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ABSTRACT

Background The subject of elder sexuality has remained grossly understudied in China, despite the country having the largest older population in the world.

Objective Guided by the Sexual Script Theory and the Theory of Planned Behavior (TPB), this study used path analysis to test an integrated path model for sexual activity with sexual interest as a mediator.

Methods Survey data was collected from a representative sample of 688 community-dwelling older Chinese adults aged 60 or above residing in Tianjin, China.

Results The final integrated model yielded a satisfactory model fit. Sexual knowledge, sexual attitude and perceived sexual control have direct positive effects on sexual interest in sample older Chinese. Furthermore, sexual interest mediated the effect of sexual knowledge, sexual attitude, perceived sexual control, available sexual partner, male gender and education level on sexual activities. Age was found negatively associated with sexual activities, while a non-significant relationship for sexual interest was observed. Male gender positively associated with sexual activities and sexual interest. In addition, education level has a positive effect on sexual interest.

Conclusion The integrated model highlighted the mediating role of sexual interest on sexual activities, thereby contributes to advancements of understanding of elder sexuality in older Chinese population. The current study also provides empirical evidence to the development of intervention and education programmes on sexuality among older Chinese adults. These programmes should pay attention to address the issues of sexual interest and partnership in older adults. Frontline health professionals should be sensitive to the needs of sex education in older population.

KEY WORDS – sexual activity, sexual interest, sexual knowledge, sexual attitude, older Chinese

1. Introduction

Recent studies in Europe and United States have found that many older adults remain sexually active and exhibit a moderate to high level of interest towards sex well into their 80s (Beckman, Waern, Gustafson, & Skoog, 2008; Galinsky, 2012; Karraker, Delamater, & Schwartz, 2011). Being sexually active has been positively linked with mental health (Choi, Jang, Lee, & Kim, 2011), self-esteem (Katz & Marshall, 2003), marital quality (Galinsky & Waite, 2014), and subjective well-being (Lee et al., 2016b), while the lack thereof has been associated with lower quality of life (Lee et al., 2016b). That being said, research on how sexual interest mediates sexual activity among older adults in Asian countries is very limited. The present study is an attempt to fill this knowledge gap by examining the mediating effect of sexual interest on the sexual activity of older Chinese adults and its relationships with predictors such as sexual knowledge, attitude, control, etc.

1.1 Correlates of sexual activeness in the older population

A growing body of empirical evidence has shown that greater sexual knowledge, positive attitude towards sex, greater perceived sexual control, higher level of education and available sexual partner helps maintain sex life in older adults (Guan, 2004; Karraker et al., 2011; Lindau et al., 2007; Momtaz, Hamid, Ibrahim, & Akahbar, 2014; Wang, Lu, Chen, & Yu, 2008; Yang, 2015; Yang & Yan, 2016), whereas advance age, female gender and poor health negatively associated with sexual activity in older adults (Buono et al. 1998; Lee et al, 2016 a; Kim and Jeon, 2013).

Meanwhile, studies in the West have also found interest in sex a prominent predictor

for sexual activity (Delamater & Moorman, 2007; Lindau et al., 2007). Sexual interest, in turn, is positively associated with various predictors such as available sexual partner (Delamater & Sill, 2005; Papaharitou et al., 2008). However, considering the vast cultural differences between eastern and western countries, further studies are necessary to determine the applicability of such findings to Asian countries such as China.

1.2 Elder sexuality in older Chinese

The open-door policy introduced in 1978 and the rapid industrialization that followed have led to increased sexual awareness among the younger people in mainland China (Pan, William, Wang, & Laumann, 2004). Many older Chinese, however, adhere to traditional Confucian principles (Guan, 2004; Yan, Wu, Ho, & Pearson, 2011), which regard sex as a mean of procreation and any deviation from such purpose disgraceful and inappropriate (Lee, Kwon, Kim, & Moon, 2007). This may have led to an atmosphere of repression that discourages older adults from seeking pleasure through sex (Ho & Tsang, 2012). The shrinking social networks (Choi et al., 2011) and inadequate understanding of their own bodies, coupled with insulation from mass media, may have further dwindled their sexual activity. An integrated model examining the relationship between sexual interest and sexual activities can bring about better understanding of the sexuality, and potentially improve sexual health, of the world's largest older population.

1.3 Theories guiding this study

The present study was guided by the sexual script theory and the theory of planned behavior (TPB). The sexual script theory emphasizes the “contexts” of sexual activity. Simon and Gagnon (1986) argued that changes in sexual “scripts” – changing circumstances and factors associated with sexual behaviors – should be evaluated constantly and comprehensively as one's sexual needs change across different life stages. TPB postulates

that intention (Ajzen, 1991) and knowledge (Ajzen, Joyce, Sheikh, & Cote, 2011) are important predictors of behavior. Recent studies have applied TPB on condom use (Armitage & Conner, 2001; Davis et al., 2016) and risky sexual behaviors in young adults (Bryan, Fisher, & Fisher 2002; Buhi & Goodson, 2007).

2. The present study

The purpose of the present study is twofold: 1) to develop and test an integrated path model to advance understanding of sexual activities in older persons; 2) to determine the mediating effects of sexual interest in the relationships between sexual knowledge, sexual attitude, perceived sexual control, availability of sexual partner and sexual activities.

3. Methods

3.1 Participants

Data was collected through face-to-face household interviews in Tianjin, China between June and October 2013. The inclusion criteria were: (1) community dwelling older adults aged 60 or above; (2) residents of Tianjin for more than a year; (3) heterosexual; and (4) cognitively capable of answering the interview questions; (5) willing to participate in the study. The study protocol has been approved by the ethical committee of the author's affiliated university.

Multi-stage stratified sampling was employed to randomly select 8 of the 20 communities in downtown Tianjin. Invitation letters stating the scope and purposes of the study were distributed in selected communities. Of the 1,000 potential participants approached, 688 were successfully interviewed, yielding a response rate of 69%. Reasons for declining the interviews or failure to complete the interview were mainly “no time” or “competing obligations”. All interviews were conducted by trained interviewers.

3.2 Assessments

Sexual Activity: Respondents were asked to rate the frequency in which they experienced or engaged in six types of sexual activities / state drawn from previous studies (Davis, Yarber, Bauserman, Schreer, & Davis, 1998; Weinstein & Rosen, 1988). They were sexual intercourse, caressing, oral sex, reaching orgasm, use of sex toys and initiating sex.

Sexual Interest: Participants' interest in sex was assessed using the 15-item interest subscale of the Senior Adult Sexuality Scale (SASS) (Davis et al., 1998; Weinstein, 1984; Weinstein & Rosen, 1988), which examines concern, desire and preference for a series of sexual activities. A satisfactory internal consistency of .88 was observed in the present study.

Sexual Knowledge: Knowledge of elder sexuality was assessed using the 35-item knowledge subscale the Chinese version of the Aging Sexual Knowledge and Attitude Scale (Chinese ASKAS; Yan & Lee, 2013). The scale focuses on sexual changes brought about by aging (White 1982). Scale scores range from 35 to 96, with higher scores indicating better knowledge. A satisfactory internal consistency of .93 was observed in the present study.

Sexual Attitude: Attitude towards sexual behavior was assessed with the 26-item attitude subscale of the Chinese ASKAS (Yan & Lee, 2013). Scale score has a potential range of 45-154, with a higher score indicating a higher level of positive attitude towards elder sexuality. A satisfactory internal consistency of .88 was observed in the present study.

Subjective Norm: Subjective norm was assessed with a single question – “Do you think it is common for older people to have sex?”

Perceived Control over Sex: Perceived sexual control was assessed using the 11-item Dyadic Sexual Regulation Scale (DSRS; Catania, Mcdermott, & Wood, 1984). A satisfactory internal consistency of .59 was observed in the present study.

Availability of Sexual Partner: Respondents were asked to report their number of sexual partner in the past year. Since only 5 out of 688 participants reported having two or

more sexual partners in the past year. The response was collapsed into a dummy variable indicating presence or absence of sexual partner.

Demographics: The demographic variables included in the survey were age, gender, and education level.

Subjective Health: Participants were asked to rate their current health condition (1 = “poor” to 3 = “very good”), with a higher score representing a better subjective health.

The SASS and DSRS subscales were translated into Chinese by experienced researchers and reviewed by an expert panel. A pilot study ($N = 30$) conducted with older adults aged from 60 and 81 ($M = 71$, $SD = 7.2$) from three typical communities in Tianjin confirmed the clarity, relevance and comprehensibility of the translation.

3.3 Data analysis

Descriptive analyses were conducted in order to acquire a better understanding of sample characteristics, while bivariate correlational analyses were performed on major variables. A series of path analyses was conducted to test the mediating effect of sexual interest. Since missing values account for less than 3% of the total sample, mean / mode value substitution was used to replace the missing data before correlation analysis and model testing. Bootstrapping (2,000 boot strap samples) was performed. The 95 % bias corrected confidence interval (CI) excluding the number zero was set to confirm the significance of indirect effects (MacKinnon, Lockwood, & Williams, 2004).

Path analysis is commonly regarded as an effective statistical approach in analyzing multiple mediator models (Preacher & Hayes, 2008). The integrated path model was used to test both direct and indirect effects of all predictive factors on sexual activities as mediated by sexual interest. A set of Goodness of Fit indices including Chi-Square Test Statistic, Tucker-Lewis Index (TLI), Comparative Fit Index (CFI), Root Mean Square Error of Approximation

(RMSEA) and Standardized Root Mean Square Residual (SRMR) were used to assess the model fits (Byrne, 2013). Data analyses were carried out with SPSS 21.0 (IBM Corp) and Amos 21.0 (Arbuckle, 2012).

4. Results

4.1 Descriptive statistics

Table 1 sets out the socio-demographic characteristics of the participants.

Participants aged between 60 and 96 years with a mean of 69 ($SD = 7.20$). Most of them were female (55%), and received primary level education (39.83%) or below (23.4%). 70% of the participants had intimate partner(s) in the past year but only 5 out of 688 reported having two or more intimate partners. More than 60% had a monthly income between US\$320 and US\$640. Mean sexual knowledge and sexual attitude score were 67.80 (range = 35-96) and 67.80 (range = 45-154) respectively, and mean perceived sexual control score was 45.61 (range = 29-64), indicating moderate levels of knowledge and attitude. Mean sexual interest and sexual activities scores were 36.57 (range = 15-83) and 1.77 (range = 0-6), indicating a relatively low level of sexual interest and types of sexual activities.

4.2 Correlations between Studied Variables

Pearson correlation analyses show that all variables were associated with each other in predicted directions. Male gender, education level, subjective norm, available sexual partner, knowledge of elder sexuality, sexual attitude, perceived control and sexual interest were all positively correlated with sexual activities, while advance age was negatively correlated. Regression analyses were performed and yielded variance inflation factor estimates (VIF) below 10, which indicates no multicollinearity among independent variables.

4.3 Model fits, regression coefficients and mediating effects of sexual interest

An integrated TPB model was built to determine the direct and indirect relationships

between sexual activities and various predictors. In the purposed path model, the dependent variable was sexual activities; Independent variables included sexual knowledge, sexual attitude, availability of sexual partner and perceived sexual control; Control variables included age, gender, education and subjective health; Mediator was sexual interest. These variables reflect the main constructs of the theory of planned behavior (Ajzen, 1991). Availability of sexual partner was included as an independent variable as it is a salient factor for an older person to maintain sex life (Delamater, 2012).

Path analysis results are presented in Table 3 and Figure 1. The non-significant paths: 1) among independent variables; 2) among control variables; 3) between independent and control variables were dropped to obtain a more parsimonious model. All the paths between control variables (age, gender, education level and subjective health) to the mediator (sexual interest) and dependent variable (sexual activities) were retained for model testing. Fit indices of the mediated path model were satisfactory: $\chi^2 (10) = 13.32$, $p = .21$; RMSEA = .02; and SRMR = .02; CFI = .998 (1.00); TLI = .99. The path model accounts for 34% of the variance in sexual interest and 49% of the variance in sexual activities.

Our results showed that sexual interest ($\beta = .12$, $p < .01$; BC bootstrap 95% CI = .05 to .18) has a direct positive effect on sexual activities while sexual knowledge ($\beta = .13$, $p < .01$; BC bootstrap 95% CI = .05 to .21), sexual attitude ($\beta = .27$, $p \leq .001$; BC bootstrap 95% CI = .19 to .35), perceived sexual control ($\beta = .18$, $p \leq .001$; BC bootstrap 95% CI = .12 to .25) and available sexual partner ($\beta = .14$, $p \leq .001$; BC bootstrap 95% CI = .07 to .21) has direct positive effects on sexual interest.

As for demographic characteristics, age ($\beta = -.36$, $p \leq .001$; BC bootstrap 95% CI = -.43 to -.30) has a negative effect on sexual activities, but no significant effect on sexual

interest. Male gender has direct and significant effects on both sexual activities ($\beta = .09, p < .01$; BC bootstrap 95% CI = .02 to .15) and sexual interest ($\beta = .08, p < .05$; BC bootstrap 95% CI = .01 to .15). Education level has a positive effect on sexual interest ($\beta = .12, p < .01$; BC bootstrap 95% CI = .04 to .20).

Our results show that sexual interest mediates the effect of sexual knowledge ($\beta = .02, p < .01$, BC bootstrap 95% CI = .00 to .03), sexual attitude ($\beta = .03, p \leq .001$, BC bootstrap 95% CI = .01 to .06), perceived sexual control ($\beta = .02, p \leq .001$, BC bootstrap 95% CI = .01 to .04), available sexual partner ($\beta = .02, p \leq .001$, BC bootstrap 95% CI = .01 to .03), male gender ($\beta = .01, p < .05$, BC bootstrap 95% CI = .00 to .02) and education level ($\beta = .01, p < .01$, BC bootstrap 95% CI = .00 to .03) on sexual activities.

-----Insert Table 1 here-----

-----Insert Table 2 here-----

-----Insert Table 3 here-----

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5. Discussion

Drawing from the Sexual Script Theory and the Theory of Planned Behaviors, the present study established an integrated path model for sexual activities in older Chinese. This study is the first of its kind to confirm, using a relatively large representative sample, that sexual knowledge, sexual attitude and perceived sexual control have direct positive effects on sexual interest in older Chinese. We have also confirmed the effect of these factors on sexual activities via sexual interest. The present results will aid the design and implementation of intervention and education program for older people, their families and professionals as well as other stakeholders.

Sexual knowledge, attitude were both directly and indirectly associated with sexual activities in this sample. This finding is consistent with existing literature which associates sexual knowledge and positive attitude towards being sexually active (Wang et al., 2008; Yang & Yan, 2016).

The present study also identified pathways connecting sexual knowledge, attitude and perceived control to sexual activities via sexual interest. As is shown in Table 3 and Figure 1, sexual knowledge, sexual attitude and perceived sexual control have significant indirect effects on sexual activities through sexual interest. Meanwhile, having an available sexual partner has a direct and significant effect on sexual interest as well as sexual activities in this sample. This reinforces available research findings which demonstrated having an available sexual partner a salient predictor for both sexual interest and sexual activities (Beckman, Waern, Ostling, Sundh, & Skoog, 2014; Delamater & Moorman, 2007; Delamater & Sill, 2005; Kontula & Haavio-Mannila, 2009). This appears to be equally applicable in the older Chinese population.

Inconsistent with previous studies that examined models of planned behavior and which reported significant relationship between perceived norms and sexual activities among young adults (Sieverding et al., 2005 ; Simms & Byers, 2013), insignificant pathways are observed between subjective norm, sexual interest and sexual activities. This may be the result of the fact that subjective norm was only measured through one question in the survey (Armitage & Conner, 2001). Ajzen (1991) also suggested that for certain specific behaviors, personal considerations tend to overshadow perceived social pressure. This might be the case of sexual behaviors

The present study also provides data that can help assess the applicability of sexual script theory to the realm of elder sexuality. The sexual script theory emphasizes the

importance of relevant factors and predicting the resulting sexual activity (Yang, 2015). It is necessary to examine the possible “scripts” associated with experience of sexuality in later life. Recent empirical studies showed that age-related changes influence on engagement with sexual activities (Hinchliff et al., 2017 ; Lee & Tetley, 2017). In particular, menopause and erectile difficulties impacted on sex lives of older persons (Lee, Nazroo & Pendleton, 2015; Tetley et al., 2016). The present study finds that whilst age has no impact on sexual interest, it is negatively associated with sexual activities, consistent with the findings of Kontula and Haavio- Mannila’s research (2009), which suggests that one’s interest in sex may not necessarily change as one ages, even though one may engage less frequently in sexual activities.

On the other hand, gender is found to be a salient predictor for sexual interest and sexual activities, which is consistent with prior study (Yang & Yan, 2016); while education is found to have a significant impact on sexual interest and which might be a result of the conservative cultural background of the sample.

6. Implication and limitation

The findings of the present study have several important implications for programme and service development targeting older adults: (1) education programmes on sexuality in older people should be introduced in major mainland Chinese cities with special focus on sexual interest, sexual partnership and cultural expectations. Older adults and their families, as well as geriatric practitioners and the general public, should be made aware of the fact that a significant portion of the older population remain interested in sex and continue to be sexually active. Basic knowledge of elder sexuality, a positive attitude and greater sexual control can vastly improve the sexual and overall health of the older population; (2) healthcare professionals and social workers should receive training on how to discuss sexual

issues openly and effectively with their care recipients and identify those who remain sexually active so that appropriate target-specific intervention or education programmes can be initiated; (3) frontline health providers should recognize the need for sex education among older adults, as recent studies have reported a rise of unsafe sexual practices and a general lack of sexual health knowledge among older Chinese adults (Chan et al. 2004). It is important for older adults to understand and prepare for the physiological changes brought on by aging, so that they can find appropriate ways to express their sexuality within acceptable cultural norms; (4) given partner availability has a significant impact on sexual interest, community organizers should take more active steps to provide older adults with social platforms through which they can find potential partners.

The present study is not without limitations. Causalities cannot be established given the cross-sectional nature of the sample, which means future longitudinal studies may be necessary to investigate the causational aspect of the relationships between sexual interest and sexual activities. Further research is needed to examine the issue of partner on sexual interest/sexual activities using a national level representative data or a longitudinal sample. Because it may yield more convincing results, for instance the dynamics of relationships on sexuality. Moreover, the response rate falls just below 70%, which is not ideal as far as data reliability is concerned. Furthermore, the results are derived solely from self-reports, which may be prone to social or recall bias, not to mention that there are other factors that may have affected the results but which were not included in the analyses, such as the participant's relationship with his/her sexual partner. The current study only included one individual in the same household due to reliability of report. We highly recommend future studies examine on older couples using dyadic data to explore on sexual activities in older adults. In particular, we highly recommend future studies of elder sexuality to employ sexual activity scale with

more items (i.e. masturbation and anal sex), or to include items assessing personal medical conditions, to gain a comprehensive understanding of how health influences the sexual interest and sexual activities. Given the fact that all the participants are heterosexual, more empirical studies assessing sexual activities of LGBT older Chinese is highly needed in the near future. Finally, given all participants are community-dwelling older adults residing in Tianjin, the findings should be applied with caution to subjects with different socio-cultural qualities, e.g. older adults residing in rural areas or nursing homes.

7. Conclusion

Using an integrated model the present study has established positive associations between certain antecedents, namely, knowledge of elder sexuality, sexual attitude, perceived sexual control and available sexual partner, and sexual activities as mediated by sexual interest, facilitating in the process a greater understanding of the sexuality of older Chinese adults and providing data that may prove helpful to the development of appropriate intervention and education programmes.

Conflict of interest

None.

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Table 1. *Socio-demographic characteristics of participants*

Characteristics	N (%)	Mean (SD)	Range	Cronbach's alpha
Age (mean +SD)		68.46 +7.20		
Gender				
Male	308 (44.77)			
Female	380 (55.23)			
Education level (%)				
None or minimal	161 (23.40)			
Primary	274 (39.83)			
High school or above	253 (36.77)			
Having a sexual partner				
Yes	490 (71.22)			
No	198 (28.78)			
Personal income in USD				
320 or below	225 (32.70)			
320-640	418 (60.76)			
640 or above	45 (6.54)			
Subjective health	688 (100)	1.72 (.74)	1 - 3	
Sexual knowledge	688 (100)	67.80 (16.54)	35 - 96	.93
Sexual attitude	688 (100)	100.13 (16.69)	45 - 154	.88
Perceived sexual control	688 (100)	45.61 (4.59)	29 - 64	.59
Sexual interest	688 (100)	36.57 (11.31)	15 - 83	.88
Sexual activities	688 (100)	1.77 (2.12)	0 - 6	

Note. $N = 688$. All the missing values (< 3%) were filled before conducting analyses.

Table 2. *Correlations among major variables*

	1	2	3	4	5	6	7	8	9	10	11
1 Age	1.00										
2 Gender	.04	1.00									
3 Education level	-.43***	.15***	1.00								
4 Subjective health	-.45***	-.00	.29***	1.00							
5 Sexual knowledge	-.34***	.25***	.27***	.01	1.00						
6 Sexual attitude	-.19***	.24***	.34***	.16***	.47***	1.00					
7 Subjective norm	-.18***	.13**	.16***	.07	.48***	.35***	1.00				
8 Perceived sexual control	.03	.28***	.13**	.04	.01	.18***	.01	1.00			
9 Availability of sexual partner	-.31***	.08*	.38***	.15***	.28***	.34***	.28***	.04	1.00		
10 Sexual interest	-.22***	.26***	.35***	.08*	.41***	.49***	.28***	.25***	.34***	1.00	
11 Sexual activities	-.54***	.18***	.36***	.28***	.44***	.38***	.25***	.10**	.49***	.41***	1.00

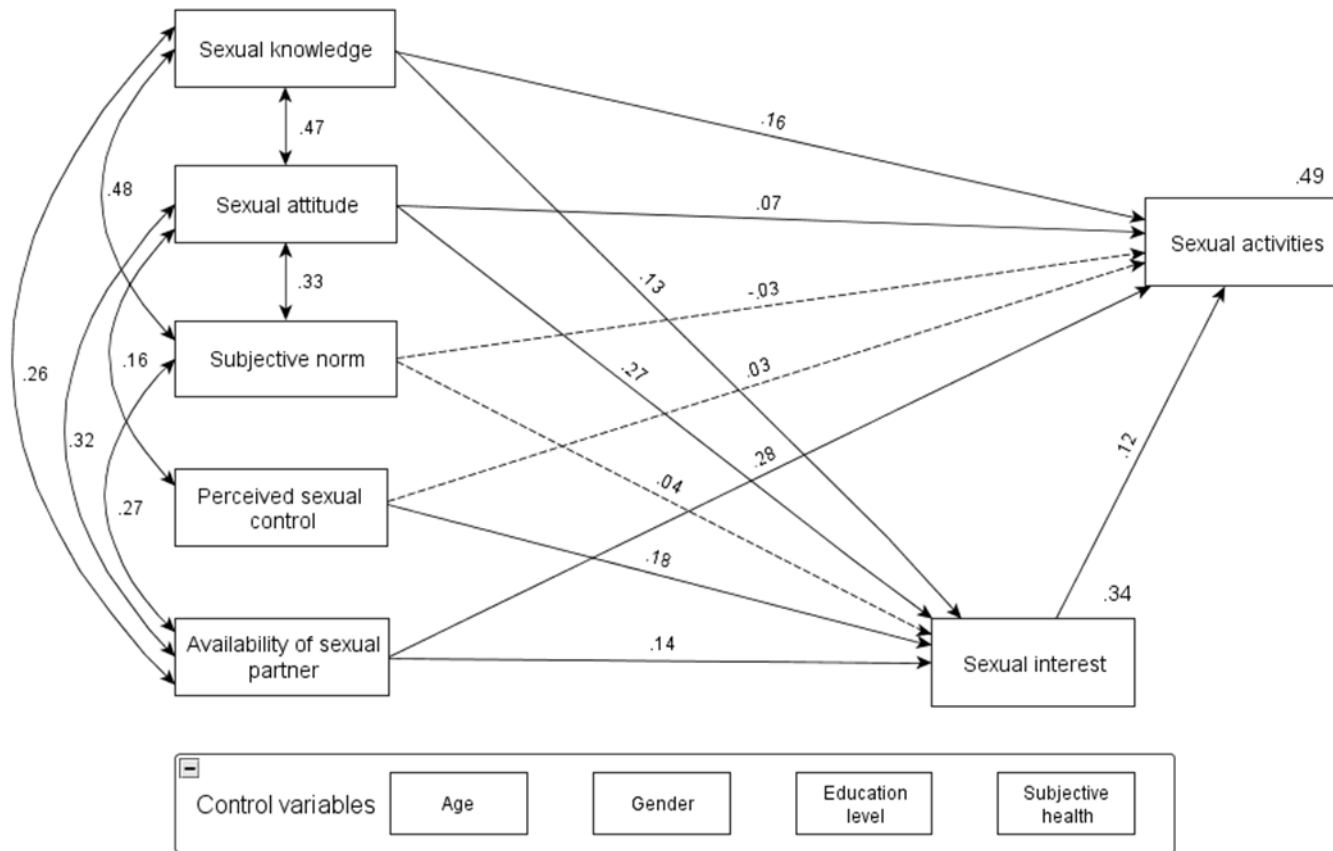
Notes. $N = 688$ * $p < .05$, ** $p < .01$, *** $p < .001$.

Table 3. *Direct, indirect and total effects of sexual activities and sexual interest*

Paths	Direct effect		Indirect effect		Total effect		R square
	Beta	BC bootstrap 95% CI	Beta	BC bootstrap 95% CI	Beta	BC bootstrap 95% CI	
Sexual activities							.49
Age	-.36***	-.43 to -.30	-.01	-.02 to .00	-.37***	-.43 to -.31	
Gender	.09**	.02 to .15	.01*	.00 to .02	.10**	.04 to .16	
Education level	-.04	-.10 to .03	.01**	.00 to .03	-.03	-.09 to .04	
Subjective health	.07	-.00 to .13	-.00	-.02 to .00	.06	-.01 to .12	
Sexual knowledge	.16***	.09 to .23	.02**	.00 to .03	.18***	.11 to .24	
Sexual attitude	.07**	.01 to .14	.03***	.01 to .06	.10***	.04 to .17	
Subjective norm	-.03	-.10 to .03	.00	-.00 to .02	-.03	-.09 to .03	
Perceived sexual control	.03	-.03 to .09	.02***	.01 to .04	.05	-.01 to .11	
Having a sexual partner	.28***	.22 to .33	.02***	.01 to .03	.29***	.24 to .35	
Sexual interest	.12**	.05 to .18					
Sexual interest							.34
Age	-.06	-.13 to .02					
Gender	.08*	.01 to .15					
Education level	.12**	.04 to .20					
Subjective health	-.04	-.11 to .04					
Sexual knowledge	.13**	.05 to .21					
Sexual attitude	.27***	.19 to .35					
Subjective norm	.04	-.04 to .11					
Perceived sexual control	.18***	.12 to .25					
Having a sexual partner	.14***	.07 to .21					

Notes. Indirect relationship here refers to relationships between factors to sexual activities mediated by sexual interest. * $p < .05$, ** $p < .01$, *** $p \leq .001$. Numbers included in 95% confidence interval derived from 2000 bootstrap resamples. Abbreviations: BC, bias-corrected; CI, confidence interval.

Figure 1. The final integrated path model



Notes. Beta values represent standardized path coefficients. The values above arrows with single head represent direct effects, whereas arrows with two arrows indicate correlations. Dashed lines indicate non-significant paths at 0.05 level. Numbers included in 95% confidence interval derived from 2000 bootstrap resamples. Control variables are age, gender, education level and self-rated health. For simplicity, the correlations between control variables and independent variables as were not shown in the figure. Likewise, paths between control variables and dependent variables (sexual interest and sexual activities) were retained for model testing but not show in Figure 1.

