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Original Study

Systematic Review and Narrative Synthesis of the Effectiveness of Contraceptive Service Interventions for Young People, Delivered in Educational Settings

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Abstract. *Study Objective:* This review was undertaken to determine the effectiveness of contraception service interventions for young people that were delivered in educational settings.

Design: We conducted a systematic review and narrative synthesis.

Setting: Interventions were included where they were delivered in educational institutions, including schools, colleges, and pupil referral units.

Participants: Young people aged 19 and under. Studies of wider age groups were included if the majority of participants were aged under 19 years.

Interventions: We included interventions which consisted of contraceptive service provision, and also interventions to encourage young people to use existing contraceptive services.

Main Outcome Measures: The main outcome measures used in the studies were: rate of teenage pregnancy, rate of contraceptive use, and sexual behavior. Many outcome measures were self reported.

Results: Twenty-nine papers were included which reported on interventions to prevent adolescent pregnancy (and repeat pregnancy), school-based health centers, contraceptive use in college students, and multicomponent interventions. Intensive case management intervention conducted by a culturally matched school-based social worker (along with other components including peer education) were shown to be effective in preventing repeat adolescent pregnancy, at least for the duration of the intervention. Also, school-based health centers appear to be most effective when contraception provision is made available on site.

Conclusions: The evidence from these papers is limited, in terms of both quality and quantity, along with consistency of findings, but some recommendations in relation to effective interventions can be made.

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Introduction

Teenage pregnancy and birth rates in the United States continue to present substantial problems for society, placing significant pressures on local authority social care, housing and education services. Teenage pregnancy rates in the U.S. remain one of the highest in the world despite a substantial decline of over 17% since the 1990s; around 60% of adolescent mothers live in poverty at the time of their child's birth.[1] This mirrors the rate of teenage pregnancy in England and Wales, which remains the highest in Western Europe despite the decline in rates of both under 18 and under 16 conceptions over the last 20 years, and teenage pregnancy is most prevalent in areas of social and material deprivation.[2]

Access to contraceptive services is most problematic for people in disadvantaged communities, and adolescents are among those least likely to have access to health care and have one of the lowest rates of primary care use of any age group.[3] 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 behavioral problems, maltreatment or harm, and illness, accidents, and injury.[4]

There is a lack of strong evaluations of teenage pregnancy prevention programs overall, but some evidence exists which suggests that certain interventions, which provide services available to all in a school-based setting, can have an effect on primary

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outcome measures such as sexual behavior and pregnancy.[5] Here we conduct a systematic review and narrative synthesis of literature which focuses specifically on interventions to provide contraception services for young people (or information to encourage young people to use established services), which were delivered in educational settings.

Methods

A full systematic search of key health and medical databases was undertaken. 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), English language, and limited to humans. No restrictions were placed in terms of study type or place of publication. Additional methods to identify evidence were undertaken as follows: searching the reference lists of included papers; searching the reference lists of relevant systematic reviews; cited reference searches on included articles, searches on two programs ''Baby Think It Over'' and ''Safer Choices.'' These additional searches were undertaken in Medline and Web of Science C.

Inclusion Criteria

This review focuses on interventions to provide contraceptive services (or to encourage young people to use contraceptive services) that are conducted on educational premises. This includes: schools, further education colleges, higher education, and pupil referral units. Interventions conducted in residential care settings have been excluded from this review.

All retrieved literature was screened at title and abstract level 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 in the conclusions. Elements relating to internal and external validity such as 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. See Table 1 for study quality ratings.

Results

We identified 29 studies which met the inclusion criteria, all conducted in the U.S. The papers focused on 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) (Table 1). We also included curriculum interventions with additional elements relevant to this review (4 studies). There were four random controlled trials (RCT), nineteen controlled before and after studies (CBA), and five interrupted time series (ITS). The evidence all comes from the U.S., which may have implications for its applicability elsewhere, as is discussed below.

The majority (26/29) of the included studies were conducted in state-run mainstream middle and high schools, with two conducted in colleges[7,8] and one in a university setting.[9] 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 participants were from a particular population subgroup such as African American,[10−12] Black,[13,14] Hispanic,[15] or a combination of these,[16−22] also including Latino.

The majority of outcomes related to pregnancy rates, sexual behavior, or use of contraceptives. For the latter two, the majority of data was obtained using self reported measures. Pregnancy rates were generally taken from local data, although some were self reported.

Most of the papers gave little attention to who was responsible for the program delivery, with the exception of a program delivered by culturally matched social workers.[10−12] Several other programs were defined as being multi-agency, and the remainder were delivered by social workers, nurses, counsellors, school health center personnel, sex educators, peer educators, or the researchers/project staff. A further two programs did not make it clear who delivered the program. Those which were in the ''curriculum plus'' category were delivered primarily by classroom teachers with additional support from outside agencies.

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. The extracted data is presented in Table 1.

Interventions to Prevent Adolescent Pregnancy

We identified seven papers with a primary focus on preventing first adolescent pregnancy. These papers

Table 1. Typology, Impact, Applicability and Quality Score of Included Papers

Study design (n)	Quality*	Paper (1st author, date)	Typology**	Population	Sample (n)	Duration (follow-up)	Intervention details
RCT (4)	++	Ingersoll 2005[9]	Pregnancy	18-24 year olds (mean 20) White 70%, African American 16%. 88% single	One university (228)	90 days (1 month)	BALANCE: Birth Control and Alcohol Awareness; Negotiating Choices Effectively. Single session of personal feedback and motivational interviewing counselling session. Delivered by counsellor
	++	Coyle 1999[22]	Multi	31% White, 27% Hispanic, 18% Asian/Pacific Islander, 17% African American. 48% Male	20 high schools (3869)	3 months (7 months)	Safer choices; a theory based multi-component, school based HIV, other STD and pregnancy prevention program. 5 components: school organization, staff development (and curriculum organization), peer resources and school environment, parent education, school community linkages.
	++	Kirby 2004[16]	Multi	9th grade students 52% male, 30% white, 18% Asian. 28% had initiated sex at baseline	20 high schools (3869)	3 months (7, 19 and 31 months).	Safer choices; a theory based multi-component, school based HIV, other STD, and pregnancy prevention program. 5 components: school organization, staff development (and curriculum organization), peer resources and school environment, parent education, school community linkages.
	++	Basen-Engquist 2001[36]	Multi	9-12th grade 53% Female African American 22%, Asian 14%, Hispanic 34%, White 26% Other 5%	20 high schools (N= unclear)	(19 and 31 months)	Schools randomly assigned to receive Safer Choices or a standard knowledge based HIV education program. 5 components: school organization, staff development (and curriculum organization), peer resources and school environment, parent education, school community linkages.
CBA (19)	+	Lieberman 2000[20]	Pregnancy	6/7/8th graders Mean age 12.9 (at pre-test). 66% Black/ Caribbean, 20% Latino. 66% Female,	1 high school (312)	2-4 months (1 year)	2-4 month abstinence based small group program 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).
	+	McBride 2000[28]	Pregnancy	Youth (4 projects) aged 9-13 (549 intervention) Teenagers (3 projects) aged 14-17 (371 intervention).	Several sites some community, but including 6 projects administered at middle and high schools. (1042, and 690)	1-2 years. (5-9 months)	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.
	+	Charyl 2001	Pregnancy	White, middle class. Mean age 16.2	3 high schools (151)	One weekend (10-12 weeks)	Took turns as ''parents'' for two night and three days (over a weekend) assuming sole responsibility for care. Researcher delivered
	+	Amin 2004	Repeat	Pregnant or parenting teens (age 13-20)	2 schools (371)	Not stated	Paquin School Program. 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).

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Table 1 (*continued*)

Study design (n)	Quality*	Paper (1st author, date)	Typology**	Population	Sample (n)	Duration (follow-up)	Intervention details
	+	Key 2001[12]	Repeat	98% African American Age at birth of first baby 14-19 (mean 15.8).	1 high school (50)	(3 years)	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 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 2008[10]	Repeat	Girls (pregnant or parenting), 99% African American, Mean age 16, 100% free school meals / Medicaid.	1 high school (63)	(24 months)	Intensive case management by (culturally matched) school based social worker (including home visits). Weekly school based peer education/support.
	+	Blake 2003[31]	SBHC	White (75.4%) Aged 12 to 18.	59 schools (4166)	(School year)	No details.
	+	Kisker 1996[33]	SBHC	Grade 9 and 10 students.	19 schools (3050)	(To graduation − no timescale)	Outcomes for SBHC program compared to normal health care provisions. Staffed by nurse practitioner and medical aide plus part time physician, social worker, and health educators.
	+	Zimmer-Gembeck 2001[30]	SBHC	Mean age 16.3 58% white, 26% black, 7% Asian, 5% Hispanic, 2% Native American, 2% n/s	(355 cohort 1, 378 cohort 2)	School year (Every 3 months)	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 behavior.
	+	LaBrie 2008[7]	Contraception	Heterosexual college males. Mean age 20.56. Caucasian 76%, Hispanic 17%, Asian American 7%.	1 college (41)	(3 months)	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)
	+	Caron 1997[8]	Contraception	First year college students 185 women (51%), 177 men (49%). Mostly 18 years old (93%) White (91%)	1 college (362)	(3 months)	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 oriented intervention 3. plus experimentally oriented intervention 4. plus both interventions

	+	Allen 1997[14]	Education plus	9th to 12th grade 67% Black	(695)	(9 months)	''Teen Outreach'', a national volunteer service program 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.
	+	Allen 2001[39]	Education plus	9th to 12th grade	National sample (1673)		''Teen Outreach'', a national volunteer service program 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.
	+	O'Donnell 2002[22]	Education plus	African American and Latino adolescent from 7th to 10th grade	1 middle school (195)	(2 years)	The ''Reach for Health'' participants spent around three hours per week providing service in community settings including nursing homes, senior centers, full service clinics and child day care centers for two years.
	+	Shegog 2007[13]	Education plus	Middle school students, 50% African American and 57% female.	1 middle school (14)	(7 months)	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.
	–	Out 2001[25]	Pregnancy	24M 90F.	1 school (114)	2 to 3 days (2 days)	Infant simulators were assigned for specific dates ranging from two days and night to three days and night (to accommodate weekends)
	–	Key 2005[11]	Repeat	Low income, 99% African American. 15-17 yrs.	1 high school (35)	4 year	Peer support in weekly facilitated group meetings, health education, health care for babies and mothers including contraception (young mother-baby clinic in ambulatory hospital center), social work services including individual case management, home visits and counselling. Multi agency
	–	Sidebottom 2003[19]	SBHC	79.1% female, 39.1% white, 36.8% African American	5 high schools (302)	1 year retrospective	Dispensing of contraceptives from the school based clinic on site (compared to previous voucher system for offsite dispensing).
ITS (5)	–	Smith 2000[38]	Multi	10th graders Aged 14-17 years (mean 15.6).	One high school (21)	4 months (1 year)	36 hour peer educator training program Students together against negative decisions (STAND). 36 hours of instruction after school over 4 months
	–	Doniger 2001[27]	Pregnancy	No details	18 school districts (1395, 1703 and 1737)	3 ''waves'' (school years)	Not me, Not now. Intervention developed by health department, community based youth service, ad agency, and communications department. Used mass 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.

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Table 1 (*continued*)

Study design (n)	Quality*	Paper (1st author, date)	Typology**	Population	Sample (n)	Duration (follow-up)	Intervention details
	–	Tiezzi 1997[15]	Pregnancy	Mean age 12.9 81% Hispanic, 10% black, 9% other	4 junior high schools (100)	3 year intervention	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.
	–	Schaffer 2008[29]	Repeat	No details	1 alternative school (38 to 57 per year)	9 year program; participants each involved for one year	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.
	–	Daly 2004[18]	Repeat	Girls aged 14-17 (mean 16.2). 6 African American, 6 Caribbean, 5 Latina.	1 school. (17)	5 months to 3 years depending on the individual	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 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
	–	Bearss 1995[31]	SBHC	36 middle school, 103 high school. Age 12-19 (median 15).	Six school based health centers (2 middle school, 4 high school) (139)	12 month program, no subsequent follow-up	Monthly reproductive health assessments and counselling related to above outcome measures. Nurse practitioner
	–	Schuster 1997[23]	SBHC	9th grade students. 51% male 8% A American, 10% Asian/Pacific Islander, 27% Latino, 48% White, 7% other.	1 urban high school (1112)	Survey conducted 1 year after intervention began	Plastic packs containing two male condoms, instruction sheet and message card advocating abstinence were made available outside 4 classrooms and the nurses' office

Abbreviations: RCT, random controlled trial; CBA, controlled before & after studies; ITS, interrupted time series.

*Quality grading: ++ (high quality; conclusions very unlikely to alter), + (good quality; conclusions are unlikely to alter), − (poor quality; conclusions are likely or very likely to alter) if all sources of potential bias are removed.

**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).

were varied and in turn focus on promoting contraceptive use (one RCT), infant simulator programs (two CBA), sexual abstinence (two CBA, one ITS), and one large multicomponent intervention (CBA).

Evidence from one high quality RCT study[9] 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 (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 (measured as highest number of drinks per day, number of binges in 3 months).

Evidence from two CBA (one good quality and one poor quality) studies[23,24] 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 ($P < 0.001$), leading the authors to suggesting that they would be more like to use contraception in the future.[23] In the second study, 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.[24]

Inconsistent evidence from one good quality CBA study,[19] and two poor quality ITS[15,25] is unclear on the effectiveness of abstinence based programs in preventing teenage pregnancy. Weak evidence from two studies may support these programs; 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 behaviors consistent with the program's message of abstinence (no statistics); however, the authors fail to discuss the diffusion effect of their mass media approach.[25] In the second study, over the three years of the intervention the percentage of those referred for contraception who actually visited the clinic rose from 11% to 76%, and pregnancy rates decreased by 34% over 4 years.[15] In the third study, there was no difference in intention to have sex, attitudes towards teenage pregnancy, condom use or pregnancy rate (no data given).[19]

Evidence from one good quality CBA study[26] does not support the use of a large multicomponent intervention to prevent teenage pregnancy either through sexual behavior or indirect factors. The presentation of the results in this papers were unclear.

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.

Evidence from two studies (reported in three good quality CBA papers,[10−12] and one poor quality ITS[17]), suggests that intensive case management interventions led by a culturally matched social worker are effective as part of multicomponent interventions (including peer education) in preventing repeat pregnancy.

The three papers by Key et al are of the same intervention but the populations vary due to ''ongoing enrolment'' throughout the project. In the first paper, the intervention was shown to significantly reduce the repeat birth rate compared to the control group over a three-year period (6% of participants verses 37% of controls) ($P = 0.05$); multiple repeat births occurred in 21 subjects, but no controls ($P = 0.05$.)[12] In the second paper, a significant decrease in repeat pregnancy was again shown in the intervention area ($P = 0.017$),[11] but the rate of change is not given in this case. In the third paper 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.[10]

In addition, in the second study by Ziegler et al,[17] 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 (no statistical data presented).

Evidence from one poor quality ITS study[27] 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 program) declined from 25% the year before the intervention to a mean of 4.7% over the nine years of the program (no further statistics are given).

Interventions Which Report on the Effectiveness of School-Based Health Centers

We identified six interventions based on the delivery of services at a school clinic or health center 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.

Evidence from four papers (two good quality CBA studies,[28,29] one poor quality CBA study,[18] and one poor quality ITS[21]), supports the direct provision of

contraceptives dispensed on site from school-based health centers 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 ($\chi^2 = 11.3$, $P < 0.001$), and were also significantly less likely to select no contraception.[28] In the second study, adolescents in the intervention group were significantly more likely to receive condom/HIV instruction (OR 1.7, $P < 0.0001$), and significantly less likely to report lifetime or recent sexual intercourse (OR 0.8, $P = 0.037$). Sexually active adolescents in the intervention group were twice as likely to use condoms (OR 2.1 $P < 0.0001$) but less likely to use other contraceptives (OR 0.526, $P < 0.01$).[29] 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.[21] In the fourth study, direct provision of contraceptives onsite increased receipt of all prescribed contraceptives to 99% (from 41% before the intervention).[18] No consideration of significance is presented.

Evidence from two papers (one good quality CBA study[30] and one poor quality ITS[31]) does not support school-based health centers 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.[30] 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).[31]

Multicomponent Interventions (Pregnancy and Sexual Health)

We identified four multicomponent 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.

Evidence from three high quality RCT studies [16,20,32] supports ''Safer Choices'' (a theory based multicomponent HIV, STI and pregnancy prevention program) in changing knowledge and behavior. 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 ($P = 0.001$), and the program also significantly reduced risk behaviors including reduced frequency of intercourse without a condom in the last 3 months ($P = 0.03$), increased use of condom at last intercourse ($P = 0.03$), and increased use of selected contraceptives at last intercourse ($P = 0.02$).[20] In the second study, the intervention students reported significantly reduced frequency of sex without a condom ($P = 0.02$), and number of unprotected sexual partners ($P = 0.04$).[16] The third study showed intervention students having sexual intercourse without a condom with fewer partners ($P = 0.001$) along with positive effects on psychosocial variables and school climate for both HIV/STI and pregnancy prevention ($P < 0.01$ and $P < 0.05$). There was no effect on the prevalence of recent sexual intercourse.[32]

Evidence from one poor quality CBA paper[33] may support the peer education program ''STAND'' in improving knowledge and changing some behaviors 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).[33]

Interventions to Increase Contraceptive Provision and Use in College Students

The two interventions reported here 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 further objectives relating to either pregnancy and/or sexual health and due to this and their older populations of study they have been categorized separately.

Evidence from two good quality CBA studies[7,8] 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 (from 41% (SD 29.42) at pretest to 70% (SD 37.97) at $t(45)=4.23$, $P < 0.001$, SD 0.85). No control data is given.[7] 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.[8]

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 program of supervised community volunteering. The fourth combined a curriculum intervention with an additional computerized element based around a ''virtual world environment.''

Evidence from three good quality CBA studies[14,22,34] suggest that curriculum interventions which include community outreach components can be effective in preventing teenage pregnancy and risky sexual behavior. In the first study 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.[14] In the second study, ''Teen Outreach'' was again show to be effective, especially for those who were already teen parents.[34] In the third study ''Reach for Health'' participants were significantly less likely than controls to report sexual initiation (OR= 0.32) or recent sex (OR= 0.39) than the control group.[22]

Evidence from one good quality CBA study[13] suggests that a virtual world intervention was effective when associated with a curriculum based intervention regarding sexual risk behavior. The intervention group had significantly better understanding than the controls of how reproduction works and the possible consequences of sex ($P < 0.05$), and the importance of enacting behaviors to limit sexual experience ($P < 0.05$).[13]

Discussion

All the papers included in this review reported on studies conducted in the U.S., frequently in populations with a high proportion of minority ethnicities. We categorized the papers as those which aimed to address teenage pregnancy or repeat teenage pregnancy, studies to assess the effectiveness of school-based health centers, 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.

Recommendations

Two main recommendations can be made from the synthesis. The interventions reported by Key et al[10–12] 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 more generally. Secondly, school-based health centers appear to be most effective when contraception provision is made available on site, either comprehensively[18,28,29] or as a condom availability program[21] when compared to interventions which only offer health care assessments or counselling.[30,31]

In addition, four studies demonstrate that multicomponent interventions, with objectives related to pregnancy and sexual health such as ''Safer Choices''[16,20,32] and "STAND''[33] are effective in their objectives. 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.

We also included curriculum interventions which had additional components. From this evidence it would appear that generic interventions can be effective in preventing specific problem behaviors, and that this can be as effective as focusing on individual problems.[13,14,22,34]

In other areas the evidence was weaker and therefore it is more challenging to make clear recommendations. 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 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.[9] Two studies employed interventions which consist of workshop style sessions to promote contraceptive use in college students, and both are shown to be affective in this population.[7,8] The effect of abstinence based program was unclear; evidence from two poor quality ITS studies may support these programs[15,25]; however, one further CBA study of better quality demonstrated no effect on pregnancy rate.[19]

Socio-Economic Status

Many papers did not adequately describe the socioeconomic 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[16] reported the greatest impact of the ''Safer Choices'' on Hispanic students than other ethnic groups. There was also only one paper which compared the effectiveness of interventions on young people who were already teenage parents with those who were not; ''Teen Outreach'' was shown by Allen and Philliber to be especially effective for those who were already teen parents.[34]

Methodology Limitations

Finding an effective methodology for the evaluation of these interventions, particularly in terms of outcomes relating to sexual behavior, 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. As teenage pregnancy is a relatively rare event, and large samples of teenage parents are difficult to achieve, many studies may be effectively underpowered, meaning that process measures such as these become even more important.

Adverse 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 the effectiveness study of a school-based health center by Kisker et al,[30] 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[31] 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 program (60%). Finally, in an evaluation of the multicomponent intervention STAND, Smith et al[33] reported that 13 male STAND members were involved in pregnancies (compared with 2 controls).

Conclusions

The literature on interventions, based in education settings, of contraceptive service provision and interventions to encourage young people to use existing contraceptive services is, in general, not well developed, especially in terms of good quality effectiveness studies. Care must be taken when considering the potential applicability of the majority of these studies outside of their particular population context. All the studies included in the review were conducted in the U.S., although some will be more applicable elsewhere than others depending on the exact population studied. Teenage pregnancy rates in the U.S. are particularly high among minority populations, especially African American and Hispanics,[35] and this is reflected in the high number of studies conducted in these populations. In addition, differences in terms of school-based culture, policy and context may be much more varied between countries and therefore caution is required when applying U.S. evidence elsewhere. We will address the issues of applying evidence in other setting in a subsequent study.

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References

1. Alan Guttmacher Institute, 2000: United States and the Russian Federation lead the world in teenage pregnancy rates. New York, Author, 2000
2. Office for National Statistics: (2007). Conception statistics in England and Wales 2006 (provisional) http://www.statistics.gov.uk/downloads/theme_health/conceptions2007/ConceptionsARV2007.pdf; Accessed 29.04.2010
3. US Office of Technology Assessment: Adolescent Health, I: Summary and policy options. Washington, DC, Publication OTA-H-468, 1991
4. Department for Children: Families and Schools: Teenage parents: who cares? A guide to commissioning and delivering maternity services for young parents. London, Department for Children, Families and Schools, 2008
5. Frost JJ, Forest JD: Understanding the impact of effective teenage pregnancy prevention programmes. Fam Plann Perspect 1995; 27:188
6. NICE2009: National Institute for Health and Clinical Excellence: Methods for the development of NICE public health guidance, (2nd ed.). London, NICE, 2009
7. LaBrie JW, Pedersen ER, Thompson AD, et al: A brief decisional balance intervention increases motivation and behaviour regarding condom us in high-risk heterosexual college men. Arch Sex Behav 2008; 37:330
8. Caron SL, Carter DB, Davis CM, et al: Evaluating the effectiveness of workshop interventions on contraceptive use among first year college students. J Psychol Human Sex 1997; 9:99
9. Ingersoll KS, Ceperich SD, Nettleman MD, et al: Reducing alcohol-exposed pregnancy risk in college women: initial outcomes of a clinical trial of a motivational intervention. J Subst Abuse Treat 2005; 29:173
10. Key JD, Gebregziabher MG, Marsh LD, et al: Effectiveness of an intensive, school based intervention for teen mothers. J Adolesc Health 2008; 42:394
11. Key JD, O'Rourke K, Judy N, et al: Efficacy of a secondary adolescent pregnancy prevention program: an ecological study before, during and after implementation of the second chance club. Int Q Community Health Educ 2005; 24:231

12. Key JD, Barbosa GA, Owens VJ: The second chance club: repeat adolescent pregnancy prevention with a school based intervention. J Adolesc Health 2001; 28:167
13. Shegog R, Markham C, Peskin M, et al: It's your game": an innovative multimedia virtual world to prevent HIV/STI and pregnancy in middle school youth. Stud Health Technol Inform 2007; 129:983
14. Allen JP, Philliber S, Herrling S, et al: Preventing teen pregnancy and academic failure: experimental evaluation of a developmentally based approach. Child Dev 1997; 64:729
15. Tiezzi L, Lipshutz J, Wrobleski N, et al: Pregnancy prevention among urban adolescents younger than 15: results of the 'In Your Face' program. Fam Plann Perspect 1997; 29:173
16. Kirby DB, Baumler E, Coyle KK, et al: The "Safer Choices" intervention: its impact on the sexual behaviors of different subgroups of high school students. J Adolesc Health 2004; 35:442
17. Daly J, Ziegler R, Goldstein DJ: Post abortion groups: risk reduction in a school based health clinic. J Psychosoc Nurs Ment Health Serv 2004; 42:48
18. Sidebottom A, Birnbaum AS, Nafstad SS: Decreasing barriers for teens: evaluation of a new teenage pregnancy prevention strategy in school based clinics. Am J Public Health 1890; 2003:93
19. Lieberman LD, Gray H, Wier M: Long-term outcomes of an abstinence based, small-group pregnancy prevention program in New York city schools. Fam Plann Perspect 2000; 32:237
20. Coyle K, Basen-Engquist K, Kirby D, et al: Short-term impact of safer choices: a multicomponent, school-based HIV, other STD, and pregnancy prevention program. J Sch Health 1999; 69:181
21. Schuster MA, Bell RM, Berry SH, et al: Student's acquisition and use of school condoms in a high school condom availability program. Pediatrics 1997; 100:689
22. O'Donnell L, Stueve A, O'Donnell C, et al: Long term reductions in sexual initiation and sexual activity among urban middle schoolers in the reach for health service learning program. J Adolesc Health 2002; 31:93
23. Out JW, Lafreniere KD: Baby Think It Over: using role-play to prevent teen pregnancy. Adolescence 2001; 36:571
24. Somers CL, Fahlman MM: Effectiveness of the "Baby Think It Over" teen pregnancy prevention program. J Sch Health 2001; 71:199
25. Doniger AS, Adams E, Utter CA, et al: Impact of the "not me, not now" abstinence oriented adolescent pregnancy prevention communications program, Monroe County, New York. J Health Commun 2001; 6:45
26. McBride D, Gienapp A: Using random designs to evaluate client-centered programs to prevent adolescent pregnancy. Fam Plann Perspect 2000; 32:227
27. Schaffer MA, Jost R, Pederson BJ, et al: Pregnancy free club: a strategy to prevent repeat adolescent pregnancy. Public Health Nurs 2008; 25:304
28. Zimmer-Gembeck MJ, Doyle LS, Daniels JA: Contraceptive dispensing and selection in school-based health centers. J Adolesc Health 2001; 29:177
29. Blake SM, Ledsky R, Goodenow C, et al: Condom availability programs in Massachusetts high schools: relationships with condom use and sexual behavior. Am J Public Health 2003; 93:955
30. Kisker EE, Brown RS: Do school-based health centers improve adolescents' access to health care, health status, and risk-taking behavior? J Adolesc Health 1996; 18:335
31. Bearss N, Santelli JS, Papa P: A pilot program of contraceptive continuation in six school based clinics. J Adolesc Health 1995; 17:178
32. Basen-Engquist K, Coyle KK, Parcel GS, et al: Schoolwide effects of a multicomponent HIV, STD, and pregnancy prevention program for high school students. Health Educ Behav 2001; 28:166
33. Smith MU, Dane FC, Archer ME, et al: Students together against negative decisions (STAND): evaluation of a school-based sexual risk reduction intervention in the rural south. AIDS Educ Prev 2000; 12:49
34. Allen JP, Philliber SP: Who benefits most from a broadly targeted prevention program? Differential efficacy across populations in the teen outreach program. J Community Psychol 2001; 29:637
35. Alan Guttmacher Institute: U.S. Teenage Pregnancy Statistics. Overall Trends, Trends by Race and Ethnicity and State by State Information. http://www.agi-usa.org/sections/youth.html; Accessed December 2009