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ORIGINAL RESEARCH

# Analysis of Factors Influencing the Acceptance of Voluntary Counseling and Testing Among Sexually Active College Students in Zhejiang Province, China

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**Background:** In recent years, China has seen a rapid rise in the HIV epidemic, especially among college students. However, the uptake of HIV testing was low. This study aimed to explore the factors influencing the acceptance of voluntary counseling and testing (VCT) among sexually active college students, in order to provide scientific evidence for the prevention and control of HIV infection on campus.

**Methods:** A cross-sectional study was completed at 13 colleges in 11 cities by stratified cluster random sampling. We formulated a questionnaire to collect information on demographic characteristics, sexual behaviors, sexual attitudes, HIV-relevant knowledge, and HIV/AIDS interventions. The chi-square test was performed to compare composition ratios. Single-factor logistic regression and multivariate regression analyses were performed to determine the influencing factors.

**Results:** This study included 3873 college students with sexual experience, of whom 199 had received VCT, accounting for 5.14%. The results of the multivariate logistic regression analysis demonstrated that the participants who were age ≥ 22 (OR = 2.11, 95% CI: 1.36–3.29), had casual sex in the past year (OR = 1.75, 95% CI: 1.21–2.52), had received a lecture or health education class on HIV/AIDS at school (OR = 1.80, 95% CI: 1.07–3.02), had received school information on HIV testing (OR = 2.15, 95% CI: 1.32–3.50), and had received a school-based HIV risk self-assessment in the last year (OR = 3.47, 95% CI: 2.40–5.03) were inclined to receive VCT.

**Conclusion:** The findings revealed that college students who had received health education about AIDS or acquired HIV testing information on campus were inclined to receive VCT, especially those who had engaged in high-risk sexual behaviors. Regarding HIV prevention among college students, it is recommended that health education related to AIDS be conducted regularly on campus and that HIV testing be promoted to increase the testing rate.

**Keywords:** voluntary counseling and testing, HIV, sexual behavior, college students, influencing factors

## Introduction

Since the 1980s, the transmission of human immunodeficiency virus (HIV) has continued to rise globally, causing the epidemic of HIV becoming a severe worldwide problem with serious implications for economic growth and social development.[1–3] The Adolescents make up a growing percentage of people infected with HIV around the world, accounting for approximately 11% of people newly infected with HIV in 2023.[4] Moreover, AIDS-associated death is one of the main reason of death among this population.[5]

In recent years, China has also seen a rapid rise in the HIV epidemic, especially in the number of college students infected with the disease, increased from 794 to over 3400 between 2010 and 2019.[6,7] The proportion of college students among newly infected individuals continues to rise at an annual rate of 30% to 50%.[8] Furthermore, among reported HIV

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infection cases, students' proportion has increased from 8.5% in 2010 to 21.7% in 2019, with over 98% of these cases stemming from sexually transmitted infections.[9] As a result, this population group has become one of the priority populations in the prevention and treatment of HIV/AIDS.

With the modernization of society, people's attitudes toward sex have become more tolerant and open, and the ways of obtaining sexual satisfaction have become more diversified.[10] Especially in colleges and universities, where young students from various backgrounds and with different sexual orientations meet and cohabit without parental supervision or relevant administrative restrictions, the sexual environment is permissive and relies entirely on self-restraint.[11] However, owing to the insufficient sexuality related health education, domestic college students may be more likely to be engaged in risky sexual behavior, including multiple sex partners and sex without a condom.[12–14] Furthermore, with the rapid development and popularization of Internet technology and the flourishing of mobile social media platforms, college students are able to access a wider variety of sex-related information content through diversified online platforms and social applications, while expanding their social boundaries with unprecedented convenience, making it easy for them to reach out to potential sexual partners.[15]

The Joint United Nations Program on HIV and AIDS (UNAIDS) suggested that the first step towards achieving the 95-95-95 goal by 2030 is for 95% of people living with HIV to be aware of their status.[16] Despite numerous efforts to prevent and control HIV in China, including HIV voluntary counseling and testing (VCT), there are merely 75.7% of people who have been infected with HIV clear about their infection status.[17] There are various methods of HIV testing, including VCT, HIV blood (fingertip/venous blood) rapid testing, HIV oral saliva rapid testing, and HIV urine testing.[13] A meta-analysis suggested VCT has a protective effect on risky sexual behavior in key populations.[18] VCT helps infected people to identify their status as early as possible, which is essential for obtaining antiretroviral treatment and reducing the risk of HIV transmission. Worryingly, a systematic review indicated the overall acceptability of HIV testing among college students in China was 68%.[19] Although there are several studies related to the acceptance of VCT in China, few studies on the factors associated with college students' acceptance of VCT.[20–22] Therefore, this study aims to understand and analyze the factors influencing the acceptance of VCT among Chinese college students, so as to provide a basis for raising college students' awareness and popularizing the ways and means of HIV/AIDS testing, as well as for the effective implementation of VCT services and the rational allocation of health resources.

# Methods

## Study Participants

A cross-sectional study was conducted among students at 13 colleges in 11 cities between October and November in Zhejiang Province. Eleven municipal Centers for Disease Control and Prevention (CDC) recommend local colleges and universities. This survey adopted stratified cluster sampling method to obtain study participants. Three departments were selected from each college by the random number table method, and classes were subsequently drawn in each faculty by grade level.

## Study Variables and Measurements

The questionnaire was developed on the basis of reading national and international literature, through consultation with the research group and fulfilling a preliminary survey among students in a school. The primary components of the final questionnaire consisted of the demographic characteristics, HIV-relevant knowledge, the occurrence of sexual behaviors, the acceptance of interventions, and self-efficacy of condom use.

HIV-related knowledge consisted of two sections: "Whether it can be identified by the appearance that a person is infected with HIV?" and "Whether there is a need to proactively seek HIV counseling and testing after high-risk sex?". The self-efficacy of condom scale consisted of three sections: 1) Do you have the confidence to discuss condom use with sex partner before having sex? 2) Do you have the confidence to reject sex if your sex partner persists in not using condom? 3) Do you have the confidence to prepare condoms before having sex? All three questions had five response options: "extremely confident", "very confident", "confident", "not confident" and "extremely not confident", which were awarded scores of 3, 2, 1, 0, and −1 correspondingly. The total scores of three questions can be categorized into three levels: ≤4, 5–8, and 9. The Cronbach's alpha coefficient of this variable was 0.784.

## Data Collection

All students were asked to scan the electronic questionnaire that had been made into a two-dimensional code during class meetings. The questionnaire was completely anonymous. Electronic informed consent was obtained prior to the start of the survey. The teachers of those chosen classes were responsible for collecting the data.

Finally, 31674 students were surveyed in total, of whom 14320 were male and 17354 were female. The inclusion criterion for this study population was the students who self-reported that they had sexual behaviors, which amounted to 3873, representing 12.23% of the total study population. Depending on whether or not they received VCT, they were classified into two different groups.

## Statistical Analysis

Data were analyzed using SPSS version 23.0 software. Count variables are shown as percentages (%) and measured variables are shown as mean ± standard deviation. The chi-square test was performed on the demographic characteristics of students who with or without receiving VCT. The single-factor logistic regression method was applied to analyze the influencing factors on the acceptance of VCT by college students who had sexual behaviors. Variables ($P < 0.2$) in the univariate analyses were listed as independent variables in the multivariate logistic regression analysis model. $P < 0.05$ was indicated as statistical significance.

## Ethics Approval and Informed Consent

The study complied with the Declaration of Helsinki and was reviewed and approved by the Ethics Committee of Zhejiang Provincial CDC (batch number: 2018-036). Moreover, all the participants signed an informed consent form.

# Results

## General Characteristics

Among the 3873 college students who had sexual behaviors, 199 students received VCT (5.14%), the average age was 20.50 ±1.67; 3674 students did not receive VCT (94.86%), the average age was 20.16 ±1.34. Among this study population, 72.46% were from Zhejiang province. There were no significant differences in household registration and hometown between the two groups ($P>0.05$), but significant differences were found for age, gender, monthly living expenses, and family relation ($P<0.05$). Detailed results are shown in Table 1.

**Table 1** Demographic Characteristics of 3873 College Students Who Had Sexual Behavior

| Variables | Received VCT (n=199) | | Not Received VCT (n=3674) | | $\chi^2$ | *P* Value |
|---|---|---|---|---|---|---|
| | n | % | n | % | | |
| Age (years) | | | | | 9.137 | 0.010 |
| ≤19 | 50 | 25.1 | 1129 | 30.7 | | |
| 20–21 | 104 | 52.3 | 1993 | 54.2 | | |
| ≥22 | 45 | 22.6 | 552 | 15.0 | | |
| Gender | | | | | 14.120 | <0.001 |
| Male | 35 | 17.6 | 1104 | 30.0 | | |
| Female | 164 | 82.4 | 2570 | 70.0 | | |
| Household registration* | | | | | 0.534 | 0.465 |
| Zhejiang province | 139 | 17.6 | 2666 | 72.6 | | |
| Other provinces | 59 | 29.8 | 1007 | 27.4 | | |
| Hometown | | | | | 3.488 | 0.062 |
| Rural area | 108 | 54.3 | 2238 | 60.9 | | |
| Town/city | 91 | 45.7 | 1436 | 39.1 | | |

(*Continued*)


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**Table 1** (Continued).

| Variables | Received VCT (n=199) | | Not Received VCT (n=3674) | | $\chi^2$ | *P* Value |
|---|---|---|---|---|---|---|
| | n | % | n | % | | |
| Monthly living expenses | | | | | 8.918 | 0.012 |
| ≤1000 | 65 | 32.7 | 881 | 24.0 | | |
| 1001–1500 | 64 | 32.2 | 1477 | 40.2 | | |
| ≥1501 | 70 | 35.2 | 1316 | 35.8 | | |
| Family relation | | | | | 9.279 | 0.002 |
| Harmonious | 162 | 81.4 | 2625 | 71.4 | | |
| General/disharmonious | 37 | 18.6 | 1049 | 28.6 | | |

**Note**: *There is missing data.

## Analysis of Factors Influencing the Acceptance of VCT

In the univariate analysis, the participants who were more likely to accept VCT were as follows (Table 2): those who had taken an HIV/AIDS-related lecture or health education class at school in the last year; those who had received information about HIV/AIDS by school-based media in the past year in the last year; those who had received promotion about HIV testing at

**Table 2** Analysis of Factors Influencing Receiving VCT Among 3873 College Students

| Variables | Received VCT (n=199) | Not Received VCT (n=3674) | Univariate Analysis | | Multivariate Analysis | |
|---|---|---|---|---|---|---|
| | | | OR (95% CI) | *P* Value | OR (95% CI) | *P* Value |
| Age | | | | | | |
| ≤19 | 50 | 1129 | 1 | | 1 | |
| 20–21 | 104 | 1993 | 1.18 (0.83–1.66) | 0.351 | 1.16 (0.80–1.66) | 0.436 |
| ≥22 | 45 | 552 | 1.84 (1.22–2.79) | 0.004 | 2.11 (1.36–3.29) | 0.001 |
| Gender | | | | | | |
| Male | 164 | 2570 | 1 | | 1 | |
| Female | 35 | 1104 | 2.01 (1.38–2.92) | <0.001 | 0.80 (0.51–1.26) | 0.333 |
| Hometown | | | | | | |
| Rural area | 108 | 2238 | 1 | | 1 | |
| Town/city | 91 | 1436 | 1.31 (0.99–1.75) | 0.062 | 0.90 (0.65–1.24) | 0.519 |
| Monthly living expenses | | | | | | |
| ≤1000 | 65 | 881 | 1 | | 1 | |
| 1001–1500 | 64 | 1477 | 0.59 (0.41–0.84) | 0.003 | 0.77 (0.53–1.13) | 0.184 |
| ≥1501 | 70 | 1316 | 0.72 (0.51–1.02) | 0.066 | 0.81 (0.55–1.19) | 0.281 |
| Family relation | | | | | | |
| Harmonious | 162 | 2625 | 1 | | 1 | |
| General/disharmonious | 37 | 1049 | 0.57 (0.40–1.02) | 0.003 | 0.81 (0.55–1.20) | 0.292 |
| Whether it can be identified by appearance that a person is infected with HIV? | | | | | | |
| No | 150 | 3220 | 1 | | 1 | |
| Yes | 49 | 454 | 0.43 (0.31–0.61) | <0.001 | 0.79 (0.53–1.17) | 0.233 |
| Whether there is a need to proactively seek HIV counseling and testing after high-risk sex? | | | | | | |
| No | 24 | 140 | 1 | | 1 | |
| Yes | 175 | 3534 | 0.29 (0.18–0.46) | <0.001 | 0.49 (0.29–0.83) | 0.008 |

(*Continued*)

**Table 2** (Continued).

| Variables | Received VCT (n=199) | Not Received VCT (n=3674) | Univariate Analysis | | Multivariate Analysis | |
|---|---|---|---|---|---|---|
| | | | OR (95% CI) | *P* Value | OR (95% CI) | *P* Value |
| Have you taken a HIV/AIDS-related lecture or health education class at school in the last year? | | | | | | |
| No | 28 | 1330 | 1 | | 1 | |
| Yes | 171 | 2344 | 3.47 (2.31–5.20) | <0.001 | 1.80 (1.07–3.02) | 0.027 |
| Have you received information about HIV/AIDS by school-based media in the last year? | | | | | | |
| No | 35 | 1057 | 1 | | 1 | |
| Yes | 164 | 2617 | 1.89 (1.30–2.75) | 0.001 | 0.69 (0.43–1.11) | 0.125 |
| Have you received promotion about HIV testing at school in the last year? | | | | | | |
| No | 28 | 1592 | 1 | | 1 | |
| Yes | 171 | 2082 | 4.67 (3.12–7.00) | <0.001 | 2.15 (1.32–3.50) | 0.002 |
| Have you taken HIV risk self-assessment at school in the last year? | | | | | | |
| No | 55 | 2540 | 1 | | 1 | |
| Yes | 144 | 1134 | 5.86 (4.27–8.06) | <0.001 | 3.47 (2.40–5.03) | <0.001 |
| Could you accept one-night stand? | | | | | | |
| No | 101 | 2141 | 1 | | 1 | |
| Yes | 98 | 1533 | 1.36 (1.02–1.80) | 0.037 | 0.75 (0.50–1.13) | 0.168 |
| Could you accept commercial sex behavior? | | | | | | |
| No | 125 | 2787 | 1 | | 1 | |
| Yes | 74 | 887 | 1.86 (1.38–2.50) | <0.001 | 1.43 (0.92–2.23) | 0.109 |
| Could you accept male-to-male sexual behavior? | | | | | | |
| No | 145 | 2844 | 1 | | 1 | |
| Yes | 54 | 830 | 1.28 (0.93–1.76) | 0.138 | 1.31 (0.88–1.96) | 0.184 |
| Whether had sex with a regular partner in the last year?* | | | | | | |
| No | 50 | 1000 | 1 | | — | |
| Yes | 141 | 2510 | 1.12 (0.81–1.56) | 0.490 | — | |
| Whether had casual sex in the last year? | | | | | | |
| No | 122 | 3062 | 1 | | 1 | |
| Yes | 77 | 612 | 3.16 (2.34–4.26) | <0.001 | 1.75 (1.21–2.52) | 0.003 |
| Self-efficacy of condom use scale | | | | | | |
| 0 ~ 4 | 44 | 1114 | 1 | | 1 | |
| 5 ~ 8 | 57 | 1207 | 1.20 (0.80–1.79) | 0.383 | 1.15 (0.75–1.75) | 0.525 |
| 9 | 91 | 1213 | 1.90 (1.31–2.75) | 0.001 | 1.33 (0.89–1.98) | 0.164 |
| Condom use with casual sex partners* | | | | | | |
| Never use | 29 | 113 | 1 | | — | |
| Sometimes/frequently used | 25 | 232 | 0.42 (0.24–0.75) | 0.003 | — | |
| Always use | 16 | 218 | 0.29 (0.15–0.55) | <0.001 | — | |
| Condom use with fixed sex partners* | | | | | | |
| Never use | 36 | 207 | 1 | | — | |
| Sometimes/frequently used | 51 | 953 | 0.31 (0.20–0.48) | <0.001 | — | |
| Always use | 54 | 1336 | 0.23 (0.15–0.36) | <0.001 | — | |

**Notes**: *: There is missing data. —: Not included in multivariate analysis.


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school in the last year; those who had taken HIV risk self-assessment at school in the last year; those who had sex with a regular partner; those who had accepted commercial sex behavior; those who had accepted one-night stand; those who had casual sex in the past year; those who scored 9 points on self-efficacy of condom use. Regarding the HIV knowledge parts, those who thought they could identify whether a person was infected with HIV by appearance and proactively sought HIV counseling and testing after high-risk sex suggested that they were more likely not to have received a VCT.

Among these students, 52.71% (1390/2637) used condoms each time with a regular sex partner and 36.97% (234/633) used condoms each time with casual partners. Furthermore, compared to never condom use, condoms were used every time or sometimes when having casual sex and every time or sometimes when having sex with a regular partner, suggesting that college students who have had sex are more likely to have not received VCT. The statistical analysis results are shown in Table 2.

## Results of Multivariate Logistic Regression Analysis

Age, gender, hometown, monthly living expenses, family relationships, and variables ($P$<0.2) in the single-factor logistic analysis were included in the multivariate logistic regression analysis. The results showed that the study participants who preferred receiving VCT were as follows (Table 2): age ≥ 22 (OR = 2.11, 95% CI: 1.36–3.29), those who had taken an HIV/AIDS-related lecture or health education class at school in the last year (OR = 1.80, 95% CI: 1.07–3.02), those who had received promotion about HIV testing at school in the last year (OR = 2.15, 95% CI: 1.32–3.50), those who had taken HIV risk self-assessment at school in the last year (OR = 3.47, 95% CI: 2.40–5.03), those who had casual sex in the past year (OR = 1.75, 95% CI: 1.21–2.52). Compared with those who did not know that they should seek VCT after engaging in high-risk sex, those who knew were more likely to have not received a VCT test (OR=0.49, 95% CI: 0.29–0.83).

# Discussion

This study was a cross-sectional survey of college students in Zhejiang Province, which can indicate the characteristics and associated factors of the acceptance of VCT among sexually active college students. This study clarifies the willingness of Chinese college students to accept VCT, which is crucial for the timely identification of HIV-infected individuals. This helps infected individuals recognize the risk of infection, understand their status, seek treatment, and prevent the further spread of HIV.

In this study, the results suggested that the proportion of participants who received VCT was only 5.14%, which was less than the results of the surveys of foreign university students (17.8%–45.6%).[23–25] This proportion was also lower than the percentage of college students with sexual experience who received HIV testing in Nanning City (14.69%), which is an area of high HIV prevalence in southwest China.[26] Similarly, HIV testing rates obtained from similar studies among male students in Sichuan and Hunan provinces are also poor.[27,28] These findings indicated that HIV testing was not widespread within college students, largely driven by the low acceptance rate of HIV testing in China. A systematic review and meta-analysis showed that the acceptance rate of HIV testing among college students in China was 68%, which was lower than the percentage of American adults who were inclined.[19,29]

The results revealed that senior college students (age≥22) were more likely to receive VCT than freshman students. Maslowsky et al showed college students' cognitive control areas of the brain matured with age, increasing subjective perceptions of healthy or risky behaviors, they can anticipate potential consequences and pursue perceived benefits more purposefully through corresponding actions by accumulating experience with various risky behaviors.[30] In addition, students' knowledge about HIV prevention and treatment increased as they move up the grades, resulting in increasing the rate of VCT.[31]

This study found that college students who had attended a lecture or health education class about HIV/AIDS, or who had been provided information on HIV testing, or who had taken HIV risk self-assessment at school in the last year were more likely to accept VCT. This suggests that lack of awareness regarding the risk of HIV infection is the most important factor hindering HIV testing, and therefore schools play a key role in promoting HIV testing among college students.[13] In this study, participants who had experienced casual sex in the last year were prone to receive VCT, which was consistent with the domestic and foreign findings.[32–34] Sexual behavior history is an essential influence on the ability of college students to undergo VCT, which can be used to rule out HIV infection out of concern for their condition.[35] Therefore, HIV testing and risk

assessment work conducted in schools should focus on students with a history of sexual behavior. Furthermore, it is necessary to establish VCT centers on campus to provide convenient support and resources for college students.

However, we also found that some students may not seek VCT after having risky sexual behaviors in this study. There are several explanations for this low willingness of VCT. First, with the popularization of the internet, college students who were open to premarital or cohabiting sex can easily find sexual partners, they believed it was not necessary to get HIV testing even if they had unprotected sex.[26,28] In addition, there was still a certain amount of prejudice and discrimination against patients with HIV in current society, which was one of the barriers to HIV testing for college students.[36–38] Finally, some college students who perceived themselves as being knowledgeable about HIV tended to engage in low-risk sexual behavior, considering to be at low risk of infection and unlikely to be exposed to HIV.[39] Given the above reasons, innovative HIV testing methods specifically designed to improve the available, private, and convenient approaches on campus are warranted.

This study had several limitations. Firstly, the questionnaire content of this survey involved sensitive privacy issues and was self-reported by the study participants, resulting in producing recall bias or response bias which may affect the explanation of the results. Secondly, due to several constraints of the cross-sectional study, causal inferences could not be established regarding the associated factors. Thirdly, this study utilized an online self-administered questionnaire to obtain data; the reliability of the information was therefore dependent on the integrity of the study participants.

## Conclusion

In this study, the percentage of college students who had sex received VCT was low. The findings indicated that college students who had attended a lecture or health education class about HIV/AIDS, or who had been provided information on HIV testing, or who had taken HIV risk self-assessment were more inclined to accept VCT. On the basis of these findings, it is recommended that health education, especially sex education and HIV testing, should be conducted regularly on campus to enhance the publicity of HIV testing-related knowledge and to raise the HIV testing rate of college students. Moreover, there is a need to establish VCT centers on campus to facilitate students to access HIV prevention and testing services.

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## Author Contributions

All authors made a significant contribution to the work reported, whether that is in the conception, study design, execution, acquisition of data, analysis and interpretation, or in all these areas; took part in drafting, revising or critically reviewing the article; gave final approval of the version to be published; have agreed on the journal to which the article has been submitted; and agree to be accountable for all aspects of the work.

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## Disclosure

The authors declare that there are no conflicts of interest in this work.

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