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The short-term impact of peers as co-facilitators of an HIV prevention programme for adolescents: A cluster randomised controlled trial

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ABSTRACT

Background There is no consensus concerning the most effective type of facilitator to promote healthy sexual behaviours in interventions targeting adolescents.

Objectives To evaluate the facilitator's effect on the implementation of the *COMPAS* programme (Spanish acronym for *Skills for Adolescents with Healthy Sexuality*), a school-based HIV prevention protocol.

Methods Participants were 832 Spanish scholars aged 14 to 18. Fifteen schools were randomly assigned to one of the three following schemes: *COMPAS* delivered by experts only; the same programme administered by experts and peers; or a control group, not exposed to any intervention.

Results The experts achieved an improvement in HIV knowledge and attitudes towards HIV and condom use; however, experts associated to peers only succeeded in increasing HIV knowledge. The effect size of the changes indicated a greater positive change in the programme when applied by experts than by experts *and* peers.

Conclusions The participation of peers as co-facilitators did not increase the efficacy of a programme delivered by experts to Spanish adolescents. Education delivered by experts was the most effective modality for reducing sexual risk. *COMPAS* is the only Spanish programme targeting the promotion of safer sex behaviours in adolescents whose efficacy has been evaluated with different health agents in Spain.

KEYWORDS Adolescents; Facilitator; HIV/AIDS; Peer education; Prevention; School interventions

INTRODUCTION

It is estimated that five million young people aged between 14 and 25 years are living with HIV worldwide[1]. In Europe, Spain ranks fourth only after Latvia, Estonia and Portugal with regard to the rate of diagnosed AIDS cases; in Western Europe, Spain is second[2]. New cases mostly concern young people who became infected through unprotected sex[3]. As HIV prevention strategies targeting young people are essential

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for controlling the epidemic, it is of interest to analyse the elements related to their effectiveness.

Facilitators (health professionals vs. lay community members or peers) have a mediating effect on the effectiveness of HIV prevention programmes[4]. Although the facilitator's qualities required to ensure intervention success are unknown[5], it seems that similarity can promote behavioural change to a greater extent than difference[6]. Peer education in HIV prevention in schools consists of training adolescents to participate in educational activities, either informal or organised, with their classmates who are around the same age, and have similar origins, and/or interests[7]. This method for reducing sexual risk among teenagers allows reaching a wider group at a lesser cost than when health professionals are involved (as well).

The effectiveness of peer education regarding sexual risk reduction among adolescents has been widely studied and there are several reviews and meta-analyses on record[6,8–11]. Controlled trials of HIV prevention have shown that peer-led education increases HIV knowledge and condom use, changes community attitudes and norms related to safe sex, and reduces some sexual risk behaviours[9], particularly in marginalised or vulnerable groups such as homeless youths, and African-American and African populations[12–14].

Most school-based HIV prevention programmes resort to experts or health professionals (physicians, nurses, physician assistants, psychologists, teachers, and social workers). A meta-analysis of HIV-prevention interventions has brought to light that more positive results are obtained when the aforementioned health agents are experts instead of community members[4]. While experts are perceived as authority figures, this characteristic does not seem to contribute to the success of preventive actions among adolescents, where the key lies in being charismatic at the same time as being respected by the group[7].

The conclusions provided by meta-analyses of HIV prevention interventions are drawn from comparing the results reported by controlled studies that evaluate an intervention applied by an expert or a peer, compared to a control group. No direct comparisons exist between different facilitators when the intervention and methodology are kept unchanged[6]. Peer educators are usually the members of the community with the best aptitude, and little is known about the effect when the facilitator is not a lay community member, even though he/she does comply with similarity criteria[7]. In Spain, there are few studies supporting the effectiveness of preventive interventions targeting university students[15], and even fewer directed at adolescents. Most Spanish HIV-prevention interventions are implemented by experts, and there is little evidence about how peer educators contribute to the effect of a school-based HIV prevention intervention. Experts, teachers, and peers have jointly participated in several studies[16,17], but the same intervention's effectiveness with different facilitators has not been assessed.

COMPAS is a personal competency improvement programme applied to promoting sexual health that includes informative, motivational, and behavioural components. In a first controlled study, the programme was shown to be effective, compared to a control group, in increasing HIV knowledge and intention to engage in safer sex, and improving attitudes towards people living with HIV/AIDS, the HIV test and condom use, even when obstacles exist which interfere with that use. School students between 15 and 18 years of age from five geographical areas in Spain participated in this study[18].

The latter assessed the contribution of two types of facilitators on the efficacy of *COMPAS* in causing positive changes in theoretical constructs immediately post-intervention. The study used a cluster-randomised controlled trial in which schools were randomly allocated to (i) *COMPAS* dispensed by experts, (ii) *COMPAS* applied by experts *and* peers, or (iii) a control group. It was expected that the effects achieved by the *COMPAS* programme administered by experts + peers would be greater than those obtained by the same programme dispensed by experts only, whose effects in turn would be greater than those observed in the control group, since the intervention draws on the strengths of each applicator.

This study will contribute to the development of effective HIV prevention programmes in Spain based on the type of facilitator. Immediate effects of *COMPAS* on intentions for safer sexual behaviour in an adolescent population are studied in comparison to controls. The outcomes of interest included attitude, perceived norms, and condom use intention. We also examined other factors that may affect condom use, including knowledge about HIV/AIDS, which has proved to be a precursor of outcome variables related to condom use[19], and it has been commonly included in studies evaluating HIV prevention programmes.

METHODS

Intervention

Skills for Adolescents with Healthy Sexuality (*COMPAS*, its Spanish acronym) is a school-based HIV prevention programme based on developing skills during five one-hour long sessions. Its effectiveness among adolescents residing in Spain has been demonstrated in a controlled study[18]. The social learning theory[20] and the Information-Motivation-Behavioural Skills Model[21] make up its theoretical bases. The social learning theory predicts human demeanour in terms of continuous reciprocal interaction among cognitive, behavioural, and environmental influences. The IBM model assumes that information and motivation facilitate behavioural skills to reduce sexual risk. The content and programme activities are well structured in the standardised manual of the implementer. The intervention is composed of five modules: (i) information and cognitive restructuring; (ii) social skills training; (iii) problem solving training; (iv) maintenance strategies: self-management; and (v) covert behaviour rehearsal. Participatory methods, such as interactive activities, games in groups, role-playing, and mixed-gender discussion groups, are used. Table 1 shows the objectives proposed in each module.

Facilitators and training

From each province, an expert and a peer were selected to deliver the interventions at the high schools situated in the area. Expert facilitators were five adults (mean age, 31.9 years, four of whom were women) who met the following criteria: (i) having a bachelor's degree in psychology and a master's in health psychology, and (ii) with at least two years' experience in health promotion.

Peer co-facilitators were five first-year university psychology students (four of whom were women), with a mean age of 18.5 years. Peers were selected based on interviews. The criteria used to select peer educators were: (i) aged between 17 and 19 years old; (ii) possessing good communication skills; and (iii) having a youthful-looking physical appearance.

Expert facilitators attended ten hours of training on the *COMPAS* programme, and its main principles, activities and strategies to approach. Peer facilitators received ten hours of training which focused on their role as peer educator, teaching methods, information on sexual risk in adolescents (HIV/AIDS and other sexually transmitted infections [STIs] and unintended pregnancy) and the *COMPAS* programme (intervention principles, activities and strategies to approach). The training sessions for experts and peers were done in a safe place at the research centres of each participating province, with minimal interruption. The performance of the facilitators in the classroom was discreetly monitored by facilitator trainers. Online tutoring sessions were provided to the facilitators to resolve doubts. To ensure implementation fidelity, records were completed about the level that the programme was followed during each session as well as a final one for every group receiving the training.

When an expert acted as the sole facilitator, he/she was responsible for delivering the classroom intervention in accordance with the facilitator's manual, as is commonly done to deliver a school-based programme in Spain. In contrast, when both an expert and a peer were the facilitators, the peer's role consisted of carrying out the programme as instructed in the facilitator's manual. An expert assigned to every peer introduced the programme to the students in the first session, attended the sessions to make sure that the programme was implemented appropriately, and gave clarifications or explanations, when needed. Throughout the intervention, the performance of the peer educator was monitored by the expert.

Data collection and measures

Participants were evaluated before- and, again, immediately after the intervention. A questionnaire was administered to them in the classroom. It had been pre-tested on ten adolescents to find out whether it was easily understandable and to determine the time needed for its completion. The questionnaire was not modified before it was administered in the classrooms. The confidentiality of responses was ensured by providing each participant with a personal code. The questionnaire included socio-demographic (age and gender), family (family structure), and school (academic performance) variables. The safe-sex predictors measured were HIV knowledge, attitudes towards HIV infection, perceived norms related to peer's condom use, and condom use intention[22,23].

Table 1 Curriculum outline and aims: *COMPAS* intervention.

Title	*Components*	*Aims*
AIDS and Health	Introduction to the *COMPAS* programme and healthy sexual behaviour Training to identify healthy and unhealthy statements Information about how HIV affects the immune system Information about HIV transmission routes Training to identify risk behaviours for HIV infection	Learning the biological, psychological and social aspects of HIV Identifying risk behaviours Learning basic prevention strategies
Knowing AIDS better	Information about HIV transmission and methods of protection Cognitive restructuring in order to eliminate mistaken beliefs	Differentiating the primary protection methods against AIDS, other sexually transmitted infections and unwanted pregnancies Acquiring a critical attitude against HIV transmission risk practices
Making decisions	Introduction to the problem-solving method and its application to affective-sexual relations Training in decision-making in the use of condoms as a protection against HIV Training in decision-making in the affective-sexual area through assessment of situations where there are obstacles to get a condom	Learning to apply problem-solving techniques in risk situations Learning to assess short- and long-term consequences, and make decisions that are more advantageous
Improving one's communication about sex	Introduction to the styles of communication: aggressive, assertive and passive Training in negotiating safe sex practices with sexual partners Training in techniques for resisting pressure to maintain risk behaviours Training in ability to use condoms despite obstacles to use them	Acquiring skills to raise the prospects of adopting safe sex practices with one's partner Learning how to resist pressure from engaging in risk behaviours Acquiring skills to overcome possible barriers in the way of using protection methods
Maintaining one's decisions	Training in correct use of condoms Training in self-instruction Training in covert behaviour rehearsal	Learning correct condom use Acquiring self-control to postpone or substitute a sexual risk practice for a safe one

We resorted to the HIV Knowledge Scale for Adolescents (HIV-KS)[24] to measure knowledge regarding the effects of HIV and its transmission by means of ten statements with three optional answers for each: True, False, or I don't know. The score the respondent could obtain ranged from 0 to 10. Examples of statements were, 'HIV is transmitted through vaginal and seminal secretions and blood', and 'HIV is transmitted through the air'. The internal consistency was adequate ($\alpha = 0.71$).

The HIV Attitude Scale for Adolescents (HIV-AS)[25] was utilised for assessing attitudes towards condom use, barriers to employing this barrier method, HIV detection methods, and persons with HIV/AIDS. The scale

consists of 12 items, with a total score ranging from 4 to 48. Examples of items are 'If I were to engage in a sexual relation and I realise we do not have condoms at hand, I would acquire them before engaging in sex', and 'I would be willing to undergo an HIV test if I engaged in risk behaviour'. The internal consistency was adequate ($\alpha = 0.73$).

Several questions addressed condom use intention and the perceived norm of applying protection methods. Perceived norms related to condom use were evaluated by means of questions such as 'Do you believe that classmates of your age use condoms when having sex?', with a dichotomous response, and 'With what frequency do you believe your classmates use condoms when having sexual intercourse?', with a four-point Likert-type scale. A question related to condom use intention was 'Would you be willing to use condoms when having sex?' with a dichotomous answer.

For analysing sexual behaviours, unprotected sexual intercourse and the number of sexual partners in the preceding six months were assessed. Examples of questions were 'What percentage of times do you use condoms when having sexual intercourse?', with a scale ranging from 0 to 100%, and 'How many sexual partners have you had in the last six months?'.

Procedure

The ethics committee at the Miguel Hernández University of Elche approved the study protocol. It entailed a multicentre project involving five provinces located in the centre (Madrid), north (Asturias, Castellón), and east (Alicante, Murcia) of Spain. From each of these provinces, three public schools were randomly selected, and those that had conducted some type of HIV/AIDS prevention project in the last year were discounted. The 15 participating schools were randomly assigned one of three work schemes: the *COMPAS* programme dispensed by experts, that same programme administered by experts *and* peers, and a control group without any intervention. A standard protocol was applied to entice the secondary schools' study participation. A total of 1036 adolescents aged between 14 and 18 years were recruited. Informed consent was sought from both the participants and their parents, and a 98% acceptance rate was achieved. Pre- *and* post-intervention evaluations could not be done in 10% of the cases, and 8% of the participants were excluded for not having attended at least three sessions. The intervention took place over five weeks (a weekly session lasting 50 minutes per group) in groups of 25 students.

Sample size and statistical analyses

The 832 students who met the requirements for valid participation were distributed into three groups: (i) that wherein the prevention programme was implemented by experts (IGE, Intervention Group Experts; $n = 371$); (ii) the group in which the prevention programme was implemented by both experts and peers (IGEP, Intervention Group Experts-Peers; $n = 241$); and (iii) the control group without any intervention (CG, Control Group; $n = 220$).

In the present study, schools were the unit of randomisation and individuals were the unit of analysis. To address this analytically, variance component estimates were computed using Restricted Maximum Likelihood (REML). To this end the potential clustering effects for each dependent variable were determined by testing the population variance factor. We tested whether a significant (non-zero) amount of variance was attributable to the random factor (school) using the Wald Z statistic. The effect of the *COMPAS* programme was assessed by means of univariate and multivariate analyses. Effect size was calculated according to Cohen's criteria[26]. Post-hoc paired comparisons were made by using the Sidak test to identify significant differences between groups. For data analyses we utilised the PASW 20.0 statistical programme.

RESULTS

Figure 1 represents the participants' flow chart throughout the study.

Sample profile

Table 2 summarises participants' characteristics per group at baseline. The mean age was 15.72 years (standard deviation [SD] = 0.73; range: 15–18 years). Sixty percent of the participants were female and their parents were married in 83% of the cases. Forty-three percent of the adolescents were sexually active and most (96%) identified themselves as heterosexual. Of the total sample, 1.5% had their first penetrative sex before the age of 14, 7% at the age of 14, and 24% at

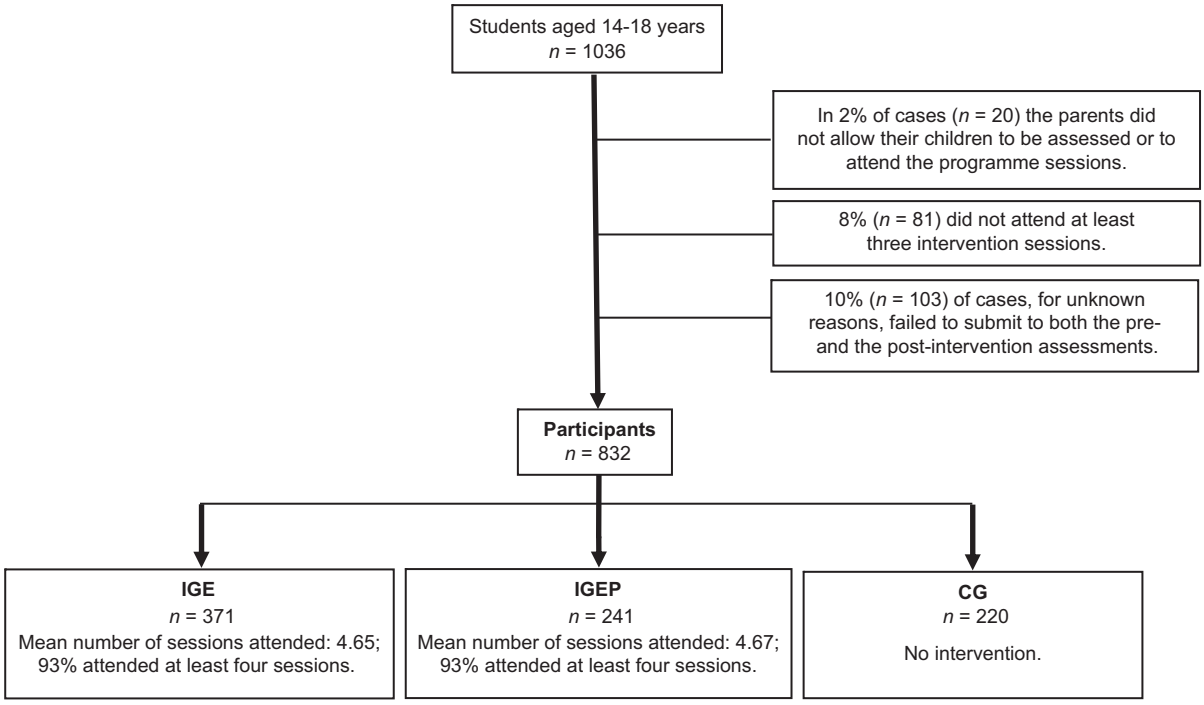

Figure 1 Flow-chart of participating students throughout the trial (IGE, Intervention Group – Experts; IGEP, Intervention Group – Experts and Peers; CG, Control Group).

the age of 15. The mean number of sexual partners in the preceding six months was 1.49 (SD = 1.23).

In the baseline analyses, the Wald Z statistic revealed that the population variance factor was similar by school in each experimental condition (IGE = 0.66, $p = 0.50$; IGEP = 0.59, $p = 0.55$; and CG = 0.48, $p = 0.62$), indicating that any school clustering effects were negligible and not statistically significant across the dependent variables. Although schools were randomly assigned to both the intervention- and control groups, there were baseline statistically significant differences in socio-demographic characteristics such as gender, age, and the proportion of sexually active adolescents between the three experimental conditions. There was a greater proportion of girls in the intervention groups than among controls ($p < 0.05$). The percentage of sexually active participants and the mean age were slightly higher in the IGEP in comparison to the other two groups ($p < 0.001$). These differences were controlled in all subsequent analyses.

Effects on safe sex precursors

At baseline, there were no significant differences in the outcome variables (HIV knowledge, attitudes towards HIV, perceived peer norms, and condom use intentions), except for knowledge about other routes of transmission (fluids such as vaginal secretions, semen and blood; air; washing clothes with those of a person with HIV/AIDS; and visiting a person infected with HIV). The mean score for this subscale was lower in the CG than in the IGE ($p < 0.05$). This baseline difference was controlled in all analyses. Significant differences were seen in HIV-related knowledge and attitudes towards HIV, but not in condom use intention or in perceived peer norms at the post-intervention survey.

HIV knowledge

In both intervention groups, *COMPAS* had a significant positive effect on HIV-related knowledge (F [2, 829] = 77.63, $p < 0.001$, $\eta^2 = 0.16$), as can be seen in Table 3. Post-hoc pairwise comparisons revealed differences in all subscales of HIV knowledge between the intervention groups and the CG ($p < 0.001$). Compared to controls, participants who received the intervention significantly increased their knowledge about oral transmission (HIV transmission through a glass, sharing food or water, and giving a

Table 2 Socio-demographic characteristics and self-reported behaviours at baseline of participating students by condition.

Characteristics	*IGE n = 371*	*IGEP n = 241*	*CG n = 220*	*Total N = 832*	*Test statistics*[a]	*p-value*
Number (%) of girls	236 (64)	152 (63)	115 (52)	503 (60)	8.39*	0.01
Mean age (SD), years	15.61 (0.76)	15.81 (0.69)	15.78 (0.71)	15.72 (0.73)	6.77**	0.00
Family structure, number (%)						
Married parents	309 (83)	199 (83)	186 (84)	694 (83)	8.08	0.42
Parents separated or divorced	53 (14)	31 (13)	23 (10)	107 (13)		
Unmarried cohabiting parents	3 (1)	4 (1)	2 (1)	9 (1)		
Single parents	0 (0)	2 (1)	1 (0.5)	3 (0.4)		
Lost one or both parents	6 (2)	5 (2)	8 (3)	19 (2)		
Sexual orientation, number (%)						
Heterosexual	352 (95)	231 (96)	209 (96)	742 (95)	0.42	0.98
Gay/homosexual	8 (2)	4 (2)	4 (2)	16 (2)		
Bisexual	11 (3)	6 (2)	7 (3)	24 (3)		
Sexually active, number (%)	146 (39)	125 (52)	87 (39)	358 (43)	10.81**	0.00
Sexual debut, mean age (SD), years[b]	15.10 (0.93)	15.03 (0.76)	14.94 (1.02)	15.04 (0.90)	0.78	0.45
Sexual partners, mean number (SD)[b]	1.60 (1.56)	1.35 (0.96)	1.48 (0.88)	1.49 (1.23)	1.25	0.28
Consistent condom use, number (%)[b]	59/146 (40)	48/125 (38)	33/87 (38)	140/358 (39)	0.18	0.91

IGE, Intervention Group with Experts; IGEP, Intervention Group with Experts and Peers; CG, Control Group; SD, standard deviation.

[a]*F* test for continuous variables and χ^2 test for categorical variables.

[b]Includes only participants who reported being sexually active at baseline ($n = 358$).

*$p < 0.05$; **$p < 0.01$.

Table 3 Impact of intervention on HIV knowledge and attitudes towards HIV/AIDS by type of intervention: IGE ($n = 371$), IGEP ($n = 241$) and CG ($n = 220$).

						Post-hoc comparisons[b]		
						IGE vs. CG	*IGEP vs. CG*	*IGE vs. IGEP*
	IGE	*IGEP*	*CG*	*F(2, 829)*[a]	*p-value*	*p-value*	*p-value*	*p-value*
Mean (SD) HIV knowledge								
Oral transmission	2.49 (0.89)	2.23 (1.07)	1.55 (1.20)	52.57	0.000***	0.000***	0.000***	0.012*
Effects	1.10 (0.89)	0.88 (0.87)	0.45 (0.66)	39.56	0.000***	0.000***	0.000***	0.004**
Other transmission routes	3.80 (0.60)	3.68 (0.70)	3.36 (1.03)	18.42	0.000***	0.000***	0.000***	0.509
Total	7.39 (1.63)	6.78 (1.83)	5.37 (2.13)	77.63	0.000***	0.000***	0.000***	0.001**
Mean (SD) HIV attitudes								
Obstacles	10.22 (1.84)	10.01 (2.01)	9.82 (1.88)	.81	0.445	0.507	0.751	0.989
HIV test	7.20 (1.01)	6.91 (1.28)	6.75 (1.23)	8.81	0.000***	0.000***	0.365	0.034*
Condom	14.68 (1.57)	14.20 (2.06)	13.94 (1.93)	9.51	0.000***	0.000***	0.509	0.013*
People living with HIV/AIDS	10.37 (1.67)	10.18 (1.72)	9.75 (1.73)	5.13	0.006**	0.004**	0.117	0.694
Total	42.47 (4.20)	41.30 (5.09)	40.25 (4.76)	10.18	0.000***	0.000***	0.123	0.060

IGE, Intervention Group – Experts; IGEP, Intervention Group – Experts and Peers; CG, Control Group; SD, standard deviation.
Adjusted by age, gender and differences in the pretest. *$p < 0.05$; **$p < 0.01$; ***$p < 0.001$.
[a]F is the ratio of the two estimates of variance (between-groups mean square value divided by the within-groups mean square value).
[b]Sidak's adjustment for multiple comparisons.

wet kiss) (IGE $d = 0.88$ vs. IGEP $d = 0.59$), HIV effects (IGE $d = 0.82$ vs. IGEP $d = 0.55$), other transmission routes (fluids such as vaginal secretions, semen and blood; air; washing clothes with those of a person with HIV/AIDS; and visiting a person infected with HIV) (IGE $d = 0.52$ vs. IGEP $d = 0.30$), and total HIV knowledge (IGE $d = 1.06$ vs. IGEP $d = 0.71$). Cohen's rates indicated that the intervention involving only experts had a higher impact than the experts' *and* peers' intervention on HIV knowledge measures. After the intervention, the IGE scored higher than the IGEP in three subscales of the HIV-KS: knowledge about oral transmission ($d = 0.26$), effects of HIV ($d = 0.24$), and total HIV knowledge ($d = 0.35$), these differences being of small to moderate magnitude[26].

Attitudes towards HIV

Changes in attitudes towards HIV following the intervention were only observed in the IGE ($F\,[2, 829] = 10.18$, $p < 0.001$, $\eta^2 = 0.03$). When compared to the CG, the IGE increased its scores in all subscales of the scale of attitudes, except for attitude towards condom use in the presence of barriers to that use. No significant differences were found in HIV attitudes between the IGEP and CG. However, adolescents to whom the *COMPAS* programme was dispensed by experts only showed more favourable attitudes towards the HIV test ($d = 0.39$) and condom use ($d = 0.42$) when compared to those belonging to the IGEP (Table 3).

Condom use intention

As shown in Table 4, no significant positive changes were observed in condom use intention following the intervention. Overall, almost 100% of the participants were willing to use condoms and more than 89% believed that getting condoms was easy. No statistically significant differences between the three experimental conditions were observed.

Perceived peer norms

Most participants felt that their peers use condoms during sexual intercourse, with a similar rate for the IGE (90%), IGEP (89%), and CG (92%) in the post-intervention survey. Therefore, the programme had no impact on the perceived norm related to peers' condom use (Table 4).

DISCUSSION

Findings and interpretation

The facilitator is considered one of the key variables related to the effectiveness of school-based HIV prevention interventions[4]. Although numerous controlled studies were carried out, no consensus exists about the contribution of peer education to the effectiveness of school-based HIV prevention programmes. With the intention of optimising existing resources and attaining the maximum benefit from preventive

Table 4 Impact of intervention on condom use intention and perceived norm by type of intervention: IGE ($n = 179$), IGEP ($n = 138$) and CG ($n = 103$).

		IGE	*IGEP*	*CG*	χ^2/*df*	*p-value*
Condom use intention, number (%)						
Willingness to use condoms	Yes	368 (99)	234 (97)	215 (98)	3.71/2	0.15
	No	3 (1)	7 (3)	5 (2)		
Easy access to condoms	Yes	331 (89)	261 (90)	206 (94)	4.98/2	0.08
	No	40 (11)	25 (10)	14 (6)		
Perceived norm, number (%)						
Condom use by peers	Yes	335 (90)	215 (89)	202 (92)	0.47/2	0.79
	No	36 (10)	26 (11)	18 (8)		
Frequency of peer's condom use	Always	131 (35)	77 (32)	77 (35)	1.30/2	0.52
	Almost	177 (48)	114 (47)	109 (50)		
	Sometimes	54 (15)	45 (19)	29 (13)		
	Never	9 (2)	5 (2)	5 (2)		

IGE, Intervention Group – Experts; IGEP, Intervention Group – Experts and Peers; CG, Control Group; df, degrees of freedom.

interventions in terms of reduction of sexual risk taking among adolescents, the effectiveness of their implementation must be analysed commensurate with the qualifications of the health agent involved.

This study revealed that *COMPAS* significantly improved HIV/AIDS knowledge among participants of both intervention groups compared to the CG. However, the IGE attained a higher level of total HIV knowledge than the IGEP in the post-intervention survey, especially regarding knowledge about oral transmission of HIV and the effects of HIV on the body. Compared to those of the CG, attitudes towards the HIV test, condom use, and people living with HIV/AIDS had improved in the IGE, but not in the IGEP. It is known that favourable attitudes towards condom use and a high level of knowledge concerning HIV/AIDS have positive long-term effects on HIV infection rates[27]. Because of this, sexual risk behaviour prevention programmes aim to improve attitudes and to increase knowledge related to HIV. In none of the three groups was an effect observed on perceived norms and intention to use condoms.

In short, the IGE had a greater impact on precursors of sex behaviour than the IGEP, compared to the CG. These results do not confirm our initial hypothesis, which was that the *COMPAS* programme administered by experts + peers would have greater effects than those obtained by the same programme dispensed only by experts.

Strengths and weaknesses of the study

The strengths of the study include the randomisation of intervention conditions, the use of a theory-based intervention, and the comparison of the efficacy of the delivery of the same intervention by, on the one hand, experts, and, on the other, by experts *and* peers. To the best of our knowledge, this is the first research evaluating the effectiveness of an HIV-prevention intervention targeting Spanish adolescents administered by health agents with different qualifications. In Spain, controlled studies evaluating prevention programmes are scarce and they do not evaluate the degree to which an intervention or programme is delivered as it was originally intended (fidelity of the implementation). *COMPAS* is a well-structured and rigorous programme and its administrators received a training course and engaged in online tutoring that enabled them to provide explanations and clarifications. Programme monitoring records evaluated the degree of adjustment to the protocol.

The major limitation of the study is the absence of monitoring of long-term results, one aspect that has yet to improve in Spain. The programme was implemented by only five experts and as many peers, and their competence level might have influenced the results. Unfortunately, the competence of the facilitators was not assessed in this study. According to previous studies evaluating the efficacy of peer-led intervention to reduce sexual risk taking among youths[10], the experts who participated in the current programme were similarly qualified and one may therefore assume they performed in a comparable fashion; this applied also to the peers.

Differences in results and conclusions in relation to other studies

Even though improvements in HIV knowledge were observed in both experimental groups, they are more marked in the IGE compared to the IGEP. Along this line, a recent study that examined trends of knowledge of HIV/AIDS prevention and its relationship to the sources of that knowledge among 20,619 young Israelis found that those who received HIV information from informal sources (friends or family) were more likely to have low HIV knowledge levels[28]. On the contrary, a classic review of intervention to reduce sexual risk for HIV in adolescents concluded that experts and peers have a similar impact[29]. The fact that the knowledge of HIV-related matters after the intervention was better among adolescents who were informed by experts than among those belonging to the IGEP may be related to the lack of credibility affecting the peers, who were youths of the same age, as was argued in a previous study[30].

Peers can influence normative perception and condom use intention in adolescents[31]. However, this study did not bring to light a significant improvement in the perception of their peers' condom use, the frequency thereof, or in condom use intention across the experimental conditions. This result may be due to the high scores achieved at the first evaluation. At baseline, the majority of participants perceived that their peers used condoms when having sex (88%) and were very much motivated to protect themselves from HIV/AIDS by resorting to this barrier method (97%). Even so, in both intervention groups, following the intervention, almost

90% of the respondents perceived that their classmates used condoms and more than 97% of them were willing to employ these during sexual intercourse, which contributes to reducing sexual risk[22,23].

Relevance of the findings: Implications for clinicians and policymakers

Our findings have important implications for the design and implementation of school-based interventions for reducing sexual risk, and the further evaluation of health agents delivering these. These initial results indicate that rigorous HIV-prevention programmes may positively impact the precursors of condom use, reducing sexual risk among adolescents. Therefore, public health agencies should promote such interventions to reduce the rate of STIs and unintended pregnancy among youths.

The most important lesson learned was that the type of implementer influences the programme's impact, and better results are achieved by experts. Our results revealed that peer education contribution can be considered a valid HIV-prevention strategy to increase knowledge about HIV, but with adolescents from Spain, it is not the most effective in the short term. HIV knowledge, social skills and problem solving are basic components in sexuality education prevention programmes. It is expected that peers possess less scientific knowledge and professional experience than health professionals[32], even when the peers receive good training and have the support of experts. Furthermore, the health agent's effect seems to be related to the cultural and social environment. While interventions administered by a community member increased condom use among Latin-American youths, in other cultures better outcomes were observed when the health agent was an expert[33]. Consistently, we found that interventions by experts had a greater impact on teenagers residing in Spain, which included only a few South American subjects. This suggests that Spanish adolescents are less influenced by their peers than South American youths.

Another lesson learned was that the similarity between the profile of the health agent and those of the persons receiving the intervention did not produce a greater effect on knowledge and attitudes towards HIV compared to that achieved by experts. Unlike findings of previous studies[6], ours does not support that similarity contributes positively to behavioural change.

Unanswered questions and future research

Future research is needed with long-term monitoring of the changes elicited by the intervention; this should allow determination of the influence of the health agent on school-based interventions to prevent HIV. Sexual behaviour measures (such as multiple sexual partners, consistent condom use, frequency of unprotected sex, STIs, etc.) to evaluate the efficacy of the intervention were not included in this study due to the short period of time elapsing between both evaluations and the relatively small proportion of sexually active adolescents at baseline (43%). Significant reductions in sexual risk practices are usually found in studies with medium- and long-term follow-up[34,35]. The qualifications and the quality of the facilitators are crucial factors for successfully developing and delivering programmes promoting sexual health. In a qualitative study in 15 schools throughout New Zealand, Allen[36] found that whoever was the facilitator, adolescents 16 to 18 years old valued qualities in the facilitators such as 'being knowledgeable', 'ability to relate to young people' and 'professionalism'. Research along these lines could contribute to identify the *best facilitator* to ensure the success of such interventions.

CONCLUSION

Information provided by experts was the most effective in the short term in improving HIV knowledge and attitudes towards condom use, the HIV test, and people living with HIV/AIDS among Spanish youths. Participation of a peer as co-facilitator, next to the expert, did not increase the efficacy of the programme. In this study, peers were trained to implement the intervention properly and their work was overseen by experts. In terms of efficiency of human resources, the involvement of only experts had a greater impact than that combining experts *and* peers. In Spain, *COMPAS* is the only programme promoting safer sex behaviours in adolescents whose efficacy has been evaluated with participation as facilitators of different types of health agents.

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REFERENCES

1. UNICEF. Opportunidades en tiempos de crisis: Evitar el VIH desde la primera adolescencia hasta el comienzo de la edad adulta. [Opportunities in times of crisis: Preventing HIV from early adolescence to early adulthood.] 2011. [In Spanish.] Accessed 24 January 2014 from: http://www.unicef.org/spanish/publications/files/Opportunity_in_Crisis-Report_SP_071311.pdf
2. European Centre for Disease Prevention and Control/WHO Regional Office for Europe. HIV/AIDS surveillance in Europe 2010. 2011. Accessed 24 January 2014 from: http://www.ecdc.europa.eu/en/publications/publications/111129_sur_annual_hiv_report.pdf
3. Spanish Ministry of Health, Social Policy and Equality. Estrategia Nacional de Salud Sexual y Reproductiva [National strategy for sexual and reproductive health]. 2011. [In Spanish.] Accessed 24 January 2014 from: http://www.msssi.gob.es/organizacion/sns/planCalidadSNS/pdf/equidad/ENSSR.pdf
4. Albarracín D, Durantini MR, Earl A. Empirical and theoretical conclusions of an analysis of outcomes of HIV-prevention interventions. *Curr Dir Psychol Sci* 2006;15:73–8.
5. Mason-Jones AJ, Flisher AJ, Mathews C. Who are the peer educators? HIV prevention in South African schools. *Health Educ Res* 2011;26:563–71.
6. Durantini MR, Albarracín D, Mitchell AL, *et al*. Conceptualizing the influence of social agents of behavior change: A meta-analysis of the effectiveness of HIV-prevention interventionists for different groups. *Psychol Bull* 2006;132:212–48.
7. FHI (Family Health International). *Peer education*. New York: Education Network 2011.
8. Kim CR, Free C. Recent evaluations of the peer-led approach in adolescent sexual health education: A systematic review. *Perspect Sex Reprod Health* 2008;40:144–51.
9. Medley A, Kennedy C, O'Reilly K, Sweat M. Effectiveness of peer education interventions for HIV prevention in developing countries: A systematic review and meta-analysis. *AIDS Educ Prev* 2009;21:181–206.
10. Simoni JM, Nelson KM, Franks JC, *et al*. Are peer interventions for HIV efficacious? A systematic review. *AIDS Behav* 2011;15:1589–95.
11. Tolli M. Effectiveness of peer education interventions for HIV prevention, adolescent pregnancy prevention and sexual health promotion for young people: A systematic review of European studies. *Health Educ Res* 2012;27:904–13.
12. Arnold EM, Rotheram-Borus MJ. Comparisons of prevention programs for homeless youth. *Prev Sci* 2009;10:76–86.
13. Lang DL, DiClemente RJ, Hardin JW, *et al*. Threats of cross-contamination on effects of a sexual risk reduction intervention: Fact or fiction. *Prev Sci* 2009;10:270–5.
14. Mason-Jones AJ, Mathews C, Flisher AJ. Can peer education make a difference? Evaluation of a South African adolescent peer education program to promote sexual and reproductive health. *AIDS Behav* 2011;15:1605–11.
15. Ballester R, Gil MD, Bravo JM, *et al*. What works well in the sexual prevention of AIDS in university students? In *Proceedings of the XVII World Congress of Sexology*; 10–15 July 2005: Montreal, Canada. World Association for Sexology 2005:437–8. [In Spanish.]
16. Callejas Pérez S, Fernández-Martínez B, Méndez Muñoz P, *et al*. Intervención educativa para la prevención de embarazos no deseados y enfermedades de transmisión sexual en adolescentes de la ciudad de Toledo [Educational intervention for the prevention of unwanted pregnancies and sexually transmitted diseases among adolescents in the city of Toledo]. *Rev Esp Salud Pública* 2005;79:581–9.
17. Prats J. Aplicaciones didácticas del programa "Sida: saber ayuda" [Educational applications of the "AIDS: know helps"]. 1997 [In Spanish.] Accessed 10 July 2013 from: http://www.bvsde.paho.org/bvsacd/cd90/1008MARapl.pdf
18. Espada JP, Orgilés M, Morales A, *et al*. Effectiveness of a school HIV/AIDS prevention program for Spanish adolescents. *AIDS Edu Prev* 2012;24:500–13.
19. Romero LM, Galbraith JS, Wilson-Williams L, Gloppen KM. HIV prevention among African American Youth: How well have evidence-based interventions addressed key theoretical constructs? *AIDS Behav* 2011;15:976–91.

20. Bandura A. Self-efficacy: Toward a unifying theory of behavioral change. *Psychol Rev* 1977;84:191–215.
21. Fisher JD, Fisher WA. Changing AIDS-risk behavior. *Psychol Bull* 1992;111:455–74.
22. Ajzen I. The theory of planned behavior. *Organ Behav Hum Decis Process* 1991;50:179–211.
23. Fishbein M, Ajzen I. *Belief, attitude, intention and behavior: An introduction to theory and research*. Reading, MA: Addison-Wesley 1975.
24. Espada JP, Huedo Medina TB, Orgilés M, *et al*. Psychometric properties of the HIV/AIDS Knowledge Scale for Spanish adolescents (HIV-KS). *Health Addict* 2009;9:149–64.
25. Espada JP, Ballester R, Huedo-Medina TB, *et al*. Development of a new instrument to assess AIDS-related attitudes among Spanish youngsters. *An Psicol* 2013;29:83–9.
26. Cohen J. *Statistical power analysis for the behavioral sciences*. Hillsdale, NJ: Erlbaum 1988.
27. Ross DA. Behavioural interventions to reduce HIV risk: What works? *AIDS* 2010;24:4–14.
28. Feldman BS, Kark JD, Zarka S, *et al*. Behavioral surveillance of knowledge about HIV/AIDS transmission and perceived need for additional knowledge in a national sample of young Israeli men and women between 1993 and 2005. *AIDS Behav* 2011;15:193–203.
29. Johnson BT, Carey MP, Marsh KL, *et al*. Interventions to reduce sexual risk for the human immunodeficiency virus in adolescents, 1985–2000: A research synthesis. *Arch Pediatr Adolesc Med* 2003;157:381–8.
30. Merakou K, Kourea-Kremastinou J. Peer education in HIV prevention: An evaluation in schools. *Eur J Public Health* 2006;16:128–32.
31. Maticka-Tyndale E, Barnett JP. Peer-led interventions to reduce HIV risk of youth: A review. *Eval Program Plann* 2010;33:98–112.
32. Sriranganathan G, Jaworsky D, Larkin J, *et al*. Peer sexual health education: Interventions for effective programme evaluation. *Health Educ J* 2010;71:62–71.
33. Albarracín J, Albarracín D, Durantini M. Effects of HIV-prevention interventions for samples with higher and lower percents of Latinos and Latin Americans: A meta-analysis of change in condom use and knowledge. *AIDS Behav* 2008;12:521–43.
34. Jemmott JB 3rd, Jemmott LS, Fong GT, Morales KH. Effectiveness of an HIV/STI risk-reduction intervention for adolescents when implemented by community-based organizations: A cluster-randomized controlled trial. *Am J Public Health* 2010;100:720–6.
35. Maticka-Tyndale E, Wildish J, Gichuru M. Quasi-experimental evaluation of a national primary school HIV intervention in Kenya. *Eval Program Plann* 2007; 30:172–86.
36. Allen L. 'It's not *who* they are it's *what they are like*': re-conceptualising sexuality education's 'best educator' debate. *Sex Educ* 2009;9:33–49.