive knowledge compared to the control, and those receiving the experimentally oriented intervention showed significantly more positive change in contraceptive attitudes ($p<0.001$), and intention to use ($p<0.05$) and reported use (p,0.05) of birth control than all other groups.

Both these studies employ interventions which consist of workshop style sessions to promote contraceptive use, and both are shown to be affective in this population.

Evidence statement 5:

Motivational interviewing (college students)

Moderate evidence from two studies supports motivational interviewing and other workshop style interventions to encourage contraceptive use in college students. In the first study motivational interviewing resulted in significant increases in (self reported) condom use. No control data is given (LaBrie et al. 2008 CBA [+]). In the second study four workshop style interventions increased contraceptive knowledge compared to the control, and those receiving the experimentally oriented intervention showed significantly more positive change in contraceptive attitudes and intention to use, and reported use of birth control than all other groups (Caron et al. 1997 CBA [+]).

4.6.6. Interventions which are part of curriculum interventions

In addition we identified several studies which reported on large interventions primarily focused on classroom based sexual health education lessons but which had additional components relevant to this review (four CBA). Three studies looked at two interventions which combined classroom based sexual health education with a programme of supervised community volunteering. The fourth combined a curriculum intervention with an additional computerised element based around a "virtual world environment".

Allen et al. (1997) (CBA, A+, USA) conducted a CBA evaluation of "Teen Outreach", a national volunteer service programme designed to prevent teenage pregnancy and school failure. The intervention included supervised community volunteering, classroom based discussions of experiences and discussion/activities related to key social-developmental task of adolescence. Students in the control group receive the regular Health or Social Studies curricula. The intervention was conducted in 25 sites (n=695, 9th to 12th grade, (age 15.8 (SD 1.13) 86 female and 14 male), predominantly Black (67.7%) students) and was assessed at program entry and 9 months later. Rates of pregnancy ($p<0.05$), along with school failure ($p<0.001$) and academic suspension ($p<0.001$) were significantly lower in the Teen Outreach group than the controls. The authors state that these results indicate the potential value for the Teen Outreach Program, and more generally for interventions that seek to prevent problem behaviour by addressing broad developmental tasks rather than focusing on individual problems.

"Teen Outreach" was also reported in Allen and Philliber (2001) (CBA, A+, USA). Again the hypothesis was that a broadly targeted intervention (with the same components as the above study) would lead to greater programme efficacy. They conducted a CBA study of teenagers (no data on age or gender) (1673 intervention and 1604 comparison) in 9th to 12th grade (which may be the same population as reported in the paper above) and measured self reported problem behaviours. Results confirmed the efficacy of the programme and also showed that it had the greatest impact on reducing future pregnancy (self reported) in those who were already parents, the risk of

pregnancy in this group was only 20% of the risk in the control group (over 4 years).

O'Donnell et al. (2002) (CBA, A+, USA) looked at a similar intervention which again combined a curriculum based intervention with community youth service (CYS). This CBA study again used normal classroom health lessons as the control and aimed to reduce sexual initiation and recent sex among African American and Latino adolescents from 7th to 10th grade (age not stated) (N= 195, 79 male and 116 female). The "Reach for Health" participants spent around three hours per week providing service in community settings including nursing homes, senior centres, full service clinics and child day care centres for two years. Follow up was completed two years after the intervention. At 2 years CYS participants were significantly less likely than controls to report sexual initiation (OR= 0.32 [0.14-0.73] p=0.007) or recent sex (OR= 0.39 [0.02-0.76] p=0.005) than the control group. Therefore this study also supports the idea of using broad based interventions to address sexual health issues.

Finally, Shegog et al. (2007) (CBA, A+, USA) conducted a CBA study of "It's Your Game, Keep It Real" which is a curriculum intervention delivered to 7th and 8th graders (age not stated) with a additional component which consisted of individualized, tailored computer-based activities embedded in a virtual world environment. This included exercises, quizzes, animations, peer video, and fact sheets targeting determinants of sexual risk taking, real time discussion and additional tailored activities. The study evaluated the impact of the multimedia education programme on student attitudes, self efficacy regarding refusal skills, and usability of the intervention through questionnaires and observational data. The population consisted of 14 middle school students, 50% African American and 57% female. A small sample of nine students completed a seven month follow up. The intervention group had significantly better understanding than the controls of: how reproduction works and the possible consequences of sex, and the importance of enacting behaviours to limit sexual experience ($p<0.05$). Ratings of self efficacy for enacting these behaviours was also significantly improved ($p<0.05$). It was

therefore concluded that the programme was affective in enhancing student's attitudes and self efficacy regarding sexual risk behaviour. This study is limited by its very small sample size (n=14) and high attrition rate (around 33%).

From this evidence it would appear that generic interventions can be effective in preventing specific problem behaviours, and that this can be as effective as focusing on individual problems.

Evidence statement 6:

Curriculum interventions with additional components

6a. Community outreach: "Teen Outreach" and "Reach for Health".

Strong evidence from three studies suggest curriculum interventions which include community outreach components can be effective in preventing teenage pregnancy and risky sexual behaviour. In the first study rates of pregnancy, along with school failure and academic suspension were significantly lower in the "Teen Outreach" group than the controls (Allen et al. 1997 CBA [+]). In the second study "Teen Outreach" was again show to be effective, especially for those who were already teen parents (Allen and Philliber 2001 CBA [+]). In the third study "Reach for Health" participants were significantly less likely than controls to report sexual initiation, or recent sex (O'Donnell et al. 2002 CBA [+]).

6b. Virtual world intervention.

Moderate evidence from one study suggests that a virtual world intervention was effective when associated with a curriculum based intervention regarding sexual risk behaviour. The intervention group had significantly better understanding than the controls of: how reproduction works and the possible consequences of sex, and the importance of enacting behaviours to limit sexual experience (Shegog et al. 2007 CBA [+]).

5. RESULTS OF THE COST EFFECTIVENESS REVIEW

The searches identified only one economic evaluation which was in respect of a school based intervention which was not teacher led. The paper by Key et al. (2005) was given a quality assessment of [-] (see Section 3.4.1 for assessment criteria). This paper assesses the cost-effectiveness of a secondary teenage pregnancy prevention intervention that includes school based social work services coordinated with comprehensive health care for teenage mothers and their children compared with matched subjects from State data. The cost-effectiveness of the intervention is calculated alongside the effectiveness study (Section 4.6.1). Very limited description of the economic evaluation is reported so it is unclear what the authors did. The analysis results are presented from a societal perspective based on a lifetime horizon using a discount rate of 5% and assuming an average life expectancy of 77.5 years. The cost per birth avoided is calculated first by obtaining the cost of the program within the study divided by the number of births avoided, and from this ratio is subtracted the societal cost savings per birth avoided. The paper provides no further details around the model assumptions or parameters, including how the societal cost savings per birth avoided have been estimated. The cost per birth avoided estimated by the analysis is -$19,097 (reported incorrectly in the paper as $19,097) which is approximately equal to -£13,750, suggesting that the program results in net cost savings. It is not clear within the paper how this result has been derived. The paper does not provide an analysis of uncertainty or present evidence of validation or generalisability, although the effectiveness data were based upon a study population of African-American US girls of mean age 16 years.

Evidence Statement 7:

Cost effectiveness.

Weak economic evaluation from one study (Key et al. 2008 (CBA [+]) reported on the cost-effectiveness of a secondary teen pregnancy prevention intervention that includes school-based social work services coordinated with comprehensive health care for teen mothers and their children within the USA compared with matched subjects from State data. The study suggested that the intervention is likely to result in net cost savings from a societal perspective, although little description of the economic evaluation was provided within the paper.

6. DISCUSSION

6.1. Summary of identified research

All the papers included in this review reported on studies conducted in the USA, frequently in populations with a high proportion of ethnicities not well represented in the UK population. We categorised the papers as those which aimed to address teenage pregnancy and repeat teenage pregnancy, studies to assess the effectiveness of school based health centres, those with primary objectives to address both sexual health and teenage pregnancy, interventions which were part of educational interventions and those which addressed contraceptive provision in college students.

In addition one study of cost effectiveness was identified, but this was of poor quality.

There were limitations throughout the papers in terms of study quality (especially sample size) and poor reporting of results. Despite these limitations several evidence statements are presented here.

6.2 Research questions for which no evidence was identified

The main issues regarding addressing the subsidiary research questions were than many papers did not adequately describe the socio-economic status of

their population. Therefore it is difficult to comment on the effectiveness of contraceptive services in reaching socially disadvantaged young people. The effectiveness of contraceptive service interventions with differing ethnicity is also difficult to quantify as most papers, although describing the ethnic mix in their population did not report their results with a breakdown for different ethnic groups. Kirby et al. (2000) reported the greatest impact of the "Safer Choices" on Hispanic students than other ethnic groups but this is not particularly relevant in the UK context. There were also no papers which compared the effectiveness of interventions on young people who were already teenage parents with those who were not.

In terms of questions such as the influence of external factors (e.g. setting of targets, adequacy of guidance and support to service providers) along with the facilitators and barriers to implementing effective contraceptive services and interventions it is hoped that the subsequent review on the views of young people (and others) will be better placed to address these questions.

6.3 Evaluating the impact of different approaches

Finding an effective methodology for the evaluation of these interventions, particularly in terms of outcomes relating to sexual behaviour, can be challenging and will have led to some of the problematic features of the papers and limitations of the literature. Many of the interventions used self reported measures which have significant issues with regard to their validity, especially in relation to young people. However, self reported measures are often the best available measure due to the lack of other appropriate, validated measures.

A lack of process evaluations or measurement of "intervention fidelity" (did they actual deliver what they were supposed to?) along with limited follow up in many cases makes it difficult to recommend specific intervention types or components.

6.4 Adverse or unexpected outcomes

Although no papers reported entirely adverse outcomes for the intervention groups in their study, three papers did report disadvantageous results for some outcome measures. In their effectiveness study of a School Based Health Centre by Kisker et al. (1996), more students reported having sex in the past month (from 22% at baseline to 49%% at follow up), and also fewer reported using effective contraception at last intercourse than the national comparator (75% compared to 80% nationally). In a second study of SBCH effectiveness Bearss et al. (1995) reported that 13 students became pregnant and 49 (35%) were diagnosed with an STI. Reported partner switching (42%) was common, as was dropout form the programme (60%). Finally, in an evaluation of the multi-component intervention STAND, Smith et al. (2000) reported that 13 male STAND members were involved in pregnancies (compared with 2 controls).

6.5 Applicability in the UK context

Care must be taken when considering the potential applicability of the majority of these studies to the UK context. All the studies included in the review were conducted in the USA although some will be more applicable than others depending on the exact population studied. Differences in terms of school based culture, policy and context may be much more varied between countries and therefore caution is required when applying USA evidence to the UK.

6.6 Implications of the review findings

The literature in general is not well developed, especially in terms of good quality effectiveness and cost effectiveness studies (and no studies of effectiveness or cost effectiveness conducted in the UK were identified). The literature has a substantial bias towards interventions conducted in the USA and the number of studies conducted in populations with high numbers of African Americans (and other ethic groups not frequently represented in the UK) will have further implications for applicability in England.

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8. APPENDICES

8.1 Appendix 1a: Evidence table for included effectiveness studies

Author, year, journal, title)	Study design	Location (country)	Population (sex, age, ethnicity, SES)	Sample size	Type of intervention	Objectives / Outcome measures	Intervention details	Duration and length of FU	Comparator	Methods and analysis	Main findings	Conclusions/ Recommendations	Limitations	Quality grading	Impact
Allen JP et al.1997. Child Development 64(4) 729-742	CBA	USA	N=695 9th to 12th grade, predominantly Black (67.7%	25 high schools	Education plus	Pregnancy rates School failure Academic suspension	"Teen Outreach", a national volunteer service programme designed to prevent teenage pregnancy and school failure. The intervention included supervised community volunteering, classroom based discussions of experiences and discussion/activities related to key social-developmental task of adolescence.	9 months	regular Health or Social Studies curricula	Logistic regression	Rates of pregnancy ($p<0.05$), along with school failure ($p<0.001$) and academic suspension ($p<0.001$) were significantly lower in the Teen Outreach group.	Potential value for Teen Outreach Program and more generally interventions that seek to prevent problem behaviours by addressing broad developmental tasks rather than focusing on individual problems		+	A
Allen and Philliber (2001) J Comm Psychol 29(6) 637-655	CBA	USA	1673 intervention and 1604 comparison in 9th to 12th grade	National sample	Education plus	Pregnancy rates School failure	"Teen Outreach", a national volunteer service programme designed to prevent teenage pregnancy and school failure. The intervention included supervised community volunteering, classroom based discussions of experiences and discussion/activities	n/s	Normal curricula	Logistic regression	Results confirmed the efficacy of the programme and also showed that it had the greatest impact on reducing future pregnancy in those who were already parents, the risk of pregnancy in this group was only 20% of the risk in the control group.	Support for broad programme in preventing teenage pregnancy, especially repeat pregnancy.		+	A

							related to key social-developmental task of adolescence.								
Amin R and Sato T (2004) Journal of Community Nursing 21(1) 39-47	CBA	USA	371 pregnant or parenting teens (age 13-20)	2 schools (one intervention, one control).	Preventing repeat adolescent pregnancy	Contraceptive use, future contraceptive intention and desire for more children	Paquin School Programme. Education and employment counselling, parenting education, transportation assistance, child care, school based health clinic services, family planning information and services, health education and social services, obstetric and other reproductive services (through an agreement with a local hospital).		506 comparable teens from another school (no programme)	Questionnaire. Multivariate analysis of logistic regression	After controlling, the positive effects of the intervention on current contraceptive use and ever use of Depo-Provera remain significant		Participants self selected to the programme. Data/findings not clear	+	A
Basen-Engquist 2001 Health Edu Behav 28 166-85	RCT (cluster)	USA	N=? unclear. 6At 31 months: 53% Female 9-12th grade A Marican 22%, Asian 14%, Hispanic 34%, White 26% Other 5%	20 high schools (10 intervention and 10 control)	Multi	Impact of the intervention on sexual risk taking behaviours: Reduce unprotected sex by delaying initiation, reducing frequency or increasing condom use. Outcome measures: initiation of sex, freq of unprotected sex, no. unprotected sexual partners, condom use, contraceptive use.	Schools randomly assigned to receive Safer Choices or a standard knowledge based HIV education programme. 5 components: school organisation, staff development (and curriculum organisation), peer resources and school environment, parent education, school community linkages.	19 and 31 months	10 schools	Regression analysis	At 31 months: not significantly reduced no. students who had sexual intercourse in last 3 months ($p=0.69$) or number of cases of intercourse without a condom ($p=0.66$) Did reduce number of sexual partners without a condom ($p=0.00$) 2 psychosocial variables significant: HIV knowledge and self efficacy to use a condom ($p<0.01$ and $p<0.05$).	Positive impacts but not for all variables		++	B

Bearss N et al. J Adol Health (1995). 17: 178-183.	ITS	USA	139 women. 36 middle school, 103 high school. Age 12-19 (median 15). 56 completed 12 months of programme	Six school based health centres (2 middle school, 4 high school)	School based clinic	Contraceptive use, pregnancy and STD risk, sexual behaviour, parental support for contraceptive use.	Monthly reproductive health assessments and counselling related to above outcome measures. Nurse practitioner	12 month programme, no subsequent FU	No comparator data.		Improvement over the course of the programme of both contraceptive use (OCP) (50 to 11%) and abstinence (17 to 37%). Condom use remained at 30% with frequent use of OCP and condoms, condoms or abstinence. 13 students became pregnant and 49 (35%) were diagnosed with an STI. Partner switching was common.	Monthly FU through a SBHC can improve contraceptive use, although drop out rates and contraceptive failure remain high.	Self selection and high drop out.	-	C
Blake SM, et al. 2003. Research and Practice 93(6) 955-961.	CBA	USA	4166 adolescents (78% response rate) 865 in schools with condom programmes mostly White (75.4%) and aged 12 to 18.	59 schools, 3 to 5 classes per school randomly selected.	Condom availability in school based clinic	Relationship between condom availability programmes accompanied by community discussion and involvement, and adolescent sexual practices: Sexual behaviours (from MYRBS), lifetime and recent (3mths) sexual intercourse, lifetime sexual partners, age at first intercourse, use of alcohol, use of condoms or other contraception, ever been pregnant or got some one pregnant. Receipt of HIV	None	School year	3301 students in schools with no condom programme	Cluster sampling from the Massachusetts Youth Risk Behaviour Survey. Analysis of covariance and logistic regression analyses.	In schools where condoms were available, adolescents were more likely to receive condom/HIV instruction (OR 1.7 $p<0.0001$) and less likely to report lifetime or recent sexual intercourse (OR 0.8 $p=0.037$). Sexually active adolescents in those schools were twice as likely to use condoms (OR 2.1 $p<0.0001$) but less likely to use other contraception (OR 0.526 $p<0.01$).	Availability may improve HIV prevention practices. Sexual intercourse rates no increased where condoms available; less likely to be sexually active. Those who were sexually active, more like to have used condoms.	Schools with condom programmes had significantly more A American ($p<0.05$), and Asian ($p<0.01$) students and more students whose primary language was not English ($p<0.05$).	+	A

						instruction, perceptions of condom access, parental communications regarding HIV.									
Charyl LS et al. J School Health (2001) 71(5): 199-194.	CBA	USA	Experimental n=151 (11M, 133F, 7?) Control n=62 (23M, 36F, 3?) White, middle class. Mean age 16.2	3 high schools (controls all from one)	Computerised infant simulator. Pregnancy prevention	Attitudes towards parenting and sexual issues Sexual and contraceptive behaviours	Took turns as "parents" for two night and three days (over a weekend) assuming sole responsibility for care. Researcher delivered	Post test at 10-12 weeks.	Additional sample from one high school	MANCOVA	Failed to reveal any statistically significant effect between pre-test and post-test measures for any of the items for either the control or experimental groups.	Failed to reveal a significant effect of the simulator	Short intervention	+	C
Caron SL et al.(1997). Journal of Psychology & Human Sexuality 9(3) 99-119.	CBA	USA	362 first year college students (50% uptake) 185 women (51%), 177 men (49%). Mostly 18 years old (93%) and white (91%)	1 college	Contraceptive use	Increase in contraceptive knowledge and attitudes, contraceptive use, intention to use	Non intervention control group or one of four workshops utilizing different approaches to education about sexuality and contraceptive use. 1. Contraceptive information only 2. plus cognitively orientated intervention 3. plus experimentally orientated intervention 4. plus both interventions	FU 3 months after pre-test	Non intervention control group	Sexual behaviour survey, contraceptive knowledge scale, sexual opinion survey, contraceptive attitudes survey, contraceptive process scale. MANOVA	All four interventions increased contraceptive knowledge, those receiving the experimentally oriented intervention showed significantly more positive change in contraceptive attitudes, and intention to use and reported use of birth control.	Expected increases in knowledge and attitudes seen, along with use and intention to use		+	A
Coyle K et al.(1999). The Journal of School Health 69(5)	RCT (clustered by school)	USA	3,869 ninth grade students (3,677 at FU) 48% Male 31% White, 27%	20 high schools (10 intervention, 10 control)	Multicomponent pregnancy and	Evaluation questionnaire: sexuality related psychosocial factors, sexual behaviours, programme exposure.	Safer choices; a theory based multicomponent, school based HIV, other STD and pregnancy prevention programme	7 month FU	10 schools	Multilevel models (linear, logistic and negative binomial).	Enhanced 9 of 13 psychosocial variables including knowledge (p=0.00), self efficacy for condom use (p=0.00), normative beliefs and attitudes regarding condom use (p=0.05), perceived	Effective intervention.	Self reported questionnaire	++	B

181-187			Hispanic, 18% Asian/Pacific Islander, 17% A American, 1% American Indian/Alaska Native.		STD prevention s	Behaviour outcomes: delayed sexual intercourse, number of times of intercourse without a condom in the past 3 months, number of sexual partners without a condom. Secondary behaviours: use of condom at first intercourse, initiating sexual intercourse between baseline and FU, use of protection at last intercourse, number of time had sex in past 3 months, number of sexual partners in past 3 months, alcohol or drug use before sex, tested for HIV, tested for other STDs					barriers to condom use (p=0.00), risk perceptions (p=0.00) and child-parent communication (p=0.03). Also reduced risk behaviours including frequency of intercourse without a condom in the last 3 months (p=0.03), less sexual partners without a condom ((p=0.07) increased use of condom at last intercourse (p=0.02), increased use of selected contraceptives (p=0.03) at last intercourse. Did not affect ability to refuse intercourse or unprotected intercourse, or ability to communicate with partner about sex.				
Doniger AS et al.(2001) Journal of Health Communication 6: 45-60	ITS	USA	9 of 18 school districts 3 school years of 1395, 1703 and 1737 children.	9 of 18 school districts	Pregnancy prevention (abstinence)	Pregnancy rates for 15 to 17 year olds in the county	Not me, Not now. Intervention developed by health department, community based youth service, ad agency and communications department. Used mass	3 waves	Pregnancy rates for 15 to 17 year olds in comparison areas	2 groups: Survey of 7th and 8th graders awareness and attitudes and intended behaviour Youth Risk Behaviour	Survey demonstrates high program awareness, and changing attitudes and behaviours consistent with the program's messages. Pregnancy rates declined faster than in comparison areas.	Independent effect on the outcome of pregnancies in the population exposed to the program		-	A

							communications approach including paid TV and radio advertising, billboards, posters, process guides in schools, educational material for parents, educational series presented in schools and community settings.			Survey 9th - 12th graders.					
Ingersoll KS et al. J. Substance Abuse Treatment 29 (2005) 173-180	RCT	USA	228 enrolled. 212 at 1 month FU. Complete data for 94 intervention subjects and 105 control. 18-24 years (av 20), at risk of alcohol exposed pregnancy. White 70% A American 16%. 88% single	One university	Pregnancy prevention	Alcohol exposed pregnancy Drinking habits Contraceptive use	BALANCE: Birth Control and Alcohol Awareness; Negotiating Choices Effectively. Single session of personal feedback and motivational interviewing counselling session. Delivered by counsellor	90 day timeline followback. 1 month FU.	105 control subjects – not exposed to intervention	T tests and X2. Hierarchical logistic regression.	Signif fewer control (48%) than intervention (64%) used effective contraception at 1 month FU X2=5.1, p<0.03. Signif more intervention (74%) no longer at risk of AEP at 1 month, control (54%) X2=8.15, p<0.005. Continued risk of AEP at 1 month FU predicted by: assignment to control condition OR 2.9, 95%CI 1.49-5.45, highest level of drinking in month prior to baseline OR 1.1 95%CI 1.01-1.22.	Assignment to control = almost triple odds of remaining at AEP risk, no. of drinks per day slight additional risk. Intervention effective.	Self reported data limitations.	++	A
Key JD et al. 2001. J Adol Health 28: 167-169	CBA: Retrospective case controlled cohort study	USA	N=50 pregnant or parenting students 98% A American Age at birth of first baby 14-19 (mean 15.8).	1 high school.	Preventing repeat teenage pregnancy	Repeat birth rate. Reappearance of a participant or control subject's name and social security number on a birth certificate at the county data registry within	Specific components include: Weekly group meetings focused on parenting, career planning, adolescent issues and group support. Participation in schools events such as school clubs Individual case	3 years	N=255 selected randomly from birth certificate registry and matched for all variables.		Repeat births occurred in 3 (6%) of participants and 95 (37% of controls) p<0.05. Number of multiple repeat births greater in control subjects (21) than subjects (0) p<0.05.	Demonstrates a significant decrease n the repeat birth rate among participating teen mothers	Sample size	+	A

						the years measured.	management and home visits Medical care through a university clinic as well as the school based clinic for adolescent and infant. Outreach to the community and at risk girls. Project run by racially/culturally matched social worker. Participants followed up even when they did not attend.								
Key JD et al.(2005). International Quarterly of Community Health Education 24(3) 231-240.	Ecological evaluation. CBA	USA	35 girls per year of intervention Low income, 99% A American. 15-17 yrs.	1 high school	Repeat pregnancy	. Reduce secondary teenage pregnancies. Birth rates. School based peer education programme "Second chance club"	Peer support in weekly facilitated group meetings, health education, health care for babies and mothers including contraception (young mother-baby clinic in ambulatory hospital centre), social work services including individual case management, home visits and counselling Multi agency	4 year intervention	State teenage pregnancy rate	Compared rate in intervention zip codes with state rate.	The intervention group demonstrated a decrease in repeat teenage births during the intervention period (p=0.017) with a rebound after it was discontinued. The state rate of teenage births remained higher.	Programme is effective	Cannot make causal links from the association.	-	A
Key JD et al. J Adol Health 42 (2008) 394-400.	Prospective cohort study CBA	USA	63 girls (pregnant or parenting), 99% A American, mean age 16, 100% free school meals / Medicaid.	One high school	Repeat pregnancy prevention	Subsequent births Contraception use	Intensive case management by (culturally matched) school based social worker (incl home visits). Weekly school based peer education/support.	At least 24 months	Matched comparison group n=252	Intention to treat (X^2, Fishers, survival analysis)	Subsequent births were more common in comparison group (33%) than among subjects (17%) p=0.001, became significant at 30 months p=0.05. Fewer births with greater participation in comprehensive medical care (p=0.08) and case management (p=0.07). Cost savings: $19,097 per	Intervention effective in reducing subsequent teenage births.	Selection bias; all participants enrolled in school	+	B

											birth avoided or $5,055 per month. Programme had no effect on overall contraception use.				
Kirby DB et al. J Adol Health (2004) 35: 442-452.	RCT (cluster)	USA	3869 9th grade students (79% at 31 month FU) 52% male, 30% white, 18% Asian. 28% had initiated sex at baseline	20 high schools (10 intervention and 10 control) Mean 1767 students per school.	Multi	Impact of the intervention on sexual risk taking behaviours: Reduce unprotected sex by delaying initiation, reducing frequency or increasing condom use. Outcome measures: initiation of sex, freq of unprotected sex, no. unprotected sexual partners, condom use, contraceptive use.	Schools randomly assigned to receive Safer Choices or a standard knowledge based HIV education programme. 5 components: school organisation, staff development (and curriculum organisation), peer resources and school environment, parent education, school community linkages.	7, 19 and 31 months.	10 schools	Poisson multilevel regression models, logistic regression models	Did not significantly delay onset of sex, but did improve condom use: over 3 months reduced frequency of sex without a condom (p=0.02), number of unprotected sexual partners (p=0.04), increased condom use (p=0.02), increased contraceptive use (p=0.07). Greatest impact on males and Hispanics (initiation of sex), and those had previously initiated sex.	Positive impact across groups. Greater impact on males and Hispanics. Greatest overall effect in increasing condom use among students who had engaged in unprotected sex before the intervention.	Self reported data, cluster randomisation	++	B
Kisker EE et al. J of Adol Health (1996) 18: 335-343.	CBA	USA	N=3050 grade 9 and 10 students.	19 schools	School based adolescent health care programme	Self reports concerning health centre utilisation, use of other health care providers, knowledge of key health facts, substance use, sexual activity, contraception use, pregnancies and births, health status	Outcomes for SBHC programme compared to normal health care provisions. Staffed by nurse practitioner and medical aide plus part time physician, social worker and health educators.	FU to graduation. (Time??)	National sample of urban youths. N=859	Logit models	52% of students visited the SBHC. Levels of contraception use improved during the evaluation period, but still poor. Less intervention students reported having sex, but also less reported using any effective contraception than the national comparator. No significant effect on pregnancy or birth rates.	Increased student access to health care and improved their knowledge, but estimated impacts on risky behaviour were inconsistent.	Self reported	+	C
LaBrie JW et al. Arch Sex	CBA	USA	41 heterosexual college	1 college	Motivational	Three separate measures of motivation to	315 students screened for alcohol use and sexual behaviour	3 months.	47 men underwent alcohol	Paired t tests	Significant increase in actual condom use at 30 day post test. Condom usage	Three separate measures of condom use increased either	Exclusion of women	+	A

Behaviour (2008) 37: 330-339.			men. Av age 20.56. Caucasian 76%, Hispanic 17%, Asian American 7%.		interviewing as an intervention to promote condom use.	change condom use	(questionnaire). Intervention included safer sex intervention, control included alcohol targeted intervention only. Intervention = motivational interviewing (5-10 min) styled conversation around the reasons for using a condom in every sexual event. Post intervention participants completed a further 30 day behaviour log (90% completed)		targeted intervention		increased from 41% (SD 29.42) at pre-test to 70% (SD 37.97) at FU t(45)=4.23 p<0.001 d=0.85. Condom use with new partners increased from 61% to 81% (not sig) t(18)=1.86 p=0.79 d=.53 and condom use with regular partners increase (ns) from 31 to 44% t(15)=1.58 d=0.53.	at post intervention or 30 day FU. Provides preliminary support for the intervention	and bi/homosexual men. Predominantly Caucasian. Self reported retrospective behaviours. 30 day FU relatively short term.		
Lieberman LD et al.(2000). Family Planning Perspectives 32(5) 237-245	CBA	USA	312 students total at FU (59% retention). Intervention 125 6/7/8th graders 66% black/Caribbean, 20% Latino. 66% Female, mean age 12.9 (at pre-test).	Sample and controls from same schools. N=?	Pregnancy prevention	Psychosocial measurements of self esteem, locus of control and self efficacy. Ability to communicate with parents or other adults about sexuality concerns. Attitudes consistent with postponing sexual activity. Attitudes consistent with preventing pregnancy. Intention to engage in sexual intercourse in the next 6 months. Onset of sexual	2-4 month abstinence based small group programme led by social workers based at multi-service agency. Project IMPACT (Inwood House Model of Pregnancy Prevention and Care for Teenagers). 8-12 per group, 12-14 sessions over 1 semester (45 min).	Pre/post test (3-4 months) and 1 year FU	187 students	Existing school based sexual attitudes and behaviour surveys (pilot n=25). T=test, Chi-squared.	At 1 year FU intervention students had significantly better scores on locus of control (p=0.01), parental relationships (p=0.21), and (boys only) attitudes towards the appropriateness of teenage sex (p=0.01). No change in depression or self esteem. No long term change in self efficacy, intentions to have sex, attitudes towards teenage pregnancy, condom use, pregnancy	Some impact on adolescents' attitudes and relationships, particularly with their parents.	Positive outcomes were especially limited in students who were sexually active before the study. Some differences between intervention and control groups (more like to have repeated a grade, experienc	+	B

						intercourse.							ed violence/ undesired sexual contact).		
McBride D and Gienapp A (2000). Family planning perspectives 32(5): 227-235	CBA	USA	1,042 "youth (4 projects) aged 9-13 (549 intervention) 690 "teenagers" (3 projects) aged 14-17 (371 intervention) .	Several sites (some community) but including 6 projects administered at middle and high schools.	Reducing pregnancy.	Two groups (teenagers/youth) due to objectives. Older (teenagers) addressed sexual behaviours directly. Younger (youth) aimed to address factors thought to increase risk of early pregnancy.	Wide variety of services tailored to individuals need. Including counselling, mentoring and advocacy. Youths received on average 14 hours of service and teenagers 27 hours (controls 2-5 hours). Delivered by sexuality educators, social workers and counsellors.	Intervention 1-2 years. Pre-test to post test 5-9 months	N=493 and 319	Covariance adjustment model.	One youth site less likely to intent to have intercourse. One teenage site reduced sexual behaviour and improved contraceptive use. One teenage site reduced sexual intentions and increased intention to use contraceptives.	Only one project showed consistent differences between intervention and control groups	Some differences between treatment and control (mothers' level of education). Risk of diffusion between groups.	+	C
O'Donnell et al.2002. J Adol Health 31 93-100.	CBA	USA	African American and Latino adolescent from 7th to 10th grade (N= 195).	1 middle school	Education plus	reduce sexual initiation and recent sex	The "Reach for Health" participants spent around three hours per week providing service in community settings including nursing homes, senior centres, full service clinics and child day care centres for two years.	two years after the intervention	normal classroom health lessons	Regression analysis	At 2 years CYS participants were significantly less likely than controls to report sexual initiation (OR= 0.32) or recent sex (OR= 0.39) than the control group.	A service learning intervention combining community involvement with health instruction can have a long term benefit by reducing sexual risk taking among adolescents		+	A
Out JW and Lafreniere KD 2001. Adolescence 36(143) 571-581.	CBA	USA	114 11th grade students, 24M 90F. 53 in intervention group	One school?	Pregnancy prevention	Attitudes, behaviours and knowledge related to contraception and fertility (measured pre-test and post-test)	Infant stimulators were assigned for specific dates ranging from two days and night to three days and night (to accommodate weekends)	2 days	N=61	MANOVA	After two days experience with BTIO, teens were more likely to accurately assess their personal risk for unplanned pregnancy than the comparison group. The intervention group rated themselves at significantly higher risk of unplanned pregnancy $F(1, 112)=17.88$ $p<0.001$.	Intervention group more able to acknowledge that failure to use contraceptives significantly increased risk for unplanned pregnancy.	Short intervention	-	B

Schaffer MA et al. Public Health Nursing 24(4) 304-311. 2008.	Longitudinal ITS	USA	Participant numbers range from 38 to 57 per year. No other details given.	One alternative school	Preventing repeat adolescent pregnancy	Reducing the rate of repeat adolescent pregnancy	Strategies include the daily presence of public health nurses in the school, monthly pregnancy tests and surveys, health counselling and referral, group health education classes.	9 year programme; participants each involved for one year.	None	No info given. Focus groups conducted.	Repeat adolescent pregnancy declined from 25% in the year before the intervention to a mean of 4.7% over 9 years of the programme. Cost of programme for 41 participants: $13,010	The daily presence of a PHN who was open, and non judgemental, paired with a supportive school environment, the availability of birth control counselling and referral, and affirmation of healthy choices to remain pregnancy free were essential program components.	Poor description of population and study methodology	-	A
Schuster MA 1997. Paediatrics 100(4) 689-694.	ITS	USA	N=1112 9th grade students. 59% included Racially and socially diverse 51% male 8% A American, 10% Asian/Pacific Islander, 27% Latino, 48% White, 7% other.	1 urban high school	Condom provision at SBHC	History of obtaining condoms from program, use of condoms, knowledge about program, attitudes towards program.	Plastic packs containing two male condoms, instruction sheet and message card advocating abstinence were made available outside 4 classrooms and the nurses' office	Survey conducted 1 year after intervention began	None	Baseline survey at outset and repeat after 1 year of intervention. Logistic regression	48% of students personally took condoms and 5% got them via someone else. 54% had used them for sexual activity. Only 13% agreed that "having condoms available at school makes it harder for someone who doesn't want to have sex to say no". Condoms were also used for exploration without having sex. 62% agreed that having condoms available at school makes it easier to talk with your sexual partner about using them.	Led to widespread use of school condoms both for sexual activity and exploration that familiarizes students with condoms.	No comparison data (control)	_	A
Shegog et al.2007.	USA	CBA	14 middle school students, 50% African American and 57% female. Nine students	1 middle school	Education plus	student attitudes, self efficacy regarding refusal skills,	individualized, tailored computer-based activities embedded in a virtual world environment. This included exercises, quizzes, animations, peer video, and fact sheets targeting determinants of sexual	7 months	No intervention	Paired t tests	The intervention group had significantly better understanding than the controls of: how reproduction works and the possible consequences of sex, and the importance of enacting behaviours to limit sexual experience ($p<0.05$). Ratings of self efficacy for	It was therefore concluded that the programme was affective in enhancing students' attitudes and self efficacy regarding sexual risk behaviour.	Very small sample	+	A

			completed a seven month follow up.				risk taking, real time discussion and additional tailored activities.				enacting these behaviours was also significantly improved ($p<0.05$).				
Sidebottom A et al. Am J PH (2003) 93(11): 1890-1892.	CBA: retrospective chart review	USA	Two year groups, before and after dispensing of contraceptives on site. Sample: 302 students, 79.1% female, 39.1% white, 36.8% A American	5 high schools	On site provision of contraception SBHC	Effect of initiating on site provision of contraception on students receipt of requested contraceptives and demand for contraceptives from the SBHC. Proportion of contraceptives requested that were received. Proportion of enrolled students who requests contraceptives.	Dispensing of contraceptives from the school based clinic on site (compared to previous voucher system for off site dispensing).	1 year (retrospective)	Previous year group – demographically similar.	Chart review. % data only given	Under voucher system 41% received all requested contraceptive and 59% at least one. Under direct distribution 99% received all requested. Under voucher system 25% of condoms and 50% of oral contraceptives were received compared to 100% under direct distribution.	Demonstrates the efficacy of a direct distribution system relative to voucher system	Poor data analysis.	-	A
Smith MU et al.(2000). AIDS Education and Prevention 12(1) 49-70.	CBA	USA	21 10th graders (intervention) Collectively with comparator: s: 37 male and 37 female aged 14-17 years (mean 15.6).	N/S	Multi STD/ Pregnancy	Sexual behaviour and medical history Knowledge, communication ,attitudes and belief scales.	36 hour peer educator training program Students together against negative decisions (STAND). 36 hours of instruction after school over 4 months.	1 year	22 hour leadership training course (n=20) or no intervention (n=45)	Written knowledge attitudes and behaviour survey at beginning of training, end of training and 8 months later. ANOVA	At 1 year all STAND members reported talking with friends about birth control or condoms and about STDs in the past 3 months (stat sig different to control). At time 3 STAND trained peer educators reported significantly greater increases in AIDS risk behaviour knowledge (4x more than comparison group), frequency of conversations with peers about birth control/condoms and STDs, condom use self efficacy and consistent condom use. Also increased	Effective method for improving selected sexual knowledge, attitudes and behaviours. Effective in encouraging communication between teens about sexual risk and risk reduction.	Greater increase in frequency of vaginal intercourse in STAND members (2x comparison).3 STAND members involved in pregnancies (Male) during	+	B

											positive behaviours including increased condom use and decreased unprotected intercourse. No STAND members were diagnosed with an STD ($p<0.01$). However, condom use at last intercourse was similar at time 3 ($p=0.93$)		training. Self reported behaviours. Relatively small samples.		
Tiezzi L et al.(1997) Family Planning Perspectives 29: 173-176.	ITS (one group pre and post test design)	USA	N=100? 81% Hispanic, 10% black, 9% other Mean age 12.9	School based clinic in 4 junior high schools	Pregnancy prevention programme	Encourage sexual abstinence, prevent pregnancy	The In Your Face pregnancy prevention program was designed to reduce the risk of unintended pregnancy by providing information, counselling, support and referral for reproductive health care. Includes: group education (Reduce the risk curriculum), individual education and counselling, interdisciplinary support (team approach with input from social workers, medical providers and psychiatrists), referrals and classroom interventions, other special events and projects.	3 year intervention		School wide screening survey to identify those who reported sexual activity or correlated activities	Among students given a family planning referral for contraception, the proportion who visited the clinic and obtained a method rose from 11% before the programme to 76% in the programme's 3rd year. Pregnancy rates amongst teenagers younger than 15 decreased by 34% over 4 years. In the fourth year, the pregnancy rate in one school which did not continue the programme was 3x that for those who continued in intervention (16.5 per 1,000 vs. 5.8).	An intensive, risk identification and case management approach may be effective in preventing pregnancy in very young adolescents.	No control	-	A
Ziegler DJ et al.2004 J Psychosocial Nursing 42(10) 48-54	ITS	USA	17 participants in total. Girls aged 14-17 (mean 16.2). 6 A American, 6 Caribbean,	One school.	Preventing repeat pregnancy	Prevent repeat pregnancy Overcome issues related to abortion	Short term post abortion groups (3 in 3 years) in adolescent mental health clinic within a school based health clinic. Each group met for 50 minutes once a week. Participants referred by nurse practitioner	5 months to 3 years depending on the individual	None	No details, self reported outcomes	Participants indicated that they chose and used a method of birth control, did not repeat an unplanned pregnancy (while known to the clinic), and remained in high school.	Short term abortion counselling groups offered in a school based health clinic mobilized support and helped debrief their experience while encouraging positive future plans. Adolescents	Self reported data. Poorly reported paper	-	A

			5 Latina.				to the social worker run counselling. Afterwards nurse practitioner contacted them for medical check, birth control and social worker discussed the abortion and reinforced birth control. Contacted weekly for 3 months.					chose and used a method of birth control and did not repeat unwanted pregnancy.			
Zimmer-Gembeck MJ et al. J Adol Health (2001) 29:177-185.	CBA Prospective Cohort.	USA	Sexually active females 355 cohort 1, 378 cohort 2 Mean age 16.3 58% white, 26% black, 7% Asian, 5% Hispanic, 2% Native American, 2% n/s	Two cohorts; school year before (cohort 1) and after (cohort 2) the initiation of on site contraceptive dispensing. Six high schools	Contraceptive provision at a SBHC	To determine whether on site dispensing of contraceptives in SBHCs can affect adolescents' use of contraceptives. Contraceptive use (time to initiation of contraception in number of days and visits), sexual behaviour.	To compare contraceptive use when dispensed by the SBHC to off site referral. Data collected at monthly family planning visits.	Every 3 months	School year before on site dispensing initiated.	Student t tests, Chi squared, analysis of covariance and logistic regression.	More of cohort 2 (72%) selected hormonal contraception at the first or second visit than cohort 1 (59%) $X2= 11.3$ $p<0.001$. Cohort 2 significantly less likely to choose no contraception (29%).	Hormonal contraception use is somewhat more consistent when dispensed on site at a SBHC	Data recording inconsistencies	+	A

Appendix 8b: Evidence table and Drummond checklist for included cost-effectiveness study

Study details	Interventions and comparator	Study population	Time period of analysis	Perspective of analysis	Outcomes of interest	Main results	Authors' conclusions	Limitations of analysis
Key et al. 2005, USA Year of analysis: 2008 Study design: Cost-effectiveness analysis Grade:-	Intervention: A secondary teen pregnancy prevention intervention that includes school-based social work services coordinated with comprehensive health care for teen mothers and their children Comparator: Matched subjects from State data (n = 252)	63 girls (pregnant or parenting), 99% African-American, mean age 16, 100% free school meals	Lifetime	Societal	Cost per birth avoided	Cost per birth avoided = -$19,097	The programme results in net cost savings	Minimal detail reported of the health economic analysis such that it is unclear what has been done; No analysis of uncertainty; No validation or discussion of generalisability provided.

Drummond checklist

Author, date	Key et al., 2008
A statement of the problem	Not related specifically to economic evaluation
A discussion of the need for modelling vs alternative methodologies	Not provided
A description of the relevant factors and outcomes	Description of relevant factors not provided. Minimal description of model outcome included: Cost per birth avoided = (Cost of program/No. of births avoided) - Societal cost savings per birth avoided
A description of the model including reasons for this type of model and a specification of the scope including; time frame, perspective, comparators and setting	A description of the model was not provided. The model scope was outlined as follows: Time frame: Lifetime (although the description of the results seems to suggest a shorter time frame) Perspective: Societal Intervention: A secondary teen pregnancy prevention intervention that includes school-based social work services coordinated with comprehensive health care for teen mothers and their children Comparator: No secondary teen pregnancy prevention intervention
A description of data sources (including subjective estimates), with a description of the strengths and weaknesses of each source, with reference to a specific classification or hierarchy of evidence	Not provided

A list of assumptions pertaining to: the structure of the model (eg. Factors included, relationships, and distributions) and the data	Minimal assumptions provided: • 5% discount rate • Average life expectancy of 77.5 years • No analysis of uncertainty
A list of parameter values that will be used for a base case analysis, and a list of the ranges in those values that represent appropriate confidence limits and that will be used in a sensitivity analysis	Not provided
The results derived from applying the model for the base case	Cost of program per participant = $1,895 = £1,364 using currency rate of 0.72 (derivation is not reported). Number of births within treatment group: 5/32 (it is not clear within the paper why this is 32 rather than 63) Number of births within control group: 83/252 Number of avoided births = 9 (unclear how this is derived from figures above) Cost per birth avoided: -$19,097 = -£13,750 using currency rate of 0.72 [date of analysis unknown; paper published in 2008]. Within the paper this is reported as a positive result when it should be negative.
The results of the sensitivity analyses No analysis of uncertainty provided A discussion of how the modelling assumptions might affect the results, indicating both the direction of the bias and the approximate magnitude of the effect	No analysis of uncertainty provided
A description of the validation undertaken	Not provided
A description of the settings to which the results of the analysis can be applied and a list of factors that could limit the applicability of the results	Not provided. 99% of the study population were African-American US girls of mean age 16 years.
A description of research in progress that could yield new data that could alter the results of the analysis	Not provided

8.2 Appendix 2: Included studies

Allen JP et al. (1997). Child Development 64(4) 729-742. Preventing Teen Pregnancy and Academic Failure: Experimental Evaluation of a Developmentally Based Approach.

Allen JP and Philliber SP (2001) J Comm Psychol 29(6) 637-655. Who benefits most from a broadly targeted prevention program? Differential efficacy across populations in the teen outreach program.

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Doniger AS et al. (2001) Journal of Health Communication 6: 45-60. Impact of the "not me, not now" abstinence orientated adolescent pregnancy prevention communications program, Monroe County, New York.

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Key JD et al. 2001. J Adol Health 28: 167-169. The second chance club: repeat adolescent pregnancy prevention with a school based intervention.

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Kisker EE et al. J of Adol Health (1996) 18: 335-343. Do school based health centres improve adolescents access to health care, health status and risk taking behaviour?

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O'Donnell L et al. 2002. J Adol Health 31 93-100. Long term reductions in sexual initiation and sexual activity among urban middle schoolers in the reach for health service learning program.

Out JW and Lafreniere KD 2001. Adolescence 36(143) 571-581. Baby think it over: using role play to prevent teen pregnancy

Schaffer MA et al. Public Health Nursing 24(4) 304-311. 2008. Pregnancy free club; strategy to prevent repeat adolescent pregnancy.

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Shegog R et al. 2007. "It's your game": an innovative multimedia virtual world to prevent HIV/STI and pregnancy in middle school youth.

Smith MU et al. (2000). AIDS Education and Prevention 12(1) 49-70. Students together against negative decisions (STAND): evaluation of a school based sexual risk reduction intervention in the rural south.

Tiezzi L et al. (1997) Family Planning Perspectives 29: 173-176. Pregnancy prevention among urban adolescents younger than 15: results of the 'in your face' program

Ziegler Daly J et al. J of Psychosocial Nursing 42(10 48-54. Post abortion groups: risk reduction in a school based health clinic.

Zimmer-Gembeck MJ et al. J Adol Health (2001) 29:177-185. Contraceptive dispensing and selection in school based health centres.

8.3 Appendix 3: Excluded studies

References	Reason for exclusion	No.
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program. *ABNF J* 1998;9: 2.40-44.

Kirby DK. The impact of the postponing sexual involvement curriculum among youths in California. *FAM PLANN PERSPECT* 1997;29: 3.1997

Kohler PKM. Abstinence-Only and Comprehensive Sex Education and the Initiation of Sexual Activity and Teen Pregnancy. *J ADOLESC HEALTH* 2008;42: 4.Apr

Kirby D, Korpi M, Adivi C, et al. An impact evaluation of project SNAPP: an AIDS and pregnancy prevention middle school program. *AIDS Education & Prevention* 1997;9: Suppl.44-61.

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Spear C, Young M, Denny G. Field testing of an abstinence-based sexuality education program for upper elementary school students. *J HEALTH EDUC* 1919;1997 Nov-Dec; 28: 6.335-344.

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Traeen BE-MA, Traeen Bbun. Effect of an intervention to prevent unwanted pregnancy in adolescents. A randomized, prospective study from Nordland county, Norway, 1999-2001. *Journal of Community & Applied Social Psychology* 207;13: 3.May-Jun

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Brittain D. Establishing an educational programme for nurses to supply emergency hormonal contraception (combined method) to protocol.,*BR J FAM PLANN* 1999;**25**: 3.118-121.	Not relevant	1
Panzer RA.The effects of fear versus norm appeals and directive versus cognitively flexible designs in abstinence-centered multimedia education on teen sexual attitudes, intentions and behaviors. *Dissertation Abstracts International Section A: Humanities and Social Sciences* 2008;**68**: 12-A.	Full study not available	1
Garwick A, Nerdahl P, Banken R, et al. Risk and protective factors for sexual risk taking among adolescents involved in Prime Time. *Journal of Pediatric Nursing* 2004;**19**: 5.340-350. ni Riain A. Increasing the effectiveness of contraceptive usage in university students. *European Journal of Contraception & Reproductive Health Care* 1998;**3**: 3.124-128.	Health care setting - to include in subsequent review	2
Hoefnagels C, Hospers HJ, Hosman C, et al. One measure, two motives. Prediction of condom use and interaction between two prevention goals among heterosexual young adults: preventing pregnancy and/or sexually transmitted diseases. *Prevention Science* 2006;**7**: 4.369-376.	No intervention/ change data	3

Mendez-Negrete J, Saldana L, Mendez-Negrete Jje. Can a Culturally Informed After-School Curriculum Make a Difference in Teen Pregnancy Prevention? Preliminary Evidence in the Case of San Antonio's Escuelitas. *Families in Society* 1995;**87**: 1.Jan-Mar Salihi S, Brown DW, Melrose E, et al. Revisiting a pilot survey involving contraception and teenage pregnancy in Ayrshire and Arran. *Journal of Family Planning & Reproductive Health Care* 2002;**28**: 1.37-38.		
de Anda DE-MA, de Anda Dde. Replication of an intensive educational intervention for youth pregnancy and STI prevention: The GIG. [References]. *Child & Adolescent Social Work Journal* 1 A.D.;**25**: 1.Feb-69 Yampolskaya S. Assessment of Teen Pregnancy Prevention Interventions Among Middle School Youth. [References]. *Child & Adolescent Social Work Journal* 1 A.D.;**21**: 1.Feb-83	Community setting - to include in subsequent review	2
Klein JD, Handwerker L, Sesselberg TS, et al. Measuring quality of adolescent preventive services of health plan enrollees and school-based health center users. *J ADOLESC HEALTH* 2007;**41**: 2.153-160.	Views paper	1
McGuire A, Hughes D. The economics of family planning services: a report prepared for the Contraceptive Alliance (Structured abstract). *Family Planning Association* 1995; 34 Olaiya ST. Medical cost savings attributable to comprehensive sex education programs that delay coitus and increase condom use among adolescents in the United States. *Dissertation Abstracts International: Section B: The Sciences and Engineering* 2006;66: 11-B. Sonnenberg FA, Burkman RT, Hagerty CG, Speroff L, Speroff T. Costs and net health effects of contraceptive methods (Structured abstract). *Contraception* 2004 ;69:447-459. Trussell J, Wiebe E, Shochet T, Guilbert E. Cost savings from emergency contraceptive pills in Canada (Structured abstract). *OBSTET GYNECOL* 2001;97:789-793.	Not economic studies	4

8.4 Appendix 4: Search strategies

List of databases searched

Medline via OVID SP
Embase via OVID SP
Cinahl via OVID SP
British Nursing Index via OVID SP
PsycINFO via OVID SP
ASSIA via CSA
Cochrane – CDSR via Wiley
Cochrane –DARE via Wiley
Cochrane –Central via Wiley
Cochrane –HTA via Wiley
Social Care Online
Science and Social Science Citation Indices via Web of Knowledge

EconLit via OVID SP
Cochrane – NHS EED via Wiley

Sample search strategy from MEDLINE

1	*adolescent/
2	teen*.ti,ab.
3	adolescen*.ti,ab.
4	underage.ti,ab.
5	youth*.ti,ab.
6	(Young adj2 (person or people or adult*)).ti,ab.
7	(School adj2 (child* or student* or age)).ti,ab.
8	minor*.ti,ab.
9	student*.ti,ab.
10	(under adj2 (eighteen or "18")).ti,ab.
11	(under adj2 (twenty five or "25")).ti,ab.
12	1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 or 10 or 11
13	*contraception/
14	*family planning services/
15	*birth control/
16	*contraceptive behavior/
17	(family adj2 planning).ti,ab.
18	(birth adj2 control).ti,ab.
19	sexual health service*.ti,ab.
20	sexual health clinic*.ti,ab.
21	(Contracepti* and (pharmacy or pharmacist* or community or service* or access* or provision or support* or clinic* or availab* or emergency or delivery or outreach or advice or information or intention*)).ti,ab.
22	13 or 14 or 15 or 16 or 17 or 18 or 19 or 20 or 21
23	exp Pregnancy, Unwanted/
24	exp Pregnancy, Unplanned/
25	(Pregnan* adj2 (unwanted or unplanned or unintent* or accident*)).ti,ab.
26	conception*.ti,ab.
27	(Prevent* adj2 pregnancy).ti,ab.
28	23 or 24 or 25 or 26 or 27
29	22 or 28
30	12 and 29
31	limit 30 to (humans and yr="1995-2008")