

Title: What works well in HIV prevention among Spanish young people? An analysis of differential effectiveness among six intervention techniques.

Running Head: What works well in HIV prevention among young people?

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Abstract

The AIDS epidemic remains a concern of public health among young people and adolescents. Prevention programs have revealed diverse deficiencies to attain their main goal: preventing risky behaviors. This experimental study evaluates the differential effectiveness of six intervention techniques for preventing HIV/AIDS based on Informational-Motivational-Behavioral Model (talk, website, attitudinal discussion, participation of a seropositive person, fear induction and role play). 239 Spanish young people took part in an experimental design to evaluate six intervention techniques and a non-intervention condition, through changes in their knowledge, attitudes and protective sex behavior. Our findings support a general effectiveness of preventive intervention techniques comparing non-intervention. In particular, the motivational techniques reveal more effectiveness for these Spanish young people. Therefore, it is required identifying a differential impact of the intervention techniques when implementing HIV behavioral interventions.

Keywords: effectiveness; HIV/AIDS prevention; young people; evaluation; intervention technique.

Resumen

La epidemia del VIH todavía supone un problema de salud pública entre la población joven y adolescente. Los programas de prevención han revelado diversas deficiencias para conseguir su objetivo: prevenir las conductas de riesgo. Este estudio experimental evalúa la eficacia diferencial de seis técnicas de intervención para prevenir el VIH-Sida, basados en el Modelo Información-Motivación-Conducta (charla, web, discusión actitudinal, participación de una persona seropositiva, inducción del miedo y juego de roles). 239 jóvenes españoles participaron en un diseño experimental para evaluar seis técnicas de intervención y una condición de no intervención, mediante cambios en su conocimiento, actitudes y conducta sexual segura. Nuestros hallazgos apoyan la efectividad general de las técnicas de intervención preventivas frente a la no intervención. En particular, las técnicas motivacionales revelan más efectividad para este tipo de jóvenes. Así pues, parece necesario identificar el impacto diferencial de las técnicas de intervención cuando son implementadas.

INTRODUCTION

HIV-AIDS is affecting young people disproportionately. Around the world, 39% of new HIV infections occurred among young people in 2012¹. In Europe, the impact of HIV remains a major public health concern and the rate of new HIV infections related to sex behavior continues to rise². However, there are many differences among European countries³. For example, Spain exceeds the regional average in HIV prevalence, 94% of new infections are related to sexual transmission, approximately 50% among young people and 66% have studied high school or some degree⁴. The impact of HIV in Spain occurs across diverse populations of young people, including those who are studying at University⁵.

In order to reverse HIV-AIDS tendency, the scientific community has attempted to develop effective interventions in different settings⁶. Few biomedical interventions have proven efficacy⁷, including male circumcision⁸ and early antiretroviral therapy for HIV serodiscordant couples⁹. In addition, methods for preexposure HIV prophylaxis are emerging¹⁰ even though side effects and cost remain concerns^{9,11}. Concurrently, behavioral programs have demonstrated effectiveness to decrease HIV risk behavior^{12,13} and reduce AIDS stigma¹⁵. In addition, behavioral interventions for young adults have not revealed unintended adverse effects such as promoting early sex behaviors^{14,16}. For example, some theoretical models as the Information-Motivation-Behavioral Skills Model (IMB)¹⁷ have been effective to prevent HIV^{18,19,20}. In particular, IMB supports that HIV preventive behavior is influenced by three determinants which explain the 75 percent of its variance²¹: information, motivation and behavioral skills. The first one includes facts about HIV transmission, prevention and treatment. The second one includes attitudes and behavioral intention to engage preventive behavior. Finally, the last one includes abilities for engaging HIV preventive behaviors²¹. For this model,

AIDS prevention information and motivation deal with AIDS prevention behavior skills to facilitate the beginning and maintenance of AIDS preventive behavior²². Accordingly, programs would include these main determinants related to behavioral change¹⁷: HIV information (knowledge about HIV transmission and prevention which guides protective actions), HIV prevention motivation (perceptions of personal vulnerability to HIV infection added to personal and social motivation to engage in protective behavior) and HIV prevention behavioral skills (ability and the perceived self-efficacy about the sequence of HIV protective behaviors). In view of this, identifying and addressing weaknesses in relevant information, motivation and behavioral skills would be an effective approach for promoting health behavioral change¹⁹.

Nevertheless, many questions remain about the best approach to facilitate the change or avoidance of sexual risk behaviors. For example, in some experiences, informational intervention has not been as effective as others²⁰, though delivering information via websites on HIV/AIDS prevention has been promising²³. Regarding others experiences, contact with a person living with HIV has reduced stigma and may impact risk behaviors in young people²⁴. To continue with motivation, some researchers state that inducing fear in preventive campaigns can negatively affect preventive behaviors²⁵, while others believe that certain fear-inducing techniques can be effective²⁶ including it among latinos²⁷. Moreover, small discussion groups have been used to improve HIV-related attitudes¹⁹. Regarding behavioral skills, some literature addresses the efficacy of conducting role-plays around condom use and related social skills²⁸. For example, in a study of HIV prevention among 283 young people, one HIV risk reduction intervention based on theatrical performances and role-play achieved positive results relative to a control group results than non-intervention²⁹. However, despite some measurable

changes in youths' practices across different countries³⁰, behavioral interventions have not yet realized their potential for sexually active youths³¹. Therefore, customizing HIV prevention programs to fit specific contexts is required³⁰.

In this context, studies have often examined the overall effectiveness of different HIV prevention programs³² or compared isolated intervention techniques³³ and, sometimes, a limited number of them^{27,30}. For example, in Spain, a school prevention program which included informational, motivational and behavioral determinants revealed its global effectiveness among Spanish adolescents³⁴. Some researchers have focused on differential effectiveness among two or three intervention techniques. For instance, a comparison between informational techniques revealed the superiority of face-to-face technique compared to online information³⁵. Concerning isolated intervention techniques, the effectiveness of informational technique such as a brochure about STDs with visual aids³⁶ and social media campaigns³⁷ were verified among Spanish young people and adolescents. Therefore, there is not experimental background which analyzes the differential effectiveness among more intervention techniques. This is important due to the lack of economic and temporary resources which make us be effective and efficient in the prevention. Considered this need and the gap of information, especially for Spanish population, this study examines the effectiveness of different intervention techniques for HIV prevention (based on different determinants of IMB model) addressed Spanish young people.

Hypotheses

1. Intervention techniques will facilitate more improvement of HIV prevention determinants (Information and attitudes -perceived risk, trust in condom-) and protective behaviors, measured by dichotomic and likert items, among participants than comparable young people who are involved in a non-intervention group.

2. Young people who participate in a specific intervention technique (included in informational, motivational or behavioral skills techniques) based on a particular determinant (Information, attitudes - perceived risk, trust in condom- or protective behavior measured by dichotomic and likert items) will get better results for this type of determinant than others young participants involved in other intervention techniques:

2.1. In informational intervention techniques (talk and website group) young participants will have more information about HIV transmission (measured by dichotomic items) than comparable young people in motivational and behavioral skills techniques.

2.2 In motivational techniques (attitudinal discussion, seropositive facilitator participation and fear induction) young participants will show more changes in perceived risk and trust in condom (measured by likert items) than comparable young people in informational and behavioral skills technique.

2.3. In behavioral skills technique (role-play group) young participants will improve more protective behaviors (measured by likert items) than comparable young people in informational and motivational technique.

3. Motivational techniques will get better results for protective behaviors (use of condoms) than the other techniques (informational and role-play group) in these young participants.

METHOD

Participants

239 young people from Spain participated in this study. Most participants were female (75%); their average age was 20.9 years (SD=1.9), ranging from 18 to 25 years old. All of them were Spanish, lived in urban areas in Valencia and Castellón, and belonged to middle class. Most of them studied high school (85.8%) and some of them had got their

degree (14.2%). The most part self-identified as heterosexual (90.8%) and some of them as homosexual (3.3%) or bisexual (3.3%). A minority (2.5%) refused to report sexual orientation.

Procedure

This study used a fully crossed experimental design to compare the differential effectiveness among diverse intervention techniques to prevent HIV. Participants were randomly assigned to seven conditions: 6 intervention techniques and 1 non-intervention condition. Participants completed measures at baseline, posttest, 1 and 4 months follow-up.

Experimental conditions

The experimental conditions were six intervention techniques based on different determinants of IMB model and we established one control group (CG). In particular, the intervention techniques contained general issues related to HIV prevention; they lasted approximately one hour and were developed in a research meeting room. All of them included three moments: (1) an introduction which tried to create confidence and to explain the intervention, (2) the development of the key technique and (3) the closing in which conclusions were elaborated. Regarding the informational determinant there were two techniques: a “talk group” and a “website group”. For the first one, an educator provided general knowledge meanwhile participants were passive recipients of the information through oral communication and without illustrative tools. Participants facing to educator received this information passively because they only had to listen. The educator did not facilitate debate. However, the second one incorporated a website where participants searched actively information about HIV/AIDS. In this element, participants were sat separately in different computers and read HIV information by themselves on a website addressed young people (www.unisexsida.uji.es). The educator

only explained the different parts of this website and, then, young participants search on the information. In this intervention, the facilitator did not create a debate either. Both of them explained the same contents: HIV transmission routes, preventive behaviors, the impact of the epidemic and HIV antibody testing. Two techniques were used to increase the knowledge because the influence of new technologies on HIV behavioral changes³⁸.

Three behavior change techniques (BCTs) were used to increase one of the motivational determinants, attitudes: the “attitudinal discussion group”, the “seropositive facilitator group” and the “fear induction group”. The first one was an attitudinal discussion related to HIV/AIDS in which an educator facilitated a debate, including questions and keywords about HIV-AIDS (the same topics covered in the informational techniques). The educator coordinated the young’s turns. They were sat down in circle and the educator participated when they had exposed misconceptions or made erroneous conclusions about HIV-AIDS. The second technique involved a young HIV seropositive person, who represents the same social characteristics as young participants, explained his experiences with HIV infection to them. Face to face, he described his risky sexual practice which caused his infection and also his experience with HIV test and different problems related to treatments and social relations (stigma and social isolation). In addition he focused on HIV routes transmission and the best methods to prevent HIV infection. Participants were sat down in circle. When HIV young educator finished his exposition, participants asked their doubts and interests to him who was answering all of them. The third technique showed fear-inducing images and video messages on the impact of HIV in order to elicit fearful attitudes towards HIV. The educator introduced the video and the activity, but did not explain concepts. Young participants only watched this video and could not ask doubts.

Finally, regarding behavioral skills, the “role-play group” included a role-play on dealing with risky sexual situations and communicative skills for negotiating condom use. Some participants were acting in the role play while the other participants (included the educator) shared their feedback about their representations. In addition, they exposed some possibilities to improve their communicative skills and ability to put on a condom. This unique technique comprised the main meaning of this determinant.

Recruitment

For the recruitment, according to ethical principles of A.P.A, 250 young people who had learned about our research through advertising in local press and on the website of UNISEXSIDA (research team focused on HIV/AIDS prevention belong to Universitat Jaume I), received additional information about the study in the research meeting room. Potential participants engaged in a brief conversation with the researchers about the study’s main objectives and methodology, as well as their responsibilities during participation and ethical issues. Then, most of the participants gave their informed consent and took part voluntarily. They completed the questionnaires confidentially and anonymously and participated in the different experimental conditions. Participants received 10 euros for completing the study.

Ultimately, 239 of those who inquired (95.6% of participants) enrolled in the study and provided their informed consent and 74% completed all the follow-ups. Participants were randomly assigned experimental conditions and the control group. In order to obtain equal presence of both genders, a table of assigned numbers was generated to divide participants in the different experimental conditions considering the same number of men and women for each group. In addition, the non-existence of statistical differences among the experimental conditions were tested.

Regarding the maintenance of participants, 4.4% young people of the first recruitment reported some difficulties to finish the follow-ups. Regarding the 21.6% who drop out they informed unexpected complications to be present at the meeting room for the follow-ups.

Ninety-seven percent of participants completed posttests immediately after the intervention, 81% completed first follow-up one month after and 74% completed the second follow-up four months afterward.

Measure

The AIDS Prevention Questionnaire³⁹ evaluates psychosocial indicators related to HIV/AIDS transmission. In particular, 65 items in pretest version explores socio-demographical variables, information, attitudes, self-efficacy, preventive behavior intention and preventive behavior. Regarding information, there are 12 items including dichotomic questions and Likert items (ranging from 0 to 3) which explore transmission routes, preventive methods, the infection process in seropositive people, HIV testing and HIV treatment. To facilitate the analyses we obtained informational variable (*information of HIV transmission*) adding its items about particular HIV transmission routes, ranging from 0 (no knowledge) to 13 (great knowledge). For attitudes, there are 8 items which evaluate health relevance by Likert item (from 0 –not important at all- to 10 –very important-), seriousness and risk perceived of HIV-AIDS (from 0 –not at all- to 100 –a lot-) or condom perception (from 0 –not trusty at all- to 3 –very trusty-), which is also examined by multiple-choice question. Self-efficacy is evaluated by examining how young people cope with risky situations according to the Likert item, ranging from 0 (Absolutely disagree) to 6 (Totally agree). Six likert items are related to risk and perceived fear (from 0 –not risky at all- to 100 –very risky-), and preventive behavior intention was assessed by likert items in different practices ranging from 0

(never) to 3 (always), a general question and a multiple-choice question. To clarify the analyses, considered the main focus on people exposure to HIV infection, we have grouped behavioral report into two categories: safe sex behavior (using condoms always and not having risky sex behavior) and risky sex behavior (using condoms rarely or sometimes). Additionally, the questionnaire explores situational factors related to risky sexual behavior through yes/no questions. HIV testing is explored through 9 items, yes/no questions and open questions. Finally, the questionnaire explores solidarity towards seropositive people through 5 items: multiple choice, likert item (from 0 –not solidary at all- to 100 –very solidary-) and a dichotomic question.

The Questionnaire has revealed psychometrical adequacy³⁰: internal consistency (Cronbach's alpha of 0.700), test-retest reliability (correlation of 0.830) and validity (correlation of .790). In particular, for this study, the internal consistency by Cronbach's alpha was 0.70 and the test-retest reliability by correlation was 0.78).

For this study, determinants and HIV prevention behaviors were assessed: informational determinant (information of HIV transmission), attitudinal determinant (risk perceived of HIV and trust in condom use) and protective behavior for different sexual acts (vaginal sex and anal sex) and one risky condition (after consuming drugs).

Analyses

Firstly, to compile the essential characteristics and descriptive information about the different independent variables at pretest, posttest and follow-ups, descriptive statistics were performed (mean and standard deviation or percentages of frequency). In order to verify the baseline differences at pretest, the ANOVA analysis was done for informational and attitudinal outcomes and Kruskal-Wallis test for protective behavior. Concerning informational and attitudinal outcomes, to examine differences among the

intervention techniques and the control group at posttest and follow-ups, controlling possible baseline differences, we carried out ANCOVA for informational and attitudinal outcomes. Moreover, to examine the possible differences of each intervention techniques, through the different evaluation points, ANOVA was done. Regarding safe sex behavior, when we had tested baseline differences, we used Kruskal-Wallis test to evaluate the differential effectiveness of these techniques at posttest and follow-ups. To analyze the evaluation of each intervention technique for safe sex behavior, Friedman test was done. Moreover, the effect sizes (ES) were calculated using Hedges'd and confidence intervals for informational and attitudinal outcomes. In safe sex behaviors, the ES were calculated through the HLS-Meta program by Huedo-Medina, Lally & Sagherian (2013). Finally, we performed a linear regression analysis to verify the relation between the types of intervention techniques and safe sex. In order to analyze this regression we added the protecting behavior items for all the sexual behaviors (vaginal sex, anal sex and after consuming drugs), ranging from 0 (never use condom) to 9 (always use condom). We tested normality and linearity assumptions before conducting these tests. To improve the accuracy of analyses, an imputation technique was used for missing data. We used SPSS-19 for all the statistical analyses.

RESULTS

Descriptive information about participants

In general, participants reported misinformation on HIV transmission. In particular, 10% believed that physical appearance always reflects HIV sero-status, 73% identified barriers to use condoms and 53% did not consider HIV infection-AIDS as an important health problem. Regarding sexual experience, 75% of participants reported having it. Most of men (83%) reported mutual masturbation, followed by oral sex (76%), vaginal

sex practice (71%) and anal sex (17%). In case of women, most of them reported mutual masturbation (77%) and vaginal sex (77%), followed by oral sex (65%) and anal sex (12%). These practices have not revealed differences statistically significant based on gender or origin. Only 40% of participants reported systematically protected vaginal intercourse, 2% always used condoms during anal sex and 28% always used condoms after using drugs. However, only 18% were aware that their own unsafe behaviors. Concerning same-sex practices, 7% of participants had been involved same-sex, 9% of men and 6% of women. This has not revealed differences statistically significant based on origin or gender.

Informational techniques: talk group and website group.

Firstly, the talk group has obtained differences statistically significant in information by ANOVA ($F=13.49$, $p \leq .001$). In addition, this group has got large ES by Hedges' d at pretest posttest comparison and at pretest second follow-up comparison. For trust in condoms, talk intervention group exceeds the other groups at second follow-up by ANCOVA ($F=4.02$, $p \leq .001$) and this obtains differences statistically significant by ANOVA ($F=6.59$, $p \leq .015$) (see table 2). Even the control group obtains differences statistically significant ($F=4.97$; $p \leq .044$) these have not been supported see confidence intervals of the ES. In perceived risk of HIV infection, this group has obtained medium ES at pretest first follow-up comparison, although the other comparisons have been lower (see table 3).

Concerning protective behavior (see table 4), talk group has revealed the best result for vaginal sex, based on differences statistically significant by Friedman test ($\chi^2=20$, $p \leq .001$), and this has also obtained them in anal sex ($\chi^2=14.76$, $p \leq .002$). However, these results have not been supported by the ES.

Secondly, the website group has also got differences statistically significant for information about HIV transmission ($F=8.37$, $p\leq.008$) and large ES at pretest posttest comparison and pretest second follow-up comparison. Nevertheless, for trust in condom and perceived risk of HIV infection, ES have been lower. Regarding protective behavior, this group has obtained differences statistically significant in anal sex ($\text{Chi}^2=9.75$, $p\leq.021$), exceeding together with the seropositive participant the others at posttest ($\text{Chi}^2=16.71$, $p\leq.010$).

Table 1

Table 2

Motivational techniques: attitudinal discussion group, seropositive participant group and fear induction group.

Firstly, attitudinal discussion group has obtained differences statistically significant by ANOVA ($F=30.18$, $p\leq.001$) and large ES. In trust in condom use and perceived risk of HIV infection, attitudinal discussion group has obtained lower ES. Concerning protective behaviors, this group has revealed differences statistical significant in vaginal sex ($\text{Chi}^2=19.57$, $p\leq.001$), anal sex ($\text{Chi}^2=20.10$, $p\leq.001$) and having sex after drug consumption ($\text{Chi}^2=13.75$, $p\leq.003$) which is the highest difference statistical significant. The ES have been low. Moreover, in anal sex, this group and seropositive participant group exceed the other groups at first follow-up ($\text{Chi}^2=13.07$, $p\leq.042$).

Secondly, the seropositive participant group has obtained differences statistical significant in information ($F=18.87$, $p\leq.001$) and medium ES at midterm and higher at long-term. In addition, this group exceeds the others at second follow-up ($F=2.77$; $p\leq.013$). In trust in condom, this group has also obtained a medium ES for comparison pretest first follow-up although the other comparisons have been low, as well as the comparisons in perceived risk of HIV infection. Regarding protective behavior, this

group has obtained differences statistical significant in anal sex ($\text{Chi}^2=25.72$, $p\leq.001$), after drug consumption ($\text{Chi}^2=10.81$, $p\leq.013$) and vaginal sex ($\text{Chi}^2=9.13$, $p\leq.028$) although these have not supported by the ES. In addition, in anal sex, this group exceeds the others at posttest and first follow-up by Kruskal Wallis.

Thirdly, the fear induction group has obtained differences statistically significant by ANOVA ($F=22.29$, $p\leq.001$) and large ES in information about HIV transmission. In trust in condom the ES of this group have been lower although in perceived risk of HIV infection, this group has exceeded the others at second follow-up ($F=2.17$; $p\leq.046$). Concerning protective behaviors, fear induction group has obtained differences statistically significant in having sex after drug consumption ($\text{Chi}^2=9.98$, $p\leq.019$), but the ES is low.

Table 3

Table 4

Behavioral skills technique: role-play group.

Regarding information about HIV transmission, the role play group has obtained differences statistically significant by ANOVA ($F=15.55$, $p\leq.001$) and this has exceeded the other groups at first follow-up ($F=3.55$, $p\leq.002$). In addition, this has got medium ES at short-term and long-term and large ES at midterm. In trust in condom this group has revealed lower ES although in perceived risk of HIV infection, this has obtained a large ES at pretest posttest comparison. In protective behavior, this group has obtained differences statistically significant for vaginal sex ($\text{Chi}^2=15.53$, $p\leq.001$) but the ES is low.

Prediction of condom by intervention techniques. In general, the seropositive participant is the only intervention technique which has been related to behavioral change. Regarding protecting behavior at post-test, seropositive intervention explained 3.4% of

variance ($\beta=1.26$, $SE=0.40$) with difference statistically significant ($F=9.78$; $p\leq.006$). At 1st follow-up is also the only one included in the model, explaining 5.6% of variance ($\beta=1.37$ $SE =0.53$) with difference statistically significant ($F=6.69$; $p\leq.024$). Finally, at 2nd follow-up, the seropositive participant intervention explained 9% of variance ($\beta=2$, $SE =0.26$) significant statistically ($F=5.43$; $p=.021$).

To sum up, informational techniques have improved information about HIV transmission and some protective behaviors, particularly, the talk technique. Regarding motivational techniques, seropositive participant and attitudinal discussion have revealed more significant results in protective behavior. Moreover, both of them have obtained differences statistically significant for information, although fear induction has obtained the highest statistical differences in this determinant. Behavioral skills technique has some improvements in information and perceived risk of HIV infection, as well as condom use in vaginal sex.

DISCUSSION

In general, our results confirm the effectiveness of behavior change techniques in HIV prevention for this type of young people^{14,30,40}. As we postulated in the first hypothesis, most of the young participants in the different intervention techniques showed higher increase of safe sexual practices compared to the non intervention.

In addition, regarding the second hypothesis, our findings have supported the differential effectiveness among the evaluated techniques, based on different determinants of IMB model, for these young people⁴¹. However, contrarily as we expected, some techniques have obtained higher results in different determinants.

For example, concerning the informational techniques, these got better results for information about HIV transmission but they have also improved motivational and

behavioral determinants. In particular talk intervention has got better results than website technique. The first one has improved trust in condoms and protective behavior for vaginal sex and having sex after drug consumption. Possibly, face to face interaction would improve more easily the protective behavior than an online technique which has not included human interaction³⁵. Therefore, these results differ from our second hypotheses. That is, one single behavior change technique could improve several determinants, independently of its main determinant of IMB.

Similarly, two interventions based on the motivational determinant, the attitudinal discussion and the participation of a seropositive young, have revealed the best improvement. Both of them have got better results for information about HIV transmission and protective behaviors in the three sex acts. The attitudinal discussion has exceeded others in having sex after drugs consumption, while the second one has exceeded others in anal sex. In addition, the seropositive participant is the only one that has been related to behavioral change. Moreover, attitudinal discussion and fear inducement have got the best results in information, even exceeding talk and website conditions (based on informational determinant). Probably, this would be because both of them included motivational messages about HIV transmission. In addition, the attitudinal discussion was based on participatory learning which has already demonstrated its relevance for HIV interventions⁴². Fear inducement has also got better results for having sex after drugs consumption. This result would support the demonstrated effectiveness of fear inducement for some determinants among Latinos²⁷ and other populations⁴³.

Regarding intervention based on skills determinant, role play intervention has improved information about HIV transmission and safe behavior in vaginal sex. However, young people who were involved in seropositive participant and attitudinal discussion

interventions have revealed more important behavioral changes than role play group. In this sense, our findings have not confirmed the relevant effectiveness of role play in past studies²⁸. Therefore, according to IMB model, our results would support the relevance of motivational determinants to achieve and maintain preventive behavior²².

Regarding the third hypothesis, the seropositive participant (one of the motivational techniques) is the only one associated with use of condoms although not the others. In particular, the results of young seropositive participation would agree past studies across different countries such as Botswana⁴⁴ and United States²⁵ or China, in case of attitudinal discussion technique¹⁹. In line with IMB, in order to develop protective behaviors, these young people would need more effort for changing motivational determinants but not for changing behavioral skills.

There were several limitations to the current study. First, our sample was not large enough to include several control variables in the regression analyses such as sexual orientation, sexual experience, type of partner (casual or regular), etc. Therefore, future studies may include a greater number of participants to increase statistical power and allow for further analyses. Another limitation could be the 74% rate of follow up at 4 months. This may impact the validity of the conclusions made regarding the long-term benefits of these interventions. Consequently, we should guarantee a long-term evaluation in the future.

CONCLUSION

To sum up, despite the aforementioned limitations, this study has implications for research and practice, identifying core techniques to improve HIV prevention²⁸. Firstly, our findings support the effectiveness of behavior change techniques for HIV prevention. In particular, it has revealed the major effectiveness of motivational techniques such as the participation of a seropositive young and attitudinal discussion.

Both of them should be included in preventive programs addressed this type of young people. In addition, the relevance of face to face informational techniques should be considered for HIV prevention. As well as, it would be required studying in depth the effect of the information on behavior change mediated by motivation. Behavioral interventions are effective to prevent HIV risk behaviors and we should optimize them to change the trend of HIV-AIDS epidemic.

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TABLES

Table 1. Differential impact of techniques on “Information about HIV transmission”

Group	Pre	Post	1	4	ANOVA (df=1) (p)	d (Confidence Interval)		
	n=239 (100%) Mean (SD)	n=232 (97%) Mean (SD)	Month n=194 (81%) Mean (SD)	months n=176 (74%) Mean (SD)		Pre-post	Pre- Follow-up1	Pre- Follow-up2
Talk group	10.02 (1.83)	11.67 (0.99)	11.04 (1.37)	11.50 (1.10)	13.49* (.001)	0.88 (0.49;1.27)	0.54 (0.18;0.90)	0.79 (0.41;1.17)
Website group	9.78 (1.76)	11.68 (1.30)	10.74 (1.91)	11.62 (1.03)	8.37* (.008)	1.04 (0.57;1.51)	0.52 (0.12;0.93)	1.01 (0.55;1.47)
Attitudinal discussion group	10 (1.94)	11.42 (1.44)	11.45 (1.24)	11.92 (1.07)	30.18* (≤.001)	0.71 (0.39;1.04)	0.73 (0.40;1.06)	0.97 (0.61;1.32)
Seropositive participant group	10.80 (1.77)	11.28 (1.66)	11.72 (0.88)	12.11 (0.83)	18.87* (≤.001)	0.26 (-0.07;0.60)	0.50 (0.15;0.86)	0.72 (0.35;1.09)
Fear induction group	9.73 (1.58)	11.43 (1.33)	11.10 (1.52)	11.36 (1.60)	22.29* (≤.001)	1.05 (0.68;1.42)	0.85 (0.50;1.20)	1.01 (0.64;1.38)
Role-play group	10.50 (1.89)	11.62 (1.16)	11.95 (0.92)	11.80 (1.45)	15.55* (≤.001)	0.58 (0.24;0.91)	0.75 (0.40;1.03)	0.67 (0.33;1.01)
Control group	9.78 (1.76)	10.14 (1.87)	11.32 (1.32)	10.67 (0.89)	4.49 (.054)	0.19 (-0.33;0.72)	0.82 (0.21;1.42)	0.47 (-0.07;1.02)
$F_{(df=6)}$	1.56	2.55*	3.55*	2.77*				
(p)	(.159)	(.020)	(.002)	(.013)				

Table 2. Differential impact of techniques on “trust in condom use”

Group	Pre	Post	1	4	ANOVA (df=1) (p)	d (Confidence Interval)		
	n=239 (100%) Mean (SD)	n=232 (97%) Mean (SD)	Month n=200 (84%) Mean (SD)	months n=176 (74%) Mean (SD)		Pre-post	Pre- Follow-up1	Pre- Follow-up2
Talk group	2.48 (0.61)	2.75 (0.42)	2.74 (0.42)	2.78 (0.39)	6.59* (.015)	0.43 (0.08; 0.77)	0.41 (0.07;0.76)	0.48 (0.13;0.83)
Website group	2.18 (0.68)	2.22 (0.75)	2.40 (0.63)	2.18 (0.63)	.218 (.645)	0.05 (-0.32;0.43)	0.31 (-0.07;0.70)	0 (-0.37;0.37)
Attitudinal discussion group	2.58 (0.54)	2.63 (0.71)	2.58 (0.50)	2.62 (0.40)	0.09 (.764)	0.09 (-0.20;0.38)	0 (-0.29;0.29)	0.07 (-0.21;0.36)
Seropositive participant group	2.34 (0.76)	2.58 (0.77)	2.74 (0.44)	2.61 (0.58)	3.97 (.054)	0.30 (-0.03;0.64)	0.51 (0.16;0.86)	0.34 (0.00;0.688)
Fear induction group	2.41 (0.76)	2.46 (0.63)	2.56 (0.47)	2.54 (0.44)	2.25 (.141)	0.06 (-0.23;0.36)	0.19 (-0.10;0.49)	0.16 (-0.13;0.46)
Role-play group	2.45 (0.67)	2.57 (0.50)	2.62 (0.46)	2.57 (0.43)	1.88 (.178)	0.17 (-0.13;0.48)	0.24 (-0.06;0.56)	0.17 (-0.43;0.48)
Control group	2.42 (0.64)	2.50 (0.65)	2.71 (0.42)	2.75 (0.37)	4.97* (.044)	0.11 (-0.40;0.64)	0.42 (-0.12;0.97)	0.48 (-0.06;1.03)
$F_{(df=6)}$	1.09	1.52	1.74	4.02*				
(p)	(.364)	(.170)	(.111)	(.001)				

*p≤.05

Table 3. Differential impact of techniques on “perceived risk of HIV infection”

Group	Pre	Post	1	4	ANOVA A(df=1) (p)	d (Confidence Interval)		
	n=239 (100%) Mean (SD)	n=232 (97%) Mean (SD)	Month n=200 (84%) Mean (SD)	months n=176 (74%) Mean (SD)		Pre-post	Pre- Follow-up1	Pre- Follow-up2
Talk group	15.21 (19.27)	22.40 (27.39)	25.74 (26.14)	20.37 (25.80)	.579 (.454)	0.36 (0.02;0.70)	0.53 (0.18;0.88)	0.26 (-0.07;0.59)
Website group	20.96 (26.66)	32.55 (33.43)	25.18 (23.42)	18.14 (23.29)	0.06 (.804)	0.42 (0.02;0.81)	0.15 (-0.22;0.53)	-0.10 (-0.48;0.27)
Attitudinal discussion group	24.60 (24.21)	25.08 (27.89)	21.30 (21.15)	21.48 (25.11)	.804 (.378)	0.01 (-0.27;0.31)	-0.13 (-0.42;0.15)	-0.12 (-0.42;0.16)
Seropositive participant group	17.14 (21.31)	16.45 (17.68)	16.28 (20.12)	13.37 (17.05)	1.56 (.221)	-0.03 (-0.36;0.29)	-0.03 (-0.37;0.29)	-0.17 (-0.50;0.16)
Fear induction group	24.37 (35.35)	21.81 (21.52)	26.80 (25.67)	33.26 (30.96)	.672 (.419)	-0.07 (-0.37;0.22)	0.06 (-0.23;0.36)	0.24 (-0.05;0.55)
Role-play group	17.85 (19.65)	32.43 (31.10)	20.28 (20.99)	19.10 (25.04)	.195 (.663)	0.72 (0.37;1.07)	0.12 (-0.18;0.43)	0.06 (-0.24;0.37)
Control group	23.57 (22.82)	34.35 (35.00)	32.57 (34.55)	30.07 (33.83)	2.43 (.153)	0.44 (-0.10;0.99)	0.37 (-0.17;0.91)	0.26 (-0.26;0.80)
$F_{(df=6)}$ (p)	0.84 (.539)	2.12 (.052)	1.19 (.312)	2.17* (.046)				

*p≤.05

Table 4. Differential impact of techniques on “Protective behavior in different sex acts”

Group		Pre n=239 (100%) %	Post n=232 (97%) %	1 Month n=200 (84%) %	4 Month n=176 (74%) %	Fried (df=3)	d (Confidence Interval)		
							Pre-post	Pre- Follow- up1	Pre- Follow- up2
Talk group	Vaginal ¹	69	91	87	94	20* ($<.001$)	-0.002 (-0.34;0.33)	-0.001 (-0.34;0.33)	-0.002 (-0.34;0.33)
	Anal ²	80	97	97	100	14.76* (.002)	-0.001 (-0.34;0.34)	-0.001 (-0.34;0.34)	-0.001 (-0.34;0.33)
	Drugs ³	83	97	91	94.3	5.60 (.133)	-0.001 (-0.34;0.34)	-0.001 (-0.34;0.34)	-0.001 (-0.34;0.34)
Website group	Vaginal ¹	67	92	93	89	0.75 (.861)	-0.002 (-0.39;0.39)	-0.002 (-0.39;0.39)	-0.002 (-0.39;0.39)
	Anal ²	81	100	92	89	9.75* (.021)	-0.001 (-0.39;0.39)	-0.001 (-0.39;0.39)	-0.001 (-0.39;0.39)
	Drugs ³	81	100	81	89	6.93 (.074)	-0.001 (-0.39;0.39)	0 (-0.39;0.39)	-0.001 (-0.39;0.39)
Attitude discussion group	Vaginal ¹	62	76	82	93	19.57* ($<.001$)	-0.001 (-0.30;0.29)	-0.002 (-0.30;0.29)	-0.003 (-0.30;0.29)
	Anal ²	78	91	100	100	20.10* ($<.001$)	-0.001 (-0.30;0.29)	-0.001 (-0.30;0.29)	-0.001 (-0.30;0.29)
	Drugs ³	75	82	96	96	13.75* (.003)	-0.001 (-0.29;0.29)	-0.001 (-0.30;0.29)	-0.001 (-0.30;0.29)
Seropositi particip group	Vaginal ¹	66	83	87	77	9.13* (.028)	-0.001 (-0.34;0.33)	-0.002 (-0.34;0.33)	-0.001 (-0.34;0.34)
	Anal ²	71	100	100	97	25.72* ($<.001$)	-0.002 (0.34;0.33)	-0.002 (0.34;0.33)	-0.002 (0.34;0.33)
	Drugs ³	74	94	97	86	10.81* (.013)	-0.001 (-0.34;0.33)	-0.001 (-0.34;0.33)	-0.001 (-0.34;0.34)
Fear induction group	Vaginal ¹	67	84	79	81	6.69 (.082)	-0.001 (-0.30;0.30)	-0.001 (-0.30;0.30)	-0.001 (-0.30;0.30)
	Anal ²	74	88	86	88	7.24 (.065)	-0.001 (-0.30;0.30)	-0.001 (-0.30;0.30)	-0.001 (-0.30;0.30)
	Drugs ³	69	81	83	93	9.98* (.019)	-0.001 (-0.30;0.30)	-0.001 (-0.30;0.30)	-0.001 (-0.30;0.30)
Role-play group	Vaginal ¹	52	72	67	85	15.53* (.001)	-0.003 (-0.32;0.31)	-0.002 (-0.32;0.31)	-0.004 (-0.32;0.31)
	Anal ²	80	87	87	92	6.12 (.106)	-0.001 (-0.31;0.31)	-0.001 (-0.31;0.31)	-0.001 (-0.31;0.31)
	Drugs ³	77	82	80	86	1.98 (.576)	-0.0001 (-0.31;0.31)	-0.001 (-0.31;0.31)	-0.001 (-0.31;0.31)
Control group	Vaginal ¹	64	64	64	71	0.53 (.912)	0 (-0.56;0.56)	0 (-0.56;0.56)	-0.001 (-0.57;0.57)
	Anal ²	79	71	92	92	4.26 (.234)	0.001 (-0.56;0.57)	-0.001 (-0.57;0.56)	-0.001 (-0.57;0.56)
	Drugs ³	78	86	78	78	0.60 (.869)	-0.001 (-0.57;0.56)	0 (-0.56;0.56)	0 (-0.56;0.56)
Kruskal Wallis (df=6)	Vaginal ¹	10.01 (.124)	10.47 (.106)	12.47 (.052)	9.59 (.143)				
	Anal ²	1.49 (.960)	16.71* (.010)	13.07* (.042)	10.35 (.110)				
	Drugs ³	2.42 (.877)	12.41 (.053)	10.91 (.091)	5.91 (.433)				

¹Vaginal sex ²Anal sex ³Having sex after drug consumption *p≤.05
