HIV prevention in Mexican schools: prospective randomised evaluation of intervention

Dilys Walker, Juan Pablo Gutierrez, Pilar Torres, Stefano M. Bertozzi

Abstract

Objective To assess effects on condom use and other sexual behaviour of an HIV prevention programme at school that promotes the use of condoms with and without emergency contraception.

Design Cluster randomised controlled trial.

Setting 40 public high schools in the state of Morelos, Mexico.

Participants 10,954 first year high school students.

Intervention Schools were randomised to one of three arms: an HIV prevention course that promoted condom use, the same course with emergency contraception as back-up, or the existing sex education course. Self administered anonymous questionnaires were completed at baseline, four months, and 16 months. Students at intervention schools received a 30 hour course (over 15 weeks) on HIV prevention and life skills, designed in accordance with guidelines of the joint United Nations programme on HIV/AIDS. Two extra hours of education on emergency contraception were given to students in the condom promotion with contraception arm.

Main outcome measures Primary outcome measure was reported condom use. Other outcomes were reported sexual activity; knowledge and attitudes about HIV and emergency contraception; and attitudes and confidence about condom use.

Results Intervention did not affect reported condom use. Knowledge of HIV improved in both intervention arms and knowledge of emergency contraception improved in the condom promotion with contraception arm. Reported sexual behaviour was similar in the intervention arms and the control group.

Conclusion A rigorously designed, implemented, and evaluated HIV education course based in public high schools did not increase condom use, with and without emergency contraception but did increase reported use of emergency contraception.

Introduction

Most recent efforts to prevent sexually transmitted infections (including HIV) and pregnancy in adolescents have been school based projects that promoted either condoms or abstinence. Recent meta-analyses show that these strategies have not been evaluated rigorously, especially in developing countries.

Of 49 projects to prevent teenage pregnancy in the United States (some were school based HIV prevention programmes), only four programmes reduced age at first intercourse and increased the use of condoms or other contraception at first intercourse (and presumably resulted in decreased rates of pregnancy), and they were based on education to prevent HIV with condom promotion. A recent review of 26 projects to prevent pregnancy (including 10 school based programmes) concluded that these interventions do not delay the onset of sexual activity, increase condom use, or decrease unplanned pregnancy. Other studies have shown that school based interventions decrease risky sexual behaviour. In another review, 27 of 53 interventions had no effect on sexual activity, pregnancy rates, or rates of sexually transmitted infections

The results of a few careful studies of promoting abstinence are mixed. Although abstinence pledges may delay first intercourse, they do not seem to decrease the incidence of sexually transmitted disease or unplanned pregnancy, and they may increase the likelihood of unprotected sex.

Even though these projects have little effect on risky sexual behaviour in adolescents, planners and decision makers still invest large amounts of money and effort in them, without investigating new approaches. It has been estimated that in 2006 more than $100m (£57m; €82m) will be needed globally for school based prevention programmes.

Unplanned pregnancy and sexually transmitted infections (including HIV) in adolescents are of major concern in Mexico, as in most of the world. In 2003, 17% of births (>400,000) in Mexico were to women under the age of 20.

According to the 2000 Mexican national health survey, 42% of young men and 26% of young women between 15 and 19 years have had a sexual relationship; only 47% of these young men and 15% of young women had used a condom during their first sexual intercourse.

Use of emergency contraceptive pills might prevent pregnancy without decreasing the use of condoms. We found no published studies comparing the effect of programmes that promote condom use, with and without emergency contraception back-up, on risk behaviour in adolescents. We analysed the effect on sexual behaviour of a high school based programme for preventing HIV and other sexually transmitted diseases by promoting the use of condoms with and without emergency contraception as back-up.

Emergency contraception is available over the counter in Mexico as a morning after pill. Concerns have been expressed that such contraception increases risky behaviour by decreasing the use of condoms, particularly among young people. In a survey of paediatricians in New York, 22% thought that providing emergency contraception encourages adolescents to take sexual

Tables showing the actually treated analysis are on bmj.com
Marginalisation

Marginalisation is the term used in Mexico for the government’s multidimensional assessment of poverty in a community

- Housing (per cent of households without piped water, without sewage, without electricity, with a dirt floor, and with more than two people per room)
- Income (per cent ≤ 2× minimum wage)
- Education (per cent aged >15 who are illiterate, per cent aged >15 who did not complete primary school)
- Urbanisation (per cent who live in towns with more than 5000 occupants)
between the second and third follow-up. This is mainly because of the high dropout rates in Mexican schools. The dropout rate of young women reported having a boyfriend than young men (83% (1313/1584) vs 77% (939/1213) in the condom promotion with contraception group). Attitudes about condom use were significantly more positive among young people who reported having a condom at intercourse (young women 77% (1825/2364), young men 57% (1263/2199)), would interrupt sex to put on a condom (young women (93% (2967/3174), young men 82% (2148/2624)), or would condition sex on condom use (young women 98% (3515/3502), young men 92% (2575/2585)) (table 1).

We found some important sex differences (table 1). More young women reported having a boyfriend than young men reported having a girlfriend (48% (1949/4078) vs 38% (1216/3192)), although more young men reported being sexually active than young women (28% (871/3105) vs 17% (692/4031)). Knowledge of emergency contraception was greater in young women than young men (83% (1313/1584) vs 77% (939/1213)) in the condom promotion with contraception group. Attitudes about condom use were significantly different between sexes; young women had a significantly more positive attitude about condom use. However, attitudes about condom use were significantly less positive among young people who reported sexual activity.

Table 2 shows data on condom use and behaviour for students who reported sexual activity at the 16 month follow-up. Overall the groups did not differ significantly in condom use at follow-up, and 44% of the students were male compared with 48% at baseline (see table 1). Overall 17% (692/4031) of young women and 27% (841/3105) of young men reported sexual activity. With no significant differences between the three arms. At baseline 10% (511/4942) of young men reported sexual activity.

We included a dichotomous variable for each intervention group and another to distinguish the baseline survey from the first follow-up survey. Thus, the follow-up dummy variable intends to capture the impact of each intervention on the outcome variable. We used age at baseline instead of age at the time of the survey, to avoid confusion with the time trend. For the follow-up survey, we used the age the respondent would have been at baseline to make the variables comparable.

Results

Our sample comprised 10 954 students at baseline (February 2002), 9572 students immediately after the intervention (June 2002), and 7908 students at one year follow-up (June 2003). Between baseline and first follow-up, 14.4% (1582/10 954) of students dropped out, and 22% (2064/9372) dropped out between the second and third follow-up. This is mainly because of the high dropout rates in Mexican schools. The dropout rate from the first to second year of high school in Morelos was about 37% for students who entered school in 2000 (higher than the estimated national dropout of 30%) (32). Mean age was 16.7 at baseline (see table 1). Overall 17% (692/4031) of young women and 27% (841/3105) of young men reported sexual activity, with no significant differences between the three arms. At baseline 10% (511/5323) of young men reported sexual activity.
first or last intercourse. A higher proportion of young men in the condom promotion with contraception group reported using a condom with a sex worker or casual partner (85%; 89/256) than in the control group (21%; 33/158) reported using emergency contraception. A higher proportion of these women in the condom promotion group (30%; 75/247) and women also reported a partner five or more years older than themselves (31% (77/245) than in the control group (21%; 33/158) reported condom with a sex worker or casual partner (85%; 81/95) than young women in the control group (23%; 35/149), reported a sexual partner five or more years older more often (35%; 89/256) than in the control group (21%; 33/158) reported

The proportion of students who reported intercourse with a risky partner (either compensated sex, sex with a sex worker, or with a stranger) did not differ significantly; however, young women in the condom promotion group (50%; 75/247) and condom promotion with contraception group (31%; 77/245) reported a sexual partner five or more years older more often than young women in the control group (23%; 35/149), although the difference was significant only in the condom promotion with contraception group.

We estimated the impact of each intervention on selected outcome variables by using multivariate logistic regression and a fixed effects model to correct for cluster design. Knowledge of emergency contraception increased in the group that was taught about it, and young women in this group reported using this form of contraception. Both interventions had a significant impact on knowledge of HIV but not on sexual behaviour (except for use of emergency contraception). Education about emergency contraception had no significant effect on the use of condoms. Use of condoms decreased with age and time, although this result was affected by the drop-out rate. Young men were significantly less positive about the use of condoms than women, but they were significantly more likely to report that they used a condom when they last had sex. A significantly lower proportion of sexually active adolescents reported the intent to use condoms than young people who were not sexually active

Tables A-C on bmj.com show the results of analysis of the actually treated groups. The descriptive statistics show small differences between the actually treated and the intention to treat groups. The results of multivariate analyses are similar for the two groups, with small differences in the size of associations.
Discussion

We directly evaluated and compared the impact on adolescents of comprehensive education on HIV prevention, including condom promotion, with the same comprehensive education with emergency contraception backup. Neither strategy affected the use of condoms (positively or negatively) at one year follow-up. Our study adds to the growing body of evidence that current HIV prevention efforts based in school do not alter risky behaviour. Our results suggest that current interventions educate effectively but do not change sexual behaviour.

Limitations and strengths of the study

One weakness of our study is the absence of biological outcomes that were measured before and after intervention. Such outcomes (pregnancy, sexually transmitted diseases, and HIV) are useful markers of risky sexual behaviour, which can help validate self reported behavioural data. A common criticism of evaluations of behavioural interventions is that self reported data on behaviour are subject to reporting bias. Students exposed to the intervention know that the researchers expect them to reduce their risk behaviour and thus they might under-report the intervention knowing that the researchers expect them to reduce their risk behaviour and thus they might under-report their true risk behaviour, which leads to overestimates of the effectiveness of interventions. Given that most well designed studies that have measured reported sexual behaviour have not shown improvements, positive results are unlikely to be seen with the use of biological markers.

If we had found evidence of an effect of either intervention on self reported risky sexual behaviour, the lack of biological outcomes would have been an important limitation. This was not the case, however, and it is unlikely that students who had been taught about preventing HIV and pregnancy would over-report risky sexual behaviour. The lack of effectiveness in our study cannot be explained by lack of power, poor study design, or poor implementation of the intervention.

The planning and implementation of our intervention was as optimal and rigorous as possible, but several other limitations deserve mention. Firstly, although teachers were trained and closely monitored, our observation of classes was limited. Despite the intensive training, teachers rarely change their preconceptions about adolescent sexuality. In Mexico, young women are not meant to have sex before marriage, whereas boys are encouraged to do so. Secondly, we have no measure of student attendance at the course, although it was part of the required curriculum. Thirdly, although the course was intensive and longer than the recommended 14 hours (it was 30 hours), it was not followed up or reinforced the next year. Fourthly, the central message of the course was self determination of decision making, with responsible action. Some experts believe this message is too vague. Fifthly, although the questionnaires were anonymous, confidential, and completed in the presence of adults, privacy may not have been optimal. Sixthly, only a small proportion of students were newly sexually active during the course, and these students cannot be identified, although they are the most likely to benefit from the course during the period of observation. In addition, although condoms and emergency contraception are available without prescription at any pharmacy, access to both forms of contraception is probably limited for young Mexicans for cultural, psychological, and economic reasons, and this could have affected our results. Finally, since data collection was school based, the follow-up survey did not include students who received the intervention in 10th grade and dropped out of school before the questionnaire was administered in 11th grade.

Although the intervention could have been monitored more closely, it is unlikely that monitoring would be any better if the intervention were implemented across the country. Teachers were trained by university professors, so the quality of training was far better than would occur under full scale implementation. Lack of follow-up of dropouts caused some loss of power, but it probably did not bias the results. However, the dropout rate does affect our capacity to estimate trends, as our follow-up sample is a subset of the baseline sample. Dropout rates did not differ between the three arms of our study. We do not think that the interventions increased the dropout rate of students who had safer behaviour and reduced that of students with riskier behaviour, thus masking a positive intervention effect. Data from a small sample of students who dropped out at the first follow-up showed that the proportions of boys who dropped out who were sexually active and who used a condom at the last sexual intercourse were similar to boys still in school, whereas a higher proportion of girls who dropped out were sexually active and a lower proportion used condoms compared with girls still at school.

Implications

Combining the condom and emergency contraception messages did not increase risky sexual behaviour, which refutes the notion that providing information and access to emergency contraception will increase frequency of sexual activity, number of partners, or sex without a condom. Thus, promoting condom use with emergency contraception back-up is a good way to reduce high rates of unplanned pregnancy and sexually transmitted diseases. Future studies should measure the direct impact of education about emergency contraception on unplanned pregnancy and sexually transmitted diseases.

Immediately after the intervention, condom use at last sex was significantly increased in the condom promotion with contraception group only, but this effect was lost at one year follow-up. These results show how important it is to evaluate longer term effects.

Innovative approaches designed to decrease adolescent risk behaviour are urgently needed. Possible approaches include integrating school based efforts to prevent HIV and sexually transmitted diseases into reproductive health services, and other community based strategies. New approaches could also add components that directly consider social norms, both within the school and within the broader community, including families and youths who do not attend school. A combined parent-adolescent intervention has not received much study, especially in developing countries.

Whatever the innovations, evaluations need to incorporate biological outcomes (for example, using screening tests for herpes simplex type 2 or human papillomavirus) because they are important in their own right and validate self reported data on behaviour. Existing interventions that rely on publicly declaring intended behaviour (such as abstinence pledges) might be more compatible with the knowledge based interventions that we implemented if pledges and group reinforcement focused more on safety (whether via abstinence, condom use, or testing and mutual fidelity) than abstinence alone. Finally, a considerable proportion of large scale programmes currently being rolled out must be phased in as cluster randomised trials to permit rigorous evaluation if we are to learn how to reduce adolescent risk behaviour.

Conclusion

New strategies are urgently needed to combat HIV and other sexually transmitted diseases and unplanned pregnancy among...
adolescents. Great care should be taken in using data related to school based education and prevention, especially when evidence of benefit relies on changes in knowledge or self reported behavioural change, or both. Cost effectiveness analyses have assumed that existing school education approaches are more effective than current data show. Those analyses support continued use of existing approaches and do not encourage the innovation and rigorous evaluation needed to improve effectiveness. Our data indicate that it is time to consider and evaluate new approaches to HIV prevention interventions based in schools.

Acknowledgements: This study was performed in collaboration with the Morales Ministry of Education and Morales Parents’ Association. Contributors: DW conceived and designed the study and oversaw implementation of the intervention and data collection and analysis. She was primarily responsible for drafting and revising the article. JG helped design the study and was primarily responsible for data management and analysis. HS contributed greatly to the content and revision of the article. PT was primarily responsible for overseeing teacher training, implementing the interventions, and applying the questionnaire. She was the overall field manager and contributed greatly to the writing and revision of the article. SB was the principal investigator for the parent study and helped at every stage of the study. He contributed greatly to the study design, analysis, interpretation of results, and editing and revision of the article. DW is guarantor.


Competing interests: None declared.

Ethical approval: Mexican National Institute of Public Health ethics and research committees.

1. DiCenso A, Grooten G, Willan A, Griffith L. Interventions to reduce unintended preg-
nancies among adolescents: systematic review of randomised controlled trials. BMJ
2002;324:1-5.


18. Morelos, Mexico

Division of Reproductive Health, National Institute of Public Health, Cuernavaca, Morelos, Mexico

Díbs Walker investigator

Division of Health Economics and Evaluation, National Institute of Public Health Juan Pablo Gutierrez investigator

Pilar Torres investigator

Stefano M Bertozzi
correspondence to: J P Gutierrez jpgutier@correo.insp.mx

BMJ Online First bmj.com

BMJ: first published as 10.1136/bmj.38796.457407.80 on 8 May 2006. Downloaded from http://www.bmj.com/ on 2 October 2023 by guest. Protected by copyright.