

Associated with Differences in Sexual Risk-Taking Behaviors Among Migrants in South Korea

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Abstract We investigated influential factors on differences in sexual risk-taking among homosexual migrants. The data used in this paper are based on the survey and medical examination for migrants' sexual behaviors that was carried out by the Korea Federation for HIV/AIDS Prevention in 2011–2013 on participants living in South Korea. Among 1141 migrants, homosexuals were 0.54 times less likely to use condom than heterosexuals. Homosexuals were 2.93 times more likely to be infected with sexually transmitted diseases (STDs) than heterosexuals. Among 250 homosexual migrants, those who preferred risky sexual intercourse were 0.19 times less likely to use a condom than heterosexual migrants. Those who have a fixed sexual partner were 0.35 times less likely to be infected with HIV than their counterparts. Administrative programs for STDs prevention of migrants should be focused on their sexual risk-taking, which were limited to casual partnership, unprotected sex, and previous contraction of sexual diseases.

Keywords Migrant · Homosexual · Sexually transmitted disease · HIV/AIDS · Sexual risk-taking · South Korea

Background

The human immunodeficiency virus (HIV), which results in an acquired immunodeficiency syndrome (AIDS), is transmitted primarily via unprotected sexual intercourse, and the management of the virus and the associated syndrome remain a daunting health care challenge [1]. Other sexually transmitted diseases (STDs) such as syphilis, gonorrhea, and chlamydia are also major public health concerns [2–4]. Due to the difficulty of accessing groups with high HIV and STD prevalence rates, there is insufficient information about their sexual risk-taking behaviors, and risk-taking behaviors can boost STD infection rates in such groups [5, 6].

Preventive intervention against sexual diseases is necessary within various groups within the general population that have attracted health-care surveillance attention such as men who have sex with men, female sex workers (FSWs), and migrant workers [7–11]. In South Korea, those belonging to such sexually high-risk groups typically have had their first sexual experience at an early age, have concurrent sex partners without the use of condoms, and combine alcohol consumption with sexual encounters [8, 10]. Despite the significant global spread of STDs, few studies have been conducted into the role of migrants in that spread. The number of migrants has steadily increased with globalization. South Korea began accepting migrant workers at the end of the 1980s in order to replenish an insufficiency in production personnel, particularly in the manufacturing and construction industries. Moreover, the number of foreign students in South Korea began to increase in the mid-1990s. According to the South Korean Ministry of Justice, as of June 2015, there were 1.6 million foreigners in the nation including short- and long-term

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sojourners and illegal aliens. Two-thirds of the registered foreigners in Korea had work visas [12, 13].

According to the Joint United Nations Program on HIV/AIDS, the estimated HIV prevalence among Koreans between 15 and 49 years of age is <0.1 % [14]. Nations sending migrants to South Korea often have similar or higher HIV infection rates; for example, 0.1 % for Chinese, 1.3 % for Thais, and 0.4 % for Vietnamese migrants. However, migrants in South Korea, have a markedly higher rate of new infection than that of Koreans citizens. In 2005, there were 1.4 new HIV infections per 100,000 Koreans, compared to 11.1 new HIV infections per 100,000 foreigners in Korea [15]. This difference indicates a need for increased public health interest in the sexual behaviors of migrants in order to propose preventive interventions for reducing HIV/AIDS and other STDs.

Conceptual Framework

In general, migrants are more likely than residents to engage in unprotected sexual behavior [16, 17]. This is because most migrants, including economically active migrant workers in their 20 and 30 s, are sexually active but find it difficult to establish a stable relationship during their travels [18]. As a result, migrants are more likely to enter into casual sexual encounters rather than stable partnerships, and increasing their risk of contracting STDs or HIV [19, 20]. Among migrants in China, 73.7 % did not use a condom during their last sexual encounter, and 28.6 % reported undertaking sexually risky behavior [21]. Misconceptions related to HIV transmission, a poor awareness of HIV infection, and a low condom usage rate was common among East Asian migrants in China [22].

Confucianism encourages the maintenance of traditional gender roles and is a core societal belief system in Korea [23]. Moreover, Confucianism is associated traditionally with sexually conservative behaviors]. Such cultural factors can result in include anti-homosexual opinions, which may affect the sexual risk-taking behaviors of homosexual migrants [6, 8].

Regardless, the risk of acquiring an STD infection is higher among populations of sexual risk-takers and within populations who have same-sex sexual orientation. Such populations should be included in a sentinel surveillance system [24, 25].

Sexual risk-takers included those who have unprotected anal sex with multiple casual sex partners [26, 27]. Same-sex sexual orientation is an enduring personal quality that inclines people to feel sexual attraction to persons of the same sex [28]. However, the relationship between the socio-demographic characteristics, STD infection status, and their sexual risk-taking (SRT) behaviors of homosexual migrants have not been fully elucidated; thus need to

explore factors associated with SRT behaviors of homosexual migrants and the association between those risks and the risk of STD and HIV infection.

At the time of this study, there were few reports focusing on homosexual migrants, migrants that are vulnerable to various sexual diseases including HIV/AIDS. There is a sentinel surveillance system in Korea that monitors sexual disease outbreak, but there has been little availability of information on the sexual behaviors of surveilled subjects. This paucity of data and absence of research has not decreased the social stigma and fear associated with HIV/AIDS, both of which contribute to the societal vulnerability and exclusion of subjects with STDs [6]. In this study, we investigated factors related to HIV epidemiology that are associated with differences in SRT behaviors between homosexual and non-homosexual migrants in Korea [10, 29]. The two research questions that guided our analyses were: (1) Are there differences in SRT behaviors between homosexual and non-homosexual migrants after controlling for socio-demographic characteristics such as ethnicity and occupation?; and (2) What factors are associated with differences in condom use among homosexual migrants? Our goal was to use the results of our analyses to contribute to the establishment of an HIV and STD prevention program for homosexual migrants.

Methods

Study Participants

A cross-sectional survey with medical examination for HIV was conducted among male migrants living in the Ansan district of Gyeonggi Province and Metropolitan Seoul in the Republic of Korea. Ansan is one of the satellite cities near Seoul, and its large-scale industrial complexes have created a high concentration of migrant workers. Participants who gave written informed consent to participate in the study were included, and those who refused to participate in the survey were excluded. In the present study, “migrant workers” refers to persons who do not have Republic of Korea citizenship and work or intend to work in a business or workplace in the Republic of Korea for the purpose of earning wages in accordance with Article 2 of the Korean Act on Foreign Workers’ Employment, Etc., or who are foreign students enrolled in undergraduate or graduate programs at South Korean universities.

Data Collection

The data used in this paper are based on the survey and medical examination for migrants’ sexual behaviors

($N = 1141$) that was carried out by the Korea Federation for HIV/AIDS Prevention (KAIDS) in 2011–2013. Face-to-face interviews were conducted on the topics of condom use, sexual risk-taking behaviors, and socio-demographic characteristics. The response rates of migrants from all countries were 98 %. To generate a large dataset with sufficient statistical power to investigate the effect of sexual characteristics on HIV and STDs infection, we pooled data from January 2011 to December 2013. There is no statistical significant difference on demographic characteristics and HIV infections across the three-year period. All of the surveys were carried out under the direction of the Korea Centers for Disease Control and Prevention.

Measures

The sexual risk behavior questions in the survey were developed from a series of focus groups and from the groundwork for behavioral surveillance surveys whose validity was verified through an internationally recognized process and its Korean version [26, 30, 31]. We examined sexual orientation as a fundamental factor regarding SRT. Socio-demographics were measured simultaneously in order to adjust for differences among homosexual migrants.

Dependent Variables

The four main outcome variables of this study were SRT indicators. Three questions were linked to sexual behavior itself: (1) Have you engaged in risky sexual intercourse? (2) Did you use a condom at last exposure in past 6 months? (3) Have you ever had a sexually transmitted disease? Risky intercourse in first question was defined as unprotected sexual behavior including unprotected penile-oral sex, anal sex, and/or hand job, etc. in past 6 months. The responses were grouped into two categories: yes or no. The other measure was the result of blood tests for HIV. Biological samples were tested SD Bioline HIV-1/2 3.0 for HIV, which is excellent for its accuracy and sensitivity. It also showed low failure rates when the specimen passed the period of unformed antibodies (12 weeks). Clinical specimens that were HIV reactive on enzyme-linked immunosorbent assay were confirmed by Western blot method at the provincial laboratory of the Research Institute of Public Health and Environment in Seoul.

Independent Variables

Sexual Orientation: Individuals reported how they self-identified regarding sexual orientation—with possible answers being “heterosexual” (1), “bisexual” (2), and “homosexual” (3).

Sexual Relationship: We asked whether the respondents currently had a fixed partner or not in past six months, with the possible responses being yes or no. The meaning of ‘fixed’ in this question was a one-to-one sexual relationship for a period of time. The type of sexual partner was assessed on the basis of the question, “How do you classify your sexual partner’s type” with responses categorized as “Someone known” (1), “Someone unknown” (2), “A sex worker” (3).

Potential Confounders

Ethnicity was assessed following the United States Office of Management and Budget standard definitions [32]. We asked about the migrants’ self-identified nationality and then categorized their ethnicity based on that. Responses to these questions were combined to create the following five categories: Asian; African; European; American; and Oceanian. Occupation was determined from self-reported jobs and was categorized as not working, performing manual work, non-manual work, foreign student, or others. The other potential confounders were age, marital status, and residence period. Age was divided into the following groups: 18–29, 30–39, 40–49, and 50 or older. Three marital status classifications were single, married, and other (which included divorce or separation by death). The length of residence was collected from the survey units of months.

Statistical Analyses

We conducted binary logistic regression analyses to determine the influence of SRT and sexual diseases infections and how these associations were linked by safe sex in homosexual migrants. In order to this, we developed a two-tiered model: bivariate model and multivariate model. In the general model, we evaluated associations between the sexual orientation of general migrants and their rates of sexual risk-taking and HIV/STD infection ($n = 1141$). This model is based on the fact that sexual behaviors in Korean are broadly divided into two groups: heterosexuals and homosexual/bisexual [11, 28]. In the homosexual model, we added relational characteristics and sexual health variables for predicting safe sex practices among homosexual migrants ($n = 250$). In this model, sexual risk taking behaviors in the general model were converted into the predictors of condom use behavior, the model for which was developed from the previous study of sexual risk behaviors of migrants [10, 33]. Statistical analyses were performed using SPSS version 21.0 (IBM SPSS Institute, Chicago, IL).

Results

General Sample Characteristics

As detailed in Table 1, we recruited 1141 migrants from two cities. The average age of the participants was 30.4 years (± 6.6) and their length of residence was 31.1 (± 34.1) months on average. Out of the total number of participants, 52.6 % were Asian, 68.1 %, were not currently married, 40.0 % were foreign students, and 2.4 % were unemployed. Approximately 21.9 % revealed their sexual orientation to be homosexual and 27.5 % reported that they have a fixed sexual partner. Regarding types of sexual partner, 16.4 % of respondents reported they had sex with someone known, 20.7 % with someone unknown, and 12.4 % with a sex worker. Of those surveyed, 32.3 % reported they used a condom at last exposure. About 45.0 % of the respondents preferred risky sexual behavior including anal sex. Around 9.6 % have experienced an STD infection and 1.7 % of respondents tested HIV positive in the medical examination. Given the amount of missing data on condom use, type of sexual partner, and other items, a sensitivity analysis was conducted. There were no significant differences between those who did and did not respond to these items.

Differences in Sexual Risk Taking Between Homosexual Migrants and Non-Homosexual Migrants Among Different Ethnic Groups

We examined the role of sexual orientation for four types of sexual risk-taking among migrants after controlling for individual socio-demographic characteristics (Table 2). First, there were no significant differences in socio-demographic characteristics and sexual orientation of migrants in model 2a. Second, we analyzed the association of sexual orientation and unsafe sex without a condom. Homosexual migrants were 0.54 times less likely to use a condom than heterosexual migrants in model 2b (95 % CI 0.37–0.79). Third, we analyzed the disparities in STD infection according to respondents' sexual orientation. Homosexual migrants were 2.93 times more likely to be infected with STDs than heterosexual migrants in model 2c (95 % CI 1.76–4.89). Last, we explored the association of sexual orientation and positive testing for HIV. As shown in model 1d, manual working migrants were 0.05 times less likely to be HIV positive than the reference group of the unemployed (95 % CI 0.01–0.64). In model 2d, when we added the sexual orientation variable, the association was no longer significant. The results may indicate for HIV infection that the tentative effects of occupational status of migrants were caused by their sexual orientation. Similar to

the results regarding STD infection, homosexual migrants were 36.07 times more likely to be HIV positive than heterosexual migrants (95 % CI 6.14–212.06). Bisexual migrants were also 12.85 times more likely to be infected HIV than heterosexual migrants (95 % CI 6.14–212.06). These results were consistently significant after controlling for other related variables. The variance explained through the model was 25.8 % (Nagelkerke $R^2 = 0.258$).

Influential Factors of Differences in Condom use Among Homosexual Migrants

We examined associated factors that influenced condom use at last sexual exposure among homosexual migrants (Table 3). Homosexual migrants who preferred risky sexual intercourse were 0.19 times less likely to use a condom than heterosexual migrants ($P < 0.01$; 95 % CI 0.06–0.59). Those who have a fixed sexual partner were 0.35 times less likely to be infected with HIV than their counterparts ($P < 0.05$; 95 % CI 0.14–0.89), and when the respondents were STDs infected, the probability of their condom use was 3.86 times higher ($P < 0.01$; 95 % CI 1.34–11.10). The probability of condom use of migrants when they had sexual relationships with a sex worker was 0.27 less likely than that of the reference group of people who had sexual relationships with someone known, though this was marginally significant ($P < 0.1$; 95 % CI 0.06–1.25). The variance explained through the model was 29.3 % of the total (Nagelkerke $R^2 = 0.293$).

Discussion

Although there is diversity within the group of migrant workers in South Korea, few epidemiological studies have reported on what produced the HIV and STD infections with that group. For such investigations, detailed information is needed, such as data on the migrants' SRT behaviors; however, there have been no previous attempts to collect and analyze such data. In the present study, we investigated SRT behaviors among homosexual migrants and the factors affecting the risk of acquiring a sexually transmitted infection in South Korea. We found that SRT behaviors in migrants differed by sexual orientation after controlling for individual socio-demographic characteristics. We also found that differences in SRT behaviors were associated with differences in condom use among homosexual migrants. Identifying groups that have a high risk of contracting STDs and HIV is necessary for a successful preventive intervention program [20], and such intervention is even more critical for homosexual migrants.

Despite the increase in the numbers of homosexual migrants and the rising incidence of HIV infection in

Table 1 General characteristics of the sample

	<i>N</i>	%		<i>N</i>	%
Age			Sexual orientation		
18–29	574	50.3	Heterosexual	742	65.0
30–39	427	37.4	Bisexual	61	5.3
40–49	79	6.9	Homosexual	250	21.9
50 or older	24	2.1	Missing value	88	7.7
Missing value	37	3.2	Condom use		
Residence period			Used	368	32.3
1 year	327	28.7	Not used	305	26.7
1–5 years	592	51.9	n.a.	468	41.0
6–10 years	89	7.8	Risky sexual behavior		
10 years or over	12	1.1	Not preferred	383	33.6
Missing value	121	10.6	Preferred	514	45.0
Marital status			n.a.	244	21.4
Single	777	68.1	STDs infected		
Married	223	19.5	Had not	783	68.6
Others	52	4.6	Had	109	9.6
Missing value	89	7.8	n.a.	249	21.8
Ethnicity			HIV test		
Asian	600	52.6	Negative	1121	98.2
African	33	2.9	Positive	19	1.7
European	119	10.4	n.a.	1	0.1
American	319	28.0	Fixed sexual partner		
Oceanian	32	2.8	Have not	555	48.6
Missing value	38	3.3	Have	314	27.5
Occupation			n.a.	272	23.8
Non-manual work	92	8.1	Type of sexual partner		
Manual work	208	18.2	Someone known	187	16.4
Foreign student	456	40.0	Someone unknown	236	20.7
Others	270	23.7	Sex worker	142	12.4
Not working	27	2.4	n.a.	576	50.5
Missing value	88	7.7	Total	1141	100.0

Sample weight% used; unweighted count data (n) presented

n.a. not applicable

developed countries, including South Korea, there are few reports on the associations between the two increases [34]. Determinants of high-risk sexual practices among migrants may be their sexual orientation and the practice of having unprotected sex with casual partners [35]. The primary factors associated with migrants' SRT are low social status and stress [6]. When migrants engage in SRT behaviors, those activities can combine with other factors such as sexual orientation to further their exclusion from mainstream society [11, 36].

The major findings of this study revealed that there are significant associations between sexual orientation and SRT behaviors among homosexual migrants in Korea. Our results indicate the importance of examining factors associated with HIV infection among homosexual migrants.

This is particularly important as, compared to non-homosexual migrants, homosexual migrants were thirty-six times more likely to be infected with HIV. Our results indicate that sexual orientation is a major factor associated with migrants' SRT behavior, which supports results reported for the Korean general population [8]. In addition, the results show that manual workers are less likely than non-manual workers to be infected with HIV, which is consistent with previous reports [17]. Moreover, SRT behavior and the duration of the sexual relationships of homosexual migrants were significant factors indicating adoption of safe sex practices among homosexual migrants in Korea. For example, homosexual migrants were nearly four times more likely to use condoms during sexual intercourse if they had previously experienced an STD

Table 2 Adjusted odds ratio (aOR) and 95 % confidence interval (CI) of socio-demographic characteristics and sexual orientations with four types of sexual risk-taking among migrants in the Republic of Korea, 2011–2013 (n = 1141)

	Risky sexual behavior				Unsafe sex				STDs infected				HIV positive			
	Model 1a		Model 2a		Model 1b		Model 2b		Model 1c		Model 2c		Model 1d		Model 2d	
	aOR	95 % CI	aOR	95 % CI	aOR	95 % CI	aOR	95 % CI	aOR	95 % CI	aOR	95 % CI	aOR	95 % CI	aOR	95 % CI
Ethnicity																
Oceanian (ref.)	1.00		1.00		1.00		1.00		1.00		1.00		1.00		1.00	
Asian	1.15	0.51–2.61	1.13	0.50–2.57	0.70	0.31–1.59	0.74	0.33–1.69	0.29	0.09–0.94	0.29	0.09–0.97	1.60	0.15–16.70	1.58	0.13–18.66
African	2.05	0.64–6.52	2.41	0.73–8.02	1.48	0.52–4.21	1.36	0.46–3.97	0.99	0.23–4.27	0.88	0.20–3.98	0.01	0.01–0.01	0.01	0.01–0.01
European	1.59	0.67–3.79	1.62	0.68–3.86	1.08	0.47–2.48	1.14	0.49–2.62	0.65	0.19–2.18	0.60	0.18–2.07	1.11	0.09–13.11	0.82	0.07–10.02
American	2.07	0.93–4.59	2.03	0.91–4.52	1.14	0.52–2.48	1.26	0.57–2.77	1.59	0.57–4.48	1.35	0.47–3.90	0.33	0.03–3.70	0.17	0.01–2.12
Occupation																
Not working (ref.)	1.00		1.00		1.00		1.00		1.00		1.00		1.00		1.00	
Non-manual work	0.47	0.15–1.43	0.50	0.16–1.53	1.58	0.60–4.14	1.38	0.52–3.68	1.03	0.19–5.63	1.32	0.24–7.38	0.30	0.04–2.36	0.46	0.05–4.68
Manual work	0.59	0.21–1.69	0.64	0.22–1.83	0.79	0.32–1.91	0.74	0.30–1.82	0.29	0.04–2.01	0.37	0.05–2.57	0.05	0.01–0.64	0.21	0.01–3.22
Foreign student	0.77	0.27–2.20	0.75	0.26–2.13	0.92	0.40–2.19	0.99	0.43–2.30	1.20	0.25–5.71	1.09	0.22–5.34	0.40	0.06–2.50	0.30	0.04–2.14
Others	0.40	0.14–1.13	0.41	0.15–1.15	1.08	0.46–2.54	1.10	0.47–2.61	0.88	0.18–4.35	0.96	0.19–4.89	0.09	0.01–0.73	0.18	0.02–1.69
Sexual orientation																
Heterosexual (ref.)	1.00		1.00		1.00		1.00		1.00		1.00		1.00		1.00	
Bisexual	1.87	0.90–3.87	1.87	0.90–3.87	0.89	0.47–1.67	0.89	0.47–1.67	1.75	0.61–4.97	1.75	0.61–4.97	12.85	1.56–105.91	12.85	1.56–105.91
Homosexual	1.16	0.78–1.73	1.16	0.78–1.73	0.54	0.37–0.79	0.54	0.37–0.79	2.93	1.76–4.89	2.93	1.76–4.89	36.07	6.14–212.06	36.07	6.14–212.06
–2LL	1036.9		1014.5		1071.8		1040.5		530.4		501.9		141.2		116.6	
Nagelkerke R ²	0.106		0.105		0.028		0.041		0.173		0.210		0.094		0.258	

All models are additionally adjusted for age, marital status, and residence period. All the figures in bold have a P value of <0.05

Table 3 Adjusted odds ratio (aOR) and 95 % confidence interval (CI) of sexual behaviors with condom use at last exposure in past 6 months among homosexual migrants in the Republic of Korea, 2011–2013 (n = 250)

	aOR	95 % CI
Ethnicity		
Oceanian (ref.)	1.00	
Asian	1.83	0.13–26.1
African	0.27	0.01–8.78
European	4.36	0.27–70.69
American	1.47	0.12–18.60
Risky sexual intercourse		
Not preferred (ref.)	1.00	
Preferred	0.19	0.06–0.59
Fixed sexual partner		
Have not (ref.)	1.00	
Have	0.35	0.14–0.89
Type of sexual partner		
Someone known (ref.)	1.00	
Someone unknown	1.55	0.50–4.80
Sex worker	0.27	0.06–1.25
STDs infected		
Had not (ref.)	1.00	
Had	3.86	1.34–11.10
HIV positive		
Negative (ref.)	1.00	
Positive	0.24	0.03–1.88
–2LL	131.7	
Nagelkerke R ²	0.293	

Additionally adjusted for age, marital status, and residence period. All the figures in bold have a *P* value of <0.05; The figure in italic was marginally significant (*P* < 0.10)

infection. However, they were less likely to use condoms when they had a fixed or long-term partner and in that case they preferred risky sexual intercourse practices. In summary, homosexual migrants can be distinguished from other migrants by their SRT behaviors and their rate of use of safe sex practices. This indicates that homosexual migrants have distinct SRT behaviors. Thus customized prevention intervention strategies are needed for homosexual and non-homosexual migrant groups vulnerable to STD and HIV infection.

Risky sexual behaviors are practiced in some groups that have characteristics that differentiate them from the general population [9]. Previous studies have indicated that the prevalence of STDs and HIV infections tends to be higher among urban residents, unmarried individuals, and young adults [4]. These groups have characteristics that are similar to the socio-demographic characteristics of migrant workers, who are often neglected in such studies. Although the present-day sex industry is extensive and diversified,

there are vulnerable groups such as homosexuals and FSWs that remain socially excluded, particularly in terms of health care [37–39]. What is especially problematic is that although homosexual migrants can easily be infected by, or infect others with, STDs, they are not being managed as a discrete, vulnerable population group by the Korea Immigration Office or the Korea Centers for Disease Control and Prevention.

The paucity of studies on SRT behaviors has allowed the continuation of misunderstandings and prejudices in Korea regarding homosexual migrants and whether they are spreading HIV/AIDS [6–10]. As HIV/AIDS is an infectious disease and is designated as such by law, foreigners seeking a long-term stay could be required to present HIV/AIDS test results before entering South Korea. Furthermore, any migrants with a positive HIV/AIDS test results could be immediately deported regardless of sojourn status and purposes [40]. While societal treatment of homosexual migrants by many Koreans has somewhat improved, it is reported that homosexual migrants remain collectively stigmatized and their sexual relationships are deemed to present a high risk for STDs [41]. We suggest that a health examination facility that considers sexual orientation should be established, and a sexual orientation-specific prevention intervention program be developed. We also suggest that sexual empowerment of migrants can be improved by providing them with regular medical checkups and preventive education about STDs and HIV [42].

Several limitations of this study should be noted. First, there was an inherent bias in collecting the sample. However, condom use rates and the proportion of fixed sex partners in our sample population were similar to results reported in previous South Korean studies [6, 10, 43]. Second, the sample population may not be representative of all categories of migrants because we recruited voluntary respondents who visited a national agency for sexual examination of migrants. This implies that the study is likely to oversample SRT migrants and the proportion of other sexual minorities may be unrepresentative. Third, the observational nature of the cross-sectional data prevents us from making causal inferences regarding the associations between and among sexual orientation, SRT, and safe sex practices. Our results are consistent with previous empirical evidence [36, 44], thereby reducing the possibility that our results reflect reverse causation. Fourth, although examining the ways in which sexual behavior practices and norms have been acculturated in South Korean society is important [45], it was not addressed in the present study. Lastly, for survey efficiency purposes we used several single rating scales to measure SRT behaviors. To improve result reliability and validity, there is a need to use multi-dimensional scales in future research.

As the world's labor market becomes more global, migrant workers are becoming dominant in many parts of the world. Little is known about the sexual behaviors of such workers and the potential for migrant workers to spread HIV and other STDs can be easily neglected. The results of our study support the hypothesis that a homosexuals-specific, prevention intervention approach can have a role in promoting safe sex and preventing HIV infections among migrants. This study also showed that administrative programs for STDs prevention should focus on SRT behaviors and should include casual partnerships, unprotected sex, prostitution relationships, and previous contraction of an STD. In addition, SRT behaviors varied according to ethnic group. Our results could help to establish strategies for the management of STD and HIV infections in migrants and could lead to more attention being paid to establishing empowerment programs for homosexual migrants.

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Author Contribution Conceived and designed the experiments: M.J. D.K. Analyzed the data: M.J. J.O. Contributed reagents/materials/analysis tools: D.K. J.O. M.J. Wrote the paper: M.J. All authors read and approved the final manuscript.

Compliance with Ethical Standards

Conflict of interest We declare that we have no conflict of interest.

Ethics Standard Approval for the study was Granted by the Korea Federation for HIV/AIDS Prevention Institutional Review Board (Ref. 2014-1-22). Ethics and Governance approvals were also awarded by the Korea Federation for HIV/AIDS Prevention. All participants gave written informed consent to participate. During the investigation process, absolutely no information that could distinguish individual respondents was collected, and clinical specimens were classified using bar codes.

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