

## The Impact of Age on Safe-Sex Knowledge, Cognitive Variables and Safe Sex Practices in HIV at-Risk Portuguese Women

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**Received Date:** 25 Feb 2016

**Accepted Date:** 09 Mar 2016

**Published Date:** 24 Mar 2016

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**Citation:** Costa ECV, McIntyre T and Trovisqueira. (2016). The Impact of Age on Safe-Sex Knowledge, Cognitive Variables and Safe Sex Practices in HIV at-Risk Portuguese Women. *M J HIV*. 1(1): 004.

### ABSTRACT

Acquired Immune Deficiency Syndrome (AIDS) has been a major concern worldwide and AIDS/HIV incidence rates show a clear trend of increasing risk for women in Portugal. Age is an important variable to understand sexual risk behavior and the psychosocial and behavioral factors, which are commonly associated with safe sex. This study examined both direct effects of age on cognitive variables and safe sex practices, as well as moderator effects of age in the relationship between cognitive predictors and behavioral variables in 177 young Portuguese women at risk for HIV, 16-26 years of age. Participants were administered several self-report questionnaires that assessed AIDS-related knowledge, AIDS risk perceptions, barriers against safe sex behaviors, self-efficacy condom negotiation, general perceived self-efficacy, and sexual behavior. Age was treated dichotomously, with 105 women making up the younger group ( $\leq 20$  years old) and 72 women the older cohort (21 or older). Results showed that younger women reported higher concern about AIDS, more frequent condom use and abstinence, and older women presented more HIV related-knowledge and higher frequency of sex in the past six months. Hierarchical regression analyses showed that: (1) barriers against safer sex add significantly to explain safe sex preparatory practices variances above and beyond age, knowledge, and self-efficacy; (2) condom use is more closely related to younger women and women with less lack of risk perception; (3) age was a significant predictor for condom use but not for safe sex preparatory practices; (4) age moderator effects added little to the regression equations. The findings indicate that proper condom use and safe sex preparatory practices can be promoted through age-group-targeted intervention programs guided by the predictor variables identified here.

### KEYWORDS

Age; Safe-sex Behaviors; AIDS Knowledge; Barriers against Safe Sex; Self-efficacy.

### INTRODUCTION

Acquired Immune Deficiency Syndrome (AIDS) has been a major concern worldwide and AIDS/HIV incidence rates show a clear trend of increasing risk for women in Portugal. At present, women account for 26% of all AIDS cases reported to the Portuguese Ministry of Health [1]. 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 with HIV, and that the main mode of HIV transmission in this group is through unprotected heterosexual sex with infected partners [1,2]. HIV infections are declining in most age groups worldwide, but infection rates among young adults are unchanged or increasing [3].

Young adults are at increased risk of HIV infection because of their high sex drive, high probability of spontaneous sexual encounters, and limited knowledge of HIV biology and partner risk factors [4]. Young single women, in particular, are a unique risk group in many aspects: they are less likely to use condoms and more likely to have multiple sexual partners (and become infected by STDs), and tend to be less assertive when requesting and enforcing condom use [5,6]. Furthermore, women might downplay their risk of HIV in order to avoid dealing with partner infidelity and risking alienating partners with safe sex requests [7].

Age is an important variable to understand sexual risk behavior and the psychosocial and behavioral factors, which are commonly associated with safe sex [6]. AIDS-related

knowledge, cognitive factors, risk perception and self-efficacy have been found to be important condom use predictors in several studies [8]. However, there is less research on the impact of demographic factors, such as age, on these relations.

Studies have found that younger women are at higher risk for HIV infection due to inconsistent condom use [9]. These women are often characterized as being at a life stage of increased experimentation and exploration associated with a range of risk behaviors, including sexual risk behaviors [10]. Moreover, adolescents are less likely than adults to have the information, skills and support to protect themselves against HIV/AIDS [11]. In younger adults (17 to 21 years) the most significant predictors of condom use intention are related to attitudes towards condoms, technical skills, and condom use self-efficacy [9]. Indeed, general self-efficacy and condom use self-efficacy have emerged consistently as predictors of condom use [12,13]. Limited self-efficacy in negotiating condom use is considered a sexual behavior risk factor [14].

As previously mentioned, studies about the determinants of safe sex behavior have focused mainly in the psychosocial and behavior factors and there is less research on the impact of demographic factors, such as age, on these factors. In order to better inform HIV prevention efforts directed at curbing current trends of increased HIV among Portuguese women, it is important to determine what may be differential predictors of safe sex behavior according to age. This study examined the impact of age on well-established socio-cognitive risk factors for safe sex risk behavior AIDS-related knowledge, AIDS-perceived risk, socio-cognitive barriers against safer sex and self-efficacy (general and specific to condom negotiation). Secondly, we examined whether these socio-cognitive factors related differentially to safe sex behavior according to age (moderator effects). The behavioral outcomes studied were self-reported frequency of condom use and current safe sex practices. The ultimate goal of the study is to inform more effective HIV prevention efforts among Portuguese women of different ages.

## METHOD

### Participants and Procedure

A consecutive sample of 177 women at risk for HIV/STD infection was recruited at the waiting room of a Primary Healthcare Centre in northern Portugal in which they were taking advantage of a free “youth-sexuality consultation” offered by the Portuguese Ministry of Health (Table 1). Women were selected according to one or more of the following criteria which defined being at-risk for HIV: (1) concern for a possible STD; (2) having had more than one sexual partner in the previous six months; (3) having had a partner who had other sexual partners in the previous six months and (4) having a partner who is an intravenous drug user. Information on inclusion criteria was obtained via a short self-report screening survey. Questionnaires were administered in a private room after proper informed consent. Women were assured that their participation was voluntary and confidential. 95 percent of the women agreed to participate.

**Table 1:** Socio-demographic characteristics of the sample by age group (N = 177).

Variable	Younger Women (n = 105)		Older Women (n = 72)		χ <sup>2</sup> /t
	n	%	n	%	
Age	M = 18.30 (SD = .13)		M = 22.33 (SD = .15)		- 19.963***
Education					44.960***
≥ High school	44	44.9	66	91.7	
< High school	61	58.1	6	8.3	
Employment					15.05***
Yes	6	5.7	19	26.4	
No	99	94.3	53	73.6	
Marital Status	105	100	72	100	----- <sup>1</sup>
In stable relationship	0	0	0	0	
Not in stable relation					
Yearly income					17.175**
< 3000€	104	99.1	62	86.1	
≥ 3000€	1	0.9	10	13.8	

\*p < .05; \*\*p < .01; \*\*\*p < .001.

<sup>1</sup>Chi-square test could not be computed due to low n in half of the cells.

### Measures

Participants were administered several self-report questionnaires which had been previously adapted and validated into Portuguese from the Women’s Health Study by Costa and McIntyre [15-17]. The measures and their psychometric properties in this sample are described below.

*AIDS-Related Knowledge* was assessed with 14 items (α = 0.89), using a scale with three possible options (true, false, I do not know) and 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 (α = 0.82) and the remaining 6 items assessed knowledge of HIV prevention (α = 0.83).

*AIDS Risk Perceptions* topic assessed individually AIDS risk in community (one item) and personal AIDS risk (one item), i.e., whether the participants’ heterosexual contacts in general and their sexual behavior in particular placed them at risk of HIV infection; response format in a four-point scale (0 = no risk, 1 = low risk, 2 = moderate risk, 3 = high risk). Additionally,

a question assessed concern about AIDS, whether the woman discussed HIV/AIDS danger and prevention with her partners 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.

*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) and items were grouped into five subscales and sum scores were computed for each. One item assessed abstinence. Three items assessed lack of risk perception ( $\alpha = 0.79$ ). Two items were chosen as a measure of negative attitudes towards safer sex behavior ( $\alpha = 0.66$ ). Two items were taken as indicators of negative perceived partner's attitude ( $\alpha = 0.78$ ). Finally, three items measured low perceived communication self-efficacy ( $\alpha = 0.56$ ). The latter is not included in this study due to its low internal consistency reliability in the current sample.

*Self-Efficacy Condom Negotiation* was assessed by five items ( $\alpha = 0.70$ ), using a nine-point scale (0 = not at all confident to 9 = fully confident), and was used as an overall score [15].

*General Self-Efficacy Scale* was measured by 10 items ( $\alpha = 0.84$ ) with a seven-point scale (1 = not at all true to 7 = exactly true), and was used as an overall score to assess the perception of personal competency in dealing effectively with a variety of stressful situations [18].

*Sexual behavior* questions inquired women about the frequency of vaginal sex, condom use and number of sexual partners in the last six months. Women were also asked about condom use during the last four sexual acts and about birth control by condoms. Furthermore, participants were asked about preparatory safer sexual behaviors: recent purchases of condoms, intention to purchase them in the future, and reliance on partners for condoms, using a four-point scale (0 = no to 3 = always). An overall indicator for safe sex preparatory practices was computed by summing the three items.

### Statistical Analyses

Descriptive analysis of socio-demographic, socio-cognitive and behavioral variables was performed for the two age sub-groups. Mean and standard deviation were computed for continuous variables. Categorical variables were described as absolute and relative frequencies. Furthermore, t-tests (for continuous variables) and Chi-square tests (for nominal variables) were conducted to compare socio-demographic, socio-cognitive and behavioral variables between younger and older women. In order to determine the psychosocial variables to include in the regression analyses that would test the predictors of behaviour outcomes (condom use and safe sex preparatory practices), *Pearson Product Moment Correlation coefficients* were computed. Hierarchical regression analyses were performed to predict safe sex preparatory practices and condom use in the last four sexual acts. All predictors were standardized to avoid problems of collinearity. Data were analyzed using the SPSS for Mac OSX version 22 software (SPSS, Inc., Chicago, IL).

## RESULTS

### The Impact of Age on Safe Sex Knowledge and Cognitive Variables

Age comparisons on the demographic, socio-cognitive and behavioral variables are presented in tables 1 and 2. Older women showed higher HIV transmission and prevention knowledge and reported higher frequency of sex in the past six months than younger women. Younger women showed higher concern about AIDS, higher levels of reported abstinence, higher frequency of recent condom purchase, intention to buy condom, condom use in the past six months, condom use in vaginal sex and condom use in the last four sexual acts than older women.

**Table 2:** T test results for the comparison between younger women at-risk for HIV ( $\leq 20$ ) and older woman at-risk for HIV ( $\geq 21$ ) on socio-cognitive and behavioral variables.

	Younger Women (n = 105)		Older Women (n = 72)		t
	M	SD	M	SD	
Socio-cognitive and behavioral variables					
<i>AIDS-perceived risk</i>					
Personal AIDS risk	0.48	0.64	0.64	0.69	-1.54
AIDS risk in community	2.38	0.73	2.46	0.65	-.73
Concern about AIDS	1.79	0.53	1.57	0.76	2.28*
<i>AIDS-related knowledge</i>					
HIV transmission knowledge	5.39	2.03	6.31	1.94	-3.00**
HIV prevention knowledge	4.06	1.71	4.61	1.51	-2.22*
<i>Barriers against safer sex</i>					
Abstinence	1.96	.78	1.67	0.75	2.51*
Lack of risk perception	7.30	2.03	7.79	2.25	-1.53
Negative attitudes towards safer sex	3.47	1.19	3.51	1.31	-.25
Negative perceived partner attitude	3.18	1.13	3.19	1.29	-.07
General perceived self-efficacy	49.11	9.81	49.21	7.97	-.07
Condom negotiation self-efficacy	41.65	4.10	41.56	5.14	.13
<i>Condom use</i>					
Recent condom purchase	1.37	1.18	.87	1.14	2.74**
Intention to buy condoms	1.61	1.19	.99	1.12	3.43**
Reliance on partner	2.02	1.06	1.71	1.14	1.82
Condom use past six months	29.55	35.08	17.57	32.55	2.43*
Condom use in vaginal sex	29.25	26.09	16.80	26.87	3.04**
Birth control by condoms	.86	.35	.74	.44	1.92
Condom use last four sexual acts	2.89	1.62	1.84	1.80	4.00***
Frequency of sex past six months	41.75	36.10	62.0	57.16	-2.89**
Number of partners	1.03	0.22	1.01	.27	.38

\*  $p < .05$ ; \*\*  $p < .01$ ; \*\*\*  $p < .001$ .

**Correlations Between Age, Socio-Cognitive Variables And Safe Sex Behaviors**

Tables 3 and 4 present the correlations between age, socio-cognitive variables and safe sex behaviors. Age was positively and significantly correlated with HIV transmission knowledge and personal AIDS risk, and negatively and significantly correlated with abstinence, condom use in the past six months, and condom use in the last four sexual acts.

**Table 3:** Pearson-product-moment correlation coefficients between age and socio-cognitive variables

Measure	1	2	3	4	5	6	7	8	9	10	11
1. Age	-										
2. Personal AIDS risk	.175*										
3. AIDS risk in community	.087	.055									
4. Concern about AIDS	-.076	-.003	.039								
5. Transmission Knowledge	.181*	.158*	.110	.113							
6. Prevention Knowledge	.078	.099	.134	.161*	.612**						
7. Abstinence	-.191*	-.001	.092	.025	-.002	.083					
8. Lack of risk perception	.095	-.177*	-.162*	.027	-.136	-.076	-.154*				
9. Negative attitudes towards safer sex	.005	-.115	-.174*	-.131	-.146	-.096	.045	.282**			
10. Negative partner attitude	.076	-.048	-.046	-.102	-.070	-.076	.068	.185*	.567**		
11. General perceived self-efficacy	.005	-.005	.020	.123	.046	.093	.043	-.112	-.127	-.171*	
12. Condom negotiation self-efficacy	.000	-.071	.012	.195**	.083	-.052	-.098	-.040	-.161*	-.207**	.276**

\* $p < .05$ ; \*\*  $p < .01$

**Table 4:** Pearson-product-moment correlation coefficients between age, sexual behavior and safe sex preparatory practices.

Measure	1	2	3	4	5	6	7
1. Age	-						
2. Condom use past six months	-.175*						
3. Condom use in vaginal sex	-.117	.496**					
4. Birth control by condoms	-.099	.083	.274**				
5. Condom use in last 4 sexual acts	-.286**	.424**	.530**	.328**			
6. Recent condom purchase	-.095	.282**	.320**	.222**	.480**		
7. Intention to by condoms	-.093	.222**	.331**	.277**	.446**	.757**	
8. Reliance on partner	-.094	.084	.097	.205**	.215**	.084	.068

\* $p < .05$ ; \*\*  $p < .01$ .

Correlation coefficients between socio-cognitive variables and safe sex behavior variables separately by age group show that barriers against safer sex are related to condom use in both age groups, although in younger women they seem to be negatively associated with preparatory practices but not actual safe sex whereas in older women they seemed to relate to long-term condom use (past 6 months). Concern about AIDS was positively correlated with safe-sex preparatory practices in younger women (Table 5).

**Table 5:** Pearson-product-moment correlation coefficients between socio-cognitive variables and safe-sex behaviors by age group.

	Younger Women (n = 105)				Older Women (n = 72)			
	Condom purchase	Intention to purchase	Condom use last four sexual acts	Overall condom use six months	Condom purchase	Intention to purchase	Condom use last foursexual acts	Overall condom use six months
Lack of risk perception	.026	-.052	-.241*	.039	-.404**	-.425**	-.070	-.361**
Negative attitudes towards safer sex	-.213*	-.200*	-.029	-.042	-.279*	-.302**	-.041	-.283*
Negative perceived partner attitude	-.271**	-.220*	-.083	-.019	-.238*	-.195	-.086	-.285*
Transmission knowledge	-.072	-.123	-.089	-.023	.178	.189	.200	.173
Prevention knowledge	-.085	-.063	-.048	-.126	.101	.074	.027	-.054
Concern about AIDS	.219*	.230*	-.025	.110	-.065	-.113	.027	-.003
General perceived self-efficacy	.092	.147	.183	.076	.205	.224	.126	-.002
Condom negotiation self-efficacy	.109	.182	.190	.069	.179	.039	.191	.118

\* $p < .05$ ; \*\* $p < .01$ ; \*\*\* $p < .001$ .

### Age and Socio-Cognitive Variables as Independent Predictors of Safe Sex Preparatory Practices and Condom Use

Hierarchical regression analyses were performed to predict safe sex preparatory practices and condom use in the last four sexual acts by age (first step), AIDS knowledge (second step), general perceived self-efficacy and self-efficacy AIDS Negotiation (third step) and barriers against safer sex (fourth step) (Table 6). Results show that 16.9% of the variance in safe sex preparatory practices can be explained by the model ( $F(7,169) = 6.111; p < .001$ ). Therefore having fewer barriers towards safe sex (higher risk perception and perception of less negative partner's attitudes) and higher perceived general self-efficacy were the most important predictors of safe sex preparatory practices.

**Table 6:** Hierarchical Multiple Regression results for age and socio-cognitive predictors of safe sex preparatory practices.

Results/Predictors	$\Delta R^2$	Fchange	$\beta$	t	sr
<i>Safe sex preparatory practices</i>					
Step 1	.022	3.86 <sup>†</sup>			
Age			-.147	-1.96	-.147
Step 2	.003	.307			
Age			-.156	-2.04*	-.153
AIDS transmission knowledge			.073	.762	.058
AIDS prevention knowledge			-.058	-.611	-.046
Step 3	.056	5.24**			
Age			-.154	-2.059*	-.156
AIDS transmission knowledge			.059	.617	.010
AIDS prevention knowledge			-.062	-.660	-.050
General perceived self-efficacy			.193	2.51*	.189
Condom negotiation self-efficacy			.095	1.230	.094
Step 4 (final model)	.121	12.78***			
Age			-.107	-1.516	-.116
AIDS transmission knowledge			.021	.230	.018
AIDS prevention knowledge			-.075	-.850	-.065
General perceived self-efficacy			.141	1.934 <sup>†</sup>	.147
Condom negotiation self-efficacy			.046	.623	.048
Barriers: Lack of risk perception			-.176	-2.47*	-.186
Barriers: Negative partner's attitude			-.286	-3.97***	-.292
$R^2 = .202$ ; adjusted $R^2 = .169$					

\* $p < .05$ ; \*\* $p < .01$ ; \*\*\* $p < .001$ ; <sup>†</sup> $p < .055$ .

Hierarchical regression analyses were also performed to predict condom use in the last four sexual acts (Table 7). The results show that 24.3% of the variance in condom use in the last four sexual acts was explained by the model ( $F(7, 169) = 9.081; p < .001$ ). Therefore being younger, having less

AIDS knowledge, and having fewer barriers towards safe sex (higher risk perception) were the most important predictors of condom use in the last four sexual acts. Due to shared variance between general perceived self-efficacy and AIDS negotiation self-efficacy, we repeated the previous regression model predicting condom use in the last four sexual acts but including self-efficacy AIDS negotiation alone in the third step. The  $F$  change value (1, 172) for self-efficacy AIDS negotiation was 4.974 ( $p = .027$ ) and the  $\Delta R^2$  was .025 ( $\beta = .16; t = 2.230, p = .027$ ). Higher perceived AIDS negotiation self-efficacy was associated with more frequency of condom use.

**Table 7:** Hierarchical Multiple Regression results for age and socio-cognitive predictors of condom use in the last four sexual acts.

Results/predictors	$\Delta R^2$	Fchange	$\beta$	t	sr
<i>Condom use last four sexual acts</i>					
Step 1	.082	15.6***			
Age			-.286	-3.94***	-.286
Step 2	.041	4.01*			
Age			-.298	-4.11***	-.299
AIDS transmission knowledge			.178	1.95 <sup>†</sup>	.147
AIDS prevention knowledge			-.254	-2.81**	-.209
Step 3	.042	4.28*			
Age			-.296	-4.16***	-.303
AIDS transmission knowledge			.158	1.74	.132
AIDS prevention knowledge			-.248	-2.76**	-.206
General perceived self-efficacy			.137	1.87	.142
Condom negotiation self-efficacy			.119	1.61	.122
Step 4 (final model)	.109	12.70***			
Age			-.251	-3.73***	-.275
AIDS transmission knowledge			.100	1.16	.089
AIDS prevention knowledge			-.241	-2.85**	-.214
General perceived self-efficacy			.097	1.39	.106
Condom negotiation self-efficacy			.114	1.62	.123
Barriers: Lack of risk perception			-.329	-4.85***	-.349
Barriers: Negative partner's attitude			-.042	-.609	-.047
$R^2 = .273$ ; adjusted $R^2 = .243$					

Note: \* $p < .05$ ; \*\* $p < .01$ ; \*\*\* $p < .001$ ; <sup>†</sup> $p < .053$ .

### Age Moderator Effects

Hierarchical regression analyses were also performed to predict safe sex preparatory practices by knowledge (first step), general perceived self-efficacy and self-efficacy AIDS Negotiation (second step), barriers against safer sex (third step) and age  $\times$  each socio-cognitive variable (fourth step) (Table 8). The analyses yielded significant results for the combined moderator effects of age (2.7% of explained variance;  $F(12,164) = 3.81, p < .001$ ) on the relation between socio-cognitive variables and preparatory safe sex practices but no significant effects for each moderator term. Age

moderator effects added little to the explanatory power of the predictive model for safe sex preparatory practices.

**Table 8:** Hierarchical Regression results for moderator effects of age on the relation between socio-cognitive variables and safe sex preparatory practices

Results/predictors	ΔR <sup>2</sup>	Fchange	β	t	sr
<i>Safe sex preparatory practices</i>					
Step 1	.002	.143			
AIDS transmission knowledge			.040	.419	.032
AIDS prevention knowledge			-.050	-.520	-.039
Step 2	.057	5.20**			
AIDS transmission knowledge			.025	.267	-.020
AIDS prevention knowledge			-.053	-.562	-.043
General perceived self-efficacy			.192	2.48*	.186
Condom negotiation self-efficacy			.099	1.265	.096
Step 3	.113	13.93***			
AIDS transmission knowledge			-.004	-.050	-.004
AIDS prevention knowledge			-.069	-.781	-.060
General perceived self-efficacy			.138	1.89	.143
Condom negotiation self-efficacy			.047	.637	.049
Lack of risk perception			-.188	-2.64**	-.199
Negative partner's attitude			-.294	-4.07***	-.298
Step 4 (final model)	.027	.939			
AIDS transmission knowledge			-.050	-.531	-.041
AIDS prevention knowledge			-.060	-.644	-.050
General perceived self-efficacy			.149	1.99*	.154
Condom negotiation self-efficacy			.081	1.045	.081
Lack of risk perception			-.163	-2.23*	-.171
Negative partner's attitude			-.314	-4.15***	-.308
Age x AIDS transmission know.			.075	.807	.063
Age x AIDS prevention know.			.026	.274	.021
Age x General p. self-efficacy			.049	.665	.052
Age x Self-efficacy negotiation			-.077	-1.002	-.078
Age x Lack of risk perception			-.117	-1.63	-.126
Age x Negative partner's attitude			-.011	.137	.011
R <sup>2</sup> = .218 adjusted R <sup>2</sup> : .161					

\*p < .05. \*\*p < .01. \*\*\*p < .001.

Hierarchical regression analyses were also performed to predict condom use in the last four sexual acts following the same procedure described above (Table 9). As the analyses show, only 1% of the variance in condom use could be explained by age moderator effects. Despite the overall significant effect of the interaction terms ( $F(12,164) = 3.93, p < .001$ ), each term (age × each socio-cognitive variable) did not yield significant results.

**Table 9:** Hierarchical Regression results for moderator effects of age on the relation between socio-cognitive variables and condom use in the last four sexual acts.

Results/predictors	ΔR <sup>2</sup>	Fchange	β	t	sr
<i>Condom use last four sexual acts</i>					
Step 1	.036	3.29*			
AIDS transmission knowledge			.114	1.22	.092
AIDS prevention knowledge			-.238	-2.53*	-.188
Step 2	.043	4.05*			
AIDS transmission knowledge			.093	.998	.076
AIDS prevention knowledge			-.231	-2.46*	-.184
General perceived self-efficacy			.135	1.76	.133
Condom negotiation self-efficacy			.126	1.63	.123
Step 3	.134	14.48***			
AIDS transmission knowledge			.041	.464	.036
AIDS prevention knowledge			-.227	-2.59*	-.195
General perceived self-efficacy			.090	1.25	.095
Condom negotiation self-efficacy			.116	1.60	.122
Lack of risk perception			-.357	-5.10***	-.364
Negative partner's attitude			-.059	-.835	-.064
Step 4 (final model)	.010	.343			
AIDS transmission knowledge			.037	.393	.031
AIDS prevention knowledge			-.231	-2.50*	-.191
General perceived self-efficacy			.081	1.09	.085
Condom negotiation self-efficacy			-.121	1.58	.122
Lack of risk perception			-.352	-4.84***	-.353
Negative partner's attitude			-.063	-.835	-.065
Age x AIDS transmission know.			.053	.568	.044
Age x AIDS prevention know.				-.107	-.008
Age x General p. self-efficacy			-.010	-.736	-.057
Age x Self-efficacy negotiation				.683	-.053
Age x Lack of risk perception			-.055	-.696	-.054
Age x Negative partner's attitude			-.050	-.086	-.007
				-.007	
R <sup>2</sup> = .223; adjusted R <sup>2</sup> : .167					

\*p < .05. \*\*p < .01. \*\*\*p < .001.

## DISCUSSION

The results showed that younger women reported higher concern about AIDS, more frequent condom use and abstinence, and older women presented more HIV related-knowledge and higher frequency of sex in the past six months. Additionally, we found that having fewer barriers against safe sex and higher general perceived self-efficacy were common predictors for safe sex preparatory practices, and being younger, having less AIDS prevention knowledge, and having fewer barriers against safer sex were predictors for condom use. However, we did not find a moderator role for age,

showing that the relation between each predictor and sex behaviors is independent of age, at least within the age range considered in this study (ages 16-26).

Age group comparison results regarding sex practices show that there was a report of riskier sexual behavior in older women than younger women. In fact, younger women reported more protective sexual behaviors (condom use) than older women, who, besides using condoms less often, also had more sexual encounters. This pattern is contrary to what has been reported in the literature that describes a higher prevalence of unsafe sex practices in adolescents and younger women (< 21 years old) [10]. However, results have also been inconsistent, with Corneille, finding a decrease of condom use with age [19]. Our results also showed a negative correlation between age and condom use, with condom use decreasing with age. However, there was not a significant relationship between age and safe sex preparatory practices. This seems to suggest that older and younger women were similar in terms of safe sex preparatory practices but despite this, older women tended to use condoms less. This happened despite some protective factors in the older cohort, such as higher level of education and economic power (higher rate of employment). The question emerges as to why safe sex preparatory practices seem to translate less into safe sex behaviors for older women.

Although the results on safer sex behavior favored younger women, we did find some contrary indicators in several potential predictors of condom use. Younger women had lower AIDS related knowledge than older counterparts, which is regarded as one of the most important factors in safer sex. Information about AIDS transmission and its prevention methods is a prerequisite for risk reduction behavior [20]. However, information about AIDS is necessary but not sufficient to reduce its risk. Information on HIV prevention should be relevant to the behavior in question and include two types of information needed for prevention to occur, namely, knowledge about HIV transmission and HIV prevention [20]. In this sample, older women seemed to possess more HIV knowledge but this did not translate into safer sex, which suggests that other factors may be driving safe sex practices, such as condom use. One variable that may account for these behavioral differences is AIDS risk perception, since concern about AIDS was higher in younger women. In fact, we found that lack of risk perception was significantly correlated with abstinence ( $r = -.15$ ), which suggests that this may be a protective factor in the younger group.

Our results show both common and differential correlates and predictors of safe sex preparatory practices and behaviors. The common predictors (independent of age) for safe sex preparatory practices were having fewer barriers against safe sex (higher risk perception and perception of less negative partner's attitudes) and higher general perceived self-efficacy, whereas for condom use those were being younger, having less AIDS prevention knowledge, and having fewer barriers against safer sex (higher risk perception). Our findings

support previous results that linked these variables to safe sex behaviors, with higher risk perception, perception of less negative partner's attitudes, and higher general perceived self-efficacy being associated with more safe sex behaviors [21]. Indeed, the most significant predictors of condom use intention in younger adults are related to attitudes towards condoms and condom use self-efficacy [6,9]. As found previously, general self-efficacy is an important predictor of safe sex practices, also being a key component in HIV intervention efforts [12,22]. Authors have found that the group intervention modality can foster increased self-efficacy in at-risk women, empowering them to practice safe sex and better negotiate with their partners [13].

Common correlates of safe sex preparatory practices like condom purchase were negative attitude towards safer sex and negative partner attitude, which are related to less condom purchase. The latter reflects the relational aspect as an important component of efforts to educate HIV at-risk women and their partners [6].

Consistent with our findings, the literature shows that condom use declines with age [4,19]. Therefore it is not surprising that in our sample being younger is a predictor of condom use in the last four sexual acts. Additionally, we found having less AIDS prevention knowledge to be a predictor of condom use. Previous studies did not provide evidence for its predictive power and explain that after a certain basic AIDS-related knowledge is obtained, other components are necessary to induce safer sex motivation, such as other socio-cognitive factors [16,23]. In fact, our results show that having higher risk perception is a strong predictor for condom use in the last four sexual acts, supporting models that address risk perception as an important predictor of health behavior [21]. This result is according to other studies that found risk perception to be a strong predictor of condom use as well as by many behavior change theories that argue that attitudes towards condom use influence safer sex behavior [12,16]. Therefore, HIV prevention interventions should include components aimed to encourage positive attitudes towards condom use and an effective evaluation of risk towards HIV.

Differential correlates were lack of risk perception and concern about AIDS. Lack of risk perception is negatively associated with condom use in the last four sexual acts in younger but not in older women (the higher the lack of risk perception the lower the use of condoms). Conversely, lack of risk perception is associated with preparatory practices for older women but not for younger women (in the same direction as above). Concern about AIDS, a measure of AIDS perceived-risk, is only associated with preparatory practices for younger women, with higher concern associated with more condom purchase and intention to buy condoms. In fact, in younger adults (17 to 21 years) attitudes or barriers towards condom use such as not using condoms due to lack of risk perception (e.g., "I don't use condoms every time I have sex because... my partner is not at risk) are a significant predictor of condom use intention [9]. Among older women, this specific attitude towards condom

use seems to interact with preparatory safer sexual behaviors (e.g., condom purchase) also because effective condom use decreases with age [19]. Younger women are more likely to have multiple sex partners and discuss with them AIDS and AIDS prevention and be for that reason more concerned with AIDS and that leads them to have more preparatory practices, while older women might be in long-term relationships and be afraid that discussing prevention issues might create conflict in the relationship [4,19].

The hierarchical regression results for moderator effects of age on the relation between socio-cognitive variables and safe sex practices and behaviors were significant for their joint effect but not individual interaction terms, possibly due to much shared variance among these socio-cognitive variables. These results suggest that age may play an important role in how socio-cognitive predictors relate to safe sex practices and behaviors, especially when considering these variables jointly. Intervention efforts need to consider the woman's age group in order to better tailor interventions both in terms of fostering safe preparatory practices (e.g. condom purchase) and behaviors (condom use).

Results suggest that lack of risk perception and other social cognitive barriers against safer sex are contributing to women's inability to protect themselves. There is also a lack of relationship between general perceived self-efficacy (and self-efficacy AIDS Negotiation) and condom use. Self-efficacy may contribute to women's ability to successfully negotiate safer sex behavior and thus might add to the pool of condom-specific negotiation self-efficacy skills that could be applied and translated into more assertive self-protective behavior [24]. These data illustrates the need for HIV prevention interventions that enhance self-efficacy through learning new skills and practice them. We can then expect that self-efficacy in communication is an important determinant for older women, since women have to convince partners to use condoms in a stable relationship.

This study had certain limitations. One limitation is the use of a cross-sectional design. We also used a broad time period of six months for some behaviors, which may result in misremembering. The findings are also limited to the population in which the research was done, and further research should be extended to women of different ages, populations and settings. However, we should notice that it is rare to have such a sample of women who are seeking for care for a possible STD in the same clinic and living in the same general area.

In conclusion, this investigation suggests that age plays an important role in AIDS risk and safer sex behavior. In fact, younger women showed more protective sexual behaviors than older women, although they had more sexual encounters, which appears to be related to increased concern about HIV and abstinence of sexual relations along with a lower frequency of sexual activities of this women. Other variables like AIDS related knowledge does not appear to be influent in safer sex behavior in this sample, emphasizing variables like

risk perception, self and partner negative attitude towards safe sex and concern about AIDS, along with condom use as a birth control method as important determinants of AIDS protective behaviors like condom purchase, intention to buy condoms and condom use among younger women.

It is important to acknowledge that, both in younger and older women, AIDS protective behavior like condom use was implemented as a birth control method and not as a safe sex behavior to protect against AIDS. Also, as ours results suggest, lack of risk perception and social-cognitive barriers against safer sex are great determinants of women's inability to protect themselves. In face of this results, future interventions aiming the increase of safer sex behaviors among women at risk of HIV infection, should address not only increasing HIV transmission and prevention knowledge but also, and more importantly, should emphasize the increase of risk perception and the de-construction of social-cognitive barriers against safer sex. These findings show that condom use can be enhanced, decreasing sexual risk behavior in women, especially if future interventions programs attend to age specificities (younger and older women) and to the predictor variables identified.

## REFERENCES

1. Instituto Nacional de Saúde Doutor Ricardo Jorge (INSA). (2014). Infecção VIH/SIDA: A Situação em Portugal a 31 de Dezembro de 2013. [HIV/AIDS: The situation of Portugal in 31 December 2013] (INSA No. 145).
2. Costa ECV, Oliveira R, Ferreira D and Pereira MG. (2016). Predictors of consistent condom use among Portuguese women attending family planning clinics. *AIDS Care*. 28(1), 119-23.
3. Shiferaw Y, Alemu A, Girma A, Getahun A, et al. (2011). Assessment of knowledge, attitude and risk behaviors towards HIV/AIDS and other sexual transmitted infection among preparatory students of Gondar town, northwest Ethiopia. *BMC Research Notes*. 4, 505.
4. Bobrova N, Sergeev O, Grechukhina T and Kapiga S. (2005). Social-cognitive predictors of consistent condom use among young people in moscow. *Perspectives on Sexual and Reproductive Health*, 37(4), 174-178.
5. Chandran TM, Berkvens D, Chikobvu P, Nostlinger C, et al. (2012). Predictors of condom use and refusal among the population of Free State province in South África. *BMC Public Health*. 12, 1-13.
6. Crosby RA, DiClemente RJ, Salazar LF, Wingood GM, et al. (2013). Predictors of consistent condom use among young African American Women. *AIDS & Behavior*, 17(3), 865-871.
7. Hirsch J, Meneses S, Thompson B, Negroni M, et al. (2007). The inevitability of infidelity: Sexual reputation, social geographies, and marital HIV risk in rural Mexico. *American Journal of Public Health*. 97(6), 986-996.
8. Reid AE and Aiken LS. (2011). Integration of five



- health behaviour models: common strengths and unique contributions to understand condom use. *Psychology & Health*. 26, 1499-1520.
9. Alvarez C, Villarruel A, Zhou Y and Gallegos E. (2010). Predictors of condom use among Mexican adolescents. *Research and Theory for Nursing Practice*, 24(3), 187-196.
10. Yi S, Poudel K, Yasuoka J, Palmer P, et al. (2010). Role of risk and protective factors in risky sexual behavior among high school students in Cambodia.
11. Eaton D, Kann L, Kinchen S, Shanklin S, et al. (2012) Centers for Disease Control and Prevention (CDC): Youth risk behavior surveillance-United States. *Morbidity and Mortality Weekly Report Surveillance Summaries*. 61, 1-162.
12. Ma Q, Ono-Kihara M, Cong L, Pan X, et al. (2009). Behavioral and psychosocial predictors of condom use among university students in Eastern China. *AIDS Care*. 21(2), 249-259.
13. Lyles CM, Kay LS, Crepaz N, Herbst JH, et al. (2007). Best-evidence interventions: findings from a systematic review of HIV behavioural interventions for US populations at high risk. 2000-2004. *American Journal of Public Health*. 97(1), 133-143.
14. Wingood G and DiClemente R. (2002). The Theory of Gender and Power: A Social Structural Theory for Guiding Public Health Interventions. *Emerging Theories in Health Promotion Practice and Research: Strategies for Improving Public Health*. San Francisco: Jossey Bass. 313-346.
15. Hobfoll SE, Jackson AP, Lavin J, Johnson RJ, et al. (2002). Effects and generalizability of communally oriented HIV-AIDS prevention versus general health promotion groups for single, inner-city women in urban clinics. *Journal of Consulting and Clinical Psychology*. 70(4), 950-960.
16. Schroder KEE, Hobfoll SE, Jackson AP and Lavin J. (2001). Proximal and distal predictors of AIDS risk behaviors among inner-city African American and European American women. *Journal of Health Psychology*. 6(2), 169-190.
17. Costa E. (2006). Evaluation of the efficacy of two psychoeducational interventions aimed at HIV/ AIDS prevention and health promotion in women at risk for HIV. Unpublished doctoral dissertation, Minho University.
18. Schwarzer R, BaBler J, Kwiatek P, Schroder K, et al. (1997). The assessment of optimistic self-beliefs: Comparison of the German, Spanish, and Chinese versions of the general self-efficacy scale. *Applied Psychology: An International Review*. 46, 69-88.
19. Corneille M, Zyzniewski L and Belgrave F. (2008). Age and HIV Risk and Protective Behaviors Among African American Women. *Journal of Black Psychology*. 34, 217-233.
20. Fisher J and Fisher W. (2002). The Information-Motivation-Behavioral Skills Model. *Emerging Theories in Health Promotion Practice and Research: Strategies for Improving Public Health*. San Francisco: Jossey Bass. 40-70.
21. Abraham C and Sheeran P. (2005). The health belief model. In M. Conner & P. Norman (Eds.), *Predicting health behaviour: Research and practice with social cognition models*. Buckingham: Open University Press. 28-80.
22. Shai N, Jewkes R, Levin J, Dunkle K, et al. (2010). Factors associated with consistent condom use among rural young women in South Africa. *AIDS Care*. 22(11), 1379-1385.
23. Cai Y, Ye X, Shi R, Xu G, et al. (2013). Predictors of consistent condom use based on the Information-Motivation-Behavior Skill (IMB) model among senior high school students in three coastal cities in China. *BMC Infectious Diseases*. 13, 262.
24. Schwarzer R, and Fuchs R. (1995). Self-efficacy and health behaviours. In M. Conner & P. Norman (Eds.), *Predicting health behavior: Research and practice with social cognition models*. (pp. 163-196) Buckingham, UK: Open University Press.