

Factores psicosociales asociados a la realización de la prueba diagnóstica del VIH en estudiantes universitarios colombianos

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Resumen

Los objetivos de esta investigación fueron: (a) relacionar el riesgo sexual, los conocimientos y las actitudes hacia la prueba del VIH con su realización en estudiantes universitarios colombianos; y (b) describir las barreras percibidas en aquellos que no se la habían realizado, identificando las diferencias según el sexo. Se llevó a cabo un estudio transversal en el que participaron 1057 estudiantes colombianos, y en el que se utilizó el Cuestionario Confidencial sobre Vida Sexual Activa (CCVSA), el test Barreras Hacia la Prueba del VIH, la Escala de Actitudes hacia el VIH-Sida y un cuestionario *ad hoc* de conocimientos sobre la prueba. Los estudiantes que se realizaron la prueba ($n = 214$) reportaron una edad inferior de iniciación sexual ($p < .01$), un número superior de parejas sexuales ($p = .01$) y un menor uso de condón en la primera ($p = .02$) y la última ($p = .04$) relación sexual, así como mayores conocimientos sobre la prueba del VIH ($p < .001$). Las principales barreras estuvieron relacionadas con la baja percepción del riesgo de la enfermedad (29.8 %), la confianza en las parejas sexuales (29.2 %) y la falta de ofrecimiento de la prueba (25.2 %). En conclusión, la realización de la prueba está relacionada con la exposición a conductas sexuales de riesgo y con los conocimientos, mas no con las actitudes hacia la prueba. La identificación de los factores psicosociales vinculados podría contribuir al diseño de intervenciones orientadas a la prevención y al tratamiento oportuno de la enfermedad.

Palabras clave: VIH, prueba del VIH, tamizaje, estudiantes, barreras.

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Psychosocial factors associated with HIV testing in Colombian university students

Abstract

The objectives of this research were: (a) to relate sexual risk, knowledge, and attitudes towards HIV testing in Colombian university students; and (b) to describe the perceived barriers in those who had not been tested, analyzing the differences according to sex. A cross-sectional study was carried out, in which 1057 Colombian university students participated. The instruments applied were the *Cuestionario Confidencial Vida Sexual Activa* (CCVSA, for its Spanish acronym), the tests *Barreras Hacia la Prueba del VIH*, *Escala de Actitudes hacia el VIH-Sida* and an *ad hoc* questionnaire on knowledge about the test. The students who were tested ($n = 214$) reported a lower age of sexual initiation ($p < .01$), a higher number of sexual partners ($p = .01$), and a lower use of condoms in the first ($p = .02$) and last ($p = .04$) sexual intercourse. They also reported more knowledge about HIV testing ($p < .001$). The main barriers were associated with low risk perception of the disease (29.8 %), trust in sexual partners (29.2 %), and lack of offer of the test (25.2 %). In conclusion, being tested for HIV is related to exposure to risky sexual behaviors and to knowledge about the test, but not to attitudes towards it. The identification of the associated psychosocial factors could contribute to the design of interventions aimed at the prevention and timely treatment of the disease. *Key words*: HIV, HIV testing, screening, students, barriers.

Introduction

At present, late diagnosis of the human immunodeficiency virus (HIV) is one of the main public health problems worldwide (Becky et al., 2015; Black et al., 2014; Fuster, Molero, Nouvilas, Arazo, & Dalmau, 2014). In recent years, the situation has been directly related to psychosocial factors associated with low rates of HIV diagnostic testing (Lopera, Martínez, & Ray, 2011). A prolonged period of time between the moment of infection and the beginning of antiretroviral treatments affects the rise in new cases of transmission, in the progression of the infection, in difficulties for the immune system to recover, in the decrease of the person's life expectancy, and in the increase of economic costs for society (Arrivillaga et al., 2012; Bolsewicz, Valleylyb, Debattistad, Whittakere, & Fitzgerald, 2015; Castel et al., 2012; Dai et al., 2015; Kall, Smith, & Delpech, 2012; Schnall, Rojas, & Travers, 2015).

In Colombia, according to the Ministry of Health and Social Protection (2015), of the 135,000 people diagnosed with HIV/AIDS in 2014, only 40 % took a diagnostic test in a timely manner and received antiretroviral treatment. The same report indicated that 22 % of those affected were young people between the ages of 15 and 24 years old. According to the National Survey of Demographics and Health (*Encuesta Nacional de Demografía y Salud* [ENDS], 2015, for its Spanish acronym), nearly 75 % of Colombians between 13 and 24 years old have never been tested for HIV. Even though 65 % know where the test can be taken, only 25 % have taken it at some point in their lives, and 8 % in the last 12 months. Altogether, only 20 % of this population group knows their serological status,

creating a circumstance that impedes identification of the reach of the epidemic and hinders early pharmacological and non-pharmacological treatments.

Low risk perception, lack of knowledge about the disease and excessive trust in sexual partners are the principal risk factors that have been associated with the contraction of HIV in this population, according to different studies (Belza et al., 2014; Fuster et al., 2014; Hoyos et al., 2019; Morales, Espada, & Orgilés, 2016; Peralta, Deeds, Hipszer, & Ghalib, 2007). Moreover, the social stigma attached to HIV has been identified with an increased probability that young people with a high-risk perception develop a larger number of avoidance behaviors towards taking the test (Decker et al., 2015; Espada, Escibano, Morales, & Orgilés, 2017; Fuster et al., 2014). To that effect, García, Reyes and Caylà (2012) found that high-risk perception and offering the test during pregnancy are motivations for women taking the test more frequently than men.

The reasons why young people report a low risk perception are related to an excess in confidence, a lack of knowledge about the test, stereotyped conceptions about the disease, and a low number of sexual relationships without protection. On the other hand, the reason for high-risk perception is associated with risky sexual relationships with people suspected of having HIV (Fuster et al., 2014). Other studies demonstrate that although high-risk perception reduces the behaviors that expose young people to the disease, it is not related to a greater frequency of taking the test (Bradley, Tsui, Kidanu, & Gillespie, 2011; Brooks, Lee, Stover, & Barkley, 2011). Likewise, it has been found that a positive attitude toward the test does not imply higher testing rates

(Espada, Escribano, Orgilés, Morales, & Guillén, 2015; Morales et al., 2016).

Previous research, guided by the health belief model proposed by Janz and Becker (1984), has identified that the main barriers for young people taking the test are: (a) at an *interpersonal level*, the unknowledge about HIV, rejection of a positive diagnosis, stigmatized perceptions of the disease, fear about the disclosure of the results, low risk perception, and lack of familiarization with the test and healthcare services (Bilardi et al., 2013; Deblonde et al., 2010; Fuster et al., 2014; Kaai, Bullock, Burchell & Major, 2012); (b) at an *intrapersonal level*, the negative perception of patients about the quality of services, resistance of the healthcare providers to talk about HIV and offer the test, and fear of the impact of the diagnosis on their employment situation (Becky et al., 2015; Hampanda, Ybarra & Bull, 2014; Hoyos et al., 2012, 2013; Hyden, Allegrante & Cohall, 2014); and (c) at an *extrapersonal level*, the sociodemographic characteristics, public policy, difficulties accessing the test in the healthcare system, scarcity of funds, and lack of human resource formation in healthcare professionals (Bilardi et al., 2013; Deblonde et al., 2010; Kaai et al., 2012; Kurth, Lally, Choko, Inwani & Fortenberry, 2015; Newman et al., 2013).

In particular, the intrapersonal barriers, like skills and reasons, are connected to the extrapersonal, like social, cultural, economic, and political elements (Beglery, McLaws, Ross & Gold, 2008). Structural limitations hinder access to services and generate a negative impact on young people's reasons to get tested (Deblonde et al., 2010; Newman et al., 2013). The perceptions of each country's public policy about the disease may perpetuate the stigma associated with HIV, a situation that directly affects attitudes in the community. A fear of interaction with patients, a lack of understanding of the epidemiology of HIV, and a unknowledge of the test's protocols on the part of healthcare professionals may all become barriers (Kaai et al., 2012; Deblonde et al., 2010).

Lacking knowledge about one's serological status makes it impossible to begin timely antiretroviral treatments and gets in the way of young people developing protective behaviors regarding their health (Becky et al., 2015; Cooney, Hiransuthikil, & Lertmaharit, 2015; Deblonde et al., 2010; Flowers, Knussen, Li, & McDaid, 2013; Hoyos et al., 2013; Kall et al., 2012; Schnall et al., 2015). Taking the HIV diagnostic test is related to, according to the health belief model (Janz & Becker, 1984), people's knowledge, attitudes, and self-efficacy, such as their perception of barriers and facilitators associated with this process. In this context, identifying the multiple psychosocial factors associated with the low rates of testing in Colombia may contribute to the design of campaigns geared toward prevention and

timely treatment of the disease, and aimed at reducing mortality and morbidity rates (Fuster et al., 2014; Hoyos et al., 2013; Newman et al., 2013). Moreover, this could help to strengthen the sexual and reproductive healthcare services that correspond to this population group.

For this reason, this research had two main objectives: (a) to relate sexual risk, knowledge, and attitudes towards HIV testing in Colombian university students; and (b) to describe the perceived barriers in those who had not been tested, analyzing the differences according to sex.

Method

Type of study

A cross-sectional study with a descriptive correlational design was carried out (Hernández, Fernández, & Baptista, 2010).

Participants

1057 students from a university in Cali (Colombia) participated. The selection of the participants and the institution was carried out intentionally. The inclusion criteria were: (a) being between 18 and 22 years old; (b) being enrolled in the educational institution; and (c) not being cognitively impaired.

Instruments

General information questionnaire. This instrument was used to characterize sociodemographic data like age, sex, sexual orientation, socio-economic level, family income, academic year, religion, and to identify the people with whom they live.

Cuestionario Confidencial sobre Vida Sexual Activa (CCVSA, for its Spanish acronym) [Active Sexual Life Confidential Questionnaire]. This instrument, designed by the Colombian Ministry of Health (1997), was used to identify sexual practices, use of condoms, and number of sex partners. The answer format is dichotomous (*yes* or *no*).

Barreras hacia la Prueba del VIH [Barriers towards HIV Testing]. This instrument, designed by Peralta et al. (2007), originally consisted of a list of 16 barriers classified in six blocks. Participants must identify, from the list, all the reasons as to why they have not taken the HIV diagnostic test. This questionnaire was validated in young people between the ages of 14 and 24 years old from the United States (Peralta et al., 2007) and Spain (Morales

et al., 2016), and reported a Cronbach Alpha of .71. The reliability identified in this research was consistent with that reported by Peralta et al. (2007) and Morales et al. (2016). This study included an additional list to describe the sources of information about the test and the frequency with which it is applied.

Knowledge associated with the HIV diagnostic test. This instrument, designed by the researchers of this study, is composed of 14 items and has the objective of measuring the correct knowledge (7 items) and incorrect knowledge (7 items) about the HIV test. The answer format of the questionnaire is *true (correct) and false/I don't know (incorrect)*. The total scores range from 0 to 14, where the highest scores indicate a greater knowledge of the HIV test. External expert judges provided support for the assessment of the coherence, relevance, and clarity of the items in the evaluation process of the content of this instrument. A group of 30 participants who met the sample's inclusion criteria was summoned to respond to the questionnaire in order to verify an adequate understanding of the questions. The reported Cronbach Alpha of this instrument was .73.

Escala de Actitudes hacia el VIH/Sida [Attitudes Towards HIV/AIDS Scale]. This instrument, designed by Espada, Ballester, Huedo, Secades and Martínez (2013), is composed of a total of 12 items and has the objective of evaluating the attitudes towards HIV/AIDS. For this study, only the subscale of attitudes towards the HIV test was employed. This subscale is composed of a total of two items with a Likert type answer format, in which 1 corresponds to *strongly disagree* and 4 to *strongly agree*. The total scores range between 2 and 8, where the highest scores indicate greater favorability towards the HIV test. This scale was validated in young Spanish people and reports a Cronbach alpha of .81. In this research, the Cronbach alpha reported was .82.

Procedure

University officials were contacted to present them with the proposal and request their authorization to access the study population. In this research, all the participants who complied with the established inclusion criteria were invited. Once they were aware of, and accepted the scope of the study, they were asked to sign an informed consent document. The application of the battery of instruments was carried out in rooms within the institution that were adapted exclusively for this activity. The time taken to complete the instruments was approximately 25 minutes. The application was carried out by the research team with the help of undergraduate and graduate students who had

been trained for the process, and occurred in July and August of 2017.

This research was guided by the Ministry of Health Resolution N. °008430 of 1993 that outlines the scientific, technical and administrative norms for conducting health research with humans. Additionally, the ethical considerations defined in the Deontological and Bioethical Manual of Psychology, and Law 1090 of 2006 that regulates the practice of psychology in Colombia were also taken into account.

Data analysis

The sociodemographic characteristics of the participants were analyzed using averages or percentages depending on the type of variable. In order to compare sexual practices, knowledge, attitudes and, barriers faced by the participants who had or had not taken the test, or to compare by sex, a *t* test was used for independent samples and analysis of the X^2 test. Before applying the *t* test, the compliance to the normality requirement was reviewed by means of the Kolmogorov Smirnov test, and the variances of homogeneity through the Levene test. The results allowed for the acceptance of the supposed normality of the distribution of the scores and variables in the groups studied. The supposed equality or difference of variances was assumed in the association of the variables, considering the results obtained in the Levene test. The phi (ϕ) coefficient and the effect size (Cohen, 1988) were calculated when the associations and differences were statistically significant. The effect size was interpreted using Cohen's original proposal: large ($d > 0.8$), medium ($0.8 > d > 0.5$), and small ($d > 0.3$). The data was analyzed using SPSS (v.23).

Results

This section presents the psychosocial factors associated with HIV testing in Colombian university students.

Sociodemographic data

In total, 1057 students participated, 651 (63 %) women and 384 (37 %) men, whose ages were between 18 and 22 years old ($M = 19$, $SD = 1.27$), and were in their first (23.1 %), second (29 %), third (28.8 %), fourth (14.6 %), and fifth (4.5 %) year of study at a university in Cali, Colombia. Of the total of participants, 214 (20.2 %) informed having taken the HIV test.

Table 1 presents the sociodemographic data of the participants, differentiated by those who have and have not taken the test.

No significant differences were found between the participants who reported having taken the HIV diagnostic test in the variables sex ($X^2 = 0.011, p = .91$), socioeconomic status ($X^2 = 0.002, p = .96$), family income ($X^2 = 0.059, p = .80$), and the people with whom they live ($X^2 = 3.293, p = .07$). Nevertheless, significant associations of a low magnitude were identified according to sexual orientation and if the participant was religious, with a greater presence of homosexual or bisexual participants ($X^2 = 16.482, p < .001, \phi = 0.12$) and lesser presence of practitioners of any given religion ($X^2 = 7.311, p < .01, \phi = 0.08$) in the group that had taken the diagnostic test.

Sexual practices and the HIV Test

In order to relate sexual practices with the test, the two groups were compared by the age of sexual initiation, the types of sexual relationships, the number of sexual partners, and the use of condoms in their first and last sexual intercourse, limiting the sample to 83.2 % of those who affirmed having had some type of sexual intercourse, be it vaginal, anal, or oral-genital. Table 2 shows that the percentage of

participants who reported having had vaginal intercourse was significantly greater ($X^2 = 29.38, p < .001, \phi = 0.16$) in the participants who took the HIV test (93.7 %) than in those that did not (77 %). However, the magnitude of this association was low.

Moreover, statistically significant differences were identified associated to the age of the first sexual intercourse ($t = -3.01, p < .01$) and to the number of sexual partners in the last six months ($t = 1.99, p = .04$), when the age of sexual initiation was slightly less (*mean difference* = -0.45, $d = 0.23$) and the number of sexual partners was slightly more (*mean difference* = 0.27, $d = 0.2$) in participants who took the HIV test. The effect size between both mean differences was small.

As for the use of condoms, significant associations of low magnitude were found in the first ($X^2 = 5.01, p = .02, \phi = 0.07$) and the last ($X^2 = 3.95, p = .04, \phi = 0.06$) sexual intercourse, with a greater percentage of use in the first (78.5 % vs. 71.4 %) and the last sexual encounter (51.7 % vs. 43.6 %) in participants who did not take the test.

Table 1.

Socio-demographic data, differentiated by those participants who have taken and those who have not taken the HIV diagnostic test

Variable	Yes HIV test		No HIV test		Total		X^2	p
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%		
<i>Sex</i>							0.011	.91
Men	77	36.7	305	37.1	382	37		
Women	133	63.3	518	62.9	651	63		
<i>Socioeconomic status</i>							0.002	.96
Low	19	8.9	74	8.8	93	8.8		
Middle/high	195	91.1	769	91.2	964	91.2		
<i>Family income</i>							0.059	.80
Less than 2 MMS	16	7.5	59	7	75	7.1		
Greater than 2 MMS	198	92.5	784	93	982	92.9		
<i>Lives with</i>							3.293	.07
Parents	143	66.8	616	73.1	759	71.8		
Other	71	33.2	227	26.9	298	28.2		
<i>Sexual orientation</i>							16.482	.001***
Heterosexual	175	81.8	770	91.3	945	89.4		
Homosexual/bisexual	39	18.2	73	8.7	112	10.6		
<i>Religious practitioners</i>							7.311	.007**
Yes	85	39.7	422	50.1	507	48		
No	129	60.3	421	49.9	550	52		

Note. * $p < .05$, ** $p < .01$, *** $p < .001$. MMS = Minimum Monthly Salary.

Table 2.
Sexual practices differentiated by participants who have taken and those who have not taken the HIV test

Variable	Total		Yes HIV test		No HIV test		X ²	p
	n	%	n	%	n	%		
Vaginal intercourse	829	80.3	194	93.7	635	77	29.38	.001***
Condom use first intercourse	628	76.7	135	71.4	493	78.5	5.01	.025*
Condom use last intercourse	415	49.8	85	43.6	330	51.7	3.95	.047*
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>t</i>	<i>p</i>
Age first intercourse	16.2	1.8	15.93	2.02	16.38	1.82	-3.01	.003**
Sexual partners last 6 months	1.64	1.32	1.85	1.79	1.58	1.13	1.99	.048*

Note. * $p < .05$, ** $p < .01$, *** $p < .001$.

Knowledge associated with the HIV Test

For the total sample, the main sources of information about the HIV test were healthcare professionals (37.1%), the Internet (29.5%), and educational institutions (26.3%). Meanwhile, TV or radio programs (19.3%), news articles (19.1%), and advertising (5.2%) were the least employed sources.

To measure the knowledge associated with the HIV test, 14 items were applied composed of correct and incorrect affirmations. The participants who took the test scored (range from 0 to 14) higher ($M = 9.21$, $SD = 1.98$) compared to those who had not taken it ($M = 7.87$, $SD = 2.19$), and these were significant differences ($t = 7.79$, $p < .001$, $d = 0.65$), with a medium effect size. Moreover, it stands out that when comparing by sex, significant differences were not found ($t = 1.69$, $p = .09$) in the knowledge reported by men ($M = 8.30$, $SD = 2.46$) and women ($M = 8.03$, $SD = 2.06$).

With respect to incorrect knowledge, it was found that the participants who had reported taking the test presented

higher indices of correct answers in the affirmations “if the results of my partner’s test are negative, it is not necessary for me to take the test” (90.1% vs. 80.1%) and “if the results of my test are negative, then I don’t have anything to worry about” (66% vs. 51%), these being significant differences ($p < .05$). Meanwhile, considering the correct knowledge, the highest indices of correct answers were reported in the affirmations “the results of the HIV test are confidential” (86.9% vs. 77%) and “healthcare providers cannot administer the test without my consent” (84.1% vs. 76.2%), evidence, again, significant differences ($p < .02$).

Tables 3 and 4 present the index of correct knowledge about the HIV test, differentiated by the participants who have taken it and those who have not.

A low index of correctly identified incorrect affirmations is notable in participants from both groups in statements like “I can only know if I have HIV through a blood test” (13.6%), “Rapid HIV detection tests are not reliable” (25.9%), and “Only people of legal adult age can take the

Table 3.
Correctly identified incorrect knowledge about the HIV test, differentiated by participants who have taken it, and those who have not

Incorrect knowledge	Total correct		Yes HIV test correct		No HIV test correct		X ²	p
	n	%	n	%	n	%		
	1. If I am a heterosexual person, I do not have to take the HIV test	814	93.6	190	96	624		
2. People who have only had sexual intercourse with one partner do not have to take the test	793	90.5	189	93.6	604	89.6	2.827	.093
3. If my partner’s results of the test are negative, it is not necessary for me to take the test	719	82.5	182	90.1	537	80.1	10.62	.001***
4. Only people of legal adult age can take the HIV test	506	57.8	129	63.9	377	55.9	4.003	.045*
5. If the results of my test are negative, then I don’t have anything to worry about	479	55.1	132	66	347	51.8	12.56	.001***
6. The rapid HIV detection tests are not reliable	226	25.9	68	33.7	158	23.5	8.348	.004**
7. The only way I can know if I have HIV is through a blood test	119	13.6	26	12.9	93	13.8	0.103	.749

Note. * $p < .05$, ** $p < .01$, *** $p < .001$.

Table 4.

Correctly identified correct knowledge about the HIV test, differentiated by participants who have taken the test and those who have not

Correct knowledge	Total correct		Yes HIV test-correct		No HIV test-correct		X ²	p
	n	%	n	%	n	%		
8. The only way to know for sure if I have HIV is by getting tested	708	80.7	171	84.7	537	79.6	2.597	.107
9. The results of the HIV test are confidential	690	79.3	173	86.9	517	77	9.140	.003**
10. Healthcare providers cannot administer the HIV test without my consent	682	78	169	84.1	513	76.2	5.569	.018*
11. The results of the HIV test are reliable	607	69.4	149	73.8	458	68.1	2.383	.123
12. I can request testing in my healthcare provider's clinic	545	62.5	165	82.5	380	56.5	44.29	.001***
13. The HIV test is free	127	14.5	65	32.2	62	9.2	65.71	.001***
14. I can only be tested with pre and post-test counseling.	110	12.6	35	17.4	75	11.2	5.456	.020*

Note. * $p < .05$, ** $p < .01$, *** $p < .001$.

test" (57.8%), likewise in correct affirmations like, "I can only be tested with pre and post-test counseling" (12.6%), "The HIV test is free" (14.5%), and "I can request testing in my healthcare provider's clinic" (62.5%).

Attitudes towards the test

The attitudes were assessed based on the scores reported by participants in two items (range from 0 to 8) associated with people's attitude towards the HIV test. Even though

those who had taken the test presented the highest scores ($M = 7.35, SD = 1.32$) compared to those who had not ($M = 7.23, SD = 1.21$), the difference was not significant ($t = 1.29, p = .19$). However, when comparing by sex, significant differences were found ($t = -2.08, p = .04, d = 0.07$) in attitudes reported by men ($M = 7.16, SD = 1.29$) and women ($M = 7.33, SD = 1.17$), although with an irrelevant effect size.

In general, 69% of the participants strongly agreed with taking the test if they had had a risky sexual encounter.

Table 5.

Barriers associated with the HIV diagnostic test

Perceived barriers	Total		Men		Women		X ²	P
	n	%	n	%	n	%		
1. I have never had sexual intercourse	178	17.2	43	11.3	135	20.7	15.17	.001***
2. I have had sexual intercourse, but I have always used a condom	246	23.8	109	28.5	137	21	7.44	.006**
3. I think that HIV only affects sex workers/homosexuals	5	0.5	5	1.3	0	0	8.56	.003**
4. I do not want my parents to know that I have had sexual intercourse	28	2.7	4	1	24	3.7	6.36	.012*
5. I am sure that my sexual partners do not have HIV	308	29.8	133	34.8	175	26.9	7.24	.007**
6. I have never been offered to take the HIV test	260	25.2	102	26.7	158	24.3	0.75	.385
7. I do not know where to get tested	111	10.7	50	13.1	61	9.4	3.47	0.062
8. I am scared of testing positive for HIV	88	8.5	46	12	42	6.5	9.65	0.002**
9. I am worried that I will not know what to do if I have HIV	74	7.2	32	8.4	42	6.5	1.34	0.247
10. I am worried that I will die if I am diagnosed with HIV	30	2.9	18	4.7	12	1.8	7.02	0.008**
11. I do not want anyone to know if I have HIV	10	1	7	1.8	3	0.5	4.72	0.030*
12. I am scared of having blood drawn	36	3.5	12	3.1	24	3.7	0.21	0.645
13. I have to pay to take the test	36	3.5	11	2.9	25	3.8	0.66	0.416
14. I do not want to wait for the results	13	1.3	6	1.6	7	1.1	0.47	0.490
15. I do not think it is possible that I have HIV	230	22.3	90	23.6	140	21.5	0.58	0.443
16. I do not know the benefits of getting tested	18	1.7	6	1.6	12	1.8	0.10	0.746

Note. * $p < .05$, ** $p < .01$, *** $p < .001$.

Moreover, 72 % affirmed that they strongly agreed recommending a friend to take the HIV detection test if they had participated in a risky sexual encounter.

Testing barriers

The primary reasons for men and women not to have taken the HIV diagnostic test were: (a) they were sure their sexual partners did not have HIV (29.8 %), (b) they trusted the sexual partners they had had (29.2 %), (c) the test had never been offered to them (25.2 %), and (d) they had never had sexual intercourse without protection (23.8 %). Table 5 presents the barriers the participants associated with the HIV diagnostic test.

Regarding the differences by sex, it was found that women do not take the test in a higher percentage than men because they have not had sexual intercourse (20.7 % vs. 11.3 %) and because they do not want their parents to know that they have had sexual intercourse (3.7 % vs. 2.7 %), being these significant differences ($p < .015$). Meanwhile, men did not get tested in a higher percentage than women because they were sure their partner did not have the virus (34.8 % vs. 26.9 %), because they had always used a condom during sexual intercourse (28.5 % vs. 21 %), and for fear of getting an HIV positive result (12 % vs. 9.65 %), also showing significant differences ($p < .01$).

Discussion

The two primary objectives of this research were: (a) to relate sexual risk, knowledge, and attitudes towards HIV testing in Colombian university students; and (b) to describe the perceived barriers in those who had not been tested, analyzing the differences according to sex.

The results identify that even though the majority of participants were already sexually active (83.2 %), nearly half of them did not use a condom in their last sexual intercourse (49.8 %). The literature has connected this situation to factors like lack of access to condoms at the moment of sexual intercourse, low risk perception of contracting HIV, and embarrassment towards demanding its use from the partner during the encounters (Belza et al., 2014; Fuster et al., 2014; Hoyos et al., 2019; Morales et al., 2016). Despite high participant exposure to sexual risk and that the majority knew that the HIV diagnostic test existed, only 20 % had taken it in order to know their serological status, a percentage that approximates to 22 % that were reported in the study by Hoyos et al. (2012) in Spain, to 29.5 % in the research by Peralta et al. (2007) in the United States, and to 25 % from the ENDS report (2015) in Colombia.

However, even though the scores on knowledge about the test obtained by the participants who had taken it were superior to those of the participants who had not, and the majority of the information was acquired from sources of information like healthcare professionals, Internet, and educational institutions, it was observed that a significant number do not know that in Colombia, by law, the test is free, that they can get it taken whenever required at the *Empresa Prestadora de Servicios de Salud (EPS)* [Healthcare Providing Service] as part of the *Plan Obligatorio de Salud (POS)* [Obligatory Health Plan], that it is freely accessible to people of all ages, and that in order to be tested they must receive pre and post-test counseling through which they will be given, respectively, basic information about the function of the test, and help for them to understand the result (Profamilia, 2017).

Likewise, some of the study's participants did not know that healthcare professionals cannot reveal information about the diagnosis, results, and evolution of the disease (World Health Organization [WHO], 2012). A large proportion was unaware of the existence of tests that were different from those that use blood screening (ELISA and rapid detection tests) and confirmative tests (Western Blot), like saliva and urine testing as a method to diagnose the disease (Ministerio de Salud y Protección Social [UNFPA], 2011). Similarly, they did not know that it is recommendable to be tested every year, and that even when the results are negative, they should continue tracking their serological status (Infosida, 2016).

Another factor reported in previous research is the relationship between taking the test and the participants' attitude toward HIV (Espada et al., 2015; Morales et al., 2016). Different from the results of previous studies (Belza et al., 2014; Bilardi et al., 2013; Bradley et al., 2011; Brooks et al., 2011; Decker et al., 2015; Deblonde et al., 2010; Espada et al., 2017; Fuster et al., 2014; Kaai et al., 2012), this research found that the exposure to risky sexual behavior and knowledge about the HIV test were related to a greater tendency to taking the test, with a medium effect on knowledge and a small effect on sexual risk. Nevertheless, in line with the discoveries from the cited studies, a relation between favorable attitudes towards the test and taking it was not identified.

Similar to what has been reported in other studies, these results demonstrate that the main personal barriers associated with low rates of HIV testing are excess trust in sexual partners, low perception of risk of exposure to the disease, and the certainty of having had sexual intercourse with protection (Belza et al., 2014; Fuster et al., 2014; Morales et al., 2016; Peralta et al., 2007). At this point,

it is noteworthy that trust in sexual partners, certainty of having always used a condom during intercourse, and the fear of receiving positive test results are reasons that are significantly more present in men than in women. Conversely, not wanting their parents to know they have had sexual intercourse was a reason more evident in the women of this research.

Other related factors were the lack of test offer by healthcare institutions and the fact that the participants still had not become sexually active (Morales et al., 2016; Peralta et al., 2007). In this research, fear of getting a positive diagnosis, stigmatized perceptions of the disease, and fear of disclosure of the results were not personal barriers that interfered with taking the test (Bilardi et al., 2013; Deblonde et al., 2010; Kaai et al., 2012).

Currently, the intervention strategies have centered on identifying the perceptions of risk concerning HIV, recognizing the strategies to better access to the tests, increase the number of specialized healthcare professionals, and reduce the stigma associated with the disease (Deblonde et al., 2010; Kaai et al., 2012; Kall et al., 2012; Newman et al., 2013). Authors like Becky et al. (2015) propose facilitators that increase the probability that people will take the test, which include: (a) *politics* that are associated with the elimination of the written consent requirement, rationalization of pre-test and post-test counseling, and obligation of doctors to perform routine HIV testing; (b) *community*, referring to decreasing the stigma and developing campaigns geared toward the acceptance of patients; (c) *practices* which imply counseling about HIV, educating healthcare professionals, and including the test as a routine practice in clinical work and the use of oral HIV tests; and (d) *personal*, which consist of educating people about the risk of contracting HIV, increasing acceptance of the advantages of being tested, timely attending the requests of patients, and addressing sexuality in an comprehensive manner.

Faced with this panorama, it becomes a priority to strengthen the conceptual training and the empowerment of individuals, families, communities, and healthcare institutions regarding beliefs and knowledge associated with sexuality and sexual and reproductive rights, from a perspective of self-care, where scientific information is the most important factor, establishing a differential focus adjusted to people's life course and contributing to the reduction of stigma and discrimination. Moreover, strengthening educational sexual health and reproduction programs from early childhood will contribute to the well-being and quality of life of these populations and decrease the cases of teenage pregnancy, HIV, and other STDs. Notwithstanding, these interventions should be coordinated within the public policy frameworks of each country (Hoyos et al., 2019; Morales et al., 2016;

Sevilla, Sanabria, Orcasita, & Palma, 2016), and should favor inclusion, comprehensive care, and easy access to sexual and reproductive health programs.

Therefore, the findings of this study are presented as a tool for the design of programs to promote sexual and reproductive health, as well as the prevention of disease and teenage pregnancy, specifically related to HIV, condom use, and HIV testing. The primary limitation of this study was that the non-randomized sample employed does not allow for a generalization of the results in this population. The validation of the instruments Barriers to HIV Testing (*Barreras hacia la Prueba del VIH*; Peralta et al., 2007) and the Scale of Attitudes Toward HIV/AIDS (*Escala de Actitudes hacia el VIH-Sida*; Espada et al., 2013) in Colombian populations presents an opportunity for researchers interested in this topic to further study it. Future work should continue to explore, through the design of different methodologies, the psychosocial factors associated with the low rate of HIV diagnostic testing.

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