

HIV Vaccine Preparedness among Men Who Have Sex with Men in Taiwan: Sociocultural and Behavioral Factors

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Abstract

In Taiwan, men who have sex with men (MSM) are at disproportionate risk of HIV infection. We examined awareness and acceptability of future HIV vaccines. From July to August 2014, we conducted a cross-sectional survey with MSM recruited through community-based organizations (CBOs) in 2 cities. Among 200 participants (mean age, 27.6 years), half reported multiple partners and one-third condomless anal sex (past 3 months); 12% were HIV-positive. Traditional Chinese medicine (TCM) use was reported by 42.7%. Over two-thirds (69.0%) were aware of HIV vaccine research, but less than half (43.8%) would accept an HIV vaccine if available. In multivariable analysis, higher educational attainment, >5 sex partners, and TCM use were positively associated with HIV vaccine awareness. Culturally informed HIV vaccine preparedness in Taiwan may be supported by a complementary approach to TCM and HIV prevention technologies, tailoring information for MSM with lower education and targeting those at high risk through gay-identified CBOs.

Keywords

HIV prevention, HIV vaccines, men who have sex with men, traditional Chinese medicine, Taiwan

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Introduction

In Taiwan, men who have sex with men (MSM) account for 60.4% of the over 33 000 people living with HIV, and the proportion of MSM among new HIV infections is increasing—from 65.5% in 2010 to 77.4% in 2015.¹ HIV vaccines and other new prevention technologies are sorely needed to control epidemics among MSM in Asia² including Taiwan. Ultimately, an HIV vaccine represents the best strategy for controlling the AIDS epidemic.³

Several trials underway globally build on incremental progress in HIV vaccine development. These include a phase III trial with 5400 HIV-uninfected adults in southern Africa (HVTN 702),^{4,5} which tests a newer version of the vaccine regimen deemed moderately efficacious in the earlier RV144 phase III trial in Thailand.⁶ A phase IIb trial with 2600 HIV-uninfected women in sub-Saharan Africa (HVTN 705; “Imbokodo”) is testing a new type of investigational “mosaic” HIV vaccine that aims to offer protection across various HIV subtypes that predominate in different geographical regions globally.⁵ Nevertheless, widespread research-to-practice gaps across innovations in HIV and

other preventive technologies, such as pre-exposure prophylaxis (PrEP), indicate the importance of sociocultural and behavioral factors in product effectiveness.⁷⁻⁹ HIV vaccine preparedness efforts, including sociobehavioral research and educational initiatives, are needed in different geographical settings and cultural milieus to support the successful introduction of HIV vaccines in development.

HIV vaccine awareness is a first step in promoting preparedness for a future vaccine. In the Asian context, studies in India identified high HIV vaccine awareness (82.2%) in a general population sample,¹⁰ but most low-socioeconomic status Indian MSM had never heard of HIV vaccine research.¹¹ Investigations in the United States showed a range of HIV vaccine awareness from 47.6% to 55.1% in the general population, with

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What Do We Already Know about This Topic?

Despite extensive progress in HIV prevention and treatment, enduring disparities in HIV infections and access to care globally indicate that an HIV vaccine is needed to end the epidemic. Substantial research-to-practice gaps in the implementation of new HIV prevention technologies suggest the importance of location population-specific HIV vaccine preparedness efforts to support the successful introduction of HIV vaccines in development.

How Does Your Research Contribute to the Field?

This study examined HIV vaccine awareness and acceptability among MSM in Taiwan, who are vastly overrepresented in new HIV infections. We identified sociodemographic, sexual risk, and sociocultural factors, including HIV stigma and traditional Chinese medicine use, and their impact on HIV vaccine preparedness.

What Are Your Research's Implications Toward Theory, Practice, or Policy?

HIV vaccine preparedness efforts in Taiwan should adopt a complementary approach to traditional Chinese medicine and HIV prevention technologies, tailor information for MSM and transgender people, particularly those with lower education, and target MSM at high risk through partnerships with community-based organizations (CBOs) serving gay communities.

36.5% to 73.8% HIV vaccine awareness among vulnerable populations, including MSM.¹² Factors associated with HIV vaccine awareness included educational attainment¹⁰ and sexual risk behaviors, with some data suggesting possible increases in condomless sex (ie, risk compensation) among MSM in the wake of an HIV vaccine.^{13,14}

HIV vaccine acceptability, another element of HIV vaccine preparedness, also varies widely across populations and contexts; a systematic review identified acceptability from 37.2 to 94.0 (100-point scale, with higher scores indicating greater acceptability; mean = 65.6).⁷ Limited investigations with MSM in Thailand found moderate (58.3/100) HIV vaccine acceptability.¹³ Factors associated with HIV vaccine acceptability have included vaccine efficacy, perceived HIV risk, and safety concerns.^{8,15} Although we are not aware of previous research on HIV vaccine acceptability in Taiwan or other Chinese cultures, moderate levels of PrEP acceptability have been identified among MSM in China¹⁶ and Taiwan^{17–19}; correlates of PrEP acceptability included older age, higher income, and engaging in higher risk sexual practices.^{16–19}

In addition to sociodemographic factors and sexual risk behaviors, HIV vaccine preparedness is likely to be influenced by “local vaccination cultures,” including traditional health care practices and related concerns about vaccine safety.^{20–22} In Chinese societies, traditional Chinese medicine (TCM) has been used as a preventive measure for more than 5000 years.^{23,24} Perceived conflicts between Western and traditional medicine may give rise to discomfort and suspicion about HIV vaccines.^{20,25} In some Asian contexts, TCM has been seen as complementary to Western medicine,²⁶ while in others it has been understood as obviating the need for Western medicine.²⁷ In Taiwan and China, TCM use by people living with HIV was associated with reduced side effects from antiretroviral treatment²⁸ and improved immune functioning,^{29,30} suggesting evidence for complementary usage. Despite high levels of TCM use (28% past year) in Taiwan,^{31,32} as in many other Chinese societies, the implications of TCM use for HIV vaccines have not been reported.

HIV stigma may also be a barrier to HIV vaccine preparedness as reported in qualitative studies conducted with MSM in India,¹¹ Thailand,^{13,33} South Africa,³⁴ and Canada.²⁰ In some Asian cultures, HIV stigma may be a key element in decisions about HIV vaccination.³³ In China and Taiwan, for instance, HIV stigma has been documented as a barrier in access to HIV prevention and care services among MSM³⁵ and to engagement in HIV-related community events.³⁶

In order to prepare for the introduction of future HIV vaccines and other new biomedical prevention technologies amidst marked disparities in HIV prevalence, the aim of this study was to investigate sociocultural and behavioral factors that may influence HIV vaccine awareness and acceptability among MSM in Taiwan.

Methods

Study Design and Recruitment

Taiwan is an island (pop. est. 23.5 million) located approximately 100 miles from Mainland China. While attitudes toward human rights for sexual minorities in Taiwan are gradually improving, persistent stigma renders MSM a “hard-to-reach” population using traditional random sampling.^{37,38} We conducted a cross-sectional survey among participants recruited using convenience sampling through community-based organizations (CBOs) serving MSM in Taipei and Taichung, 2 large metropolitan areas. A recruitment letter describing the study was given to all clients who visited the 2 collaborating CBOs from July to August 2014. Inclusion criteria were: (1) self-identified as gay, bisexual, MSM, or transgender; (2) at least 18 years of age; (3) not an employee of the recruitment site; (4) able to read and write Chinese, and understand Mandarin; and (5) living in Taiwan. Those who indicated interest and met the eligibility criteria were invited to complete the survey questionnaire.

Data Collection

All study materials, including the recruitment letter, consent form, and self-administered paper-and-pencil survey questionnaire,

were written in English, translated into Chinese language, back-translated into English, and revised in Chinese. Participants completed the 25- to 30-minute questionnaire in a private room at one of the CBOs or in a mutually agreed upon public space nearby for those MSM who chose not to enter the premises of a gay-identified CBO. Participants returned the questionnaire to the research coordinator in an unmarked, sealed envelope and were provided with 300 TWD (~10 USD) compensation.

Measures

Two questions, adapted from studies in Thailand^{13,39} and the United States,¹² assessed HIV vaccine awareness (“Have you ever heard about HIV vaccine research?”) and acceptability (“If an HIV vaccine became available in the future, do you think you would use it?”). Responses were indicated on a 4-point Likert-type scale with higher scores indicating higher awareness or acceptability. Responses to both questions were dichotomized: awareness (1 = yes, a lot/some-what; 0 = no, a little bit/no) and acceptability (1 = yes, definitely; 0 = all other responses).

Sociodemographic items included age, gender (male/transgender), sexual orientation (gay/bisexual or heterosexual/straight), education (less than college/college or above), employment status (full time/not full time), relationship status (single, monogamous or open relationship), and monthly income (<30 000 TWD [~ \$950 USD] or ≥30 000 TWD). Median monthly income in Taiwan is 20 000 to 29 999 TWD (~ \$633-\$950 USD).

HIV risk items included number of male (and female) sexual partners (past 3 months), self-reported sexually transmitted infection (STI) diagnosis by a physician (past year; yes/no), self-reported HIV test result (positive/negative/untested), sexual role (top/bottom/versatile), transactional sex (past 3 months; yes/no), and condomless anal (and vaginal) sex (past 3 months; yes/no).¹³ The number of female sex partners (n = 3), transactional sex (n = 7), and condom use for vaginal sex (n = 4) were excluded from analysis due to few applicable responses. The number of male sex partners (past 3 months) was grouped into 3 categories (0-1, 2-5, and >5), based on HIV prevention research conducted among MSM in Taiwan¹⁸ and China.¹⁶ In a study with MSM in Taiwan, >5 sex partners was associated with high-risk behaviors (ie, recreational drug use and condomless sex).⁴⁰

Two dichotomous questions were developed to assess TCM use: “Have you used TCM for treatment instead of medicine prescribed by a Western medical doctor?” (1 = yes; 0 = no) and, “Do you currently use TCM?” (1 = yes; 0 = no).

We used an HIV stigma scale that demonstrated high reliability and validity among MSM in China⁴¹ and India.^{42,43} Felt-normative stigma measures perceptions about HIV stigma in participants’ communities; vicarious stigma measures indirect experiences of discrimination in health care settings, family, and community. These items were assessed on a 4-point Likert-type scale (0 to 3), with higher scores indicating higher HIV

stigma. For the current study, Cronbach α was .94 for the felt-normative and .87 for the vicarious stigma scale.

Statistical Analysis

Statistical analyses were conducted using IBM SPSS 24.0 (International Business Machines Corp, New York). Descriptive analyses were conducted to report frequencies, proportions, means, and standard deviations (SD) of sample characteristics. Bivariate analyses were then conducted using χ^2 or Fisher exact tests to measure the association of HIV vaccine awareness and acceptability with sociodemographic and sexual behaviors. Independent sample *t* tests examined continuous independent variables (eg, age), and mean differences between HIV vaccine awareness and acceptability. The normality of the distribution was tested prior to applying independent sample *t* tests.

Two multivariable logistic regression models were constructed to identify characteristics independently associated with HIV vaccine awareness and acceptability. The MSM who indicated being HIV-positive (n = 24) were retained in the analyses of HIV vaccine awareness, in accordance with the principle of Greater Involvement of People Living with HIV,⁴⁴ given their important role in promoting awareness about HIV prevention and related research; but they were excluded from the analyses of acceptability, given the study focus on a preventive HIV vaccine. Variables with a bivariate association with the outcome at $P < .25$ were selected for inclusion in the full model. Nonsignificant variables were then removed and a second, reduced version was retained as the final model. Model fit of each final model was assessed with Hosmer, Lemeshow, and Sturdivant⁴⁵ goodness-of-fit test by using predicted value groups.

Ethical Approval and Informed Consent

Ethics approval was obtained from the Research Ethics Board of the University of Toronto (Reference number: 30370), with administrative approvals from Taiwan Tongzhi (LGBT) Hotline Association and Taiwan GDi Association. All participants provided written informed consent. At the time of the study, the institution of ethical review was not yet thoroughly established in Taiwan, particularly for social sciences research⁴⁶; thus, adherence to ethical guidelines was ensured by the University of Toronto in collaboration with the 2 research partner organizations.

Results

A total of 221 MSM were invited to participate in the study when they visited or contacted 1 of the 2 collaborating CBOs. Among 21 of those invited to participate, 8 declined, 5 withdrew, and 8 were ineligible (<18-years-old or not self-identified gay/MSM). Two hundred MSM completed the questionnaire, for a response rate of 90.5%.

Sample Characteristics and Descriptive Analysis

Table 1 indicates the sample characteristics. Participants' mean age was 27.6 years (SD = 6.8; range, 18-50 years). The majority identified as male (96.5%), gay (88.0%), single (57.5%), had college or postgraduate degrees (67.0%), full-time jobs (58.0%), and monthly income <\$30,000 TWD (62.5%). The mean number of male sex partners in the past 3 months was 2.5 (median = 1; range, 0-15). Nearly one-third (32.0%) reported condomless anal sex (past 3 months). Eleven percent of the participants reported a physician-diagnosed STI in the past year; 12.0% self-reported being HIV positive, with 14.0% never tested or of unknown status.

Ever having used TCM for treatment instead of medications prescribed by a Western medical doctor was reported by 42.7%; 11.1% reported current TCM use. The mean of felt-normative HIV stigma was 1.6 (SD = 0.8) and of vicarious HIV stigma was 1.5 (SD = 0.7) on the 0-3 scale, indicating moderate levels of stigma.

HIV Vaccine Awareness

Over two-thirds (69.0%) of participants indicated being aware of HIV vaccine research or development efforts (see Table 1). In bivariate analyses, greater HIV vaccine awareness was associated with higher education ($\chi^2 = 6.01, P < .05$), income >30 000 TWD ($\chi^2 = 6.79, P < .01$), and >1 male sex partner ($\chi^2 = 6.33, P < .05$). Older MSM ($t = -1.89, P = .06$), and those who currently use TCM ($\chi^2 = 3.54, P = .06$) were marginally more aware of HIV vaccines. HIV stigma showed no statistically significant differences in HIV vaccine awareness.

HIV Vaccine Acceptability

Less than half of participants (43.8%; excluding people living with HIV, $n = 24$) reported willingness to use an HIV vaccine if it became available in the future. Demographics, sexual behaviors, TCM use, and HIV stigma showed no significant differences on HIV vaccine acceptability in bivariate analyses (Table 1).

Correlates of HIV Vaccine Awareness and Acceptability

For HIV vaccine awareness, 8 variables were included in the full model ($P < .25$); 4 variables (age, STI, felt-normative, and vicarious stigma) were removed as they did not contribute meaningfully to the outcome. Due to the high association between education and monthly income ($\chi^2 = 13.32, P < 0.001$), we retained only education in the model. The reduced version modeled HIV vaccine awareness as a function of education, current relationship status, number of male sex partners, and current use of TCM (Table 2).

Men who have sex with men with college degrees or higher had greater than 2-fold higher odds of HIV vaccine awareness (adjusted odds ratio [AOR] = 2.08, confidence interval [CI] = 1.07-4.07, $P < .05$). Participants with >5 sex partners had 4-fold higher odds of HIV vaccine awareness (AOR = 4.24, CI = 1.15-15.60, $P < .05$). Those who currently use TCM had

nearly 4-fold higher odds of HIV vaccine awareness (AOR = 3.79, CI = 1.03-13.96, $P < .05$). The model successfully predicted 66.5% of cases, with 87.4% sensitivity and 21.0% specificity (Nagelkerke $R^2 = .14$).

HIV vaccine acceptability was modeled as a function of sexual orientation and number of male sex partners; the model (not shown) explained little of the outcome variance ($\chi^2 = 4.45, df = 4, P = .35$), with Nagelkerke $R^2 = .03$.

Discussion

In this study of community-recruited MSM in 2 major metropolitan areas in Taiwan, the majority of participants were aware of HIV vaccines; this suggests a starting point for educational efforts to support HIV vaccine preparedness. The 12.0% HIV-positive and 11.0% with a physician-diagnosed STI in the past year among this community sample, with nearly half overall reporting multiple partners and one-third condomless anal sex (past 3 months), is indicative of high risk of HIV acquisition and transmission. Nevertheless, a future HIV vaccine was acceptable to less than half of those surveyed.

The positive association observed between HIV vaccine awareness and educational attainment, controlling for other sociodemographic characteristics, is consistent with findings from India in which formal educational attainment predicts increased knowledge about HIV and HIV vaccines.¹⁰ Tailoring HIV vaccine educational efforts to communicate about HIV vaccines with MSM with lower levels of education may help to broaden awareness.

The more than 4-fold higher odds of HIV vaccine awareness among MSM with more than 5 sex partners (past 3 months) versus 1 or no sex partners may be explained by their higher risk for HIV infection—an encouraging sign for HIV prevention efforts. HIV vaccine education and awareness initiatives for MSM in Taiwan might benefit from supporting accurate perceptions of the disproportionate HIV risk among MSM and by emphasizing the potential role of HIV vaccines and other new prevention technologies as part of combination prevention.

The over 3-fold higher odds of HIV vaccine awareness among MSM who are current TCM users is a potentially counterintuitive finding—if one understands TCM and Western medicine as in opposition to one another. However, this finding is corroborated by evidence from other East Asian contexts in which health care institution acceptance of TCM was associated with patients' concurrent use of TCM and Western medicine.²⁶ Thus, these 2 approaches need not be seen in opposition. A study of persons living with HIV in China similarly indicates complementary use of antiretroviral treatment and TCM, depending on individuals' particular symptoms.²⁸

Nearly half of MSM in the present study reported ever using TCM, on par with general population data on TCM use in Taiwan.³¹ This suggests that building partnerships between Western medical and TCM practitioners and institutions may be a viable strategy for reaching out to the many TCM users to increase awareness about new HIV prevention technologies,

Table 1. Demographics, Sexual Risk and Sociocultural Factors, and HIV Vaccine Awareness among MSM in Taiwan.^a

Characteristic	Total, N (%)	Bivariate Analysis		Multivariable Analysis (Final Model)
		No, n (%)	Yes, n (%)	AOR (95% CI)
Demographics				
Age, mean (SD)	27.6 (6.8)	28.2 (6.8)	26.3 (6.2)	
Gender				
Male	193 (96.5)	61 (98.4)	132 (95.7)	
Transgender	7 (3.5)	1 (1.6)	6 (4.3)	
Sexual orientation				
Gay	176 (88.0)	55 (88.7)	121 (87.7)	
Bisexual/heterosexual	24 (12.0)	7 (11.3)	17 (12.3)	
Education				
Less than college	66 (33.0)	28 (45.2)	38 (27.5) ^b	Ref.
College or above	134 (67.0)	34 (54.8)	100 (72.5)	2.08 (1.07-4.07) ^b
Employment status				
Full-time	115 (57.5)	32 (51.6)	55 (60.1)	
Not full-time	85 (42.5)	30 (48.4)	83 (39.9)	
Monthly income				
< \$30 000	125 (62.5)	47 (75.8)	78 (56.5) ^c	
≥ \$30 000	75 (37.5)	15 (24.2)	60 (43.5)	
Current relationship status				
Monogamous relationship	71 (35.5)	16 (25.8)	55 (39.9)	Ref.
Single	115 (57.5)	40 (64.5)	75 (54.3)	0.57 (0.29-1.17)
Open relationship	14 (7.0)	6 (9.7)	8 (5.8)	0.34 (0.10-1.19)
Sexual risk indicators				
Number of male sex partners, past 3 months (missing = 2)				
0-1	103 (52.0)	39 (62.9)	64 (47.1)	Ref.
2-5	71 (35.9)	20 (32.3)	51 (37.5)	1.69 (0.85-3.35)
> 5	24 (12.1)	3 (4.8)	21 (15.4)	4.24 (1.15-15.60) ^b
Sexual role				
Always bottom	38 (20.2)	11 (19.0)	27 (20.8)	
Versatile/both	120 (63.8)	37 (63.8)	83 (63.8)	
Always top	30 (16.0)	10 (17.2)	20 (15.4)	
Condomless anal sex				
No	64 (32.0)	18 (29.0)	46 (33.3)	
Yes	136 (68.0)	44 (71.0)	92 (66.7)	
Sexually transmitted infection, past year				
No	178 (89.0)	4 (6.5)	18 (13.0)	
Yes	9 (11.0)	58 (93.5)	120 (87.0)	
HIV serostatus				
HIV positive	24 (12.0)	5 (8.1)	19 (13.8)	
HIV negative	148 (74.0)	47 (75.8)	101 (73.2)	
Untested	28 (14.0)	10 (16.1)	18 (13.0)	
Sociocultural factors				
Ever used TCM for treatment (missing = 1)				
No	114 (57.3)	27 (43.5)	58 (42.3)	
Yes	85 (42.7)	35 (56.5)	79 (57.7)	
Current TCM use (missing = 1)				
No	177 (88.9)	3 (4.8)	19 (13.9)	Ref.
Yes	22 (11.1)	59 (95.2)	118 (86.1)	3.79 (1.03-13.96) ^b
HIV stigma, mean (SD)				
Felt-normative stigma	1.6 (0.8)	1.7 (0.7)	1.6 (0.8)	
Vicarious stigma	1.5 (0.7)	1.3 (0.6)	1.5 (0.7)	

Abbreviations: AOR, adjusted odds ratio; CI, confidence interval; TCM, traditional Chinese medicine; SD, standard deviation.

^an = 200.

^bp < .05.

^cp < .01.

including future HIV vaccines.⁴⁷ A similar model of working with TCM practitioners was successfully implemented in the United States to promote hepatitis B vaccine awareness and

prevention for Asian TCM users.²³ However, traditional medicine practitioners in Taiwan, as in other contexts,⁴⁸ may lack relevant training in HIV; and both TCM and Western medical

Table 2. Demographics, Sexual Risk and Sociocultural Factors, and HIV Vaccine Acceptability among MSM in Taiwan.^a

Characteristic	Total N (%)	Bivariate Analysis		Multivariable Analysis (Final Model) AOR (95% CI)
		No n (%)	Yes n (%)	
Demographics				
Age, mean (SD)	27.6 (6.8)	27.5 (7.0)	27.2 (6.3)	
Gender				
Male	193 (96.5)	108 (95.6)	85 (97.7)	
Transgender	7 (3.5)	5 (4.4)	2 (2.3)	
Sexual orientation				
Gay	176 (88.0)	84 (84.4)	70 (90.9)	0.59 (0.23-1.56)
Bisexual/heterosexual	24 (12.0)	15 (15.2)	7 (9.1)	Ref.
Education				
Less than college	66 (33.0)	34 (34.3)	26 (33.8)	
College or above	134 (67.0)	65 (65.7)	51 (66.2)	
Employment status				
Full-time	115 (57.5)	52 (52.5)	47 (61.0)	
Not full-time	85 (42.5)	47 (47.5)	30 (39.0)	
Monthly income				
< \$30 000	125 (62.5)	62 (62.6)	44 (57.1)	
≥ \$30 000	75 (37.5)	37 (37.4)	33 (42.9)	
Current relationship status				
Monogamous relationship	71 (35.5)	35 (35.4)	26 (33.8)	
Single	115 (57.5)	56 (56.6)	46 (59.7)	
Open relationship	14 (7.0)	8 (8.1)	5 (6.5)	
Sexual risk indicators				
Number of male sex partners, past 3 months (missing = 2)				
0-1	103 (52.0)	56 (57.1)	36 (46.8)	Ref.
2-5	71 (35.9)	32 (32.7)	35 (45.5)	0.59 (0.31-1.12)
> 5	24 (12.1)	10 (10.2)	6 (7.8)	1.11 (0.37-3.33)
Sexual role				
Always bottom	38 (20.2)	19 (20.7)	13 (17.8)	
Versatile/both	120 (63.8)	59 (64.1)	45 (61.6)	
Always top	30 (16.0)	14 (15.2)	15 (20.5)	
Condomless anal sex				
No	64 (32.0)	29 (29.3)	26 (33.8)	
Yes	136 (68.0)	70 (70.7)	51 (66.2)	
Sexually transmitted infection, past year				
No	178 (89.0)	95 (96.0)	72 (93.5)	
Yes	9 (11.0)	4 (4.0)	5 (6.5)	
Sociocultural factors				
Ever used TCM for treatment (missing = 1)				
No	114 (57.3)	54 (55.1)	41 (53.2)	
Yes	85 (42.7)	44 (44.9)	36 (46.8)	
Current TCM use (missing = 1)				
No	177 (88.9)	86 (87.7)	70 (90.9)	
Yes	22 (11.1)	12 (12.2)	7 (9.1)	
HIV stigma, mean (SD)				
Felt-normative stigma	1.6 (0.8)	1.6 (0.7)	1.7 (0.8)	
Vicarious stigma	1.5 (0.7)	1.6 (0.7)	1.7 (0.8)	

Abbreviations: AOR, adjusted odds ratio; CI, confidence interval; TCM, traditional Chinese medicine; SD, standard deviation.

^an = 176.

practitioners may lack competencies in working with sexual minority populations, requiring further training in order to effectively support HIV vaccine awareness.

Finally, the mean felt-normative stigma score indicates that most MSM reported at least some people in their community

held negative beliefs and attitudes toward people living with HIV (eg, that they are shameful). The mean vicarious stigma score indicates that many MSM reported hearing stories about mistreatment and social exclusion of people living with HIV. Although HIV stigma was not significantly associated with

HIV vaccine awareness or acceptability, the prevalence of HIV stigma among this predominantly HIV-negative sample of MSM is concerning. HIV stigma was negatively associated with HIV testing (a necessary step in HIV vaccine uptake) and with acceptability of a future rectal microbicide among HIV-negative MSM in Thailand.⁴⁹

Limitations to this study include the use of convenience sampling through CBOs, which limits generalizability to other MSM in Taiwan, particularly those who are not affiliated with gay-identified organizations. However, our partnerships with gay-identified CBOs facilitated successful recruitment of MSM, including HIV-positive MSM, who remain a population that is challenging to recruit amidst enduring sexual stigma and HIV stigma in Taiwan. In general, MSM who do not attend CBOs may indicate lower awareness and acceptability of HIV vaccines, and higher levels of HIV stigma. Additionally, we did not assess the acceptability of possible characteristics of future HIV vaccines (eg, based on percent efficacy and duration of protection) or other possible reasons for acceptability, which might provide additional information for interventions to increase future uptake.^{13,50,51} However, HIV vaccine awareness and acceptability may shift as research progresses and the results of clinical trials of candidate HIV vaccines become available.

With disproportionate HIV prevalence among MSM in Taiwan, as is characteristic across the Asia-Pacific region,⁵² the present findings suggest cultural opportunities and challenges for supporting HIV vaccine preparedness, including the pivotal role of CBOs serving MSM amidst high levels of HIV stigma, and the importance of building on complementary use of TCM and Western medicine.

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Declaration of Conflicting Interests

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