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Relationship between sexual sensation seeking and condom use among young men who have sex with men in China: testing a moderated mediation model

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ABSTRACT

The present study incorporated a moderated mediation model to explore the role of attitude towards condom use in mediating the link between sexual sensation seeking (SSS) and condom use and whether this indirect link was modified by HIV-related knowledge among Chinese YMSM. Survey data were collected from a cross-sectional study conducted in Wuhan, China and 373 YMSM were recruited. The mediation and moderated mediation modelling analyses were performed with the software SPSS PROCESS macro. Mediation analysis indicated that attitude towards condom use partly mediated the link between SSS and condom use (indirect effect = -0.158 , $P < 0.001$). Moderation analysis found HIV-related knowledge acted as a moderator in the relationship between SSS and attitude towards condom use (interaction effect = 0.089 , $P = 0.001$). Final moderated mediation analysis demonstrated that the indirect effect from SSS to condom use through attitude towards condom use was moderated by HIV-related knowledge, that is the interaction between HIV-related knowledge and SSS was positively associated with attitude towards condom use ($\beta = 0.101$, $P < 0.001$). Therefore, increased YMSM-specific HIV-related knowledge education programs need to be conducted. Further longitudinal research is required to verify the findings of this study.

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Introduction

Since sexual transmission is now the primary route of transmission for HIV (Liao et al., 2015), men who sex have sex with men (MSM) became one of the high-risk groups in the spread of HIV for the reason of their active anal sexual activities (Cao et al., 2016; Dong et al., 2014), particularly the young MSM (YMSM) who adopt the receptive anal sex role without a condom (Pathela et al., 2017; Schilder et al., 2014). Thus decreasing condomless sexual behavior among YMSM as a means to reduce the number of new HIV infections is a public health priority, and a critical component in the prevention of HIV transmission for this key population around the world.

According to multiple previous studies, a variety of different factors associated with inconsistent condom use including younger age (Margolis et al., 2014; Nelson et al., 2015a), substance use (Aho et al., 2014; Barron-Limon et al., 2012; Margolis et al., 2014), perceived HIV stigma (Nelson et al., 2015a), attitudes towards condom use (Cai & Lau, 2014; Li et al., 2015), HIV-related knowledge (Manji et al., 2007; Ugarte et al., 2013), etc.

On account of their particular physiological and psychological period, personality traits especially sexual sensation seeking (SSS) has been found and confirmed that is an enormous importance influenced factor for inconsistent condom use among YMSM (Gao et al., 2017; Xu et al., 2016). Zuckerman's research first proposed high sexual sensation seekers have a more permissive attitude toward sexuality (Zuckerman et al., 1980). Our previous study found that high sexual sensation seekers among YMSM tending to have a negative attitude towards condom use (Gao et al., 2017). As we mentioned above, attitudes towards condom use are associated with condom use. Therefore, the study developed a conceptual model based on theoretical constructs and previous literature that is there is potential mediation pathway between SSS, attitude towards condom use and condom use, attitude towards condom use may act as a mediator variable.

Although HIV-related knowledge generally been thought as a predictor of condom use, low levels of knowledge about HIV transmission and prevention, and high rates of inconsistent condom use (Aho et al.,

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2014; Manji et al., 2007; Nelson et al., 2015a; Nelson et al., 2015b). But in a study among MSM, although the level of knowledge was higher, the rate of condom use remained low (Ugarte Guevara et al., 2012). Especially among individuals who were high sensation seekers, the high awareness of HIV/AIDS knowledge and the low proportion of protective sexual behavior often happened simultaneously and presented the divergence of knowledge and behavior (Zhang et al., 2015). The separation between knowledge and action implied HIV-knowledge may not always have a direct effect on condom use, and it may be suitable act as a moderator.

From the above, a moderated mediation research model shown in Figure 1 was constructed. So far, no reported study has tested this integrative moderated mediation among YMSM. The ultimate goal is to advance our understanding of the mechanisms of SSS lead to inconsistent condom use and to provide new data supporting the development of behavioral interventions for more effective condomless sexual behavior prevention programs.

Methods

Participants and procedure

Participants were recruited from Wuhan, China, from March to December 2013. Participants were eligible if they: aged 16–25 years old, had engaged in homosexual intercourse with a male partner in the past six months, and provided informed consent. Data were collected using a self-reported questionnaire. Ethical approval for this study was obtained from the Medical Ethics Committee of Wuhan University.

Measures

Socio-demographic characteristics

Socio-demographic characteristics including age, monthly income, educational level, sex position, and sexual orientation.

Sexual sensation seeking. SSS was measured by the Sexual Sensation Seeking Scale (Kalichman et al., 1994)

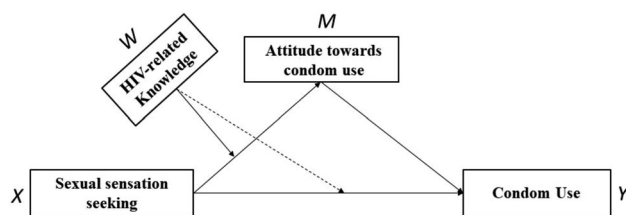


Figure 1. The proposed conceptual diagram of moderated mediation model in the study.

comprises 11 items, and employs a 4-point scale, ranging from “not at all like me” (1 point) to “very much like me” (4 points). Higher scores indicate stronger sexual sensation seeking (Cronbach’s alpha = 0.891).

Attitude towards condom use. Attitude towards condom use were assessed by asking about a person’s perception of condom use (“What is your attitude towards the condom use?” Postive: I think condom should be used in every sexual act; Unsure: I’m not sure, condom use is dispensable; Negative: The use of condom is objectionable). “Positive” response was scored as a 2, “unsure” response was scored as a 1 and a “negative” response answer scored as a 0. Higher scores indicate better attitudes toward condom use.

HIV-related knowledge. HIV-related knowledge included condom use knowledge and AIDS prevention knowledge about oral or anal intercourse, which contained 2 items in each section, and a total of six items were investigated. Each correct response was scored as a 1 and an incorrect response or a “do not know” answer as a 0. Higher scores indicate a higher level of HIV-related knowledge (Cronbach’s alpha = 0.752).

Outcome variables: condom use

Condom use measured by two questions that individuals self-reported the condom use status during anal intercourse and oral sex in the last six months (always, sometimes, no). “Always” response was scored as 2, “sometimes” and “no” were scored as 1. Total scores were calculated by summing up two item scores for analysis such that higher scores indicating better condom use (Cronbach’s alpha = 0.713).

Analytical strategies

All data analyses were performed using SPSS version 21.0. We integrated the proposed moderator variable into the mediation model and empirically tested the overall moderated mediation model following the approach by Preachers and colleagues (Preacher et al., 2007). Both the mediation and moderated mediation analyses were conducted with the SPSS PROCESS macro developed by Hayes (2013).

Results

Descriptive statistics

A total of 375 YMSM were enrolled in this study. As shown in Table 1, the mean age of YMSM was 22.1

Table 1. Descriptive statistics.

Characteristic	Number	Percent (%)
Age (years)		
16–18	20	5.4
19–22	179	48.0
23–25	174	46.6
Mean, SD	22.1	2.2
Education level		
High school or lower	64	17.2
Bachelor degree	292	78.3
Master degree or higher	17	4.5
Employment		
Student	180	48.3
Non-student	193	51.7
Marital status		
Never married	369	98.9
Married	4	1.1
Monthly income (RMB)		
≤1000	128	34.3
1001–2000	113	30.3
≥2000	132	35.4
Sexual orientation		
Homosexual	289	77.5
Bisexual	69	18.5
Heterosexual	15	4.0
Sexual role		
0	90	24.1
1	79	21.2
0/1	204	54.7
Finding partners		
Internet	307	82.3
Bar	26	7.0
other	40	10.7

years (SD = 2.2). Of all participants, 48.3% were students, and 82.4% had more than high school education. Approximately two-thirds (64.5%) reported monthly incomes less than 2000 RMB, most of them (77.6%) were self-identified as “homosexual” and 54.7% were both receptive and insertive in sex position.

Correlation analysis

The bivariate correlations among all variables included in the hypothesized model are reported in Table 2.

Mediation analysis

Table 3 lists the results of simple mediation analysis, attitude towards condom use partly mediated the association between SSS and condom use (effect = -0.158 , $P < 0.001$).

Table 2. Key variables and Spearman correlation coefficients.

	Mean	SD	1	2	3	4
1. Sexual sensation seeking	22.70	7.47	1.000			
2. Attitude towards condom use	2.61	0.66	-0.309^{**}	1.000		
3. Condom use	2.73	0.89	-0.231^{**}	0.445^{**}	1.000	
4. HIV-related knowledge	3.41	1.61	-0.145^{**}	0.405^{**}	0.387^{**}	1.000

** $P < 0.01$.

Table 3. Regression results for simple mediation analysis.

^a Variables	Coeff.	SE	t	P
Sexual sensation seeking – Condom attitude	-0.325	0.069	-2.318	<0.001
Attitude towards condom use – Condom use	0.486	0.072	6.797	<0.001
^b Sexual sensation seeking – Condom use (controlling condom attitude)	-0.160	0.069	-2.318	0.021
^c Sexual sensation seeking – Condom use	-0.318	0.069	-4.712	0.000
Indirect effect of Sexual sensation seeking on Condom use	-0.158	0.029	–	–

^aControlling for age, educational levels, employment status.

^bDirect effect of sexual sensation seeking on Condom use.

^cTotal effect of Sexual sensation seeking on Condom use.

SE: standard error.

Moderation analysis

Figure 2 illustrates the different slopes associated with different level of HIV-related knowledge, as HIV-related knowledge levels increased, the effect of SSS on attitude towards condom use decreased (interact effect = 0.089 , $P = 0.001$).

Moderated mediation analysis

Table 4 and Figure 3 present the results of the moderated mediation analysis. The results indicated that in addition to the significant mediation pathways from SSS to condom through attitudes toward condom use, the interaction term (SSS×HIV-related knowledge) was also significant (effect = 0.101 , $P = 0.005$), which means

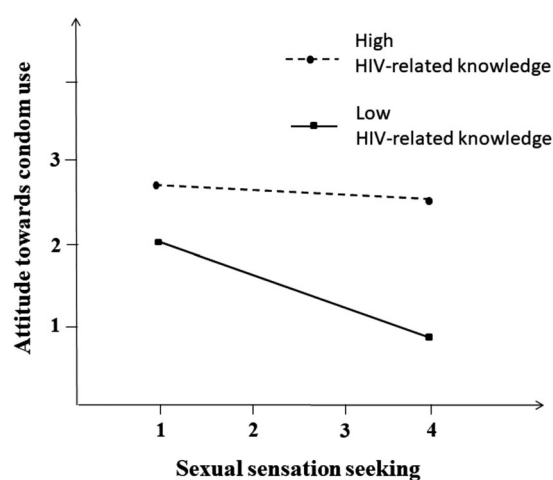


Figure 2. HIV-related knowledge moderates the effect of SSS on attitude towards condom use. Note: One standard deviations below and above mean were chosen to represent “low”, and “high” levels of HIV-related knowledge, respectively. HIV-related knowledge significantly buffered the effect of SSS on attitude towards condom use (interact effect = 0.089 , $P = 0.001$). As HIV-related knowledge levels increased, the effect of SSS on attitude towards condom use decreased: the simple slopes were -0.377 and -0.091 at low, and high levels of HIV-related knowledge.

Table 4. Regression results for the conditional indirect effect (moderated mediation model).

Explanatory variable ^a		Consequent								
		M (Condom attitude)				Y (Condom use)				
		Coeff.	SE	t	p		Coeff.	SE	t	p
Constant		2.621	0.0309	84.908	<0.001		1.677	0.324	5.176	<0.001
Sexual sensation seeking (SSS)	a ₁	-0.230	0.046	-5.031	<0.001	c' ₁	-0.160	0.068	-2.349	0.019
Attitude towards condom use	-	-	-	-	-	b ₁	0.378	0.079	4.762	<0.001
HIV-related knowledge	a ₂	0.177	0.019	9.200	<0.001	c' ₂	0.123	0.031	3.948	<0.001
HIV-related knowledge × SSS	a ₃	0.101	0.029	3.508	0.005	c' ₃	-0.067	0.042	-1.590	0.113
		$R^2 = 0.322$ $F = 51.578$					$R^2 = 0.246$ $F = 14.982$			
				$P < 0.001$					$P < 0.001$	
Conditional indirect effect of SSS on Condom use										
Mediator		HIV-related knowledge ^b	Coeff.	Boot SE		Boot LLCI		Boot ULCI		
Attitude towards condom use			-1.610	-0.149	0.038	-0.232		-0.084		
			0.000	-0.087	0.022	-0.138		-0.048		
			1.610	-0.025	0.022	-0.073		0.018		

^aControlling for age, educational levels, employment status.

^bCentralized.

SE: standard error; LLCI: lower levels for confidence interval; ULCI: upper levels for confidence interval.

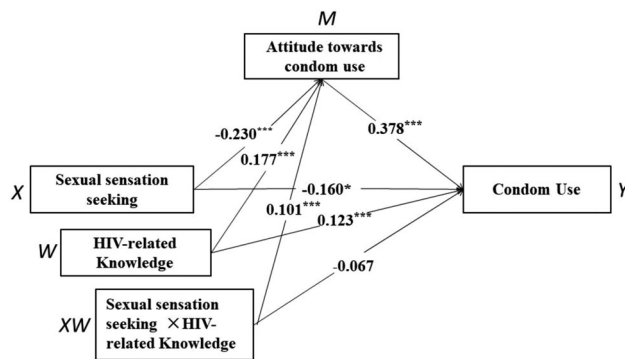


Figure 3. Statistical diagram of moderated mediation model in the study. Note: Controlling for age, educational levels, employment status; * $P < 0.05$, *** $P < 0.001$.

HIV-related knowledge significantly moderated the association between SSS and the attitudes toward condom use.

Discussion

To our knowledge, this is the first study to test a moderated mediation mechanism to explain the relationship between SSS, attitudes toward condom use, HIV-related knowledge, and condom use among YMSM. Our results indicate a partial mediation effect of attitude towards condom use between SSS and condom use, which is consistent with the previous study that SSS has not only a direct but also an indirect effect on sexual risk behavior (Oshri et al., 2013). Further, a significant moderated mediation effect was found where HIV-related knowledge moderated the indirect relationship from SSS to attitude towards condom use, which mediated the relationship between SSS and condom use.

The mediation mechanism helps explain the impact of SSS on risk sexual behavior, especially the inconsistent

condom use (Gao et al., 2017; Xu et al., 2016). This finding also adds empirical support for the incorporation of psychological and behavioral components addressing extreme personality traits and negative attitudes in inconsistent condom use intervention programs. Personality trait is an inherent character of one person and difficult to intervene, therefore, it may be more useful to change attitude towards condom use than to change high sexual sensation seekers for inconsistent condom use prevention and cessation (Palmgreen et al., 1995). Indeed, previous research has shown a significant effect of behavioral intervention targeting negative attitudes towards condom use (Morisky et al., 2006).

In the moderate analysis, we found that HIV-related knowledge can help to buffer the negative impact of SSS on attitudes toward condom use. This finding suggests that HIV-related knowledge promotion could be an integral part of the general HIV/AIDS services to reduce negative attitudes towards condom use among this group. Then, by taking moderated mediation into account, we acknowledge that this conditional process works differently in subgroups of individuals: those with a higher degree of HIV-related knowledge are more able to buffer the negative indirect effect of negative attitudes toward condom use, and thus are less likely to engage in condomless sexual behavior. Well-organized educational programs have been proved effective earlier in many countries to raise the level of HIV-related knowledge (Ali et al., 2018; Latman et al., 1996). Therefore, increased YMSM-specific HIV-related knowledge education programs need to be conducted. Besides, media messages may also increase the knowledge of HIV/AIDS, and serve to encourage protective attitudes and behaviors. Improvement of educational programs and curriculum with standardization is warranted to decrease the negative effect of SSS on condom use.

Limitations

There are several limitations to this study that should be noted. First, data used for this study were cross-sectional designed. Second, the study's use of self-report may have reduced the ability to accurately detect some measures (i.e., attitude towards condom use and condom use). Third, HIV-related knowledge and attitude towards condom use were not measured by a matured scale. Fourth, this study only included personal level factors, whereas more social level predictors may also influence inconsistent condom use. Finally, except for included variables, other possible constructs for example condom use self-efficacy was not tested in this study.

Conclusions

Findings of our study provide information not only on the etiology of how SSS leads to inconsistent condom use, but also the protective mechanism of how HIV-related knowledge education can buffer the impact of SSS on attitude towards condom use and in turn reduce inconsistent condom use, which suggests an effective way to intervene and minimize inconsistent condom use – HIV-related knowledge promotional education. Future studies are implied to replicate the results with longitudinal data in different populations.

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Disclosure statement

No potential conflict of interest was reported by the author(s).

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