

# Impact of an educational intervention program on the sexual behaviors of higher education students

Impacto de um programa de intervenção educativa nos comportamentos sexuais de jovens universitários

Impacto de un programa de intervención educativa en los comportamientos sexuales de jóvenes universitarios

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## Abstract

**Background:** Sexually transmitted infections are a public health issue among young people.

**Objectives:** To assess the effectiveness of an educational program to reduce risky sexual behaviors.

**Methodology:** Prospective and quasi-experimental cohort study. The sample consisted of 1,303 higher education students, aged between 18 and 24 years. Eight hours of group sessions were held, with pre- and post-test assessment, and a follow-up took place at 6 and 36 months. The control group was evaluated at baseline and after 36 months.

**Results:** In this sample, 69.38% of students were sexually active, with a mean of 2.26 sexual partners; 72.8% used a condom in the last sexual intercourse with a stable partner, 82.2% used it with occasional partners; 10.2% tested positive for STIs; 10.7% took an HIV test; 21.6% had sex under the influence of alcohol or other substances. The intervention group is more likely to use a condom in the last sexual intercourse with a stable partner (ORa: 4.61: [1.31-16.20]) and take an HIV test (ORa: 7.59: [3.33-17.35]). Sex with an occasional partner in the past 12 months was less frequent in the female group.

**Conclusion:** Short-term group interventions proved to be useful.

**Keywords:** sexual behavior; infection; VIH; students; education, higher

## Resumo

**Enquadramento:** Infecções sexualmente transmissíveis são um problema de saúde pública entre os jovens.

**Objetivos:** Avaliar a eficácia de um programa educacional de redução dos comportamentos sexuais de risco.

**Metodologia:** Estudo de coorte prospetivo e quasi-experimental. Amostra constituída por 1.303 estudantes do ensino superior, dos 18 aos 24 anos de idade. Realizadas 8 horas de sessões em grupo, com pré e pós-teste. Seguimento aos 6 e 36 meses. Grupo de controlo avaliado num primeiro momento (baseline) e 36 meses depois.

**Resultados:** Na baseline, sexualmente ativos são 69,38%, parceiros sexuais em média 2,26. Usaram preservativo na última relação sexual, com parceiro estável 72,8%, com parceiros casuais 82,2%. Referiram IST, 10,2%. Fizeram o teste VIH 10, 7%. Relações sexuais sob influência de álcool ou outras drogas, 21,6 %. Após intervenção, têm maior probabilidade de usar preservativo na última relação sexual com parceiro estável (ORa:4,61: [1,31-16,20]), de realizar o teste VIH (ORa:7,59:[3,33-17,35]), e o sexo com parceiro casual nos últimos 12 meses é menos frequente nas raparigas.

**Conclusão:** Foi constatada a utilidade de intervenção de grupo de curta duração.

**Palavras-chave:** comportamento sexual; infeção; HIV; estudantes; ensino superior

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## Resumen

**Marco contextual:** Las infecciones de transmisión sexual son un problema de salud pública entre los jóvenes.

**Objetivos:** Evaluar la eficacia de un programa educativo para reducir los comportamientos sexuales de riesgo.

**Metodología:** Estudio de cohorte prospectivo y casi experimental. Muestra constituída por 1.303 estudiantes de enseñanza superior, de 18 a 24 años de edad. Se realizaron 8 horas de sesiones en grupo, con pretest y postest. Seguimiento a los 6 y 36 meses. Grupo de control evaluado en un primer momento (base de referencia) y 36 meses después.

**Resultados:** En la base de referencia, el 69,38 % es sexualmente activo, parejas sexuales una media de 2,26. Utilizaron preservativo en la última relación sexual, con una pareja estable el 72,8 %, con parejas casuales el 82,2 %. El 10,2% mencionó las ITS. El 10,7% hizo la prueba del VIH. El 21,6 % tuvo relaciones sexuales bajo la influencia del alcohol u otras drogas. Después de la intervención, tienen más probabilidades de usar el condón en la última relación sexual con pareja estable (ORa: 4,61: [1,31-16,20]), de realizar la prueba del VIH (ORa: 7,59: [3,33 -17,35]), y el sexo con pareja casual en los últimos 12 meses es menos frecuente en las chicas.

**Conclusión:** Se constató la utilidad de la intervención de grupo de corta duración.

**Palabras clave:** conducta sexual; Infección; HIV; estudiantes; educación superior

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## Introduction

According to the National Institute of Health Dr. Ricardo Jorge, Center for Epidemiological Surveillance of Communicable Diseases (Ministério da Saúde, 2015), progress has been made in the evolution of the epidemics; however, the human immunodeficiency virus (HIV) and the acquired immunodeficiency syndrome (AIDS) are still one of the main health issues among young people. In Portugal, 32.7% of infected individuals are aged between 15 and 29 years and 14.1% between 15 and 24 years (Ministério da Saúde, 2015). Male individuals infected through sexual intercourse (SI) with men correspond to 42.7% of cases. In 2014, the median age at the time of diagnosis was 38 years (Ministério da Saúde, 2015). Among newly diagnosed individuals, the percentage of late presenters is 48% (World Health Organization, European Centre for Disease Prevention and Control, 2016). In other words, an infection diagnosed between 30 and 40 years of age corresponds to an infection acquired around the age of 20 years or less. Portugal continues to have one of the highest HIV incidence rates in the European Union: 6<sup>th</sup> position in the European Union (EU) and in European Economic Area (EEA), with 9.5 cases/100,000 inhabitants in comparison to 5.8 in the EU/EEA (World Health Organization, European Centre for Disease Prevention and Control, 2016). The literature suggests that adolescents and young adults (13 to 24 years of age) are more likely to take risks in comparison to older people and are less likely to consider themselves as vulnerable to risks (Centers for Disease Control and Prevention [CDC], 2012; Steinberg, 2008).

This study aims to assess the effectiveness of an educational program to reduce risky sexual behaviors.

Its specific objectives include: To determine the prevalence of sexual behaviors among higher education students; to increase the level of knowledge about HIV and the perception of HIV risk in the in-

tervention group; to improve prevention behaviors, such as using condoms, reducing the number of occasional partners, and increasing the knowledge of HIV status in the intervention group; to assess the maintenance of benefits in the intervention group at the 36-month post-intervention follow-up (magnitude and consistency of outcomes).

## Background

There is increasing evidence that well designed, targeted, theory-based behavior change interventions can be effective in reducing the spread of HIV; however, each behavior is unique and there is only a limited number of theoretical variables that serve as determinants for a given behavior (Fishbein, 2000).

In Portugal, in a study with higher education students aged between 18 and 35 years, older young people reported more often to have SI with another person while being in a relationship, occasional sexual partners, more than three occasional sexual partners over the past year, and SI under the influence of alcohol or other substances (Reis, Ramiro, Matos, & Diniz, 2012). No explanatory model of risk and protection or even of sexual behaviors has been used in a consistent manner. Attitudes, social norms, self-efficacy, knowledge, parent-children relationship, and school connection have been used as predictors of unprotected sex, sex under the influence of substances, early sexual initiation, and diagnosis of sexually transmitted infections (STIs). However, results have been inconsistent to identify the most significant set of predictors influencing each indicator or outcome of risky sexual behavior. Given that different indicators are important for different behaviors, interventions must focus on multiple processes, in order to achieve maximum impact (Shneyderman & Schwartz, 2012). Indeed, Cunha-Oliveira (2013) observed that those who do not adhere to intervention programs are those who would need them the most.

## Research questions

What is the impact of the intervention program on higher education students' sexual behavior changes over time?

## Methodology

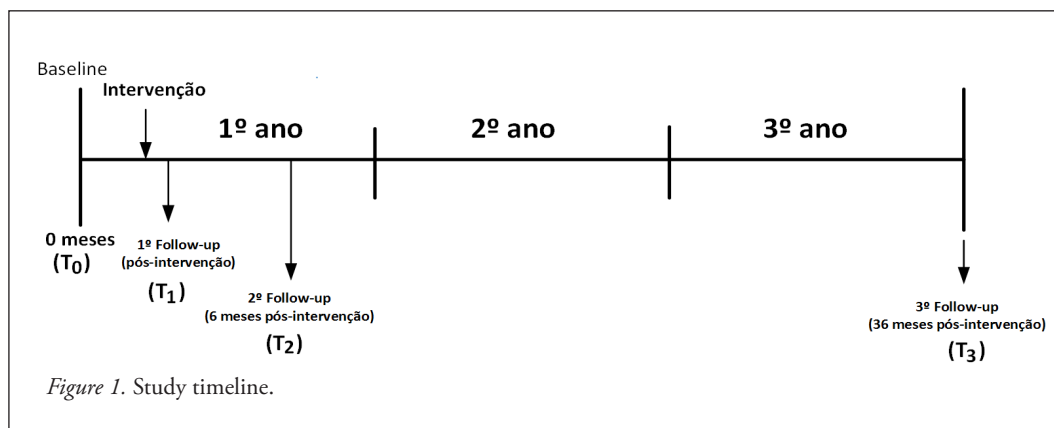
This is a prospective cohort study with a quasi-experimental design.

The study population consisted of higher education students of the University of Coimbra, Aveiro, and Beira Interior, attending the 1<sup>st</sup> year of their degree.

Three procedures were used for sample selection. The academic training area was divided into two strata - health and non-health - using the stratified random sampling

technique. The degrees in each stratum were randomly selected. The health area included students of the Medicine, Pharmaceutical Sciences, and Nursing degrees; the non-health area included students of the Economics, Sociology, Law, Psychology, and Engineering degrees. Students were then recruited using a convenience sampling technique. A total of 1,368 students were recruited, and 65 were excluded (26 for being over 24 years of age, 17 for not having signed the informed consent form, and 22 for having incorrectly completed the questionnaire).

The final sample was composed of 1,303 students. Students were recruited between December 2009 and February 2010. The intervention and control groups were created after the first questionnaires were distributed (Figure 1).



For reasons of logistics and accessibility, and for being easier for the researcher to monitor the process, the intervention group was composed of students from the various faculties or schools of the University of Coimbra who were willing to participate and participated in the training. The group was composed of the remaining students in the sample of the University of Coimbra and the students in the samples of the Universities of Aveiro and Beira Interior. Students in the intervention group were informed by email of the date, time, and venue of the training sessions and of when the subsequent questionnaires would be distributed. There were three follow-ups. The last follow-up occurred between March and June 2013 (Figure 1). The evaluation

process was monitored as follows: the prospective measurements were done at baseline (T0) for both groups, and in the post-intervention (T1), 6 months (T2), and 36 months (T3) post-intervention follow-up for the intervention group. The control group was assessed at the 36 months follow-up (T3; Figure 1).

Students completed the questionnaires in a classroom, in the presence of the researcher and the professor, after having agreed to participate in the study and signed the informed consent form. The data collection tool was designed for this study, taking into account the conceptual basis of the study and the training objectives. Clinical questions were included (physical symptoms, sexual history, risky sexual behaviors, and sexual

orientation). The perception of infection risk was assessed using a 5-point Likert scale (1 - *no risk* to 5 - *high risk*) and indicators of knowledge about HIV transmission and prevention, through 15 true/false questions (WHO, 2004).

The psychometric characteristics of the instrument, namely its validity and test-retest reliability, were analyzed over a period of 2 weeks, with 142 students (approximately 11% of the sample). Kappa coefficient of agreement ranged from *substantial* to *almost perfect*. In the same way, intra-class correlation coefficients (ICC) for numerical answers ranged from *substantial* to *almost perfect* (ICC = 0.76 to 0.89). In addition, Pearson's correlation coefficients (*r*) ranged from *moderate* to *strong* (0.42 to 1). The intervention group consisted of students from the *health* and *non-health* areas. For each group, four bi-weekly 2-hour sessions were held, in a total of 8 hours each. The training program was designed and implemented by the researcher. The design of the training program took into account the gaps in the knowledge about HIV and risk factors found in the answers to the first questionnaires applied (T0). The intervention modules addressed were epidemiology of STIs; risk behaviors; development of skills, decision-making, and negotiation; and cognitive skills and behavioral performance. The theoretical framework was based on a combination of two theoretical models widely used in research on HIV prevention, particularly with regard to behavioral change: the AIDS Risk Reduction Model (Catania, Kegeles, & Coates, 1990) and the information-motivation-behavioral skills model (Fisher & Fisher, 1992). Both models have been useful in explaining and predicting behaviors for prevention of HIV infection, namely the use of condoms. The intervention was designed with the purpose of increasing knowledge about HIV/AIDS, reducing risky sexual behaviors (HIV test), and developing other behavioral skills (using a condom and reducing the number of sexual partners). An explanatory and interactive methodology was used. The sessions were planned using various techniques, such as watching and

discussing campaigns and news about HIV, identifying misconceptions and incorrect attitudes towards HIV and its protective factors. The discussion and performance of the modeled behaviors were planned to contribute to empowerment. The effectiveness of the intervention was analyzed for 36 months, in four measurement moments. A binary logistic regression was performed to explore the magnitude of associations between primary outcomes and exposure to the intervention. Adjusted odds ratio (ORa) was used to measure the effect size of the program. The IBM SPSS 19 software was used for statistical analysis. The confidence interval (CI) was set at 95%. Outcome indicators: use of condom in the last sexual intercourse (SI) with a stable and/or occasional partner; number of occasional sexual partners in the past 12 months; and HIV testing. The study was approved by the Ethics Committee of the Faculty of Medicine of the University of Coimbra (010-CE-2010). Participants' recruitment and instrument application were approved by the rectors of the universities and directors of the faculties. The confidentiality of the answers was ensured by assigning a code to each questionnaire.

## Results

The sample of 1,303 higher education students in the first year was distributed as follows: 42.5% from the University and Polytechnic Institute of Coimbra, 31.8% from the University of Aveiro, and 25.6% from the University of Beira Interior. The distribution by age varied between 18 and 24 years ( $M = 18.71$ ,  $SD = 1.20$ ). The distribution by gender showed a predominance of women (63.9% of women *vs.* 36.1% of men), as it is usual in higher education populations. With regard to the academic training area, 53.7% were enrolled in health-related degrees and 46.3% in non-health degrees. The analysis of the sampled subjects' sexual behaviors (Table 1) showed that the mean age at first SI was 16.56 years,  $SD = 1.40$  ( $M = 16.38$  and  $SD = 1.53$  for men and  $M = 16.68$ ;

$SD = 1.29$  for women). It should be noted that 6.1% of the participants reported having had their first SI before the age of 15 (9.32% of men and 3.94% of women) (Table 2). The mean number of sexual partners in lifetime was  $M = 2.27$ ,  $SD =$

$2.49$  ( $M = 3.04$  and  $SD = 3.29$  for men and  $M = 1.74$  and  $SD = 1.52$  for women). As to the number of sexual partners in the past 12 months, the mean was 1.31,  $SD = 1.30$  ( $M = 1.51$  and  $SD = 1.59$  for men and  $M = 1.17$  and  $SD = 1.03$  for women).

Table 1

*Sexual behavior of male (M) and female (F) participants at baseline (n = 905)*

Indicators	N	Md	M	SD	Range [min-max]
<b>(MF)</b>					
Sexual partners (lifetime)	905	1	2.27	2.49	1-40
Sexual partners (12 m)	905	1	1.31	1.30	0-20
Age at first sexual intercourse (years)	905	17	16.56	1.40	10-22
<b>M</b>					
Sexual partners (lifetime)	371	2	3.04	3.29	1-40
Sexual partners (12 m)	371	1	1.51	1.59	0-20
Age at first sexual intercourse (years)	371	17	16.38	1.53	10-22
<b>F</b>					
Sexual partners (lifetime)	534	1	1.74	1.52	1-20
Sexual partners (12 m)	534	1	1.17	1.03	0-20
Age at first sexual intercourse (years)	534	17	16.68	1.29	13-22

*Note: N= Participants who reported being sexually active.*

As shown in Table 2, 72.8% of the participants used a condom in the last sexual intercourse with a stable partner (76.4% of men and 70% of women) and 82.2% used it in the last sexual intercourse with an occasional partner (85.9% of men and 76.2% of women). With regard to HIV testing for diagnosis of HIV status, 10.7% of the respondents had been tested (8.9% of men and 12% of women). As for self-reported STIs (presence of symptoms, such as abnormal vaginal discharge, and past or present diagnoses), 10.2% of respondents reported having, or having had, a STI or

symptoms (1.5% of men and 15.2% of women). This discrepancy may be explained by the overvaluation of vaginal discharge. A more detailed analysis revealed that 106 of the 831 young women (12.75%) reported having or having had *abnormal vaginal discharge*. When the answer *abnormal vaginal discharge* is deleted, the percentage of STIs diagnosed in the sampled women is 2.41%. With regard to the indicator of SI under the influence of alcohol or other substances, 21.6% of the respondents reported this behavior (35.3% of men and 12% of women).

Table 2

*Participants' self-reported sexual behavior and health status at baseline (N = 1303)*

Sexual behavior indicators	N	Observed value	%
<b>(MF)</b>			
Age at 1 <sup>st</sup> sexual intercourse (< 15 years)	55	905	6.1
Use of condom in last SI (stable partner)	653	897	72.8
Use of condom in last SI (occasional partner)	282	343	82.2
Tested for HIV	139	1303	10.7
Diagnosis of self-reported STDs	133	1301	10.2
SI under the influence of alcohol or other substances	197	912	21.6
<b>(M)</b>			
Age at 1 <sup>st</sup> sexual intercourse (< 15 years)	34	375	9.1
Use of condom in last SI (stable partner)	279	365	76.4
Use of condom in last SI (occasional partner)	183	213	85.9
Tested for HIV	42	470	8.9
Diagnosis of self-reported STDs	7	470	1.5
Si under the influence of alcohol or other substances	133	376	35.3
<b>(F)</b>			
Age at 1 <sup>st</sup> sexual intercourse (<15 years)	21	532	4.0
Use of condom in last SI (stable partner)	374	532	70
Use of condom in last SI (occasional partner)	99	130	76.2
Tested for HIV	97	833	12
Diagnosis of self-reported STDs	126	831	15.2
Si under the influence of alcohol or other substances	64	536	12

The results on the equivalence between groups before the intervention are shown below (Table 3).

The intervention group and the control group were similar regarding the age at first SI ( $M = 16.40$  vs.  $M = 16.58$ ,  $p = 0.18$ ), the use of condom in the first sexual intercourse (95.40% vs. 91.8%;  $p = 0.14$ ), and the use of condom with a stable partner (68.0% vs. 73.8%;  $p = 0.20$ ) and with an occasional partner (68.6% vs. 83.9%;  $p = 0.54$ ). The percentage of students who reported being sexually active was also consistent in both samples (75.7% vs.

69.9%;  $p = 0.41$ ). In relation to HIV testing, both groups were also similar (11.3% vs. 10.8%;  $p = 0.85$ ).

With regard to other indicators, the intervention and control groups were not homogeneous, particularly regarding the mean number of sexual partners in lifetime ( $M = 1.72$  vs.  $M = 2.38$ , respectively;  $p < 0.001$ ), the mean number of sexual partners in the past 12 months ( $M = 1.13$  vs.  $M = 1.34$ , respectively;  $p = 0.02$ ), and sexual intercourse with occasional partners in the past 12 months (12.0% vs. 25.2%, respectively;  $p = 0.00$ ).



Table 3

*Characteristics of the sample at baseline in the intervention and control groups and p level of significance for the mean difference test*

Items and indicators	Intervention group		Control group		<i>p</i>		
	<i>N</i>	%	<i>N</i>	%			
Sample	226		1077				
<i>Young women</i>	182	80.5	651	60.40			
Academic training area - Health	169	74.8	531	49.3			
Academic training area - Non-Health	57	25.2	546	50.7			
							<i>p</i>
<b>Behavioral indicators</b>	<i>N</i>	<b>M</b>	<b>SD</b>	<i>N</i>	<b>M</b>	<b>SD</b>	
Age (years)		18.49	0.88		18.75	1.25	
Age at 1 <sup>st</sup> sexual intercourse		16.4	1.4		16.58	1.44	0.18
Total no. of sexual partners	151	1.72	1.7	753	2.38	2.61	0.001
No. of partners in past 12 months	151	1.13	0.89	753	1.34	1.36	0.02
							<i>p</i>
	<i>N</i>	%		<i>N</i>	%		
Tested for HIV		11.3			10.8		0.85
Sexually active	171	75.7		753	69.9		0.41
Occasional sexual partners past 12 months	18/150	12		190/753	25.2		0.00
Condom 1 <sup>st</sup> sexual intercourse	166/174	95.4		706/769	91.8		0.14
Condom last SI stable partner	102/150	68		551/747	73.8		0.20
Condom last SI occasional partner	24/35	68.6		258/308	83.9		0.54
Heterosexual ( <i>n</i> , %)	224/226	99.1		1061/1077	98.5		
Bisexual ( <i>n</i> , %)	2/226	0.9		11/1077	1		
Sex with another man ( <i>n</i> , %)	0			5/1077	0.5		

Table 4 shows that 82.3% of young people in the intervention group and 87.3% of young people in the control group had already participated in HIV/AIDS prevention programs in secondary education. It also shows that 90.7% of young people in the intervention group and 92.7% in the control group had received information on HIV/AIDS prevention through the media, and that

72.6% of young people in the intervention group and 75.5% of young people in the control group had been exposed to prevention messages through billboards. However, when questioned about whether they remembered the last STI/HIV/AIDS prevention message, only 27% of young people in the intervention group and 27.7% of young people in the control group answered affirmatively. The

Chi-squared test showed that the groups are homogeneous in terms of the variables

under analysis, since the *p* values are non-significant.

Table 4

*Qui-squared test for mean differences at baseline in young people of the intervention and control groups who were exposed to prevention programs (N = 1303)*

Exposure to Prevention Programs	Intervention Group (n = 226)	Control Group (n = 1076)	<i>p</i>
In secondary education (n, %)	186 (82.3)	939 (87.3)	0.05
Media (n, %)	205 (90.7)	997 (92.7)	0.20
Billboards (n, %)	164 (72.6)	812 (75.5)	0.29
Do you remember the last message on DST/HIV/AIDS prevention? (n, %)	61 (27.0)	298 (27.7)	0.79

Table 5 shows an increase in risk perception in the intervention group between baseline (T0) and follow-up at 36 months after the intervention. It also shows an increase in SI

under the influence of alcohol in both groups, particularly in the control group. With regard to the knowledge about the infection, Table 5 shows an increase in both groups.

Table 5

*Behavioral and knowledge indicators at baseline and 36 months after the intervention*

Indicators	Before intervention		36 months after intervention	
	Intervention (N = 226)	Control (N = 1077)	Intervention (N = 203)	Control (N = 859)
Sexual intercourse (n, %)	151 (66.8)	753 (69.9)	174 (85.7)	769 (89.5)
Risk perception (median)	1	1	2	1
Sexual intercourse under the influence of alcohol (%)	5.3	24.5	12.8	36.1
Knowledge about HIV/AIDS (mean score, SD) [0-15 items]	13.24 SD = 1.27	12.93 SD = 1.43	14.87 SD = 0.83	13.26 SD = 1.52

To assess the impact of the training intervention, the *ORa* was calculated for the variables: SI with an occasional partner in the past 12 months; use of condom in the last SI with a stable and occasional partner; and HIV testing. These variables are considered primary outcomes (Table 6). The values used were those observed at the final follow-up (36 months). As regards HIV testing, for male subjects, the *ORa* between participating/not participating in the training intervention and having done the HIV test was *ORa* = 7.59, 95% CI [3.33 - 17.35]; *p* < 0.001. This value is statistically significant and points to the idea that those who participated in the training intervention are more likely to have been tested for

HIV. In female subjects, the adjusted odds ratio between participating/not participating in the training intervention and having used a condom with a stable partner was *ORa* = 3.86, 95% CI [2.51 - 5.95]; *p* < 0.001. This value is statistically significant and points to the idea that those who participated in the training intervention are more likely to have been tested for HIV. Regarding SI with an occasional partner in the past 12 months: in male subjects, the adjusted odds ratio between participating/not participating in the training intervention and having had SI with an occasional partner was *ORa* = 0.41; 95% CI [0.14 - 1.21]; *p* = 0.106. This value is not statistically significant. In female subjects, the adjusted odds ratio between



participating/not participating in the training intervention and having had SI with an occasional partner was  $ORa = 2.26$ ; 95% CI [1.17 - 4.37];  $p = 0.015$ . This value is statistically significant and points to the idea that those who participated in the training intervention are more likely to not having had SI with an occasional partner. As regards the use of condom in the last SI with a stable partner: in male subjects, the adjusted odds ratio between participating/not participating in the training intervention and having used a condom with a stable partner was  $ORa = 4.61$ , 95% CI [1.31 - 16.20];  $p = 0.017$ . This value is statistically significant and points to the idea that those who participated in the training intervention are more likely to use condoms. In female subjects, the adjusted odds ratio between participating/not participating in the training intervention and

having used a condom with a stable partner was  $ORa = 2.20$  95% CI [1.35 - 3.58];  $p = 0.002$ . This value was statistically significant and points to the idea that those who participated in the training intervention are more likely to use condoms. Regarding the use of condom in the last SI with an occasional partner: in male subjects, no significant association was found between having participated in the training intervention and having had one or more occasional sexual partners in the past 12 months. The odds ratio reflects the same conclusion,  $ORa = 0.95$ ; 95% CI [0.88 - 1.07];  $p = 1.000$ . In female subjects, the adjusted odds ratio between participating/not participating in the training intervention and having had SI with an occasional partner was  $ORa = 2.84$ ; 95% CI [0.28 - 28.37];  $p = 0.375$ . This value is not statistically significant.

Table 6  
*Impact of the intervention program on primary outcomes*

Sexual behavior indicators	Adjusted <i>ORa</i>	95% CI	<i>p</i>
HIV test (lifetime)			
Male	7.59	[3.33 – 17.35]	< 0.01
Female	3.86	[2.51 – 5.95]	< 0.001
Occasional sexual partner past 12 months*			
Male	0.41 <sup>a)</sup>	[0.14 – 1.21]	0.106
Female	2.26	[1.17 – 4.37]	0.015
Condom last sexual intercourse stable partner			
Male	4.61	[1.31 – 16.20]	0.017
Female	2.20	[1.35 – 3.58]	0.002
Condom last sexual intercourse occasional partner			
Male	0.95 <sup>a)</sup>	[0.88 – 1.07]	1.000
Female	2.84 <sup>a)</sup>	[0.28 – 28.37]	0.375

Note: \*The indicator “Number of occasional partners in the past 12 months” was transformed into a dichotomous indicator (yes – one or more occasional partners; or no – no occasional partner). <sup>a)</sup>No statistical significance.

## Discussion

In general terms, the data in this study are consisted with those of other studies with higher education students, in particular as regards the age of sexual initiation, number of sexual partners, use of condoms, HIV testing, and SI under the influence of alcohol and other substances. The usual gender differences were also found in this study (Reis, Ramiro,

Matos, & Diniz, 2012). The majority of behavioral indicators were similar at baseline, providing more confidence to the analysis of the outcomes at the 36-month follow-up. The respondents gave little mention to the campaigns. When asked at baseline about whether they remembered the last STI/HIV/AIDS prevention message, only 27.0% of young people in the intervention and control group recalled it. In a study with a sample of

696 higher education students, when asked about how to overcome the limitations of the impact of campaigns about condom use, most of them (40.7%) suggested that campaigns should *be shocking, strong, and with real testimonials*; 24% suggested *more instructive and appealing messages, that said the truth*; 17.8% suggested *messages that made condoms trendy* (social marketing of condoms); and only 14.2% considered that the campaigns were *fine just as they were* (Oliveira, 2008). The use of shocking pictures to convey information, such as the use of pictorial warnings on tobacco packets in many countries, does not seem to have an effect on those who need it the most, mainly reaching, and in an initial phase, those who never smoked or smoke occasionally, having no significant impact on regular smokers (Humphris & Williams, 2013). The perception of STI risk is essential to assess the actual risk of sexual behaviors (Sychareun, Thomsen, Chaleunvong, & Fixelid, 2013). In fact, the major barrier to HIV testing is the denial of HIV risk (Deblonde et al., 2014). These results reveal that risk perception at baseline is low, and that only 10.7% of participants had been tested for HIV. A study with higher education students showed that respondents had no intention of being tested for HIV nor did they intend to ask their partner (Matos, Reis, Ramiro, & Equipa Aventura Social, 2012). An increase in risk perception was found in the intervention group. The change in the perception of HIV risk among young people has been observed in surveillance studies. Young people born between 1963 and 1980, most of whom began their sexual lives before 1996, when HIV mortality was high, may have integrated HIV risk into their representations and behaviors. However, most of the respondents, born in and after 2001, had their first sexual intercourse after the introduction of the antiretroviral therapy, which may have changed the way HIV and AIDS were perceived by the general public and portrayed in the media (Beltzer et al., 2013). The intervention group also showed an improvement in the level of knowledge about HIV prevention and transmission. Although the control group improved their knowledge score, it should be noted that there are still basic gaps in key issues

related to the risk of infection, which has an impact on the implementation of prevention measures. The intervention proved to have statistically significant effects on primary outcomes, which were considered indicators of risky sexual behaviors, namely the use of condom in the last SI with a stable partner ( $ORa$  in men = 4.61, 95% CI [1.31-16.20];  $ORa$  in women = 2.20, 95% CI [1.35-3.58]). As can be seen, the likelihood of condom use is higher in men than in women, which is consistent with other studies. With regard to SI with an occasional partner in the past 12 months, the intervention only had an impact on women ( $ORa$  = 2.26, 95% CI [1.17-4.37]). Thus, the likelihood of a woman having had an occasional partner in the past 12 months is two times lower than in women who participated in the training intervention. HIV testing is an indicator of protection, since it points to the need for determining our own HIV status. In this respect, the intervention proved to have a statistically significant effect in both men ( $ORa$  = 7.59, 95% CI [3.33-17.35]) and women ( $ORa$  = 3.86, 95% CI [2.51- 5.95]).

With regard to the use of condoms in SI with an occasional partner, the intervention had no statistically significant effect in men ( $ORa$  = 0.996, 95% CI [0.371-2.67]) or in women ( $ORa$  = 2.84, 95% CI [0.28-28.37]). However, this indicator, which is one of the indicators of higher sexual risk, depends on unmeasurable factors such as the context in which the SI occurs. In this regard, the Directorate-General for Health, in its national plan for HIV/AIDS prevention and control for 2012-2016, aims at reducing the number of new cases by 25% and increase by 95% the proportion of individuals who use condoms in occasional SIs (Ministério da Saúde, 2015). A meta-analysis of 16 behavioral and social interventions in sexually experienced adolescents showed a significant reduction of unprotected sex (13 studies;  $ORa$  = 0.66; CI: 0.55 - 0.59) and a lower behavioral risk (two studies;  $ORa$  = 0.66; CI: 0.50 - 0.88), but with no difference in the number of sexual partners (eight studies;  $ORa$  = 0.89; CI: 0.76 - 1.02) and STIs (two studies;  $OR$  = 1.18; CI: 0.48 - 2.86). In general, the interventions had a protective effect in sexually experienced adolescents (16 studies;  $ORa$  = 0.65; CI: 0.50

- 0.85; Mullen, Ramírez, Strouse, Hedges, & Sogolow, 2002). In a systematic review of 22 studies, the *outcomes* of condom use revealed an increase in the use of condoms in the intervention group of 16 studies, with a statistical significant result in eighth of them (Free, Roberts, Abramsky, Fitzgerald, & Wensley, 2011). Brief interventions can reduce the costs and difficulties of retention associated with long-term interventions. Interventions with multiple sessions require more staff and resources and bring added complications in participants' retention throughout the sessions. Brief interventions can be effective if they are adjusted to the specific circumstances of the target population. An alternative to long-term interventions is the use of *consolidation* sessions after the formal intervention, in order to prevent a relapse in risk behaviors. Interventions with multiple sessions or high workloads have not proven to have better results than short-term interventions (Pedlow & Carey, 2003). A limitation may be related to a bias associated with the groups, because at baseline they are not entirely homogeneous in terms of the variables under analysis. Of the 1,303 participants at baseline, 81.5% of them remained in the intervention group at the 36-month follow-up. The retention rate was 95.13% in the 6-month follow-up and 88.82% at the 36-month follow-up. In the control group, the retention rate was 79.78% at the 36-month follow-up. These retention rates are higher than the 70% rate, which is usually considered a *satisfactory* retention rate, and have a difference below 10% between groups, thus ensuring the necessary reliability in result analysis.

## Conclusion

These results suggest that the program had an immediate and long-term prevention effect, improving short- and long-term protective behaviors, namely in what concerns the use of condom with a stable partner in the last SI, HIV testing in both men and women, and women having less occasional partners in the past 12 months. Knowledge about HIV infection and risk perception also improved. It seems that the intervention on the use of

condom with an occasional partner had no particular impact on men, who have more occasional partners. The intervention also had no impact on the number of occasional partners in the past 12 months. However, the deterioration in the indicators of sexual behavior measured over the period of 36 months in the control group is worrying. Since the participants were recruited among higher education students attending the 1<sup>st</sup>-year of their degree, the sample meets two categories - Peer group and Social network - to the extent that they knew and interacted with each other prior to the study. In this way, although this type of study does not have the means to carry out this evaluation, it would be interesting to study the likelihood of the participants in the intervention group disseminating the positive outcomes of the intervention to the control group. Influential people in society may be useful in the dissemination of information on prevention through their networks and become the target of prevention measures.

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## References

- Beltzer, N., Saboni, L., Sauvage, C., Lydié, N., Semaille, C., Warszawski, J., & Group KABP France. (2013). An 18-year follow-up of HIV knowledge, risk perception, and practices in young adults. *AIDS*, 27(6), 1011-1019. doi:10.1097/QAD.0b013e32835e1583
- Catania, J. A., Kegeles, S. M., & Coates, T. J. (1990). Towards an understanding of risk behaviour: An AIDS risk reduction model (ARRM). *Health Education Quarterly*, 17(1), 53-72. Retrieved from <http://chipts.ucla.edu/wp-content/uploads/2015/07/Towards-an-Understanding-of-Risk-Behavior-An-AIDS-Risk-Reduction-Model-ARRM.pdf>
- Centers for Disease Control and Prevention. (2012). Trends in HIV-related risk behaviors among high school students: United States, 1991-2011. *MMWR*,

- 6, 556-560. Retrieved from <http://files.eric.ed.gov/fulltext/ED534806.pdf>
- Cunha-Oliveira, A. (2013). Predictors of adherence of young graduates to a program of educational intervention for prevention of infection by the human immunodeficiency virus. *Psychotherapy and Psychosomatics*, 82(suppl. 1), 24. Retrieved from <https://www.karger.com/Article/Pdf/354142>
- Deblonde, J., Hamers, F. E., Callens, S., Lucas, R., Barros, H., Riiütel, K., Hemminki, E., & Temmerman, M. (2014). HIV testing practices as reported by HIV-infected patients in four European countries. *AIDS Care*, 26(4), 487-496. doi: 10.1080/09540121.2013.841831
- Fishbein, M. (2000). The role of theory in HIV prevention. *AIDS Care*, 12(3), 273-278. doi:10.1080/09540120050042918
- Fisher, J. D., & Fisher, W. A. (1992). Changing AIDS risk behaviour. *Psychological Bulletin*, 111(3), 455-474.
- Free, C., Roberts, I. G., Abramsky, T., Fitzgerald, M., & Wensley, F. (2011). A systematic review of randomised controlled trials of interventions promoting effective condom use. *Journal of Epidemiological Community Health*, 65(2), 100-110. doi:10.1136/jech.2008.085456
- Humphris, G., & Williams, B. (2013). Is disgust the driver behind the selection of images for UK tobacco packets? *Health Education Journal*, 73(5), 522-529. doi:10.1177/0017896913496399
- Matos, M. G., Reis, M., Ramiro, L., & Equipa Aventura Social. (2012). *A saúde sexual e reprodutiva dos estudantes universitários: Relatório do estudo: Dados nacionais 2010*. Retrieved from [http://aventurasocial.com/arquivo/1303148036\\_Relatorio\\_HBSC\\_\\_SSREU.pdf](http://aventurasocial.com/arquivo/1303148036_Relatorio_HBSC__SSREU.pdf)
- Ministério da Saúde. (2015). Infecção VIH/SIDA: A situação em Portugal a 31 de dezembro de 2014. Recuperado de [http://repositorio.insa.pt/bitstream/10400.18/3205/3/Relat%C3%B3rio%20VIH\\_SIDA\\_2014.pdf](http://repositorio.insa.pt/bitstream/10400.18/3205/3/Relat%C3%B3rio%20VIH_SIDA_2014.pdf)
- Mullen, P. D., Ramírez, G., Strouse, D., Hedges, L., & Sogolow, E. (2002). Meta-analysis of the effects of behavioral HIV prevention interventions on the sexual risk behavior of sexually experienced adolescents in controlled studies in the United States. *Journal of Acquired Immune Deficiency Syndromes*, 30(suppl. 1), S94-S105. doi: 10.1097/01.QA1000019980.12814.DF
- Oliveira, A. (2008). *Preservativo, sida e saúde pública: Factores que condicionam a adesão aos mecanismos de prevenção do VIH/SIDA* (10ª ed.). Coimbra, Portugal: Imprensa da Universidade de Coimbra.
- Pedlow, C. T., & Carey, M. P. (2003). HIV sexual risk-reduction interventions for youth: A review and methodological critique of randomized controlled trials. *Behavior Modification*, 27(2), 135-190.
- Reis, M., Ramiro, L., Matos, M. G., & Diniz, J. (2012). Os comportamentos sexuais dos universitários portugueses de ambos os sexos em 2010. *Revista Portuguesa de Saúde Pública*, 30(2), 105-114.
- Shneyderman, Y., & Schwartz, S. J. (2012). Contextual and intrapersonal predictors of adolescent risky sexual behavior and outcomes. *Health Education & Behavior*, 40(4), 400-414. doi:10.1177/1090198112447800
- Steinberg, L. (2008). A social neuroscience perspective on adolescent risk-taking. *Developmental Review*, 28(1), 78-106. doi:10.1016/j.dr.2007.08.002
- Sychareun, V., Thomsen, S., Chaleunvong, K., & Faxelid, E. (2013). Risk perceptions of STIs/HIV and sexual risk behaviours among sexually experienced adolescents in the Northern part of Lao PDR. *BMC Public Health*, 13, 1126. doi:10.1186/1471-2458-13-1126
- World Health Organization (2004). *National AIDS programmes: A guide to indicators for monitoring and evaluating national HIV/AIDS prevention programs for young people*. Geneva, Switzerland: Author.
- World Health Organization, European Centre for Diseases Prevention and Control. (2016). *HIV/AIDS surveillance in Europe 2015: Surveillance report*. Retrieved from <http://ecdc.europa.eu/en/publications/Publications/HIV-AIDS-surveillance-Europe-2015.pdf>