

Applying the health belief model to identify predictors of self-perceived risk of HIV infection among undergraduates in mainland China

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Abstract

Objective This cross-sectional study aimed to identify predictors of self-perceived risk of HIV infection among undergraduates in mainland China, based on the health belief model.

Methods A self-administered questionnaire survey method was used to collect information from 10665 eligible undergraduates across the whole country (except for Tibet). Multivariate Logistic regression analysis was chosen to explore the predictors of self-perceived risk of HIV infection.

Results Approximately half (48.2%) of the undergraduates perceived themselves to be at risk of contracting HIV, yet only 8.9% reported to engage in risky sexual behaviors. After controlling for potential confounders, males [adjusted odd ratio (AOR)=0.72, 95% confidence interval (CI)=0.66-0.77], those residing in urban areas (AOR=0.86, 95% CI= 0.79-0.93), having higher levels of condom use self-efficacy (AOR=0.64, 95% CI=0.58-0.69) and knowing the national AIDS policy (AOR=0.68, 95% CI=0.62-0.74) were less likely to perceive themselves to be at risk of acquiring HIV. Conversely, freshmen (AOR=1.27, 95% CI=1.16-1.38), non-heterosexuals (AOR=1.57, 95% CI=1.39-1.77), and those who had expressed less stigma towards people living with HIV (PLHIV) (AOR=1.25, 95% CI=1.15-1.35) and had the intention of utilizing voluntary counseling and testing (VCT) services (AOR=1.29, 95% CI=1.16-1.43) perceived themselves to be at increased risk for HIV infection.

Conclusions Undergraduates tended to overestimate their own risk of acquiring HIV infection. In order to help undergraduates accurately assess their risk of being infected with HIV and effectively avoid risk, a comprehensive intervention measure should be taken to target females, non-heterosexuals, freshmen and those residing in rural areas, raise their awareness of the national AIDS policy, relieve their stigma against PLHIV, improve their condom use self-efficacy and provide VCT services in college campus.

Background

Self-perceived HIV risk is a psychological construct developed to describe an individual's perception of the likelihood that he/she will become infected with HIV and has long been assumed as a precursor to the adoption and maintenance of self-protective behaviors such as condom use and uptake of HIV testing [1]. In China, previous studies about risk perception focused predominantly on most-at-risk populations such as men who have sex with men [2-6], sexually transmitted infection clinic attendees [7], female sex workers [8], and rural-to-urban migrants [9,10].

In recent years, researchers have begun to investigate HIV risk perception among undergraduates in mainland China, due to the rising number of youths who were newly diagnosed with HIV infection. For example, only 527 young students aged 15 to 24 years were discovered to be infected with the virus in 2008, but the figure rose drastically to 3236 in 2015, according to the official figures released by the Chinese Center for Disease Control and Prevention (China CDC). It is noted that the number of studies examining risk perception among undergraduates in mainland China is limited to five studies [11-15] and all these five studies assessed risk perception through face-to-face questionnaire among college students

conveniently sampled from one or two universities in metropolitan cities such as Beijing [12,15], Tianjin [12], Hangzhou [11], Longyan [13], and Changsha [14]. Furthermore, these studies have consistently suggested individual risk perception is very low, ranging from 8.1% [11] to 28.8% [13]. In addition, HIV risk perception was found to be significantly associated with gender [11], sexual orientation [12], alcohol use [12], school [11], information of HIV epidemic status [11,13], sexual intercourse history [11], knowing their classmates had sex [13], and exposure to unhealthy messages via internet [13]. However, few studies have been methodologically rigorous in analyzing the interrelationships of the independent variables associated with HIV risk perception. Nor have many studies been undertaken to identify significant variables in explaining and predicting HIV risk perception under the guidance of explicit theoretical model.

In order to fill in these research gaps, this study aimed to determine the level of self-perceived risk of HIV infection and the factors associated with HIV risk perception among a large undergraduate sample selected from 30 provinces throughout the whole country (except for Tibet), based on the health belief model which will be discussed in detail a little later. The findings of this study are expected to achieve two goals: (1) to better understand how accurate risk perception was formed, and (2) to help clinicians and other health professionals to improve risk communication and promote safe sex among college students.

Conceptual framework

In order to systematically analyze the social and cognitive factors associated with risk perception among undergraduates in mainland China, the health belief model (HBM), which incorporates seven key elements including perceived susceptibility, perceived severity, perceived benefits, perceived barriers, perceived self-efficacy, cues to action and social-demographic variables [16-19], was chosen as a conceptual framework. This model has been frequently used to explain why individuals adopt or do not adopt preventive measures and guide the development of behavior change programs for more than sixty years.

According to the health belief model, individuals will take action to prevent HIV transmission, if they (a) feel susceptible to HIV infection, (b) perceive the seriousness of HIV infection, (c) perceive the benefits of condom use, (d) perceive few barriers to condom use, and (e) believe in their own ability to use condoms during sexual intercourse. These five dimensions have been demonstrated to predict risk perception in previous studies [11,13,16,20], although their respective contributions as predictors have varied across different samples. Furthermore, cues to actions such as having ever seen a person infected/dead of HIV [20,22,23], knowing that their classmates had sex [13], the intention [20,21,23] and use of Voluntary Counseling and Testing (VCT) services [20,21], exposure to HIV-related information from school [11] or parents/peers [13], previous sexual experience [11,16,22] and past risky sexual behaviors [16,20-23] have also been found to be significantly associated with self-perceived risk of HIV infection. Finally, social-demographic variables such as gender [11,20], age [20,21], grade [11], education [20,21], sexual orientation [12], residential areas [11,20] and household income [16] have been demonstrated to influence how a person perceives their own risk of HIV infection.

Methods

The outcome (dependent) variable

The outcome variable for this study is self-perception of HIV risk, measured by asking undergraduates to estimate their risk of acquiring HIV and five choices were provided: 1=no risk at all, 2=uncertainty, 3=small risk, 4=moderate risk, and 5=high risk [11,24]. Consistent with our previous studies [24,25], perceived risk was treated as a dichotomous variable, which is equal to 0 if undergraduates perceived themselves to have no risk of acquiring HIV infection, and is 1 otherwise.

Explanatory (independent) variables

Based on a review of prior studies and measures of HBM constructs, twelve independent variables hypothesized to influence self-perception of HIV risk were identified and tested in this study, as illustrated in Figure 1. Consistent with previous studies [20,24,25], a combination of perceived susceptibility to HIV infection (e.g., "A healthy looking person can be HIV positive" [16,20,24]), perceived severity of HIV infection (e.g., "HIV is a highly contagious, incurable disease [16,24,25]), and perceived benefits of health promoting behaviors (e.g., "Correct and consistent use of condoms during sexual intercourse could reduce the risk of HIV transmission" [16,24,25]) has been termed "HIV-related knowledge", which is measured by the 12-item scale of Yes/No/I do not know questions [24,25]. Stigma and discrimination against people living with HIV, which has been identified as a major barrier to HIV prevention, diagnose, care and treatment, was based on the Chinese version of Zelaya's 24-item scale of Yes/No/It depends on the situation statements [24,25].

Three types of HIV risk behaviors in this study, including having multiple sexual partners in the past six months, having sex with non-steady sexual partners (e.g., casual sex, commercial sex, and one night stand), and failing to condom use consistently and properly in every act of sexual intercourse, were used to reflect actual risk of becoming infected with HIV [25]. In the final analysis, actual risk was treated as a dummy variable, which was equal to 1 if undergraduates had engaged in any of the above-mentioned risky behaviors, and was 0 otherwise.

Awareness of the national AIDS policy, the intention and actual use of VCT service were respectively assessed through the following three Yes/No questions: 1) Do you know the "Four Frees and One Care" policy? 2) Have you even been tested for HIV? 3) If you were offered free VCT service, would you wish to accept?

Finally, the following five social-demographic variables were also included in the present study: gender (0=Female, 1=Male), residential areas (0=Rural, 1=Urban), major (0=Non-Medical, 1=Medical), grade (0=Non-freshmen, 1=Freshmen), and sexual orientation (0=Heterosexuals, 1=Non-heterosexuals).

Statistical analysis

The procedure to identify factors significantly associated with self-perceived risk of HIV infection was conducted in the following three stages. The analysis began by describing characteristics of the study sample. Secondly, zero-order correlations were performed to explore the associations between the variables. Additionally, variance inflation factors (VIF) and tolerance values were further calculated to diagnose collinearity in multiple regression. Multivariate logistic regression analysis model was finally chosen to determine factors significantly associated with HIV risk perception after adjusting potential confounders. Due to the large sample size and the non-normal distribution of the dependent variable, which may be very sensitive to statistical tests of significance, the cut-off P value was adjusted to a more conservative statistical significance level. Therefore, a predictor was considered statistically significant only when the two-tailed P value was less than 0.001. In addition, odds ratios (OR) and 95 % confidence intervals (CI) were also provided.

Results

The characteristics of participants

Table 1 presents the characteristics of participants. Out of 10665 undergraduate students in the sample, 48.2% (95% CI:47.2%-49.1%) perceived themselves to be at risk of contracting HIV. Slightly more than half of the sample was female (57.5%) and approximately one-third came from urban areas (32.4%), majored in medical science (29.9%) and were still freshmen (28.2%). Beyond our expectation, 11.5% identified themselves as non-heterosexuals. HIV-related knowledge was lacking, since the percentage of undergraduates that answered more than 10 out of the 12 basic questions correctly was 61.7% , which was far from the goal of 90 percent that the anti-AIDS project originally set. Furthermore, stigma was highly prevalent, with only 46.1% of undergraduates responding correctly to no less than 18 out of the above- mentioned 24 situations. Nearly one-tenth of undergraduates reported that they had ever been tested for HIV (7.7%) and had engaged in risky sexual behavior including multiple partners, casual sex and inconsistent condom use (8.9%). More than four fifths (83.4%) of undergraduates expressed the willingness to utilize VCT service. Despite being fully implemented in China for almost fifteen years, the national AIDS policy (i.e., "Four Frees and One Care policy") was known to only a small proportion of undergraduates (33.8%). In addition, only 32.8% were wholly confident of negotiating condom use with their sexual partners.

The correlations between independent variables and dependent variable

As indicated in the last column in Table 2, nine independent variables were found to be significantly related at the bivariate level to self-perceived risk of HIV infection. More specifically, those who perceived risk of HIV infection tended to be female, from rural areas, freshmen, non-heterosexual, have lower levels of knowledge about HIV, indicate lower levels of stigma, express the willingness to utilize VCT service, know about national AIDS policy, and have a higher self-efficacy of condom use. However, three independent variables including major, past risky sexual behavior and having ever being tested were found to have no significant association with self- perceived risk of HIV infection.

Multicollinearity diagnosis

As indicated in Table 2, there were statistically significant but weak correlations between some independent variables. Furthermore, the variance inflation factor (VIF) and tolerance were all within acceptable limits (Table 3), indicating no evidence of multicollinearity. Therefore, no variable was excluded from further analysis.

Multivariable logistic regression analysis

Table 2 showed that nine independent variables were significantly related at the bivariate level to self-perceived risk of HIV infection, as already described above. It also appeared from Table 2 that these nine independent variables were interrelated. Therefore, all these nine statistically significant independent variables were simultaneously entered into the multiple logistic regression model in order to adjust for potential confounders. As demonstrated in Table 4, except for HIV-related knowledge, all other eight variables remained significantly associated with self-perceived risk of HIV infection. More specifically, male undergraduates (AOR=0.72, 95% CI=0.66-0.77) and individuals residing in urban areas (AOR=0.86, 95% CI= 0.79-0.93) perceived lower HIV risk than their respective counterparts. Being a freshman increased the chance of perceiving themselves to be at risk of HIV infection by 1.27 times (95% CI=1.16-1.38). Non-heterosexuals were 57 percent more likely to perceive themselves to be at risk of HIV infection (95% CI=1.39-1.77), when compared to their heterosexual counterparts. Having higher levels of condom use self-efficacy (AOR=0.64, 95% CI=0.58-0.69) and being knowledgeable of the national AIDS policy (AOR=0.68, 95% CI=0.62-0.74) reported lower perceived risk, while those who had expressed less stigma towards PLWH (AOR=1.25, 95% CI=1.15-1.35) and more willingness to utilize VCT service (AOR=1.29, 95% CI=1.16-1.43) perceived themselves to be at increased risk for HIV infection.

Discussion

The results of this study suggest that undergraduates in mainland China tended to systematically overestimate their risk relative to their self-reported exposure to unsafe sex, because approximately half of the participants perceived themselves to be at risk of HIV infection, yet only 8.9% reported they had in fact engaged in risky sexual behaviors such as having multiple sexual partners in the past six months, having sex with non-regular partners, or failing to use condoms correctly and consistently. Monde inferred that a large-scale public health campaign, which has recently been conducted to distribute the information about the severity of HIV infection, contributed to the overestimation of risk of being infected by HIV [21]. However, Fagbamigbe and colleagues [26] thought overestimation of self-perceived risk could serve as a cautionary message to even HIV-uninfected individuals to have safer sex.

Consistent with previous studies [27,28], no significant relationship was found between perceived and actual risks. This apparent discordance can be explained by the following three factors. One possible explanation is that only sex-related risky behaviors [28] were assessed in this study, given the fact that the predominant mode of HIV transmission among Chinese young students is through sexual intercourse, accounting for up to 81.6% of new HIV infections in 2014. The second possible explanation is that self-

perception of HIV risk question, despite being widely applied, has a low positive predictive value (i.e. only a minority of the individuals who perceived themselves to be at risk were actually HIV infected [26]), especially in the low-prevalence population [29]. Therefore, self-perception of risk may not truly indicate the presence of an HIV infection, but reflect a worry about being infected with HIV. The third possible explanation is that undergraduates have a tendency to under-report their risky sexual behaviors due to the sensitivity of these questions.

Based on the health belief model, eight variables (i.e., gender, sexual orientation, residential areas, grade, awareness of the national AIDS policy, willingness to utilize HCT service, HIV-related stigma and self-efficacy of condom use) were found to be significantly associated with self-perceived risk of HIV acquisition. Some of these findings were consistent with previous research.

Contrary to findings of a previous study [11], female undergraduates were more likely to perceive themselves to be at risk of contracting HIV, due to their lower awareness [20] and also because they remain in vulnerable positions during sexual intercourse and have less power to refuse sex or negotiate for safe sex [16]. On the other hand, females' perception was higher possibly because they were more likely to shoulder the burden of caring for a chronically ill family member including an AIDS victim and the intimate contact with patients aroused their sense of being at risk of HIV infection. Non-heterosexual individuals, who have long been identified as target audience for many prevention programs, made relatively accurate evaluation of their risks and thus exhibited higher levels of self-perceived risk of HIV infection.

Similar to the findings from a previous study conducted by Admasu, Kifle, Tefera, Nega, Meseret and Rai, 83.4% of undergraduates expressed their willingness to use VCT service, and those who had the intention of utilizing VCT service were more likely to perceive themselves at risk of acquiring HIV [23]. This result has important implication for the government to launch a large-scale testing campaign to achieve the ambitious "90–90–90" targets by 2020 and the final goal of zero AIDS.

Our findings also indicated that non-freshmen, urban undergraduates, and those who knew about the national AIDS policy were less likely to perceive themselves at risk, compared to their respective counterparts. These finding support the idea that exposure to accurate levels of HIV and AIDS information through the media, health education and access to VCT services may improve knowledge about risks for HIV infection and dispel worries about being infected with the virus, which can help to a certain extent reduce overestimation bias and contribute to accurate risk perception.

Our findings indicated that stigma is highly prevalent among undergraduates and stems from the fact that HIV infection is linked to immoral behaviors such as homosexuality, drug addiction and prostitution. Therefore, undergraduates with higher stigma would be less likely to perceive themselves to be at risk of contracting HIV, because they adopted cognitive coping strategies such as denial, distancing, and downward comparison to minimize their HIV risk perception [16,21,23,30].

Consistent with the health belief model, undergraduates with higher self-efficacy of condom use are indeed more likely to use condoms during sexual intercourse to prevent HIV transmission and are consequently less likely to perceive themselves to be at risk of contracting HIV.

Limitation

Our study has several limitations. First, because this study used a cross-sectional design, it is impossible to draw firm causal conclusions due to the uncertainty and ambiguity associated with temporal orderings among the observational variables. Second, all data were self-reported and anonymous, so there was no mechanism to verify survey responses. Third, dichotomizing self-perception of possibly having an HIV infection might oversimplified or magnified differences of the measured relationships. However, when performing Logistic regression models with any of the interval, we found that all these independent variables were consistently significant predictors of self-perception of HIV infection. Therefore, the use of dichotomized risk perception was an appropriate strategy given the purposes of the current investigation. Fourth, due to the sensitivity of sexual behaviors, respondents might be reluctant to admit their sexual experiences or that they are sexually active, thus introducing misclassification bias into the assessment of the association between self-perceived risk and past sexual behaviours. Finally, after answering the questions regarding HIV-related risky behaviors, undergraduates were then required to assess their risks of being infected with HIV, which might affect participant responses and the observed relationships, according to [Alexovitz](#) and colleagues [31].

Implications of the study

In spite of the above-mentioned limitations, the findings from our study have several implications for the design and implementation of HIV risk reduction programs on college campuses. To the best of our knowledge, ours is the first to employ the health belief model as theoretical framework, combined with the more rigorous statistical techniques, to determine the level of self-perceived risk of HIV infection and the factors associated with HIV risk perception among a large undergraduate sample selected from 30 provinces throughout the whole country (except for Tibet). Our findings suggested that females, undergraduates residing in urban areas, having higher levels of condom use self-efficacy and being knowledgeable of the national AIDS policy were less likely to perceive themselves to be at risk of acquiring HIV, while freshmen, non-heterosexuals and those who had expressed less stigma towards PLHIV and more willingness to utilize VCT service perceived themselves to be at increased risk for HIV infection. Consequently, five main types of intervention aimed at helping undergraduates accurately assess their risk of being infected with HIV and effectively avoid risk are recommended.

(1) Target undergraduates with higher risk perception: Undergraduates in this study have a tendency to overestimate their own risk of acquiring HIV infection and no significant relationship was found between perceived and actual risks. In order to help undergraduates accurately assess their risk of being infected with HIV and effectively protect themselves from negative outcomes, the first and foremost intervention is to target undergraduates with higher risk perception such as females, non-heterosexuals, freshmen and those residing in rural areas so as to better understand the relationship between their actual behavioral

risk and perceptions of risk, given the fact that the ability to accurately judge one's risk to HIV is an essential element in developing and implementing successful strategies for prevention [16, 21].

(2) Enhance condom-use self-efficacy: due to its simplicity, cheapness, safety and effectiveness, consistent condom use is still highly recommended for college students to prevent HIV and other sexually transmitted diseases. In order to promote consistent use of condoms, it is of program and policy relevance to improve their skills for negotiation of condom use. Also, the intervention should focus on the individuals' perceived barriers to negotiating with sexual partners about condom use and develop strategies appropriate to make these individuals feel at ease with the negotiating process and thus enhance condom-use self-efficacy [32].

(3) Conduct a large-scale education campaign: a large-scale education campaign should be launched to inform the undergraduates of HIV-related knowledge and the national AIDS policy (i.e., "Four Frees and One care" policy), so as to relieve stigma against PLHIV and dispel worries about being infected with the virus, and consequently reduce overestimation bias and contribute to accurate risk perception, and finally to adopt safety measures and to achieve the ultimate goal of zero-AIDS.

(4) Provide free VCT services in college campus: According to a study conducted by Addis and colleagues [33], the main reason cited by university students for not utilizing VCT was fear of a positive result and fear of being stigmatized. Furthermore, given the fact that the majority of undergraduates expressed their willingness to use VCT service, continued effort should be made to recruit and train student volunteers to provide free VCT services in college campus [25], and meanwhile more effort should be made to provide positive individuals with the information about the treatability and controllability of HIV infection [33].

Conclusion

Undergraduates tended to overestimate their own risk of acquiring HIV infection. Furthermore, our findings also indicated that males, those residing in urban areas, having higher levels of condom use self-efficacy and knowing the national AIDS policy were less likely to perceive themselves to be at risk of acquiring HIV, while freshmen, non-heterosexuals, and those who had expressed less stigma towards PLHIV and had the intention of utilizing VCT services perceived themselves to be at increased risk for HIV infection. In order to help undergraduates accurately assess their risk of being infected with HIV and effectively avoid risk, a comprehensive intervention measure should be taken to target females, non-heterosexuals, freshmen and those residing in rural areas, raise their awareness of the national AIDS policy, relieve their stigma against PLHIV, improve their condom use self-efficacy and provide free VCT services in college campus.

Abbreviations

AOR: Adjusted odds Ratio; CI: Confidence Interval; HIV: Human Immunodeficiency Virus; VCT: Voluntary counseling and testing; HUST: Hubei University of Science and Technology; PLHIV: People living with HIV.

Declarations

Acknowledgments

Not applicable

Authors' contributions

WJF, ZJH, RF and FGC conceived and designed the study, and wrote the manuscript. ZMY, LX, CYH, LYL, LC, KSH, PMG, LYJ and ZY interpreted the data, and reviewed and edited the manuscript. SB, GQX, FZH, ST, LYS and LFQ collected and analyzed the data. All authors read and approved the manuscript.

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Availability of data and materials

The data set supporting the results of this article is available in the Harvard Dataverse repository at:

<https://dataverse.harvard.edu/dataset.xhtml?persistentId=doi:10.7910/DVN/GBFCTK>.

Ethics approval and consent to participate

This study was approved by the academic ethics and moral supervision committee from Hubei University of Science and Technology (No.2019-XZ-002). Informed written consent was obtained from Director of Students' Affairs Division and each class adviser for their own participation as well as on behalf of students prior to data collection, and the purpose of the study was also explained to the respondents in advance. After signing informed consent voluntarily, all the participants completed an self-designed anonymous online questionnaire distributed via sojump.com and all survey responses were confidentially treated.

Consent for publication

Not applicable.

Competing interests

The authors declare that they have no competing interests.

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Tables

Table 1 characteristics of the 10665 undergraduates in mainland China

Variable	n	%
Y: Perception of HIV risk		
0=No	5526	51.8
1=Yes	5139	48.2
X1: Gender		
0=Female	6137	57.5
1=Male	4528	42.5
X2: Residential areas		
0=Rural	7207	67.6
1=Urban	3458	32.4
X3: Major		
0=Non-Medical	7472	70.1
1=Medical	3193	29.9
X4: Grade		
0=Non-freshmen	7657	71.8
1=Freshmen	3008	28.2
X5: Sexual orientation		
0=Heterosexuals	9434	88.5
1=Non-heterosexual	1231	11.5
X6: HIV-related knowledge		
0=Low	4084	38.3
1=High	6581	61.7
X7: HIV-related stigma		
0=High	5752	53.9
1=Low	4913	46.1
X8: Risky sexual behavior		
0= No	9715	91.1
1=Yes	950	8.9
X9: Having ever being tested		
0=No	9847	92.3
1=Yes	818	7.7
X10:Willingness to utilize HCT service		
0=No	1774	16.6
1=Yes	8891	83.4
X11: Awareness of the national AIDS policy		
0=No	7062	66.2
1=Yes	3603	33.8
X12: Self-efficacy of condom use		
0=Low	7163	67.2

Table 2 The matrix of Pearson correlation coefficients of factors associated with self-perceived risk of HIV infection (Y)

Variable	X2	X3	X4	X5	X6	X7	X8	X9	X10	X11	X12	Y
X1: Gender	0.05	-0.01	0.08	-0.05	0.02	-0.05	0.11	0.06	-0.06	0.06	-0.02	-0.09
X2: Residential areas		0.01	0.00	0.04	0.01	-0.01	0.07	0.02	0.01	0.05	0.07	-0.05
X3: Major			-0.04	0.03	0.11	0.07	0.00	0.05	0.03	0.15	0.04	0.00
X4: Grade				-0.02	-0.02	0.06	-0.05	-0.03	0.02	0.00	-0.06	0.05
X5: Sexual orientation					-0.04	-0.02	0.08	0.08	-0.01	0.00	0.01	0.07
X6: HIV-related knowledge						0.25	-0.06	-0.05	0.10	0.11	0.16	-0.04
X7: HIV-related stigma							-0.09	-0.04	0.10	0.09	0.12	0.04
X8: Risky sexual behavior								0.06	0.00	0.03	-0.03	0.01
X9: Having ever been tested									-0.07	0.07	0.00	0.01
X10: Willingness to utilize VCT service										0.12	0.11	0.03
X11: Awareness of AIDS policy											0.20	-0.11
X12: Self-efficacy of condom use												-0.11

Y: self-perceived risk of HIV infection; boldface indicates significance at the $P \leq 0.001$.

Table 3 Multiple variate Logistic regression analysis of factors associated with self-perceived risk

	Tolerance	VIF
X1: Gender	0.96	1.04
X2: Residential areas	0.99	1.01
X3:Major	0.96	1.04
X4: Grade	0.98	1.02
X5: Sexual orientation	0.98	1.02
X6: HIV-related knowledge	0.90	1.11
X7: HIV-related stigma	0.91	1.10
X8: Risky sexual behavior	0.96	1.04
X9: Having ever being tested	0.97	1.03
X10:Willingness to utilize utilize HCT service	0.96	1.04
X11: Awareness of AIDS policy	0.91	1.09
X12: Self-efficacy of condom use	0.92	1.08

Table 4 Multiple variate Logistic regression analysis of factors associated with self-perceived risk of HIV infection (N=10665)

Variables	AOR	95% CI
X1: Gender (0=Female,1=Male)	0.72	0.66-0.77
X2: Residential areas (0=Rural, 1=Urban)	0.86	0.79-0.93
X4: Grade (ref: Non-freshmen)	1.27	1.16-1.38
X5: Sexual orientation (ref: Heterosexuals)	1.57	1.39-1.77
X7: HIV-related stigma (0=High, 1=Low)	1.25	1.15-1.35
X10: Willingness to utilize HCT service (0=No, 1=Yes)	1.29	1.16-1.43
X11: Awareness of AIDS policy (0=No, 1=Yes)	0.68	0.62-0.74
X12: Self-efficacy of condom use (0=Low, 1=High)	0.64	0.58-0.69

Figures

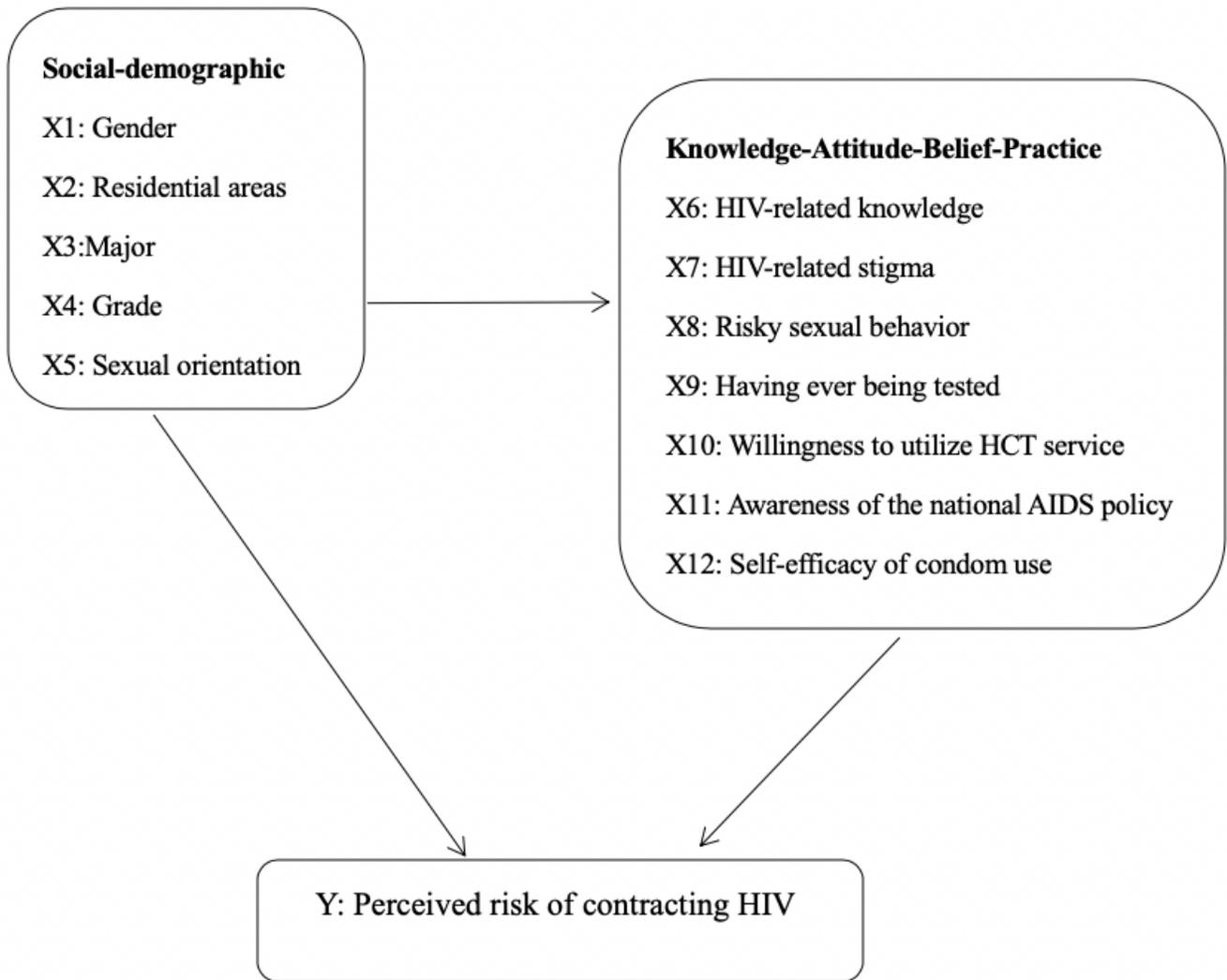


Figure 1

Individual determinants of self-perceived risk of HIV infection