HIV VOLUNTARY TESTING AMONG PORTUGUESE WOMEN ATTENDING FAMILY PLANNING CLINICS: IMPLICATIONS FOR HIV PREVENTION EDUCATION AND TESTING

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ABSTRACT. ***Objectives*: The aim of this article is to analyze the factors associated with HIV testing among 767 sexually active women.** ***Methods*: Participants were administered several self-report questionnaires that assessed behavioral and psychosocial measures.** ***Results*: Overall, 59.8% of the participants reported ever having tested for HIV. Results show that higher levels of education, being pregnant or having been pregnant, concern about AIDS, AIDS knowledge, self-efficacy in condom negotiation and perception of no risk in partner significantly predicted the likelihood of testing among women. Attending the mass was negatively associated with HIV testing.** ***Conclusions*: These findings provide information that can be used in the development of a focused gender sensitive HIV prevention program to increase HIV testing.**

KEYWORDS. HIV prevention, women, sexual attitudes and behaviors, HIV testing

INTRODUCTION

In Portugal, women account for 26.6% of all AIDS cases reported to the Health Ministry, Instituto Nacional de Saúde Doutor Ricardo Jorge (INSA, 2014), and this percentage is expected to rise due to the fact that women account for more than 30% of newly diagnosed HIV cases in the last five years. Epidemiological studies have shown that Portuguese women, between the ages of 20 and 39, are the fastest-growing group becoming infected, and the main mode of HIV transmission in this group is through unprotected heterosexual sex with infected partners (INSA, 2014). Since there is no vaccine for AIDS, a demand for development of effective behavioral intervention programs to reduce women's risk and to promote HIV screening test is urgently needed.

Although HIV prevention efforts have focused on young adult women, women of all ages may engage in HIV risk behaviors and experience barriers to condom use and other preventive measures such as voluntary HIV counseling and testing (VCT). Clinically, the viral properties of HIV have lead healthy individuals to remain asymptomatic for an extended period of time, with a mean latency period of seven years (Sabato, Burnett, Kerr, & Wagner, 2013). This extended clinical latency together with the rate of late diagnosis of HIV / AIDS (i.e., a person has remained unaware of their HIV status for several years, increasing the risk of onward transmission), in Portugal (65%, double that recorded in Europe) make it probable that many people are HIV positive without knowing it. When they are diagnosed, they may have been infected for many years. Last year in Portugal, there were about 4,000 early

diagnostic tests (early diagnosis of HIV infection). These numbers are similar to previous years (2010–2011), which reveals the need to increase early diagnostic testing (INSA, 2014).

Voluntary testing for HIV antibodies is extremely important for prevention and treatment. Testing limits the transmission of the virus, as the prevalence of high-risk sexual behavior is reduced substantially after becoming aware of being HIV positive (Marks, Crepaz, Senterfitt, & Janssen, 2005; Eisele et al., 2009; WHO & UNAIDS, 2007). Nonetheless, increases in risky behavior have been found among individuals who tested negative (Sherr et al., 2007).

The Portuguese National Health Service has been investing resources for expanding VCT services and provides universal coverage for HIV testing and care. The National Portuguese Program for HIV/AIDS Prevention and Control (Direção Geral da Saúde, 2012) proposes by the end of 2016 to decrease from 65% to 35% the late diagnosis of HIV infection, among other goals. In fact, the number of HIV tests in Counseling and Early Detection of HIV Centers (CEDC) increased between 2000 and 2007 (2,337 to 25,568) (Direção Geral da Saúde, 2012). Although data for HIV testing of women cannot be presented because gender differences are not available in official data, HIV tests for women in child-bearing age is a national recommendation (although not a requirement) in the context of current/planned pregnancy in Portugal.

The rate of testing has been increasing, but to encourage further earlier detection of infection and initiation of HIV care, the Portuguese parliament recently adopted a resolution to expand routine, population-based HIV testing. This policy is in accordance with the recommendations of the World Health Organization (WHO) and the United States Centers for Disease Control and Prevention (Assembleia da República, 2011; World Health Organization, 2013). According to a recent study (Yazdanpanah et al., 2013), one-time HIV screening in the Portuguese national population will increase survival and will be cost-effective by international standards. The study recommends prioritizing screening in high-risk populations and geographic settings, although the authors of this study admit that Portugal faces numerous challenges in implementing this resolution because of the current economic crisis.

Women's HIV testing behaviors are important to understand, given the rates of risky sexual behavior recently found in a Portuguese study conducted among university students, which reported low levels of condom use (Ramiro, Reis, Matos, & Diniz, 2014). Also there is epidemiological evidence of increasing heterosexual transmission of HIV among the Portuguese female population (INSA, 2013).

Determinants of VCT

Prior research has identified demographic, behavioral, and psychosocial factors specifically related to HIV testing. Demographic factors positively associated with HIV testing were female gender (Caldeira, Singer, O'Grady, Vincent, & Arria, 2012), racial and ethnic minorities (Crosby, Miller, Staten, & Noland, 2005), young age (Wang, Li, Stanton, & McGuire, 2010), affluence (Agha, 2012), past pregnancies, urban residence (MacPhail, Pettifor, Moyo, & Rees, 2009), education (Crystal et al., 2012; Tenkorang & Owusu, 2010), and religion (Tenkorang & Owusu, 2010). There are contradictory findings about the relation between HIV testing and marital status, with some studies considering being single positively associated with HIV testing and others finding that being married predicted HIV testing (Kalibala et al., 2014; Tenkorang & Owusu, 2010). Other authors add that the relation between marital status and HIV testing may change after adjusting for other factors. For example, in a study conducted by Agha (2012), a higher proportion of never married women have been tested for HIV. However, the author found that never married women (who are at greater risk of HIV infection) were less likely to have been tested, after adjusting for income and education. On the other hand, among the factors associated with no history of HIV testing in women in Massari et al.'s study (2011) included age above 44 years old, the absence of any pregnancy during the previous 15 years, a low educational level, unemployment, having only one or no steady relationship in one's lifetime, a religious affiliation, and residence in a poor neighborhood.

The behavioral correlates of HIV testing involve high-risk sexual behaviors such as frequency of unprotected sex and number of sexual partners (Caldeira et al., 2012), as well as other sexual and drug-using risk behaviors (Bond, Lauby, & Batson, 2005). However, some studies report that women at higher risk of HIV were less likely to be tested for HIV (Agha, 2012). In this regard, there are mixed findings in research between sexual risk behavior and HIV testing. Sherr et al. (2007) found that motivation for HIV uptake was driven by knowledge and education rather than sexual risk. This finding suggests that having engaged in risky behavior may not (always) be sufficient to motivate individuals to request HIV testing. Several psychosocial factors may mediate between risk-taking and HIV testing (de Wit & Adam, 2008).

Psychosocial predictors of HIV testing include greater HIV/AIDS knowledge (Mall, Middelkoop, Mark, Wood, & Bekker, 2013; Raba, Skret-Magierlo, & Skret, 2010), lower stigma and positive attitudes (Mall et al., 2013), perceived high personal susceptibility to HIV/AIDS (de Paoli, Manongi, & Klepp, 2004; Crystal et al., 2012), perceived peer sexual risk involvement and satisfaction with life (Wang et al., 2010), conversations about HIV/AIDS (MacPhail et al., 2009), relationships dynamics (e.g., trust, power, sexual communication, and sexual coercion), and beliefs about partner's sexual risk behavior (Longmore, Johnson, Manning, & Giordano, 2013). Intention to test has also been predicted by perceived pros, cons, risk, self-efficacy, and availability/accessibility related to testing (Hou & Wisenbaker, 2005). In general, testing for HIV seems to be more likely when individuals perceive that they have been at risk, although this association is not perfectly observed (de Wit & Adam, 2008).

Theoretical Model

Although this study does not aim at testing a theory, it studies several constructs of the Health Belief Model (HBM; Rosenstock, Stretcher, & Becker, 1994) that are relevant, specifically, risk perception, AIDS knowledge, self-efficacy, and barriers towards safe sex. Several social cognitive theories, including the HBM, have been used to explain protective behaviors (Abraham & Sheeran, 2005). Behavioral theorists suggest that perception is an important component of an individual's decision to perform a health-related behavior and is a key concept in the HBM. According to the HBM, for the behavior change to occur, an individual "must feel threatened by his current behavior (perceived susceptibility and severity), and believe that change will be beneficial by resulting in a valued outcome at acceptable cost, but he must also feel competent (self-efficacious) to implement the change" (Rosenstock et al., 1994, p.10). Meta-analysis of published research on HBM shows that perceived benefits, perceived barriers, and self-efficacy are the strongest predictors of health-related behaviors (Carpenter, 2010; Lin, Somini, & Zemon, 2005) and have an impact on the willingness to accept VCT testing (Vermeer, Bos, Mbwambo, Kaaya, & Schaalma, 2009).

To our knowledge, no study has been conducted to identify the prevalence and the determinants of VCT in sexually active Portuguese women attending family planning clinics. This study documents the prevalence of HIV testing in a sample of sexually active women attending family planning clinics and examines the demographic, behavioral, and psychosocial correlates of HIV testing. Specific measures of sexual risk behaviors (frequency of unprotected sex and number of sexual partners) and several measures of psychosocial variables (risk perception, AIDS-related knowledge, self-efficacy, and barriers against safe sex) are hypothesized to be associated with greater likelihood of HIV testing. As Portugal tries to implement HIV prevention interventions, it is important that women are fully involved in HIV prevention strategies. Understanding HIV testing could help to guide the development of interventions designed to motivate Portuguese women to adhere to VCT services.

Methods

Sample and procedure

Data were collected at urban, publicly funded, family planning clinics in the north of

Portugal where women were taking advantage of a free gynecological consultation offered by the Portuguese Ministry of Health ($N = 767$). Standardized questionnaires were administered from January to July 2014 to women eligible to participate (searching for gynecological care and sexually active in the previous six months). Participants provided written informed consent and replied to the questionnaires in a private area at the clinic. The administration of the questionnaires was conducted by master's students in clinical and health psychology, who had been familiarized with the objectives of the study and trained in interviewing skills. Participation was voluntary, and the data were confidential. The refusal rate was 5%, and women who declined to participate in the study cited lack of time to complete the questionnaires as the reason for their nonparticipation. Ethical approval for the study was given by the North Regional Health Administration of Portugal.

Measures

Participants were administered several self-report questionnaires that had been previously adapted and validated into Portuguese from the Women's Health Study (Hobfoll et al., 2002; Schroder, Hobfoll, Jackson, & Lavin, 2001) by Costa and McIntyre (2002). The measures and their psychometric properties in this sample are described below.

Sociodemographic measures. Several questions addressed age, area of residence, education, ethnicity, employment status, with whom they live, marital status, religion, attendance at mass, yearly income, pregnancy, and number of children.

Behavioral measures. HIV testing—the main outcome variable of interest—was assessed by a question (self-report) that asked if the respondent had ever been tested for HIV. Additionally, women were asked about their HIV status, as they knew their HIV testing results. This topic included a total of two items, and scores were created for each item.

Sexual Behavior. questions asked women about the frequency of vaginal sex, condom use, and the number of sexual partners in the last six months (e.g., "During the past six months, how many times did you engage in vaginal sex? Of these times, on how many occasions did you use a condom? During the past six months, with how many people have you had sex?"). Women were also asked about condom use during the last four sexual acts (e.g., "During the last four sexual acts you engaged in, on how many of these occasions did you use a condom?"). This topic included a total of four items, and scores were created for each item.

Psychosocial measures. AIDS-Related Knowledge was assessed with 14 items, not covering HIV testing (e.g., "Someone can be infected with HIV by shaking hands, touching or kissing the face of someone with HIV?" $\alpha = 0.79$), using a scale with three possible options (true, false, I do not know). The percentage of correct answers was used as a summary score. AIDS-related knowledge designates a full scale comprising two subscales: HIV transmission and HIV prevention knowledge. Knowledge of HIV transmission was measured with 8 of these 14 items (e.g., "Someone can be infected with HIV by working near someone with HIV?" $\alpha = 0.76$). The remaining 6 items assessed knowledge of HIV prevention (e.g., "Effective methods to avoid AIDS: Use a condom"; $\alpha = 0.66$).

AIDS Risk Perceptions topic assessed individual AIDS risk in community (one item) and personal AIDS risk (one item), i.e., whether the participants' heterosexual contacts in general (e.g., "I believe sexual contact between a man and women has. . .") and their sexual behavior in particular ("I believe my current sexual behavior has. . .") placed them at risk of HIV infection. The response format was in a four-point scale (0 = *no risk*, 1 = *low risk*, 2 = *moderate risk*, 3 = *high risk*). Additionally, a question assessed whether the woman discussed HIV/AIDS danger and prevention with her partners (talking about AIDS and AIDS prevention, one item) using a three-point scale (0 = *rarely or never*, 1 = *with some partners but not others*, 2 = *with every partner*). These are three isolated questions about a topic but not a scale.

Risk beliefs about the partner were assessed by four items that evaluated women's beliefs in four areas: (1) their partners used I.V. drugs (injections) in the past; (2) their partners had

other sexual partners during the past year; (3) their partners had sex with other men in the past five years; (4) their partners(s) had been in prison during the past five years. Answers were recorded on a three-point scale (0 = *no*, 1 = *maybe, do not know for sure*, and 2 = *yes*), and an overall indicator for partner risk was computed by summing the four items.

Barriers Against Safe Sex Behaviors were assessed by 11 items about reasons for not practicing safe sex behaviors in sexual intercourse on a four-point scale (ranging from 0 = *strongly disagree* to 3 = *strongly agree*); items were grouped into five subscales and sum scores were computed for each. One item assessed *abstinence* (e.g., "I have chosen to be abstinent"). Three items assessed *perception of no risk in partner* (e.g., "My partner is not at risk"; "I know my partner(s) is(are) not infected because he/they has (have) been tested for HIV"; $\alpha = 0.66$). Two items were chosen as a measure of *negative attitudes toward safer sex behavior* ("I find that safer sex practices interfere with being free and doing what I want"; $\alpha = 0.71$). Two items were taken as indicators of *perceived partner's negative attitude* (e.g., "My partner(s) would not enjoy safer sex practices"; $\alpha = .87$). Finally, three items measured *low perceived communication self-efficacy* (e.g., "I cannot talk to my partner(s) about it"; $\alpha = .70$).

Exploratory factor analysis confirmed the multidimensionality of the construct proposed by the original authors (Hobfoll, Jackson, Lavin, Britton & Sheperd, 1994; Schroder et al., 2001), showing that items could be grouped into the described five subscales in the Portuguese population (Costa, 2006).

Self-Efficacy Condom Negotiation was assessed by five items (e.g., "How confident you feel about your present or most recent partner ... to convince your partner to use a condom even if he says he does not want?"; $\alpha = 0.96$), using a nine-point scale (0 = *not at all confident* to 9 = *fully confident*). The result was used as an overall score (Hobfoll et al., 2002).

General Self-Efficacy Scale was measured by 10 items (e.g., "I can always manage to solve difficult problems if I try hard enough"; $\alpha = .70$) with a seven-point scale (1 = *not al all true* to 7 = *exactly true*). The result was used as an overall score to assess the perception of personal competency in dealing effectively with a variety of stressful situations (Schwarzer, BaBler, Kwiatek, Schroder, & Zang, 1997).

Data Analysis

The sample was described using frequencies and percentages, or means and standard deviations. In order to evaluate univariate relationships with the dichotomized measure of HIV testing, a logistic regression was conducted. To establish the contributions of these correlates in the explanation of HIV testing, the variables displaying significant values of $p < .05$ in the univariate analysis were analyzed in a multivariate logistic regression model (forward stepwise method). However, for barriers included in the multivariate logistic regression model, a p level $> .05$ was selected for theoretical reasons, as it is an important concept in the HBM and was marginally significant. This model was based on the analysis of $N = 767$ cases; there were no missing cases. Multicollinearity was assessed through VIF, and no problems for all the variables were found because VIF scores were two or lower. For the estimation of odds ratio (OR), 95% confidence interval (CI) and p values are presented for all analysis and a p value $< .05$ was considered statistically significant. All analyses were performed with SPSS for Mac OSX version 22 software (SPSS, Inc., Chicago, IL).

RESULTS

Sociodemographic Characteristics

Mean age of the sample was 36 (SD = 11. 2), with a range of 18 to 65 years of age. Half of the participants ($n = 388$; 50.6%) live in urban areas, and the other half live in rural areas ($n = 379$; 49.4%). In terms of education, 73.3% ($n = 562$) have less than university education, and 26.7% ($n = 205$) have a university education. Almost all of the participants were Caucasian ($n = 764$; 99.6%). A total of 70.7% ($n = 542$) of the participants were currently working, and the remaining were unemployed

($n = 225$; 29.3%). Of the participants, 60.5% ($n = 464$) were married or cohabiting, 30.6% ($n = 235$) were not married, and 8.9% ($n = 68$) were divorced, separated, or widowed. Most women were living with a partner ($n = 465$; 60.6%), with children ($n = 351$; 45.8%), or with their parents ($n = 212$; 27.6%). In terms of religious background and religious practices, 50.5% ($n =$) were practicing Catholic, 43.5% ($n = 334$) were nonpracticing Catholic, and the remainder had other or no religious beliefs ($n = 46$; 6%). Regarding church attendance, 26.9% ($n = 206$) always attend mass, 37.9% ($n = 291$) attend only sometimes, and the remaining do not attend ($n = 270$; 35.2%). A total of 63.7% ($n = 447$) reported having a yearly income of less than 6,000 euros, 25.6% ($n = 180$) between 6,000–12,000 euros, and 10.7% ($n = 75$) more than 12, 000. Only 5.1% ($n = 39$) of the women were pregnant and 63.2% ($n = 485$) had been pregnant. The majority of the women had one or more children ($n = 477$; 62.2%) ($M = 1$; $SD = 1.3$; range between 0 and 12) (Table 1).

Sexual behavior

In terms of sexual behaviors, a total of 97.4% ($n = 747$) of the women in the study reported having one main sexual partner during the past six months, and 2.6% ($n = 20$) indicated having additional sexual partners as well. The mean number of female sexual partners in the past six months was 1.15 ($SD = 2.9$). Vaginal sex during the past six months was the most frequent sexual practice with a mean of 40.7 ($SD = 36.3$); condom use in this sexual behavior was low ($M = 7.5$; $SD = 21.8$). Most women had not used condoms in the last four sexual acts ($n = 641$; 83.6%). Despite sexual risk behaviors, 94.4% ($n = 725$) reported none or low personal AIDS risk perception against a higher AIDS risk perception in the community ($n = 328$; 42.8%). The majority of the sample did not test for HIV, and 40.2% ($n = 308$) indicated they had taken the test (0% tested positive).

Means and standard deviations for the psychosocial variables are presented in Table 2.

Univariate models of HIV testing

The associations of the univariate logistic regression between HIV testing and the sociodemographic, behavioral, and psychosocial variables are presented in Table 3. HIV testing was positively associated with high levels of education, being employed, living with a partner, living with children, being either non-Catholic or a nonpracticing Catholic, a good yearly income, being pregnant or having been pregnant, having children, good AIDS-related knowledge (transmission and prevention knowledge), having risk beliefs about the partner, able to talk about AIDS and AIDS prevention (concern about AIDS), and high self-efficacy in condom negotiation. Negative associations with HIV testing were found for those living with parents, attending mass, and manifesting most of perceived barriers to condom use. There was no univariate association between HIV testing and age; area of residence; living with family or friends or alone; marital status; frequency of penile-vaginal sex; condom use and number of sexual partners in the past six months; condom use in the last four sexual acts; personal and community risk perception; and general perceived self-efficacy.

Multivariate models of HIV testing

Significant variables from the univariate logistic regression were further explored in a multivariate logistic model (Table 3). Independent, positive associations with HIV testing were found for education, being pregnant or having been pregnant, AIDS-related knowledge, willingness to talk about AIDS and AIDS prevention, self-efficacy in condom negotiation, and perception of no risk in partner. Unique contributions were also found for attending mass that was negatively associated with HIV testing.

A test of the model with all significant univariate correlates against a constant-only model was significant χ^2 (8, $N = 767$) $= 155.369$, $p < 0.001$, suggesting that the correlates, as a set, reliably distinguished those who took HIV testing and those who did not. The Hosmer-

TABLE 1. Socio-demogtaphic and behavioral characteristics of the sample (N = 767)

Variables	*n*	% or M(SD)
Age		36 (11. 2)
18–29	243	31.7
30–39	235	30.6
40-65	289	37.7
Area of residence		
Rural	379	49.4
Urban	388	50.6
Education		
Less than university education	562	73.3
University education	205	26.7
Ethnicity		
Caucasian	764	99.6
African	2	0.3
Other	1	0.1
Employment		
Yes	542	70.7
No	225	29.3
Living with		
Parents	212	27.6
Family	38	5.0
Friends	6	0.8
Partner	465	60.6
Children	351	45.8
Alone	32	4.2
Marital Status		
Married or cohabiting	464	60.5
Not married	235	30.6
Divorced, separated, or widowed	68	8.9
Religion		
Practicing Catholic	387	50.5
Nonpracticing Catholic	334	43.5
Other	46	6
Attending Mass		
No	270	35.2
Sometimes	291	37.9
Yes	206	26.9
Yearly income (euros)		
Less than 6,000	447	63.7
Between 6,000–12,000	180	25.6
More than 12,000	75	10.7
Pregnancy		
Is now pregnant	39	5.1
Has been pregnant	485	63.2
Number of children		
None	290	37.8
One or more	477	62.2
Behavioral measures		
HIV testing		
No	459	59.8
Yes	308	40.2
Frequency of vaginal sex during the past six months	767	40.7 (36.3)
Frequency of condom use during the past six months	767	7.5 (21.8)
Number of sexual partners during the past six months	767	1.15 (2.9)
One	747	97.4
Two or more	20	2.6
Condom use in the last four sexual acts	767	0.76 (1.5)
Yes	126	16.4
No	641	83.6

TABLE 2. Means and standard deviations of psychosocial variables in the sample (N = 767)

Variables	M	SD
Knowledge		
HIV transmission knowledge	5.40	2.04
HIV prevention knowledge	4.28	1.49
AIDS-related knowledge	9.68	2.99
AIDS Risk Perceptions		
AIDS risk in community	1.35	.99
Personal AIDS risk	.34	.67
To talk about AIDS and AIDS prevention	.83	.97
Risk beliefs about the partner	.62	1.49
Barriers Against Safe Sex Behaviors		
Abstinence	.49	.80
Perception of no risk in partner	4.45	2.06
Negative attitudes toward safer sex	1.51	1.54
Negative perceived partner attitude	1.27	1.42
Low perceived communication self-efficacy	1.90	1.85
Barriers against safer sex total scale	9.61	5.58
Self-efficacy condom negotiation	36.94	13.13
General perceived self-efficacy	4.58	.81

Note. Scales used: AIDS-Related Knowledge; AIDS Risk Perceptions; Risk beliefs about the partner; Barriers Against Safe Sex Behaviors; Self-Efficacy Condom Negotiation; General Self-Efficacy Scale.

Lemeshow test for goodness of fit was not significant χ^2 (8, N = 767) = 3.979, $p = .859$, suggesting that the model fits with the data. Overall, the full model correctly classified 70.4% of the participants, compared to 58.1% being correctly classified with the constant-only model. The full model explained about a third of the variance in HIV testing (Nagelkerke $R^2 = 0.27$).

DISCUSSION

This study examined factors that predict HIV testing among women attending family planning clinics. It revealed that 40.2% of the interviewed women have taken the test. A multivariate analysis showed that higher levels of education, being or having been pregnant, talking with partners about AIDS and its prevention, AIDS knowledge, self-efficacy in condom negotiation, and perception of no risk in partners significantly predicted the likelihood of testing among women. Attending mass had a negative association with HIV testing. The need for HIV testing among women is paramount as demonstrated by the prevalence and incidence rates of HIV in women in Portugal as well as by the reported low levels of condom use (83.6% did not use condoms in the last four sexual acts). These percentages are comparable to those reported in studies conducted in the United States (Guttmacher Institute, 2014) and also in Portugal (Ramiro et al., 2014). Our research findings were consistent with other studies that have reported considerable levels of HIV testing among women, especially among pregnant women (Remis et al., 2012). Despite this result, still half of the sample were not tested for HIV; this fact shows the need for HIV prevention programs to be gender specific, targeting women. However, we did not explore the possibility that partners had already taken the test, rendering the study not necessary from the participant perspective.

The results of this study support the applicability of constructs of some behavioral change theories in explaining HIV testing behavior. A set of predictors, as a whole, was identified in the multivariate model of HIV testing, and this identification allowed us to know which variables should be targeted to increase HIV testing in women and which variables deter women from taking the HIV test. Sociodemographic variables, such as high educational level and being pregnant or having been pregnant, were positively associated with HIV testing. In fact, the Health Belief Model assumes that a wide range of demographic, sociological (e.g., education), psychological, and structural variables may affect the perception of the individual (e.g., susceptibility, severity, benefits, barriers) and, thereby, affect the performance of preventive behavior indirectly (Abraham & Sheeran, 2005; Rosenstock et al., 1994). Other studies have confirmed the importance of these variables, specially education, marital status, and religion (e.g., Tenkorang & Owusu, 2010). Therefore, the results show that those with educational resources higher than others are being HIV tested, suggesting that information about the dangers of HIV reach them more effectively (assuming that people such as doctors, who are expected to seek such information actively, were rare in our sample) and/or that highly

TABLE 3. Results of significant predictors from the univariate analysis and multivariate logistic regression

	HIV Testing		Univariate Model				Multivariate Model			
	No	Yes	OR(95% CI)				OR(95% CI)			
Variables	(*N* = 459)	(*N* = 308)	OR	LCI	UCI	*p*-Value	OR	LCI	UCI	*p*-Value
Age	36.56 (12.35)	36.01 (9.12)	0.996	0.983	1.009	0.536				
Area of residence	0.48 (0.50)	0.59 (0.50)	1.276	0.955	1.704	0.099				
Education	0.19 (0.39)	0.38 (0.49)	2.512	1.812	3.482	<0.001	2.230	1.484	3.351	<0.001
Employment	0.67 (0.47)	0.76 (0.43)	1.550	1.119	2.148	0.008				
Living with parents	0.33 (0.47)	0.19 (0.40)	0.489	0.347	0.688	<0.001				
Living with family	0.06 (0.23)	0.04 (0.19)	0.675	0.335	1.359	0.269				
Living with friends	0.00 (0.07)	0.01 (0.11)	3.007	0.547	16.517	0.184				
Living with partner	0.57 (0.50)	0.66 (0.47)	1.488	1.103	2.008	0.009				
Living with children	0.41 (0.49)	0.53 (0.50)	1.620	1.211	2.168	0.001				
Living alone	0.04 (0.20)	0.04 (0.19)	0.890	0.429	1.848	0.754				
Marital status	0.49 (0.64)	0.47 (0.68)	0.951	0.761	1.186	0.654				
Religion	0.51 (0.59)	0.62 (0.62)	1.341	1.057	1.702	0.016				
Attending Mass	1.00 (0.81)	0.80 (0.74)	0.716	0.593	0.864	<0.001	0.708	0.567	0.884	0.002
Yearly income	2.17 (0.85)	2.41 (0.96)	1.589	1.273	1.985	<0.001				
Being pregnant	0.02 (0.13)	0.10 (0.30)	6.309	2.859	13.922	<0.001	10.307	3.772	28.164	<0.001
Having been pregnant	0.59 (0.49)	0.70 (0.46)	1.658	1.220	2.253	0.001	3.290	2.207	4.906	<0.001
Number of children	1.16 (1.37)	1.14 (1.10)	1.541	1.138	2.087	0.005				
Frequency of vaginal sex during the past six months	38.89 (33.51)	43.50 (40.16)	1.003	0.999	1.007	0.087				
Frequency of condom use during the past six months	48.99 (45.42)	53.22 (51.82)	1.002	0.999	1.005	0.245				
Number of sexual partners during the past six months	1.03 (0.96)	1.32 (4.45)	1.066	0.931	1.221	0.354				
Condom use in the last four sexual acts	0.74 (1.51)	0.79 (1.51)	1.212	0.858	1.712	0.276				
HIV transmission knowledge	5.04 (2.11)	5.93 (1.79)	1.262	1.166	1.365	<0.001				
HIV prevention knowledge	4.02 (1.58)	4.68 (1.26)	1.385	1.241	1.546	<0.001				
AIDS-related knowledge	9.06 (3.15)	10.60 (2.48)	1.217	1.149	1.288	<0.001	1.188	1.110	1.271	<0.001
AIDS risk in community	1.31 (1.04)	1.41 (0.92)	1.100	0.950	1.272	0.202				
Personal AIDS risk	0.34 (0.68)	0.34 (0.66)	1.012	0.816	1.254	0.913				
To talk about AIDS and AIDS prevention	0.69 (0.93)	1.03 (0.99)	1.435	1.234	1.668	<0.001	1.317	1.100	1.578	<0.001
Risk beliefs about the partner	0.52 (1.38)	0.77 (1.65)	1.123	1.011	1.247	0.031				
Abstinence	0.55 (0.84)	0.39 (0.73)	0.770	0.636	0.932	0.007				
Perception of no risk in partner	4.34 (2.05)	4.61 (2.08)	1.068	0.995	1.147	0.068†	1.105	1.016	1.203	<0.001
Negative attitudes toward safer sex	1.64 (1.55)	1.31 (1.52)	0.865	0.786	0.953	0.003				
Negative perceived partner attitude	1.37 (1.44)	1.10 (1.39)	0.871	0.784	0.968	0.010				
Low perceived communication self-efficacy	2.01 (1.83)	1.73 (1.89)	0.920	0.849	0.996	0.039				
Barriers against safer sex total scale	9.92 (5.45)	9.15 (5.74)	0.975	0.950	1.001	0.062†				
Self-efficacy in condom negotiation	35.18 (14.31)	39.57 (10.63)	1.029	1.016	1.042	<0.001	1.018	1.004	1.033	<0.001
General perceived self-efficacy	4.54 (0.84)	4.65 (0.77)	1.181	0.986	1.414	0.070				

Note. † Marginally significant results; OR > 1 means positive relationship between predictors and the dependent variable.

educated women absorb such information efficiently, which may also apply to pregnant women when told they should get an HIV test. On the other hand, those who are more pressured by religious practices seek HIV testing less.

The finding that AIDS-related knowledge is a significant predictor of HIV testing might suggest that HIV preventive interventions are being effective in giving information to women, even to those in rural communities. This same result has been found in other studies that show motivation for HIV uptake is driven by knowledge and education rather than sexual risk (Sherr et al., 2007). Indeed, prior research has identified AIDS knowledge specifically related to HIV testing (Mall et al., 2013;

Raba et al., 2010). Talking about AIDS and AIDS prevention was significantly associated with HIV testing. Those who feel that AIDS is a concern and a threat (perceived severity) are more likely to implement health-related behavior (Rosenstock et al., 1994) than those who disregard the severity. Therefore, HIV preventive interventions should include dimensions aimed to promote partner communication regarding AIDS and AIDS prevention. Self-efficacy in condom negotiation was also positively associated with HIV testing, which indicates that women who have high self-efficacy in negotiating condom use are more likely to test for HIV than others. Other studies have found that self-efficacy predicts the intention to test for HIV (Hou & Wisenbaker, 2005), and the HBM considers that for behavior change to occur, in addition to other factors, individuals must feel themselves competent (self-efficacious) to implement change. Additionally, condom negotiation and HIV testing are both protective behaviors, and the same reasons that motivate an individual to negotiate condom use may contribute to that individual's motivation to test for HIV. In fact, these correlates may be explained by HBM variables. Specifically, perceived susceptibility and severity, perceived benefits and barriers, and self-efficacy (Abraham & Sheeran, 2005; Rosenstock et al., 1994) are the strongest predictors of health-related behaviors (Carpenter, 2010; Lin et al., 2005). They also have an impact on the willingness to accept VCT testing (Vermeer et al., 2009).

In the multivariate logistic regression, another variable came across as being significantly associated with HIV testing, a barrier called perception of no risk in partner meaning that women who consider themselves as not using condoms because they believe they are in a relationship with an uninfected or low risk partner and that their partner is not at risk because he was tested for HIV are more likely to test for HIV. Prior research has identified a low risk for HIV to be associated with taking the test frequently, although there are mixed findings in research between sexual risk behavior and HIV testing (Sherr et al., 2007). In fact, this result is not straightforward. A woman who believes her partner is not at risk and that he has taken the HIV test (the questions addressed by the questionnaire) may feel motivated to be tested herself. These women do not use condoms, but they want to make sure they are at no risk and cannot infect their partners, which prompts them to seek testing.

The negative relation between attending mass and HIV testing found in the multivariate model may well be explained by participants' religious beliefs that praying protects them from getting STIs. Results from some studies highlight the influence of religious beliefs on HIV-related behaviors, such as believing that prayer can cure HIV (Zou et al., 2009). Also having a religious affiliation has been found as one of the factors associated with no history of HIV testing (Massari et al., 2011).

Although not significant in the multivariate analysis, the univariate analysis showed a negative association between seeking HIV testing and barriers against safe sex, and a positive association between HIV testing and risk beliefs about the partner. This finding is consistent with the latter two factors' importance in the HBM. Both should, perhaps, be studied with larger samples and considered for HIV preventive intervention. For example, interventions should include components aimed at identifying sexually risky partners (e.g., I.V. drug use, other sexual partners, sex with other men, prison record) as well as components that would help decrease barriers against safe sex behaviors.

Contrary to findings from previous research (Caldeira et al., 2012; Crystal et al., 2012; Wang et al., 2010), this study did not establish age and other demographic factors, sexual risk behavior, and specific risk perceptions as significant predictors of testing or not testing for HIV. Addressing inaccurate perceptions of risk may be a key to improving uptake of HIV testing.

This study has several limitations that should be considered. The interpretation of the results is limited to the population in which the research was done, and further research should be extended to women of different populations and settings. The use of self-reported measures to assess personal sexual information and HIV testing leaves room for misreporting. Another limitation of the study is the cross-sectional design, which does not enable causal inference.

Nevertheless, this design was considered appropriate because it was conducted to estimate the prevalence of the outcome of interest for this specific population (HIV testing), for the purposes of public health planning and assessment of many risk factors. Further, this study did not include a set of predictors that could also be important to explain HIV testing in this particular context, such as existence/perceptions of policies supporting HIV testing, routinely offering HIV testing in the context of certain health concerns (e.g., planned surgery), confidentiality, perceived risk for HIV transmission to fetus, self-efficacy related to HIV testing, and availability/accessibility related to testing, among others. The inclusion of these variables could optimize the prediction of HIV testing, as there is a small amount of variance in HIV testing explained by the logistic regression model.

In this study only predictors of motivation were considered, and self-regulatory variables (or skill development dimensions) were not explored, albeit these have proven effects on health behaviors in general. However, research suggests that motivational models provide an incomplete account of health behavior and, in particular, do not predict it well, unlike more successful behavioral inaction and multi-stage models (Armitage & Conner, 2000). Nonetheless, self-regulatory variables should be considered in future research because meta-analyses related to HIV risk show that these variables are involved in behavioral change that resulted from interventions (Johnson, Michie, & Snyder, 2014). In any case, the burden of change should not be placed only on individuals but also on the larger society that should start efforts to increase HIV testing, e.g., through media products that mobilize society and through HIV prevention interventions to change sexual beliefs and norms (Bertozzi et al., 2006).

Women who do not test for HIV might be influenced by their cultural context, including their religiosity, their perceived role in society, and how a patriarchal society limits their sexual education by assigning them a subordinate role and hindering their formal education (Portuguese society has started to value women's education only in the last few decades). These factors contribute to women's dependence and deter assertive behavior, particularly regarding safe sex and its negotiation. According to our results, HIV prevention education and testing programs should consider the cultural context of the target group.

Despite these limitations, these results address the need for focused and culturally sensitive HIV preventive interventions integrated in health education programs in family planning clinics. Thus, free gynecological care offers an opportunity for VCT among women attending family planning clinics. Medical staff, nurses, and health psychologists must work together to encourage women to test for HIV, incorporating HIV prevention programs in order to improve HIV prevention using HBM constructs. The knowledge of HIV status would help women and clinical staff to develop prevention plans aimed at reducing the risk of acquiring or spreading the disease. Although the lack of HIV awareness was not a significant predictor of not testing for HIV, this result is not enough to diminish the importance of this variable for future research and interventions. Lack of awareness is an important variable according to the literature and, specifically, for behavior change to occur, according to the HBM (Abraham & Sheeran, 2005; Rosenstock et al., 1994). Additionally, it may reduce the perceptions of susceptibility and severity of contracting HIV, which, in turn, may reduce the feeling of competence to implement change. Therefore, we propose that the family planning consultations should provide information that would enhance susceptibility and severity evaluation for women who engage in sexually risky behaviors.

Our study suggests that tailored interventions could consider including components aimed at increasing women's self-efficacy beliefs, as well as basic knowledge about HIV and its severity, HIV/AIDS discussion with the partner, and the suggested frequency of testing in relation to the behavioral risk. Sociodemographic factors such as level of education and religion should also be considered when targeting and defining the content of the HIV prevention interventions because

women with fewer resources (e.g. low levels of education) and those who attend mass appear to be at higher risk.

Also religious beliefs should be integrated in intervention programs. Religion may affect the perception of the individual (e.g., barriers) and thereby affect the performance of the preventive behaviors indirectly (e.g. HIV testing) (e.g., Tenkorang & Owusu, 2010). Because religion contributes to the shaping of social values and norms and influences public attitudes and national policies related to the epidemic, it might contribute to the mobilization of people for HIV testing.

Finally, the focus should be on targeting both men and women when trying to encourage HIV testing, given that the most predominant route of transmission among women is heterosexual contact. However, barriers to gaining access to women's partners may lead professionals to a compromise of working with only women through education and skills training (El-Bassel, Caldeira, Ruglass, & Gilbert, 2009; Hobfoll, Jackson, Lavin, Britton, & Sheperd, 1993). In fact, working through individual empowerment may have as a consequence a transfer of safer sex behaviors into the couple. Through the improvement of negotiation skills, women will feel more empowered and, therefore, be able to persuade their partners to test for HIV. The need for these types of intervention is clearly consistent with our study findings.

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