

Association between Peer Education and HIV Testing Among Student MSM in China: A Cross-Sectional Study

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Abstract

Background HIV prevalence among young men who have sex with men (YMSM) (<25 years old) all over the world varied dramatically from 35.5%(Gambia) to 0.5%(Belgium). In China, by contrast, the HIV prevalence among YMSM was at a low level (5.6%). However, the number of newly diagnosed college students has increased by 30 to 50 percent annually and HIV prevalence among student MSM in China has increased over the past few years, with access to HIV testing and peer education remaining limited. The objective of this study was to examine the relationship between peer education and HIV testing among student MSM in China. Methods The cross-sectional study was conducted in Tianjin, China between January 1, 2018 and December 31,2018. 494 student MSM aged 17-24years old were recruited using snowball sampling. Outcome variables were tested and not tested for HIV in the past year. Besides, social demographics, and sex-related behaviors were collected. Results The prevalence of HIV infection for the population was 5% (25/494). Overall, 60.5% of student MSM had tested for HIV in the past year, among which 68.9% had received peer education service. Peer education was significantly associated with HIV testing. After adjusting for sociodemographic characteristics, sexual behaviors, knowledge about HIV and STD infection, student MSM who received peer education were more likely to test for HIV [OR=19.751; 95%CI: (8.630,45.202)]. Conclusions HIV testing coverage among student MSM in China remains suboptimal. Peer education is significantly associated with HIV testing among this population. Government and non-government organizations could consider this alternatively risk-reduction prevention strategy in the future.

Background

Men who have sex with men(MSM) are the groups most affected by HIV(1, 2), among which YMSM have been a group of concern(3). According to UNAIDS(2018)(4), the HIV prevalence among YMSM(< 25 years old) in 104 countries all over the world varied dramatically from 35.5%(Gambia) to 0.5%(Belgium) irrespective of 8 countries of 0%(e.g. Afghanistan, Bangladesh and more).Nearly one in four of countries' HIV prevalence were up to 10%, among which 40% of countries were more than 15%. Although the prevalence in China was 5.6% at a low level in the world, a particularly worrisome fact was that the number of newly diagnosed college students has increased by 30 to 50 percent annually over the past few years(5). And there were studies showing that HIV prevalence among student MSM in China have increased over the past years(6).

HIV testing is a key measure for the prevention and control of AIDS, which is helpful for testers to know their infection status timely and take measures to reduce the risk of infection and transmission, thus better protect themselves and their sexual partners. However, there was a low awareness of getting tested for HIV voluntarily or passively among YMSM(7). In the United States, 79% of YMSM aged between18 to24 tested for HIV voluntarily(8). And in England, the proportion was 72%(9), 79.6% was for Beirut, Lebanon(10). However, according to a report in China(2017), the proportion was 64.77%, a little bit lower than countries above(11). In addition, the YMSM who were sexually active were always exposed to high-risky behaviors such as recreational drug use(12) and condomless anal sex(10, 13) due to lack of sex

education and susceptible value conception(5, 14). All the above put young men at high risk for HIV infection.

Peer education is a pattern where individuals who have certain appeal power are trained purposely and then provide information, skills or resources to their peers(15). Peer education is a relatively low-cost strategy for preventing AIDS and other sexually transmitted diseases (STD) worldwide and is beneficial for both peer educator and receptor especially among the young(15–17). In 2018, a study in America about sex education and HIV testing among YMSM showed that YMSM were more likely to have ever tested for HIV if they knew about how to prevent HIV from a partner(12). A cohort study in Yemeni(17) demonstrated that school-based peer education significantly increased knowledge about HIV, decreasing levels of stigma and discrimination. A quasi experiment in Ethiopia(15) proved that peer education in secondary school could promote consistent condom use and willingness to go for HIV counseling and testing. However, even notified by HIV-positive partner about potential risk for infection, no more than 1/2(47%) blacks or African Americans(2) go for HIV testing. So far, the study about peer education in China is not well reported, as a result, its effect is unknown, limiting the implementation and improvement among YMSM to some extent.

With Chinese traditional culture deeply rooted, the cultural stigma, social ostracism and widespread homophobia all limit the access to publicly available health-care services. Besides, the inadequate school sex education exposes young students to an increasingly unprotected sex and vulnerable HIV infection(5, 14). But it was feasible to implement school-based HIV education in a very conventional setting and the intervention was expected to gain inflexible and continued HIV prevention among young students(17). Fortunately, there are relevant peer education services being implemented in different venues and on the Internet in Tianjin. The purpose of this study is to examine the association between peer education and HIV testing and explore the factors which influence the behavior of HIV-testing among student MSM, thus providing implications for further HIV education and intervention among this population.

Methods

Sample and Procedures

The cross-sectional study was conducted from January 1, 2018 to December 31,2018 in Tianjin, the third largest city in China. The original aim of the study was to establish AIDS prevention service station for MSM. The data for this study were from Tianjin Shenlan Community-Based Organization (CBO) who has its own offices in different gay gathering venues such as bathhouses and bars to provide HIV counseling and testing (HCT). We adopted snowball sampling to recruited participants through diverse venues and Internet (WeChat, QQ, gay app). After being repeatedly mobilized, one came to venues or Shenlan CBO to get free HCT. Each participant was asked for their fingerprints and then they entered in the private office to receive one-on-one counseling with a trained researcher who was also MSM. The researcher completed the questionnaire when communicating with the participant using the jargon. Blood antibody/antigen test was adopted when participants agreed to collect venous blood samples, otherwise, oral mucosa exudate

antibody detection was done. During the 20 minutes of waiting for the rapid test's outcome, the researcher did a risk assessment for the participant according to the questionnaire and provided specific sex education and advices. All the participants were provided condoms and lubricants as compensation for their cooperation and was advised to introduce their peers coming here for the same service. For participant whose rapid test outcome was HIV-positive, ID card was used for real name authentication and then the blood sample was tested for AIDS confirmation by Western Blot test. All the participants were informed of their results and institutions for standard treatment were introduced to those who were infected with HIV. Eligible participants from the consulting interview included MSM who were students between the age of 16 and 24 and reported anal intercourse with a male partner in the past 6 months.

All the participants signed informed consent prior to HIV counseling and testing and were informed the right to drop out of the study at any time. The study was approved by institutional review boards of the National Center for AIDS/STD Control and Prevention, Chinese Center for Disease Control and Prevention (China CDC), US CDC and Tianjin CDC.

Measures

Demographics including birthday which was used to calculate age, sexual orientation, nationality, education, registered residence and time of residence in Tianjin. Cigarettes, alcohol and recreational drug use collected the current status and the type of alcohol and recreational drug. Sexual behavior assessed age at first sex, venue for sexual partners, STD history in the past year(yes or no), homosexual anal sex experience in the past 6 months(yes or no), times of homosexual anal sex last week, condom use for last anal sex(yes or no) and frequency of condom use in the past 6 months(always, sometimes or never). Knowledge about HIV was assessed using 8 questions of the basic knowledge of AIDS that the public should master clearly stipulated by the state with replying 6 or more was "have good HIV-related knowledge". Questions about PrEP and PEP "Whether heard about"," Willingness to use" and "Reasons for not using" were added in August 1st,2018.

Peer education was assessed by "whether received peer education service last year". Peer education was defined as having gain sex- or HIV-related knowledge from a trained peer via daily contact or the Internet. The CBO staff are all MSM and they are active in various venues and online communities to provide HIV-related risk-reduction knowledge which especially aimed at MSM. HIV testing were assessed by previous experience (yes or no), if "Yes", the latest date was asked to determine whether tested in the past year and the result of HIV testing was collected.

Data analysis

For the current analyses, 573 non-students were excluded and among the remainder 8 students who had not experienced anal sex in the past 6 months were excluded (Fig. 1), as a result, 494 student MSM were included. The primary binary dependent variable and independent variable are respectively HIV testing experience last year and peer education service received last year. Chi-square test and Fisher's exact

probability test were used to explore the factors associated with HIV testing among student MSM. In order to determine the influence of peer education on HIV testing, multivariable logistic regression was running by steps. The sexual behaviors and STD infection were adjusted in model 1, with demographics adjusted in model 2. Finally, knowledge about HIV was added in model 3. SPSS25.0 was used for data analysis.

Results

A total of 494 students enrolled who self-reported as MSM (Table 1). Student MSM were on average 21.22 years old (SD = 1.52, range 17–24) and over half (55%) were lower than 22 years old. Most of participants were homosexual (98%), from Han nationality (97%) and university (76%), residing in Tianjin over 2 years (84%) and experienced their first sex below 19 years old (70%). 15% of participants smoked, while 34% used alcohol and 39% used recreational drug.

Table 1
Sample characteristics (N = 494)

Characteristic	Number	Percentage (%)
Nation		
Han	479	97
Other	15	3
Sexual Orientation		
Homosexual	483	98
Bisexual	11	2
Age		
Mean (SD), Range	21.22(1.52)	17 ~ 24
≤ 21	273	55
> 21	221	45
Education		
High/Secondary School	32	6
Junior college	53	11
University	375	76
Postgraduate and above	34	7
Local residence time(years)		
< 1	22	4
1 ~ 2	55	11
> 2	417	84
Smoke		
Yes	76	15
No	418	85
Alcohol use		
Yes	167	34
No	327	66

^a258missing data; SD Standard deviation; STD Sexually transmitted diseases

Characteristic	Number	Percentage (%)
Recreational drug use		
Yes	193	39
No	301	61
Age at first sex Mean (SD), Range		
≤ 18	348	70
> 18	146	30
Times of homosexual anal sex (last week)		
0	223	45
≥ 1	271	55
Venue for sexual partners		
Internet/dating apps	445	90
Others	49	10
Have good HIV-related knowledge		
Yes	481	97
No	13	3
Condom use (last time)		
Yes	393	80
No	101	20
Condom use (last 6 months)		
Never	9	2
Sometimes	247	50
Every time	238	48
STD (last year)		
Yes	12	2
No	482	98
Tested for HIV (last year)		

^a258missing data; SD Standard deviation; STD Sexually transmitted diseases

Characteristic	Number	Percentage (%)
Yes	299	60.5
No	195	39.5
Have received peer education service (last year)		
Yes	218	44
No	276	56
Heard about PrEP ^a		
Yes	63	27
No	173	73
Heard about PEP ^a		
Yes	133	56
No	103	44
AIDS		
Yes	25	5
No	469	95
^a 258missing data; SD Standard deviation; STD Sexually transmitted diseases		

As for sex-related behavior, 45% of participants did not have homosexual anal sex last week and the remainder had once or more. The majority of participants sought sexual partners through Internet or dating apps (90%), had good HIV-related knowledge (97%), used condom for last anal sex (80%) and had not been diagnosed with STD last year (98%). The proportion of condom use consistently for last 6 months is 48%, among the remain, 3.5% never used condom.

When asked about AIDS-prevention-related services last year, 44% had received peer education service, among which 94.5% of MSM have tested for HIV. In contrast, only 44.6% of MSM had tested among those who had not received peer education service. There were 236 participants answering questions about PrEP and PEP, among which 27% had heard about PrEP and 56% heard about PEP. The prevalence of AIDS for the population was 5%.

Overall, 60.5% of Student MSM had tested for HIV last year, that is, 39.5% of students did not know about their HIV infection status. What's more, 33.2% never knew in the past life. As shown in Table 2, compared with participants who had never tested for HIV, Student MSM who had tested were more often older (> 21 years old), having no homosexual anal sex last week, using recreational drug, having good HIV-related

knowledge, using condom for last sex, using condom consistently for the past 6 months, having been diagnosed with STD and received peer education service last year, having heard about PrEP and PEP.

Table 2

Comparison of baseline sociodemographic and behavior characteristics between student MSM who had tested for HIV(N = 299) and those who had not(N = 195)

Characteristics	Tested last year, N (%)		OR (95%CI)	P
	Yes	No		
Nation Han Other	289(96.7) 10(3.3)	190(97.4) 5(2.6)	0.761(0.256,2.260) Ref	0.621
Sexual Orientation Homosexual Bisexual	292(97.7) 7(2.3)	191(97.9) 4(2.1)	0.874(0.252,3.025) Ref	1.000
Age ≤ 21 > 21	153(51.2) 146(48.8)	120(61.5) 75(38.5)	0.655(0.454,0.945) Ref	0.023
Education Postgraduate and above University Junior college High/Secondary School	20(6.7) 227(75.9) 30(10.0) 22(7.4)	14(7.2) 148(75.9) 23(11.8) 10(5.1)	1.540(0.559,4.239) 1.434(0.660,3.115) 1.687(0.669,4.249) Ref	0.403 0.362 0.268
Local residence time, y > 2 1 ~ 2 < 1	266(89.0) 23(7.7) 10(3.3)	150(76.9) 33(16.9) 12(6.2)	0.470(0.198,1.114) 1.196(0.443,3.230) Ref	0.086 0.725
Smoke Yes No	52(17.4) 247(82.6)	24(12.3) 171(87.7)	1.500(0.890,2.527) Ref	0.126
Alcohol use Yes No	97(32.4) 202(67.6)	70(35.9) 125(64.1)	0.857(0.587,1.254) Ref	0.427
Recreational drug use Yes No	134(44.8) 165(55.2)	59(30.3) 136(69.7)	1.872(1.279,2.741) Ref	0.001
Age at first sex ≤ 18 > 18	205(68.6) 94(31.4)	143(73.3) 52(26.7)	0.793(0.531,1.184) Ref	0.256
Times of homosexual anal sex (last week) 0 ≥ 1	149(49.8) 150(50.2)	74(37.9) 121(62.1)	1.624(1.125,2.346) Ref	0.009

^a258missing data; STD Sexually transmitted diseases

Characteristics	Tested last year, N (%)		OR (95%CI)	P
	Yes	No		
Venue for sexual partners Internet/dating apps Others	275(92.0) 24(8.0)	170(87.2) 25(12.8)	1.685(0.932,3.045) Ref	0.081
Condom use (last time) Yes No	257(86.0) 42(14.0)	136(69.7) 59(30.3)	2.655(1.698,4.151) Ref	< 0.001
Condom use (last 6 months) Every time Never/Sometimes	172(57.5)12742.5)	66(33.8) 129(66.2)	2.647(1.819,3.851) Ref	< 0.001
STD (last year) Yes No	12(4.0) 287(96.0)	0(0.0) 195(100)	–	0.011
Have good HIV-related knowledge Yes No	295(98.7) 4(1.3)	186(95.4) 9(4.6)	3.569(1.083,11.754) Ref	0.026
Have received peer education service (last year) Yes No	206(68.9) 93(31.1)	12(6.2) 183(93.8)	33.780(17.931,63.634) Ref	< 0.001
Heard about PrEP ^a Yes No	51(31.1) 113(68.9)	12(16.7) 60(83.3)	2.257(1.118,4.556) Ref	0.021
Heard about PEP ^a Yes No	101(61.6) 63(38.4)	32(44.4) 40(55.6)	2.004(1.143,3.513) Ref	0.014
AIDS Yes No	16(5.4) 283(94.6)	9(4.6) 186(95.4)	1.168(0.506,2.699) Ref	0.715
^a 258missing data; STD Sexually transmitted diseases				

Peer education is steadily associated with HIV testing among student MSM as shown in Table 3. After adjusting for sex-related behaviors and STD infection, the peer education was associated with a 16.755(7.494,37.458)-fold possibility of HIV testing. Adjustment for age, education and local residence time slightly increased the association. Further adjustment for knowledge about HIV, PrEP and PEP, the OR became 19.751. In addition, age and PrEP were significant in the multivariable model 2 and model 3 respectively, among which student MSM aged 17–21 were less likely to test for HIV(OR = 0.438;95%CI:0.219,0.878), with those who had heard about PrEP 3.502 times more likely to have tested.

Table 3
Odds ratios of peer education for HIV testing among student MSM

Characteristics	OR (95%CI)	P
Multivariable model 1		
Peer education Yes No	16.755(7.494,37.458)	< 0.001
Multivariable model 2		
Peer education Yes No	17.258(7.643,38.973) Ref	< 0.001
Age ≤ 21 > 21	0.438(0.219,0.878) Ref	0.020
Multivariable model 3		
Peer education Yes No	19.751(8.630,45.202) Ref	< 0.001
Heard about PrEP Yes No	3.502(1.578,7.770) Ref	0.002
Multivariable model 1 adjusted by recreational drug use, venue for sexual partners, condom use last time, condom use last 6 months, age for first sex and times of homosexual anal sex (last week), STD last year and AIDS		
Multivariable model 2 adjusted by age, education and local residence time in addition to variables in model 1		
Multivariable model 3 adjusted by PrEP, PEP and have good HIV-related knowledge in addition to variables in model 2		

Discussion

According to this study, the prevalence of HIV infection among 17–24 years old student MSM in Tian, China was 5%, which is higher than previous study from 2003 to 2016 (5, 18, 19) but is consistent with report from UNAIDS about 16–24 years old YMSM in 2018 (4). There was no statistically significance for the HIV prevalence between student MSM who had tested and who not (5.4% VS 4.6%). A higher rate of recreational drug use (44.8% VS 30.3%) among student MSM who had tested was found. This might be explained by the association between recreational drug use and high-risky sexual behaviors and STD infection (20–23). Risky behaviors and status may put students on HIV testing.

The purpose of this study was to examine the relationship between peer education and HIV testing among student MSM in China. Our study found that the rate of HIV testing was 60.5%, which is higher than a previous systematic review(53%)(18) about MSM attending university. Considering 83% of MSM attending university in this study, we did the above comparison. The higher rate in this study might indicate that HIV testing is gaining popularity among student MSM over time. However, this finding also presents a public health concern because 39.5% of student MSM are living with undiagnosed in the past year and even 33.2% never knew about their HIV-infection status, as a result, are unaware of their ability to transmit HIV.

In our study, we found that those who received peer education service were more likely to have tested for HIV, which is consistent with previous studies(15, 24, 25). School sex education in China is far from adequate, let alone education aiming at MSM(14). Chinese government and some non-government organizations are investigating effective ways to reach young men, and mobile phone apps have been applied(1). However, an online video intervention promoting HIV testing among never-tested MSM in China(26) demonstrated that students had a lower testing rate compared with nonstudents at follow-up probably because of fear of testing in local healthcare institutions. Given the circumstance, peer education may be a complementary intervention. Further study may be needed to assess the effect of peer education and other interventions to adjust prevention strategies based on local conditions.

Consistently with a study in Metropolitan Detroit in 2016(27), we found that YMSM ever tested for HIV were more likely to be older, seeking sexual partners on the Internet and having a STD history. In addition, we also found that relatively safe behaviors and status were more likely to be seen among YMSM who have tested such as condom use last time or consistently for last 6 months, having good perception of HIV-related knowledge, having heard about PrEP and PEP and having no anal sex last week. This may be an implication that risk-reduction behaviors are more likely to be seen among YMSM who had experienced HIV testing.

Our study has several limitations. First, although the students were recruited through different ways, the snowball sampling has its inherent disadvantages, as a result, are subject to selection bias. However, the sampling method is feasible for the concealment of the population. Second, the questionnaire was designed retrospectively and the answer was self-reported, so information biases were inevitable such as recall bias. For some sensitive questions, lying out of shame resulted in social expectation bias. The CBO conducted the interview in the private office with a professional researcher who was also MSM to guarantee authenticity largely. In addition, the cross-sectional design could not prove the causal relationship between peer education and HIV testing because we cannot determine the temporality.

Despite these limitations, few studies have assessed the relationship between peer education and HIV testing and factors associated with HIV testing among student MSM in China. Our study has important implications for HIV prevention among the hard-to-contact risky population in China.

Conclusions

Peer education was significantly associated with HIV testing among student MSM in China. Government and non-government organizations could consider this complementally prevention strategy in the future. Further research is needed to examine the causal relationship between peer education and HIV testing and compare effect of different interventions.

Abbreviations

HIV:Human immunodeficiency syndrome; YMSM:Young men who have sex with men; MSM:men who have sex with men; AIDS:Acquired immune deficiency syndrome; STD:sexually transmitted diseases; CBO:Community-based organization; HCT:HIV counseling and testing (HCT); PrEP:Pre-exposure prophylaxis; PEP:Post-exposure prophylaxis; SD:Standard deviation; CI:Confidence interval; OR:Odds ratio.

Declarations

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Availability of data and materials: The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

Ethics approval and consent to participate: All the participants signed informed consent prior to HIV counseling and testing and were informed the right to drop out of the study at any time. The study was approved by Institutional Review Boards of the National Center for AIDS/STD Control and Prevention, Chinese Center for Disease Control and Prevention (China CDC).

Consent for publication: Not applicable.

Competing interests: The authors declare that they have no competing interests.

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Figures

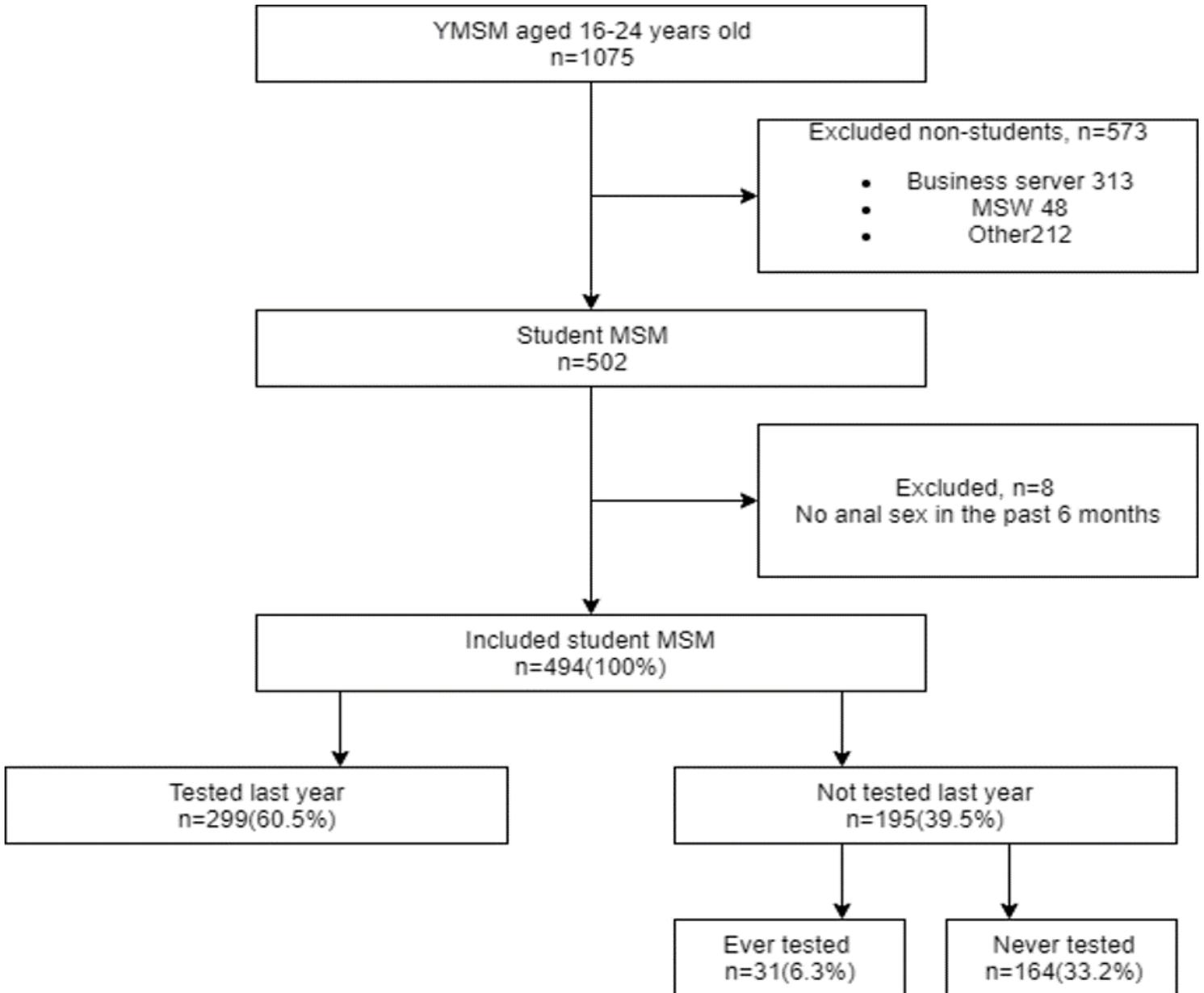


Figure 1

Student MSM Inclusion