

Systematic review and narrative synthesis of the effectiveness of contraceptive service interventions for young people, delivered in health care settings

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Abstract

A systematic review and narrative synthesis to determine the effectiveness of contraception service interventions for young people delivered in health care premises was undertaken. We searched 12 key health and medical databases, reference lists of included papers and systematic reviews and cited reference searches on included articles. All retrieved literature was screened at title and abstract levels, and relevant articles were taken through to full paper appraisal. Data relating to study design, outcomes and quality were extracted by one reviewer and independently checked by a second reviewer. We included interventions that consisted of contraceptive service provision for young people, and also interventions to encourage young people to use existing contraceptive services. The searches identified 23 studies that met the inclusion criteria. The papers focused on: new adolescent services, outreach to existing services, advanced provision of emergency contraception, condom/contraceptive provision and advice and repeat pregnancy prevention. The literature in general is not well developed in terms of good quality effectiveness studies and key outcome measures. However, it is possible to make recommendations in terms of outreach versus targeted young people's services in health care settings, advanced provision of emergency contraception and long-acting reversible contraception to prevent repeat adolescent pregnancy.

Introduction

The teenage pregnancy rate in the United States is still one of the highest in the world (despite a decline of >17% since the 1990s) [1]. Similarly, the UK rate of teenage pregnancy remains the highest in Western Europe despite declining over the last 20 years [2]. Teenage pregnancy and birth rates in both countries continue to present substantial problems for society, placing significant pressures on local authority social care, housing and education services.

Teenage pregnancy is most prevalent in areas of social and material deprivation [2], where access to contraceptive services is often most problematic. Around 60% of adolescent mothers live in poverty [1] and adolescents are among those least likely to have good access to health care, and have low rates of primary care use compared with other age groups [3]. Teenage conceptions can lead to socio-economic deprivation, mental health difficulties and lower educational attainment. Resulting children are at a greater risk of low education attainment, emotional and behavioural problems, maltreatment or harm and illness, accidents and injury [4].

There is a lack of robust evaluations of teenage pregnancy prevention programmes and including the potential wider effect on positive sexual health. Reviews are often limited to measuring the success of one form of contraception over another. To address this evidence gap, here we conduct a systematic review and narrative synthesis of literature

that focuses on the effectiveness of contraceptive service interventions delivered in developed countries; that is, services which provide contraception to young people (or information to encourage young people to use established services that provide contraception). A review of interventions conducted in education setting has been reported separately [5].

Methods

Search strategy

A full systematic search of key health and medical databases was undertaken (Medline, Embase, Cinahl, British Nursing Index, PsycINFO, ASSIA, Cochrane—CDSR, Cochrane—DARE, Cochrane—Central, Cochrane—HTA, Social Care Online and Science and Social Science Citation Indices via WoK). The search strategy included terms relating to young people, contraceptive services, family planning and pregnancy prevention. The search was limited by date (limited to 1995–2008 to pre-date the UK teenage pregnancy strategy), English language and limited to humans. No restrictions were placed in terms of study type or place of publication. Additional methods to identify evidence included: searching the reference lists of included papers and systematic reviews, and cited reference searches on included articles.

Inclusion criteria

This review focuses on papers that reported on the effectiveness of interventions to provide contraceptive service provision to young people (or to encourage young people to use contraceptive services), which are delivered on health care premises in developed countries, including interventions with an outreach element where the majority of the service provided is delivered in the clinic. All study designs (with/without comparators) were considered. All outcomes relating to the provision of contraceptive services and advice along with secondary outcomes such as contraception use, pregnancy and moderated behaviour were extracted. Effectiveness was defined as an increase in the number young people accessing a service and

advice, and/or an increase in the provision of contraception to young people. Studies where effectiveness was reported in terms of pregnancies prevented were also included. This definition is intentionally broad as the focus was on selecting interventions and not the outcomes they measured. Interventions conducted solely on education premises or in community settings are excluded from this review and are the subject of separate systematic reviews conducted as part of this programme of work [5]. This separation was determined after papers were identified in order to provide clear messages to practitioners working in the different settings. Papers were excluded if they did not report effectiveness, were not conducted with young people (nominally $\geq 50\%$ aged < 25 years), or were not conducted in developed countries.

In terms of PICO therefore, the study inclusion criteria can be defined as:

Population: young people aged < 25 years.

Intervention: the provision of contraception (or advice regarding contraception) delivered in health care settings.

Comparator: any

Outcomes: provision of contraception and/or advice, contraception use, pregnancy and moderated behaviour.

All retrieved literature was screened at title and abstract levels for relevance, and relevant articles were taken through to full paper appraisal. Data relating to study design, outcomes and quality were extracted by one reviewer and independently checked by a second reviewer. Disagreements were resolved by consensus and consulting a third reviewer where necessary.

Quality appraisal

Study quality was appraised using the NICE (2009) [6] checklist to identify potential sources of bias. Elements relating to internal and external validity including population, method of allocation, outcomes and analytical methods were considered, with each study awarded a grading of [++] (high

quality) if it was judged that the conclusions are very unlikely to alter, [+] (good quality) where it was judged that the conclusions are unlikely to alter and [–] (poor quality) where it was judged that the conclusions are likely or very likely to alter if all potential sources of bias were removed. The checklist was used to give a comparative measure of study quality rather than to exclude studies from the review.

Results

Our initial search identified 1219 papers; with a further 115 papers identified by citation searching of included papers and relevant systematic reviews. We also searched the reference lists of included papers and consulted with a panel of experts, but no additional references were identified through these processes. Initially we identified 64 potentially relevant papers but subsequently excluded 41 papers that were obtained as full papers and found to be outside of the scope of the review. We included 23 studies (Table I), which met the inclusion criteria for the review.

The papers were categorized by their main focus as described by the study authors. The focus related to either the main outcome measures or the type of service provided that were: service types; new adolescent clinic services, outreach to existing services or outcome measures; services focusing on advanced provision of emergency contraception, services focusing on condom provision and advice, services focusing on general contraceptive provision and advice and services focusing on repeat pregnancy prevention. The evidence comes mostly from the United States (18 of 23 papers). There were 10 random controlled trials (RCTs) (two of cluster design), two non-randomized controlled trials (nRCT), one controlled before and after study (CBA), seven retrospective cohort studies (RCS) and three interrupted time series studies (ITS). As would be expected, those studies that employed an RCT design scored best for quality, with eight scoring [++]. Studies that employed a CBA design and the nRCTs also scored well,

with the vast majority of ITS and RCS studies scoring [–].

Description of the interventions, including theoretical basis, study settings, timeframe and content were poor overall. Where a description of the study setting was given, interventions were most often located in family planning clinics (four studies), and teenage/youth clinics (two studies). In addition, we identified one study conducted in each of the following settings: case management office, community health clinic, hospital-based clinic, genito-urinary medicine (GUM) clinic, university health centre (Table I).

Descriptions of study populations (Table I) were not always comprehensive, and many did not describe socio-economic status (SES). However, Orr *et al.* [7] stated that their population were from SES Group 4 (lower socio-economic status), and Jemott *et al.* [8] stated that their population was from low-income families. A further two studies [9, 10] stated that the majority of their population were in receipt of ‘medi-assist’ indicating their low SES. Several studies were conducted within locations where the majority of adolescents were from a particular population subgroup such as African American [9, 11, 12], Black [13, 14], Hispanic [15, 16], or a combination of these [8, 10, 14, 17, 18]; also including Latino.

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 were obtained using self-reported measures. Pregnancy rates were generally taken from local data, although some were self-reported.

Most authors did not clearly state who delivered the intervention. Six authors (Gillam *et al.* [12], Kissinger *et al.* [19], Reed *et al.* [20], Ullman and Lanthrop [21], Thompson and Smith [22], Adams *et al.* [23]) reported interventions delivered by nurses or nursing assistants. Other authors did not give any information on intervention delivery, or gave unclear descriptions such as ‘clinical outreach worker’ [24], specialist health personnel [25], peer providers [16] or trained facilitators who were community members [8].

Table I. Evidence table of included studies

References, year	Study design	Location (country)	Population (sex, age, ethnicity, SES)	Comparator	Sample size	Objectives/ outcome measures	Intervention details	Duration and length of follow up	Methods and analysis	Main findings	Grade
New adolescent clinics											
Hughes <i>et al.</i> [26], 1995	ITS	United States	<i>N</i> = 1961 in analysis (two waves) Black/White only in analysis Age: 14–18 years	Rest of city	12 clinics	Pregnancy Knowledge and use of services Attitudes towards contraception	Increased family planning budget compared with areas without RESPECT clinics. (nine clinics increased or began services for teenagers, three new clinics in communities with no previous services.) Evaluation of a new teenage clinic	30 months	Interviews (Wave 1 baseline, Wave 2 at 30 months)	No improvements	+
Wilson <i>et al.</i> [25], 1994	Retrospective Cohort	UK	1402 females Age: 12–19 years		New clinic	Conception rates Reasons for attending clinic Clinical care provided Number and timing of repeat visits		3 years	Clinical records	No reduction in teenage conception rates. 20- to 44-year-old conception rate rose by 0.7/1000 with a significant trend ($P=0.001$) Teenage conception rate by 19/1000 ($P<0.005$). Teenage conceptions increased more than would have been expected from the overall trend.	–
Outreach to existing services											
Baraitser <i>et al.</i> [24], 2002	ITS	UK	Age: <25 years. <i>N</i> = 2978	None	One clinic	Number of new users Number of young people citing clinic as their source of information.	Mainstream service (open to clients of all ages) with extended hours and no appointments; plus outreach programme for people aged <25 years includes development of close links between clinic and local schools, youth services, social services and voluntary sector.	6 months before and 18 months after new service.	Questionnaire	The number of new users aged <16 years increased by 12-fold in the first 18 months (from 280 6 months before, to 959, 18 months after implementation). The number of young people citing a school sex education class as their source of information about the clinic increased >5-fold.	–

(continued)

Table 1. Continued

References, year	Study design	Location (country)	Population (sex, age, ethnicity, SES)	Comparator	Sample size	Objectives/ outcome measures	Intervention details	Duration and length of follow up	Methods and analysis	Main findings	Grade
Brindis <i>et al.</i> [16], 2005	Non-random CT	United States	Adolescents 1424 females 41% Hispanic 53% aged 15–17 years 45% aged 18–20 years 166 males 37% Hispanic 50% aged 15–17 years 47% aged 18–20 years	One group, clinic services only	Five community health clinics	Effectiveness of peer provider model Frequency of contraception/condom use, use at last intercourse	Four groups, retrospectively assigned from case notes: Group 1, clinic services only Group 2, clinic plus outreach Group 3, clinic plus phone FU Group 4, clinic plus outreach and phone FU (full model); Groups 3 and 4, females only	3 years (quarterly follow-ups)	Multivariate analysis	Females Clients exposed to multiple components were no more likely than clinic-only clients to always use birth control, have used an effective method at last intercourse, always use condoms, or have tested positive for an STI. Compared with clinic-only, clinic-telephone clients were more likely to report consistent birth control [OR 1.7, 95% CI (1.33–2.08)] and less likely to report pregnancy [0.2, 95% CI (0.01–0.66)] Males Clinic-outreach less likely than clinic-only to report that they always used birth control or condoms (OR 0.8, $P < 0.01$ for both) 52% of women entering the programme were using condoms in 2000 compared with 31% at the earlier evaluation. Almost 6.4 million woman-months of contraception were provided through family PACT in 2002; as a result, an estimated 205 000 pregnancies, leading to 79 000 abortions and 94 000 births (including 21 400 births to adolescents) were averted.	+
Greene <i>et al.</i> [27], 2006	Retrospective	United States	$N = 202\,289$	Before outreach	Clinics throughout California	Claims data on contraceptives dispensed were used to estimate the number of pregnancies, and thus the number of pregnancies averted	Normal service plus outreach and recruitment programmes to improve access to family planning services for hard to reach populations (e.g. adolescents, men and residents of underserved counties).	About 5 years—unclear.	Medical records data.		+

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Table 1. Continued

References, year	Study design	Location (country)	Population (sex, age, ethnicity, SES)	Comparator	Sample size	Objectives/outcome measures	Intervention details	Duration and length of follow up	Methods and analysis	Main findings	Grade
Kissinger <i>et al.</i> [19], 1997	Retrospective cohort	United States	American adolescent women $N = 737$ Mean age, 16 years 23% attended orientation session	Did not attend orientation session.	Two initiatives	Initiation of family planning services Continuation of service (attendance at annual visit)	Two initiatives: 1 hour orientation session and 3-month booster visits conducted in adult-specific clinics for improving initiation and continuation of family planning services	1 year	Multiple logistic regression	Attendance at the orientation session (intervention) was associated with initiation of services (29% versus 9% non-initiated), after adjusting (age, school enrollment), those attending the orientation session were 14.3 times more likely to initiate services (Relative Risk (RR) 14.3, 95% CI 5.73–35.82) Attendance at 3-month booster visit and choosing a contraceptive require medical follow-up were associated with attendance at annual visit [3.4 (95% CI 2.1–5.52), $P < 0.01$] and 4.3 [(2.22–8.18), $P < 0.01$] times as likely as those who did not attend annual FU).	–
Reed <i>et al.</i> [20], 1999	Retrospective cohort	UK	Young people aged <20 years	Rest of area	Family planning clinic	Use of family planning services Teenage pregnancy rates	Reconfiguration of services, retraining multidisciplinary staff, development of clinic guidelines and protocols, outreach activities, reducing wastage, income generation	5 years	Routine data	For those who attended orientation, attendance at booster session was associated with return for 1 year FU, RR 2.4, (95% CI 1.03–5.61, $P < 0.05$). Number of attendees at family planning clinics (young people aged <20 years) increased by 71% (from 840 to 1433), those aged <16 years increased by 183% (from 66 to 188). Teenage pregnancy rates continued to be low.	–

(continued)

Table 1. Continued

References, year	Study design	Location (country)	Population (sex, age, ethnicity, SES)	Comparator	Sample size	Objectives/ outcome measures	Intervention details	Duration of follow up and analysis	Main findings	Grade
Interventions to provide advanced supply of emergency contraception										
Belzer <i>et al.</i> [15], 2005	RCT	United States	160 adolescent mothers, aged 13–20 years (mean 17.2) 82% Hispanic N = 82 intervention Advanced supply of EC (AEC) group	N = 78 control One case management office Controls more sexually active at baseline (P = 0.05), more likely to use condoms (P = 0.035)	Requesting EC at a youth clinic.	Emergency Contraception (EC) use Sexual activity Unprotected intercourse Contraception use	Emergency contraception (one course) provided to intervention group. Information and handouts on contraception provided to all, as well as information on how to use and access EC.	Base line plus Baseline 6 and 12 months follow-up N = 77 at 12 months	At 12-month follow-up: AEC group more likely than controls to: have unprotected sex in last 6 months (P = 0.02) use EC (P < 0.01) No differences in sexual activity levels, type of contraceptive used, pregnancy rate	+
Ekstrand <i>et al.</i> [28], 2008	RCT	Sweden	N = 420 girls aged 15–19 years; mean age 17 (±1.3) 92% Nordic Intervention n = 214	N = 206 0.035)	Requesting EC at a youth clinic.	EC use, time span between unprotected sex and EC, EC intake, contraceptive use, sexual risk taking	Both groups received EC on request, intervention group received one extra dose of EC, condoms and an information leaflet regarding EC and condom use.	Baseline ques- tionnaire, t-test, Chi-squared, FU 3–6 months (telephone)	At 6 months ECP use higher intervention (31%) than control (19%) P = 0.01 Mean time to use EC, 15.59 intervention versus 26.38 control P = 0.006 No differences in use of contraception or condoms.	++
Gold <i>et al.</i> [9], 2004	RCT	United States	301 minority, low-income women Age group of 15–20 years (mean 17.1 ± 1.7) 57% African American, 305 Caucasian, 13% others 46% Medical assistance	Advice only	One hospital-based clinic	Self-reported Unprotected sex Use of EC, HC, condoms Time of EC after unprotected sex	AEC provided versus advice only (written and verbal communication) Stratified as early (15–16 years), mid (17–18 years) and late (19–20 years) age groups	6 months post-enrolment 63% at 6-month FU 10-min telephone interviews Multiple logistic regression	At 6 months AEC group reported: more condom use (72% versus 62%) P = 0.02 but not significant at last intercourse (83% versus 78%) P = 0.19) More EC use n/s (8% versus 6% P = 0.54) but also used sooner (11h versus 22 hours P = 0.0005) No effect on unprotected sex, hormonal contraception use or condom use over all.	++

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Table I. Continued

References, year	Study design	Location (country)	Population (sex, age, ethnicity, SES)	Comparator	Sample size	Objectives/ outcome measures	Intervention details	Duration and length of follow up	Methods and analysis	Main findings	Grade
Harper <i>et al.</i> [17], 2005	RCT	United States	$N=2117$ (964 adolescents, 90 aged <16 years), African American 35.6%, Latina 26.7% aged <16 years, other groups similar).	Three groups—differing access.	Four clinics	Contraceptive and sexual risk behaviours Pregnancy and STI rates	Pharmacy group—given details of how to obtain EC from pharmacy with prescription (including pharmacy addresses) Advanced provision group—three courses of EC Clinic access group—card telling them to return to the clinic if they needed EC	Baseline and 6 months visits.	Logistic regression Young (<16 years) middle (16–17 years) and older (18–19 years) adolescents and adults (20–24 years)	Adolescents aged <16 years behaved no differently. In all groups, EC use was greater in advanced provision than in clinic access (44% versus 29% $P<0.001$) and other behaviours were unchanged by study arm. Additionally, improved access to EC did not become vulnerable to unwanted sexual activity.	++
Interventions to promote condom provision and advice											
Jemont <i>et al.</i> [8], 2005	RCT	United States	682 adolescent girls 463 African American 210 Latino Age group of 12–19 years (mean 15.3) Low-income	Normal health promotion	Adolescent medicine clinic (children's hospital)	Frequency of unplanned sex in last 3 months. Sexual intercourse while intoxicated, number of sexual partners, STDs, theoretical mediators including intention to use condoms and condom use knowledge.	CBT Skills-based Information-based About 250 min group discussion, videotapes, games and exercises. One session with 2–10 participants. Health promotion control	12 months (3, 6 and 12 months)	Questionnaires Poisson regression Facilitators = 14 African American women, mean 38.2 years, 8-hour training.	No difference between information-based CBT and health promotion control. Skills-based CBT, less likely to have unprotected sex at 12 months than information-based CBT mean (SE): 4.04 (0.8) $P=0.03$ or control mean (SE): 5.05 (0.8) $P=0.002$	++
Orr <i>et al.</i> [7], 1996	RCT (cluster)	United States	295 female adolescents aged 15–19 years (mean 17.9, SD 1.7) (112 at FU) 55% Black Median SES Group 4 (lower class)	One clinic served as the control site	Two family planning clinics	Sexual behaviour, condom practices, attitudes and beliefs, cognitive complexity and motivation. <i>Chlamydia trachomatis</i> infection Aimed to increase adolescent perception of vulnerability to and seriousness of STDs and to decrease barriers to condom use.	Control consisted of individual discussion with the clinic nurse about STDs. Intervention: research assistant briefly discussed <i>C. trachomatis</i> infection with young women, then shown how to use condom correctly. Finally participated in brief, structured rehearsal scenario (young woman trying to get her partner to use a condom).	6 months (5–7 months)	Multi-instrument questionnaire Examination.	Intervention subjects reported increased use of condoms by their sexual partners for protection against STDs (OR 2.4, $P=0.02$) and for vaginal intercourse (OR 3.1, $P=0.005$) at 6-month FU. Controlling for condom use at enrolment demonstrated that the experimental intervention (OR 2.8, $P=0.03$) and higher cognitive complexity (OR 4.6 $P=0.02$) independently contributed to increased condom use at FU	++

(continued)

Table 1. Continued

References, year	Study design	Location (country)	Population (sex, age, ethnicity, SES)	Comparator	Sample size	Objectives/ outcome measures	Intervention details	Duration of follow up	Methods and analysis	Main findings	Grade
Smith <i>et al.</i> [13], 1997	CBA	United States	205 female adolescents aged 13–20 years (mean 17.3 ± 1.55) with a current STD. 72.7% Black, 9.7% white, 17.6% Hispanic (86 intervention group)	N = 119 Comparable age and ethnicity, received STD treatment but not motivation	Two sites of a teenage health clinic	rates of STDs	Condom motivation class given by a clinic STD educator in small groups of four or more adolescents.	6 months	Specimen analysis, clinic attendance	No significant differences on return rates, new and re-infection rates or any socio-demographic variables But 70% overall (73% of study group and 67% of comparators) returned for their scheduled clinic re-visit	++
Thompson and Smith [22], 2001	Retrospective cohort	Scotland	286 males, 327 females	Normal GUM clinic services	One Nurse-lead condom club at GUM clinic	Number of visits Services accessed Age	Each person attending for condoms is seen individually by a trained member of staff who discusses issues related to sexual activity (STI/HIV access for EC, under-age sex). Condom demonstration. Condoms given out.	N/a	N/s	Proportion of new patients attending GUM clinic much higher than in the rest of the country. Mostly at site offering daily access and geographically close to school (approximately poor data)	-
Ullman and Lanthrop [21], 1996	Cluster RCT	Canada	N = 100 85% aged ≤24 years	Age matched contraceptive pill using sample from second clinic	Family planning clinics	Use of dual methods of contraception	In addition to usual advice/teaching, nurse counsellors were asked to offer all clients at their first visit, a pack containing six condoms and an information card about dual contraception methods. Each client received additional condoms at each birth control supply visit.	1 year	Brief anonymous self-administered questionnaire	Intervention clients were twice as likely to report having received condoms from the clinic (89% versus 45%) and a high percentage (~72%) had used them or given them to someone else. At last intercourse, 39% of intervention clients used dual protection compared with 29% of control clients Of them, 15% believed the programme helped them to initiate condom use, 51% believed they were helped to continue use. But differences in condom use not significant (data not presented).	++

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Table 1. Continued

References, year	Study design	Location (country)	Population (sex, age, ethnicity, SES)	Comparator	Sample size	Objectives/ outcome measures	Intervention details	Duration and length of follow up	Methods and analysis	Main findings	Grade
Interventions to promote hormonal contraceptive service use and advice											
Hanna [29], 1993	RCT	United States	51 adolescent females Age group of 16-18 years (mean 17) 50 Caucasian 1 Black Control = 25 Intervention = 26	Clinic's contraceptive teaching	Clinic	Oral contraceptive adherence (self-reported) Contraceptive perceptions	Transactional intervention: facilitate the adolescents consideration of perceived oral contraceptive benefits and barriers and means for reducing barriers. Confirming goal of avoiding pregnancy and developing an adherence regimen to manage perceived oral contraception barriers.	3 months	Contraceptive health belief scale Sample size calculation given.	Those who experienced the transactional intervention had greater levels of oral contraceptive adherence than those who had not $F = 4.15$, $P < 0.05$	++
Chewning <i>et al.</i> [11], 1999	Non-random CT	United States	$N = 949$ Chicago sample 96% African American Madison sample 94% white	$N = 493$ controls (456 expert-mental) Control = standard patient education package	Family planning clinics in Chicago and Madison, United States	Pregnancies Improved short term knowledge of oral contraceptives and confidence.	Contraceptives used, graphs of effectiveness, personal suitability discussed, benefits and costs discussed, feedback and advice given, print-out generated	1 year	Contraception barriers, Demonstrations of how	After 1 year Intervention group had higher OC knowledge and trend for fewer pregnancies (8.6% versus 3.6%, $P < 0.074$) in the Madison sample only	+
Edwards <i>et al.</i> [18], 2008	RCT	United States	539 adolescents aged 12-17 years (mean 15.9 + 1) African American 58%, Latina 34% and others 8%	Normal provision	Urban clinics	Continuation rates Pregnancies	Randomized to conventional initiation of the OC pill (conventional start CS) versus immediate, directly observed OC injection in the clinic (quick start: QS).	3 and 6 months Interviews (telephone) 86 and 77% at two follow-ups.	No difference in OC continuation rates at 3 or 6 months [OR 1.0, 95% CI (0.7-1.1) and OR 1.1, 95% CI (0.7-1.8)]. Only 26% of adolescents continued OC at 6 months 45 pregnancies occurred during FU (8.3%), all among subjects who discontinued OC for at least 7 days. About 17 pregnancies were in the QS group and 28 in the CS group (6.5% versus 10.5% $P = 0.08$).	++	

(continued)

Table 1. Continued

References, year	Study design	Location (country)	Population (sex, age, ethnicity, SES)	Comparator	Sample size	Objectives/ outcome measures	Intervention details	Duration of follow up	Methods and analysis	Main findings	Grade
Interventions to prevent repeat adolescent pregnancy											
Adams <i>et al.</i> [23], 1990	Retrospective cohort	United States	43 adolescent mothers Age group of 12–19 years	None	Rochester Adolescent Maternity project	Repeat pregnancy Programme adherence Knowledge of contraception Locus of control	Specialized programme of prenatal care, including attendance at prenatal groups and nurse/ social worker visits.	2 years	Questionnaires	20 (47%) were non-repeaters, including 16 with no subsequent pregnancy, 3 with planned pregnancy and 1 IUD device failure, which resulted in pregnancy. No relationship found between locus of control score and unplanned repeat pregnancy. No relationship found between attendance at the RAMP programme and repeat unplanned pregnancy. No decrease in repeat pregnancies (intervention versus control) at 12 months. Increased knowledge in OCs throughout the study period. Poor data.	–
Gilliam <i>et al.</i> [12], 2004	RCT	United States	43 young pregnant African American Women. Age group of 15–25 years (mean 19)	Resident physician counselling (normal) plus three pill packs.		Repeat pregnancy Knowledge of OC	Antipartum, multipoint intervention consisting of counselling, videotape, about OC, written material.	6 weeks, 6 months and 12 months (<i>n</i> = 25 intervention at 12 months) Only 6 control and 8 intervention with data at all time points.	2-tailed <i>t</i> -test	No decrease in repeat pregnancies (intervention versus control) at 12 months. Increased knowledge in OCs throughout the study period. Poor data.	+
Omar <i>et al.</i> [14], 2008	Retrospective cohort	United States	1386 teen mothers aged 11–19 years 50.4% black, 48.9% white, 6% Hispanic	None—state data used as comparator	University health centre young parent programme	Repeat teenage pregnancy Contraceptive choice	Comprehensive care for mother and baby pre/postnatal. Preventative care, reproductive services, mental health, acute care. Family counselling also provided to siblings	3 years	Descriptive statistics	11.87% repeat pregnancy compared with state rate of 18.7% Pregnancy rate related to contraceptive choice. Pregnancies occurred with condoms (7). Hormonal Contraception (HC) (2), no contraception (2), but not with DMPA.	–

(continued)

Table 1. Continued

References, year	Study design	Location (country)	Population (sex, age, ethnicity, SES)	Comparator	Sample size	Objectives/ outcome measures	Intervention details	Duration of length of follow up	Methods and analysis	Main findings	Grade
Stevens-Simon <i>et al.</i> [10], 2001	ITS	United States	<i>N</i> = 373 41% white, 33% black, 24% Hispanic, 2% others 93% medic-aid Age group of 13–19 years (mean 17.4 + 1.4)	None	Maternity programme—one clinic Recruited at delivery	Repeat adolescent pregnancy	Pregnancy prevention by simplifying access to contraception, discouraging school drop-out, encouraging career development. Professional services integrated together, emphasis on healthy habits, school, future oriented career planning, 3-weekly visits in pregnancy, nine visits in first year after, four visits in second year.	2 years	Questionnaires Logistic regression	Strongest predictor of repeat pregnancy during first 2 years was failure to use Norplant [RR 8.89, 95% CI (2.8–28.5)] Also, exhibiting more than nine pregnancy-related factors [RR 2.37 (95% CI 1.38–4.06)] and not using Depo-Provera post-pregnancy [RR 2.3 (95% CI 1.6–3.3)] Not significant: frequency of clinic visits, contact with health care, return to school.	–

EC: advanced provision of emergency contraception, New: new adolescent clinics, Outreach: outreach to generic services, Condoms: condom provision and advice, Contra: general contraceptive provision and advice, Repeat: repeat pregnancy prevention, NS: insufficient data.

The heterogeneity of the intervention aims, 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. A summary of each paper is presented in Table I. Statistical data is presented in the narrative where it was reported by the authors.

Interventions to provide new adolescent services and to encourage access to existing services

New adolescent clinics

Weak evidence from two studies suggests that new adolescent clinics may not be effective in reducing teenage pregnancy rates. In the first study by Wilson *et al.* [25] [RCS (–)], the local rate of conception rose slightly by 0.7/1000 compared with the regional teenage pregnancy rate, which rose significantly by 1.0/1000 ($P < 0.005$). In the second study by Hughes *et al.* [26], no overall improvements were seen in pregnancy rates, knowledge and use of services, or attitudes towards contraception [ITS (+)]. As these interventions had little or no effect on the rate of teenage pregnancy or attendance rates, they may not be reaching those young people with the most need (i.e. the ones most likely to become pregnant). However, it is difficult to attribute any change in outcome to one particular service and young people may use clinics outside of their local vicinity that cannot be accounted for here.

Outreach to existing services

Moderate evidence from five studies suggests that outreach programmes to encourage young people to attend sexual health services may be effective in increasing service use, but the effect on reducing teenage pregnancy rates is unclear. In the nRCT study by Brindis *et al.* [16], compared with control, the outreach group were significantly more likely to consistent birth control use [Odds ratio (OR) 1.7, 95% confidence interval (CI) 1.33–2.08], and females were also less likely to report pregnancy (OR 0.2, 95% CI 0.01–0.66) [nRCT (+)]. In the first cohort study, Greene *et al.* [27] reported that

condom use increased and pregnancy decreased but the impact of the intervention is unclear due to poor reporting [RCS (+)]. In the second cohort study by Reed *et al.* [20], during the 5 years of the intervention, the number of attendees at family planning clinics significantly increased; for people aged <20 years by 71% (from 840 to 1433) and for those aged <16 years by 183% (from 66 to 188). Pregnancy is reported to have ‘remained low’ but no data is given [RCS (–)] [20]. In the third cohort study, Kissinger *et al.* [19] found that, those who attended an orientation session were significantly more likely to initiate services (RR 14.3, 95% CI 5.73–35.82, $P < 0.01$), and attendance at the 3-month booster session was associated with significantly higher continued clinic contact at 1 year (RR 2.4, 95% CI 1.03–5.61, $P < 0.05$) [RCS (–)]. In the ITS study, Baraitser *et al.* [24], the number of new users of family planning services aged <26 years increased significantly (from 280, 6 months before, to 959; no further data) in the first 18 months of the outreach programme [ITS (–)].

These programmes are therefore effective in terms of service initiation and continued attendance, and some were effective in terms of pregnancy and contraceptive use where that was measured (but this outcome is poorly reported in most cases). These results suggest that outreach is effective in getting young people to attend services aimed at the general population and show some success in terms of pregnancy-related outcomes. However, there is little evidence as to whether bespoke services for young people are the best solution in health care settings.

Interventions to provide advanced supply of emergency contraception

There is strong evidence from the four RCT studies to support the advanced provision of emergency hormonal contraception (EHC) to adolescents to increase EHC use. In most cases, increased use was not at the expense of other contraceptive use, and did not promote risky sexual behaviour (such as number of sexual partners, or condom non-use); the exception was one study with adolescent mothers [RCT (+)] [15]. In the first study, Ekstrand *et al.* [28], at

6-month follow-up, found that emergency contraception use was higher in the intervention group (31%) than the control (19%) $P=0.01$, and the mean time to use emergency contraception was shorter in the intervention (15.6 hours) compared with the control (26.4 hours) $P=0.006$; there were no differences in hormonal contraception or condom use between the groups [RCT (++)]. In the second study, Harper *et al.* [17] (with random allocation to receive EHC via pharmacy, clinical access or advanced provision) noted that EHC use at 6-month follow-up was greater in the advanced provision (44%) than the clinical access (29%) group, $P<0.001$. Pharmacy access did not affect emergency contraception use when compared with clinic access (30% versus 29%) $P=0.83$. Other behaviours were unchanged by study arm including unprotected sex, condom use and pregnancy [RCT (++)] [17]. In the third study by Gold *et al.* [9], the advanced EHC group reported (non-significantly) higher emergency contraception use (8% versus 6%, $P=0.54$) and significantly sooner use (11 hours after sexual intercourse versus 22 hours, $P<0.001$) [RCT (++)][9]. There were no significant differences in unprotected sex, hormonal contraception use or condom use overall (63% of the sample available at 6-month follow-up). In the fourth study, Belzer *et al.* [15] noted that at 12-month follow-up, those in the advanced provision group were more likely than the controls to have used EHC (64% versus 17%, $P<0.01$) but also more likely to have had unprotected sex in the last 6 months (69% versus 45%, $P=0.02$) [RCT (+)]. There was some loss to follow-up in these studies.

Advanced provision of EHC to adolescents is shown to be effective in promoting its use, and speed of use in several adolescent populations (when compared with advice only, or alternative methods of provision). In most cases the increased use has not been at the expense of other contraceptive use, nor has it promoted risky sexual behaviour. The exception to this was the study by Belzer *et al.* [15] of adolescent mothers, so particular consideration is required with this group [RCT (+)]. However, the only study to compare pregnancy rates (which looked at advanced provision and

other methods of EHC access) did not show a difference in pregnancy rates [17].

Interventions to promote condom provision and advice

There is moderate evidence from five studies to support interventions that combine discussion and demonstration of condom use to encourage adolescent condom use and engagement with clinical services. In the first study by Orr *et al.* [7], at 6-month follow-up intervention subjects reported significant increased condom use by their sexual partner for protection against sexually transmitted infections (STIs) (OR 2.4, $P=0.02$) [cRCT (++)]. Controlling for condom use at enrolment demonstrated that involvement in the intervention (OR 2.8, $P=0.03$), and higher cognitive complexity (a measure of intellect) (OR 4.6, $P=0.02$), independently contributed to increased condom usage at 6 months [7]. In the second study by Ullman and Lanthrop [21], at 1 year, clients were twice as likely to report having received condoms from the clinic (89% versus 45% of the control) [RCT (++)]. In the third study by Jemott *et al.* [8], of the two methods of CBT to reduce unprotected sex (without a condom), those in the skills-based CBT group were less likely to have unprotected sex at 12 months than the information-based CBT group ($P=0.03$) or control ($P=0.002$) (percentages not given) [RCT (++)]. In the fourth study by Smith *et al.* [13], more of the intervention group (73%) than the comparators (67%) returned for their scheduled clinic revisits (significance not clear) [CBA (++)]. In the fifth study by Thompson and Smith [22], it is suggested that, compared with the rest of the country, attendance at the GUM clinic by young people is much higher, particularly at sites offering daily access and located geographically close to a school (no statistical data are given to validate this) [RCS (-)].

Each of these five studies demonstrated increased condom usage but also high levels of continued engagement with the clinics. Although the studies were mostly well designed, details of the data

analysis were not always given. Outcomes related to pregnancy rate were not considered.

Interventions to promote hormonal contraceptive service use and advice

Evidence from three studies suggests that interventions aimed to improve adolescent contraceptive use by additional service provision may be effective, but this depends upon the intervention. In the first study by Hanna [29], a nurse-led intervention, the intervention group reported significantly greater oral contraception adherence than the controls ($F = 4.15$, $P < 0.05$) [RCT (+)]. In the second study by Chewning *et al.*, a computer-based contraception decision aid intervention, at 1 year follow-up, the first intervention sample had significantly higher contraception knowledge $P = 0.03$ (no percentages given) and (non-significantly) fewer pregnancies (8.6% control versus 3.6% intervention) $P = 0.07$. This finding was not replicated in a second population who attended a different clinic, although the authors do not discuss the possible reasons for this [nRCT (+)] [11]. In the third study by Edwards *et al.* [18], of an intervention to administer 'quick start' of contraception (immediately administered contraceptive injection), at 6-month follow-up, there were no differences in continuation rates [OR 1.1, 95% CI (0.7–1.8)] and no difference in pregnancy rate (6.5% versus 10.5%, $P = 0.08$) between the groups [RCT (+)].

These three studies employed very different interventions in an attempt to improve adolescent use of hormonal contraception. It is possible that a computer-based contraception decision aid or a nurse-led intervention can have positive effects on engaging young people in services and improving contraceptive adherence in specific populations, but more data is needed.

Interventions to prevent repeat adolescent pregnancy

Evidence from four studies is inconclusive as to the benefit of multi-component programmes to prevent repeat pregnancy in adolescents. Weak evidence from two studies may support these programmes.

In the first study by Omar *et al.* [14], at 3-year follow-up, the repeat pregnancy rate for those completing the programme was lower than the state rate. The intervention effect is not clear, as the lack of repeat pregnancies may be attributable to the use of long acting reversible contraception (LARC) [RCS (–)]. In the second study by Stevens-Simon *et al.* [10], the strongest predictor of repeat pregnancy in the first 2 years was failure to use LARC [RR 2.30, 95% CI (1.60–3.29)] [ITS (–)].

A further two studies did not support comprehensive, multi-component programmes. In the first study by Gilliam *et al.* [12], no decrease in repeat pregnancy was seen at 12 months [RCT (+)]. In the second study by Adams *et al.* [23], no significant association could be found with attendance at the programme and repeat unplanned pregnancy [RCS (–)]. A further study by Belzer *et al.* [15] looking at advanced provision of emergency contraception (discussed above) was also conducted in a population of young mothers.

These programmes struggled to demonstrate any programme effect on repeat pregnancy rates. However, data from two studies suggests that choosing LARC after adolescent pregnancy may be more effective in preventing repeat pregnancy than any aspects of a multi-component programme itself.

Discussion

Summary of evidence

We included 23 studies (Table I) that met the inclusion criteria for the review. The papers focused on: new adolescent services, outreach to existing services, advanced provision of emergency contraception, condom provision and advice, general contraceptive provision and advice and repeat pregnancy prevention. The evidence comes mostly from the United States (18 of 23 papers), which may have implications for its applicability elsewhere.

Socio-economic status

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 who are most at risk from adolescent pregnancy. The effectiveness of contraceptive service interventions with differing ethnicity is also difficult to quantify since most of the papers, although describing the ethnic mix in their population, did not report their results with a breakdown for different ethnic groups. The exception to this is one study [11] conducted in two populations (one majority White and affluent, one majority Black and deprived) and reported positive results for the White population only. 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, our review on the views of young people (and others) is better placed to address these questions [30].

Methodology limitations

Finding an effective methodology with which to evaluate these complex interventions is challenging. In particular, reliance on self-reported outcomes relating to sexual behaviour that have significant issues with regard to their validity (especially in relation to young people) is problematic. However, self-reported measures are often the best available measure due to the lack of other appropriate, validated measures. Some studies did not measure pregnancy rate due to the restrictions of small study numbers and short timescales. A lack of process evaluations or measurement of 'intervention fidelity' (did they actually deliver what they were supposed to?) along with limited follow-up in many cases makes it difficult to recommend specific intervention types or components.

We developed this review within a tight timescale due to the requirements of our funders who have a role in informing policy development. This limited timescale meant we were unable to consider grey literature sources or to make contact with authors to obtain unpublished material. Although it is clear that these methodologies may have resulted in the

identification of further studies, a large number of additional studies would need to have been identified to reliably answer some of the questions raised by the evidence we found, or to alter our conclusions significantly.

Recommendations

The data presented here are unclear as to the role of targeted clinics for young people (i.e. the ones most likely to become pregnant). In contrast, teenage-focused outreach programmes to whole population services were effective in terms of service initiation and continued attendance but also in terms of pregnancy and contraceptive use (where that was measured). These results suggest the need for more evidence to determine whether bespoke services for young people are the best solution in health care settings. However, this may only be relevant for interventions delivered in health care setting, as new clinics for young people based in alternative settings (e.g. schools) have been shown to be effective [5]. More research is needed to confirm this, with a focus on key outcome measures such as pregnancy.

Studies with the primary aim of preventing (unplanned) repeat adolescent pregnancy showed little effect on repeat pregnancy rates. However, data from two studies suggests that choosing LARC after adolescent pregnancy may be more effective than any of the programmes in preventing repeat pregnancy. Therefore, interventions encouraging the use of LARC in this population should be considered.

The data presented here suggests that advanced provision of emergency contraception to adolescents is effective in promoting its use, and speed of use; this was not at the expense of other contraceptive use, nor did it promote risky sexual behaviour in most cases. However, the only study to compare pregnancy rates did not show a difference so again, further data on this key outcome measure is needed.

Interventions that combined discussion and demonstration of condom use showed increased condom usage but also high levels of continued engagement

with the clinics. However, the data were not always well analysed and reported, which may have issues for result reliability, and therefore recommendations. In addition, further data around interventions to improve adolescent contraception use overall are needed as the promotion of condoms may have the potential to have a negative effect on pregnancy rates in young people if not used with a more reliable method of contraception.

Conclusions

The literature in general is not well developed in terms of good quality effectiveness studies. Much of the literature we excluded consisted of process evaluation reports with no data on effectiveness of the intervention, particularly key outcome measures such as pregnancy. There is also a lack of studies measuring the key outcomes of pregnancy rate and long term contraceptive use, with many studies considering self-reported measures and clinic attendance in the shorter term.

The literature has a substantial bias towards interventions conducted in the United States and the number of studies conducted in populations with high numbers of African Americans (and other ethnic groups not frequently represented outside the United States) will have further implications for applicability elsewhere. Teenage pregnancy rates in the United States are particularly high among minority populations, especially African American and Hispanics [31] and this is reflected in the high number of studies conducted in these populations. In addition, differences in terms of health care culture, policy and context may be much more varied between countries and therefore caution is required when applying this evidence elsewhere.

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Conflict of interest statement

None declared.

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