The effectiveness of group-based comprehensive risk-reduction and abstinence education interventions to prevent or reduce the risk of adolescent pregnancy, human immunodeficiency virus, and sexually transmitted infections: two systematic reviews for the Guide to Community Preventive Services


CRD summary
The authors concluded that group based risk reduction interventions were effective in reducing adolescent pregnancy, HIV and sexually transmitted infections. It was unclear if this was the case for abstinence education interventions. This was a well-conducted review, but the unexplained variation for some outcomes suggests that the authors’ conclusions should be interpreted with caution.

Authors’ objectives
To assess the effectiveness of group-based risk-reduction and abstinence-based interventions to reduce adolescent pregnancy, HIV and other sexually transmitted infections. In addition, to examine moderators of the effectiveness of these interventions such as delivery setting and intervention focus.

Searching
Eleven databases were searched (including PubMed, CINAHL, PsycINFO and The Cochrane Library) were searched from 1988 to August 2007; search terms were reported. References of included papers, relevant journals and a specialist database were handsearched. Only studies published in English were considered for inclusion.

Study selection
Group-based comprehensive risk reduction or group-based abstinence education interventions designed for adolescents (aged 10 to 19 years) that focused on HIV/sexually transmitted infections prevention or pregnancy were eligible for inclusion. Interventions had to be delivered in US schools, community settings or both. Eligible studies could be either experimental or quasi-experimental design and had to report at least one biological or behavioural measure concerning reduced sexual activity or risk.

Most included studies focused on either HIV/sexually transmitted infections only, or a combination of HIV/sexually transmitted infections and pregnancy. Half of study arms included a majority of African-Americans; fewer studies included a majority of either White, Hispanic or Mixed samples, with only one study reporting a majority of Asian Americans. The mean duration of contact with intervention deliverer was 63 hours. The baseline mean of participant virginity was 53%. Approximately one-third of all study arms consisted of multi-component interventions; the rest were single component interventions.

Studies were selected by two reviewers; disagreements were resolved by consensus.

Assessment of study quality
Study quality was assessed using criteria developed by the Task Force on Community Preventive Services which included: study population and intervention description; sampling; exposure and outcome measurement; data analysis; and interpretation of results (including confounding bias). Studies with five or more limitations on these criteria were excluded from the analyses.

Two reviewers assessed study quality; disagreements were resolved by consensus.

Data extraction
Behavioural outcomes were extracted as follows: abstinence/delayed initiation, frequency of sexual activity, number of sex partners, unprotected sexual activity, condom use, and hormonal contraceptive use. Biological outcomes were extracted for pregnancy, HIV and sexually transmitted infection rates. Data were transformed to ensure consistent direction of effects. For each outcome, the odds ratios (ORs) and 95% confidence intervals (CIs) were calculated by
Two reviewers extracted data and disagreements were resolved by consensus.

**Methods of synthesis**
The studies were pooled for seven key outcomes (current sexual activity; number of sex partners; frequency of unprotected sexual activity; use of condom protection; use of hormonal contraception; pregnancy; and sexually transmitted infections) using a random-effects model. Heterogeneity was assessed using $\chi^2$ and $I^2$ (greater than 50% was considered substantial heterogeneity). Follow-up time was from beginning of intervention to assessment. Outcomes were grouped into quick-to-change or slow-to-change sexual behaviours.

Heterogeneity was explored using subgroup analyses for the following variables: age, race/ethnicity, setting, dosage, focus, deliverer, multicomponent, targeting, study design, and comparison group type.

Publication bias was assessed using funnel plots and Orwin's fail safe N. Assessment of potential outliers was examined by removing one study at a time and assessing the impact on pooled effect estimate.

**Results of the review**
Sixty-two studies were included in the review. Twelve studies were rated as high quality and 50 studies as fair quality. Fifty of the study arms included in the meta-analyses were based on RCTs and 32 study arms were based on quasi-experimental studies. Seventy-four study arms compared the intervention with an untreated or minimal treatment group, and eight study arms compared the intervention with a treated control group. Four studies (five study arms) were excluded due to limited quality.

**Risk-reduction interventions**
There were statistically significant reductions in sexual activity (OR 0.84, 95% CI 0.75 to 0.95; 38 studies; $I^2=68$%), unprotected sexual activity (OR 0.70, 95% CI 0.60 to 0.82; 22 studies; $I^2=56$%), and risk of an sexually transmitted infections (OR 0.65, 95% CI 0.47 to 0.90; six studies; $I^2=11$%). It was unclear if the intervention reduced pregnancy rates (OR 0.88, 95% CI 0.60 to 1.30; nine studies; $I^2=53$%). No data on HIV rates were identified.

Between-study subgroup analyses did not find any consistent moderators of effect. Using within-study data on subgroups identified, a borderline statistically significant improvement for boys compared with girls on reported sexual activity outcome (OR for boys 0.61, 95% CI 0.46 to 0.81; OR for girls 0.90 95% CI 0.69 to 1.19). Similar differences were found for condom use, but this was not statistically significant (OR for boys 2.08, 95% 0.97 to 4.48; OR for girls 0.88, 95% CI 0.40 to 1.92). There did not appear to be differences between virgins and non-virgins in their response to interventions.

**Abstinence education interventions**
There was a reduction in sexual activity (OR 0.81, 95% CI 0.70 to 0.94; 19 studies; $I^2=57$%). However, there did not appear to be any benefit for reducing unprotected sexual activity, pregnancy rates and sexually transmitted infections rates. No data on HIV rates was identified.

The only statistically significant difference identified by subgroup analyses was on study design for the sexual activity outcome (OR for RCTs 0.94, 95% CI 0.81 to 1.10; OR for non-RCTs 0.66, 95% CI 0.54 to 0.81), with RCTs showing less favourable results.

**Cost information**
In six of eight studies costs ranged from US $66 to $10,024 per person each year. One study did not provide costs per person, but reported an annual budget of $335,358 which took into account costs such as staff salaries and materials. A further study cost $119 per participant for a five-hour intervention conducted in one day. Two studies reported a cost-utility ratio for HIV infections averted; this ranged from $9,000 to $76,000 per QALY.

**Authors' conclusions**
Group-based risk-reduction interventions were effective in reducing adolescent pregnancy, HIV and sexually transmitted infections. It was unclear if group-based abstinence education was effective.

**CRD commentary**
The review question and inclusion criteria were clear. An extensive search was conducted, but was limited to studies published in English so it was possible that relevant studies may have been missed. Appropriate methods for minimising error and bias in review processes were applied.

The meta-analysis included a diverse range of studies in terms of content of intervention (single and multimodal), study design (RCT and quasi-experimental). In addition, studies differed in the participants they targeted (such as age and ethnicity). This seemed to contribute to the high heterogeneity found in a number of the meta-analyses. However, heterogeneity was explored in fairly comprehensive subgroup analyses.

This was a well-conducted review, but the unexplained high heterogeneity for some outcomes suggests that the authors’ conclusions should be interpreted with caution.

**Implications of the review for practice and research**
**Practice:** The authors recommended that risk-reduction interventions should be used to prevent or reduce the risk of HIV, pregnancy, and sexually transmitted infections.

**Research:** The authors stated that further research was required to identify which moderator variables impact on the effectiveness of these interventions. They also stated that a greater consistency in reporting both of outcome measures and moderator variables was required to benefit future evidence syntheses. Finally, they recommended that further cost-utility analyses should be conducted from a societal perspective.

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