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Dual Control Model in a Cross-Cultural Context: Role of Sexual Excitation in Sexual Response and Behavior Differences Between Chinese and Euro-Caucasian Women in Canada

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Abstract

Chinese women in Western nations frequently report less engagement with sexuality, such as lower sexual response and behaviors, and more restrictive sexual attitudes, than their Euro-Caucasian peers. This difference is likely related to sexual conservatism within traditional Chinese culture, though the mechanisms underlying how culture influences sexual responding are not well understood. The current study investigated if these differences were consistent with the dual control model, a well-established model for understanding regulation of sexual response. Chinese and Euro-Caucasian women (N = 471; age M = 20.7 years, SD = 3.3) residing in Canada from a university sample completed self-report questionnaires on sexual excitation and inhibition, sexual attitudes, and various sexual response and behavior measures. Sexual excitation was significantly lower in Chinese than Euro-Caucasian women and was significantly associated with sexual response in both groups. Structural equation modeling showed that sexual response variables were associated with a latent sexual excitation factor and that sexual attitudes partially mediated the relationship between this latent factor and ethnicity. The findings showed that sexual excitation and sexual attitudes contribute to cross-cultural differences in women's sexual responding. Theoretical and clinical considerations are discussed.

 $\textbf{Keywords} \ \ Chinese \cdot Cross\text{-}culture \cdot Dual \ control \ model \cdot Sexual \ excitation \cdot Sexual \ inhibition \cdot Female \ sexual \ response$

Introduction

Like almost all important psychological phenomena, sexuality is regulated by a complex interaction between a multitude of biopsychosocial factors. This includes the various cultural norms, values, beliefs, and how individuals conceptualize and experience sexuality (e.g., Bhavsar & Bhugra, 2013). Although much progress has been made in recognizing the importance of culture and ethnicity in sexual behaviors and responding, the role of the broader social context of culture and specifically the mechanisms through which culture impacts other variables remains to be fully elucidated.

Understanding the role of culture in sexuality is a particularly pertinent issue for our current social context. Canada, the U.S., and other Western nations are becoming increasingly ethnically and culturally diverse. According to the 2011 Census, visible minorities comprised 19.1% of the Canadian population (Statistics Canada, 2015). Delivery of effective sexual health services and education in these populations require a thorough understanding of how culture and ethnicity interact with sexuality.

One example of a populous ethnic group in North America is people of Chinese descent. With regards to sexual health, Chinese and other East Asian individuals in Western nations have been noted for, on average, reporting lower levels of sexual engagement than their Euro-Caucasian peers. This has been observed for a variety of domains, including lower sexual desire and arousal (Brotto, Chik, Ryder, Gorzalka, & Seal, 2005), less sexual activity and experience (Brotto et al., 2005; Brotto, Woo, & Ryder, 2007; Meston, Trapnell, & Gorzalka, 1996), less sexual knowledge (Brotto et al., 2005, 2007; Meston, Trapnell, & Gorzalka, 1998), fewer lifetime sexual partners and less interest in casual sex (Ahrold &



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Meston, 2010; Meston et al., 1996; Schuster, Bell, Nakajima, & Kanouse, 1998), and later initiation of partnered sexual intercourse (Baldwin, Whiteley, & Baldwin, 1992; Feldman, Turner, & Araujo, 1999; Huang & Uba, 1992; Lowry, Eaton, Brener, & Kann, 2011; Regan, Durvasula, Howell, Ureño, & Rea, 2004; Upchurch, Levy-Storms, Sucoff, & Aneshensel, 1998). These group differences are particularly robust when comparing Chinese to Euro-Caucasian women. These effects have been attributed to cultural (as opposed to biological) factors, as variability among Chinese individuals on these factors are directly associated with the individual's level of acculturation (i.e., the degree to which individuals adopt the values and practices of their mainstream cultural context and heritage cultural background) (Brotto et al., 2005; Ryder, Alden, & Paulhus, 2000). Chinese and other East Asian women in Western nations who have a higher level of mainstream acculturation (i.e., greater identification with Western culture) are typically more similar to their Euro-Caucasian peers with regards to their sexual responding. However, a more detailed model of how Chinese culture and ethnicity interact with specific aspects of sexuality is still lacking.

In order to better incorporate cultural factors into our understanding of sexuality, characterizing how elements of Chinese culture interact with existing models of sexual response is crucial. An important theoretical perspective is the dual control model (Bancroft, 1999; Bancroft, Graham, Janssen, & Sanders, 2009; Bancroft & Janssen, 2000). From this framework, there are two distinct but interconnected conceptual mechanisms involved in the regulation of sexual responses: an excitatory system that facilitates sexual arousal and behaviors, and an inhibitory system that reins-in sexual arousal and behaviors. The dual control model further states that differences in specific overt sexual behaviors and responses depends on differences in levels of excitation and inhibition. Sexual excitation and inhibition represent higherorder constructs that are thought to underlie a diverse range of more specific sexual behaviors and responses. Variability in sexual excitation and inhibition has been shown to be associated with individual differences in sexual responding and behaviors, and predictive of sexual dysfunctions in men and women (in majority Euro-Caucasian samples). We hypothesize that the impact of Chinese culture and ethnicity on sexual response and behaviors likely involves the influence of culture and ethnicity upon at least one of the excitatory or inhibitory systems. Elucidation of this relationship will be useful for better understanding the sexuality of Chinese individuals and may help identify areas of possible intervention for sexual difficulties. This may also exemplify how cultural factors in general influence sexual responding through the lens of the dual control model.

Bancroft and Janssen's (2000) original model leaves fairly open the types of factors that could impact the excitatory and inhibitory systems, including genetic predisposition, learned

experience, and situational context. One potential relevant factor is sexual conservatism. It is generally conceptualized as self- and socially imposed restrictions on various areas of sexuality, such as who are appropriate sexual partners, what sexual activities are acceptable, and under what contexts sex is allowed to occur (Burt, 1980). In Chinese culture, elements derived from the teachings of Confucius (551-479 BCE) and especially the Neo-Confucian movement during the Song Dynasty (960–1276 CE), and various other historical Chinese spiritual and philosophical beliefs have been previously cited as the distal historical basis of sexual conservatism (Ng & Lau, 1990). Despite recent waves of liberalization characterized by some as a "sexual revolution" in China (Xiao, Mehrotra, & Zimmerman, 2011), Chinese samples tend to be more sexually conservative or restrictive compared to Western standards. Chinese and East Asian individuals in Western nations have consistently been found to report higher levels of sexually conservative attitudes (Ahrold & Meston, 2010; Brotto et al., 2005, 2007; Kennedy & Gorzalka, 2002; Leiblum, Wiegel, & Brickle, 2003; Meston et al., 1998). Conservative attitudes have also been found to be a significant mediator of the mean group difference in sexual desire between East Asian and Euro-Caucasian women, as well as the within-group association between mainstream acculturation and sexual desire (Woo, Brotto, & Gorzalka, 2011, 2012). Therefore, restrictive sexual attitudes likely reflect one way in which Chinese culture and ethnicity may act upon the dual control model.

Although there has been little direct prior research in this area, there are reasons to expect that sexual excitation may be especially important in understanding the sexuality of Chinese women. In our prior qualitative study (Dang, Chang, & Brotto, 2017), Chinese women often reported not noticing or experiencing sexual desire and arousal except in very specific contexts, such as only experiencing desire when being intimate with a committed romantic partner. Chinese women also often had difficulty describing or elaborating upon their experiences of sexual desire, as well as how explicit mentions of sexuality are often seen as stigmatizing and "un-ladylike" by traditional Chinese culture. Furthermore, research on sexual communication has found that Asian-American youth are less likely to receive information on sex-related topics from their parents, compared to Euro-Caucasian, African, and Latin American parents (Kim & Ward, 2007). The most commonly reported theme by Asian-American youth was that sexuality was a taboo topic, either absent or actively avoided, in their families. Other common themes of parental discussion involved directing their children to focus on other matters, such as deferring dating to focus on academic/career achievements and restricting sexual activity until marriage. These themes were particularly prominent for parental communication targeted toward girls. Avoidance of and restrictions on sexuality thus appear to be a commonly



seen element of Chinese culture. This pattern potentially deemphasizes the importance of sexual excitation for young Chinese women, reduces their opportunity to learn about or explore their own sexuality, and removes the social rewards and incentives for engaging in sexual behaviors.

Current Study

The current study investigated the potential role of sexual excitation in the impact of ethnicity on sexual responding and behavior in Chinese and Euro-Caucasian women. This was the first study to date which examined how Chinese ethnicity and cultural factors interact with the dual control model. The putative mechanism was that high levels of sexual restrictiveness discourage women from attending to and valuing their experiences of excitation, hence reducing the opportunity for many Chinese women to notice and become aware of their internal sexual responses. This reduction in awareness of one's own sexual responses may then have a broad range of consequences for observed sexual outcomes, such as reduced desire and arousal and less motivation for sexual activity. We sought to show that many observed differences on sexual responding between Chinese and Euro-Caucasian women can be conceptualized as a group difference in a latent sexual excitation factor. We also sought to show that the group difference in latent sexual excitation is mediated by restrictive attitudes about sex.

Specifically, we predicted that Chinese women would score significantly lower than Euro-Caucasian women on a self-report measure of sexual excitation, the Sexual Excitation/Sexual Inhibition Inventory for Women (SESII-W; Graham, Sanders, & Milhausen, 2006), as well as have higher conservative and lower liberal attitudes about sexuality. Based on previous research, we also expected Chinese women to score lower than their Euro-Caucasian peers on various sexual outcome variables: sexual desire (dyadic and solitary), sexual arousal, current frequency of sexual activity, prior experience of sexual activity, sexual fantasies, and sociosexual orientation (interest in casual sex). These variables were selected as they are important aspects of the female sexual response cycle (e.g., sexual desire and arousal), and solitary and dyadic sexual behaviors that are common in young adults. These measures were also interpretable in individuals who are not currently engaging in regular partnered sexual intercourse, as young Chinese women have been found to be less likely to be sexually active. As well, based on the existing conceptualization of the dual control model, it is predicted that higher sexual excitation would be positively correlated with greater levels of sexual response and behavior among both Chinese and Euro-Caucasian women.

Given the established role of restrictive sexual attitudes among Chinese women, we anticipated that there would be notable indirect effects from ethnicity to sexual excitation through conservative and liberal sexual attitudes. Structural equation models (SEMs) were therefore constructed to examine the hypothesized mediation, as well as the validity of conceptualizing an overarching sexual excitation factor for the measured sexual response variables among Chinese women. Based on our hypothesis, we expected to find that group differences between Chinese and Euro-Caucasian women on manifest sexual response variables, including sexual excitation measured by the SESII-W, could be adequately modeled by group differences on an underlying latent sexual excitation factor. Three putative models were thus examined (Fig. 1). Model 1 reflected the most parsimonious representation, wherein ethnicity directly impacts latent sexual excitation, which is then manifest in all the observed sexuality variables. Model 2 showed a mediational process, wherein ethnicity directly predicts a latent sexual attitudes variable, which then impacts latent sexual excitation. Model 3 further broke down the latent excitation factor into a second latent sexual activity factor, to examine whether deviating from a one-factor model of excitation improves fit for the patterns seen among the outcome variables. Model 3 showed the direct impact of ethnicity on each of the latent attitudes, excitation, and activity factors, along with a mediated pathway among latent factors from attitudes to excitation to activity.

Method

Participants

Chinese (n=270) and Euro-Caucasian (n=201) undergraduate women were recruited from a large Canadian university, completed online questionnaires, and were included in the data analysis. Ethnic category (Chinese or Euro-Caucasian) was based on participant self-report. Individuals who self-identified as being women of Chinese or Euro-Caucasian ethnic descent, who had sufficient English reading skills to understand the survey materials, and who were over the age of 18 were invited to participate in the study. Individuals under the age of 18 or those who reported difficulties with English comprehension were excluded from the study. Further demographic variables for participants are reported in Table 1. All participants were living in Canada during the study. Given the narrow age range of this sample, it was expected that age would not be a prominent covariate.

Procedure

Participants were recruited through online ads at the university's psychology human subject pool system. The study was advertised as involving ethnicity, culture, and sexuality. Interested participants were directed to an online questionnaire hosted on the Web site www.fluidsurveys.com. Upon



Fig. 1 Hypothetical models for women wherein the association ▶ between ethnicity (Chinese and Euro-Caucasian) and sexuality variables. In Model 1, all observed sexuality variables are associated with a single latent sexual excitation factor, which is impacted by ethnicity. In Model 2, ethnicity directly impinges upon a latent sexual attitudes factor, which then impacts latent excitation. Model 3 is similar to Model 2, but the latent sexual excitation factor is broken into a latent excitation factor (associated with desire and arousal variables) and a second latent sexual activity factor (associated with drive, experience, and sociosexuality). DSFI Derogatis Sexual Functioning Inventory, SESII Sexual Excitation and Inhibition Inventory for Women, SAI-E Sexual Arousability Inventory-Expanded, SDI Sexual Desire Inventory, SOI-R Sociosexual Orientation Inventory-Revised, Att attitudes, Lib liberal, Con conservative

accessing the survey, participants had the opportunity to review consent documents, which explained their rights as participants, data confidentiality and security, and the sexual nature of some of the study questions. If they gave consent to participate, they then completed a series of online questionnaires. After completing the questionnaire, participants attended an online debriefing session, where they were informed about the intent of the study and invited to contact or meet with the researchers should they have further concerns and questions. Participants received one bonus mark toward an undergraduate psychology class in compensation for their participation. All procedures and methods were reviewed and approved by the university's behavioral research ethics board, and consistent with the 1964 Declaration of Helsinki and its later amendments or comparable ethical standards.

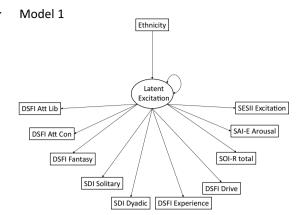
Measures

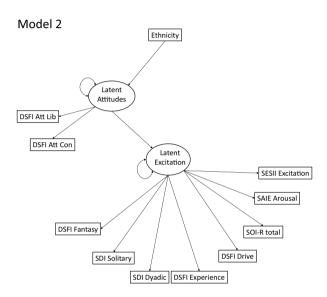
Sexual Excitation and Inhibition

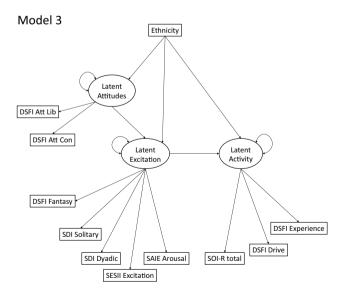
The Sexual Excitation/Sexual Inhibition Inventory for Women (SESII-W) (Graham et al., 2006) was administered to assess sexual excitation and inhibition. The SESII-W is a self-report inventory consisting of 36 statements about factors that might influence sexual responding, which participants rate on a 5-point scale of their endorsement. The instrument contains eight factors, five of which form a higher-order excitation factor and three of which form a higher-order inhibition factor. Higher scores on the excitation factor (range of scores from 1 to 4) indicate higher levels of sexual excitation, and higher scores on the inhibition factor (range of scores from 1 to 4) indicate higher levels of sexual inhibition. In our sample, the Cronbach's α for the excitation factor was .88 and for the inhibition factor was .75.

Sexual Attitudes

The Attitudes scale of the Derogatis Sexual Functioning Inventory (DSFI Attitudes) (Derogatis & Melisaratos, 1979)







was administered to assess sexual attitudes. The DSFI Attitudes scale is a self-report inventory consisting of 30 statements, which participants rate on a 5-point scale of their



Table 1 Demographic characteristics of Euro-Caucasian (n=201) and Chinese (n=270) women

Ethnic cat- egory	Age		Years in Canada	No. of previous relationship partners	No. of previous sex part.
Euro-Cauca- sian	21.5 (4.3)		17.2 (8.7)	2.4 (2.4)	5.5 (8.6)
Chinese	20.2 (2.1)		10.5 (7.8)	1.4 (1.5)	1.1 (2.6)
				Euro-Cauca- sian (%)	Chinese (%)
Sexual orientation			clusive het- sexual)	75.1	74.4
		2-3		8.0	5.9
		4		5.0	6.3
		5–6		3.5	3.3
		`	clusive homo- ual)	4.5	3.7
		Asex	ual	1.0	4.4
		Othe	r	3.0	1.9
Relationship st	atus	Mon	ogamous	58.2	38.9
		Open	relationship	3.0	0.4
		Singl	le	38.8	60.7
Sexually active	•	Yes		71.1	32.6
		No		28.9	67.4

endorsement. The scale has two subscales: liberal attitudes (range of scores from 15 to 75) and conservative attitudes (range of scores from 15 to 75). Higher scores on each subscale indicate greater endorsement of those respective beliefs. In our sample, the Cronbach's α for the conservative and liberal attitudes subscales were .84 and .82, respectively.

Sexual Desire

The Sexual Desire Inventory (SDI) (Spector, Carey, & Steinberg, 1996) was administered to assess sexual desire. The SDI is a self-report instrument consisting of 11 items, some of which inquire about the frequency of sexual desire (on an 8-point scale) and others about the intensity of desire (on a 9-point scale). The instrument contains two subscales: solitary desire (range of scores from 0 to 35) and dyadic desire (range of scores from 0 to 56). Higher scores indicate higher levels of sexual desire. In our sample, the Cronbach's α for the solitary desire subscale was .87 and that for the dyadic desire subscale was .88.

Sexual Arousal

The Sexual Arousability Inventory-Expanded (SAI-E) (Hoon, Hoon, & Wincze, 1976) was administered to assess sexual arousal. The SAI-E is a self-report instrument consisting of 28 items describing various situations. For each item,

participants rate on a 7-point scale about how aroused they would feel when engaged in such a situation. The instrument has a range of scores from -28 to 140. Higher scores indicated higher arousability. In our sample, the Cronbach's α for this scale was .96.

Sexual Experience

The Experience scale of the Derogatis Sexual Functioning Inventory (DSFI Experience) (Derogatis & Melisaratos, 1979) was administered to assess sexual attitudes. The DSFI Experience scale is a self-report instrument consisting of 24 sexual behaviors, which participants indicate if they have ever engaged in that behavior in their lifetime. Higher scores (range of scores from 0 to 24) in this scale indicate greater diversity of sexual experience. In our sample, the Cronbach's α for this scale was .97.

Sexual Drive

The Drive scale of the Derogatis Sexual Functioning Inventory (DSFI Drive) (Derogatis & Melisaratos, 1979) was administered to assess sexual drive (i.e., frequency of current sexual activities). The DSFI Drive scale is a self-report instrument consisting of four sexual activity domains, which participants indicate the frequency of which they engage in such activity. Higher scores (range of scores from 5 to 45) in this scale indicate greater frequency of sexual activity. In our sample, the Cronbach's α for this scale was .76.

Sexual Fantasies

The Fantasy scale of the Derogatis Sexual Functioning Inventory (DSFI Fantasy) (Derogatis & Melisaratos, 1979) was administered to assess sexual fantasies. The DSFI Fantasy scale is a self-report instrument consisting of 20 sexual fantasy themes, which participants indicate if they have ever experienced each fantasy. Higher scores (range of scores from 0 to 20) in this scale indicate greater diversity of sexual fantasies. In our sample, the Cronbach's α for this scale was .87.

Sociosexual Orientation

The Revised Sociosexual Orientation Inventory (SOI-R) (Penke & Asendorpf, 2008) was administered to assess sociosexual orientation (i.e., engagement in casual sex). The SOI-R is a self-report instrument consisting of nine items that inquire about previous sexual partners, interest in sex without emotional commitment, and beliefs about casual sex. Participants respond along 9-point scales. Higher scores (range of scores from 0 to 9) indicate greater willingness and interest in casual sex. In our sample, Cronbach's α for this scale was .86.



Social Desirability

The short form of the Marlowe–Crowne Social Desirability Scale (M-CSDS) (Reynolds, 1982) was used to general social desirability responding. The instrument contains 13 true or false items about negative but common experiences that individuals highly concerned about social perception have been found to be reluctant to admit to. Higher scores (range of scores from 0 to 13) indicate greater levels of socially conscious responding. In our sample, the Cronbach's α for the instrument was .65.

Data Analysis

Comparisons of mean differences between Chinese and Euro-Caucasian participants were conducted using t tests. Pearson's r correlations were used to examine zero-order associations between study variables. Bonferroni correction was used to control for type I error inflation, setting the alpha level at p = .002. Indirect effects of ethnic category on sexual excitation through sexual attitudes, and the overall pattern of associations between all variables, were analyzed using SEM. Models fits were considered adequate if they showed comparative fit index (CFI) > .90, root-mean-square error of approximation (RMSEA) < .10, and standardized root-mean-square residual (SRMR) < .08 (Hu & Bentler, 1998). Comparison between the models was examined with the Akaike information criterion (AIC) (Akaike, 1987).

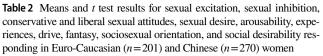
Some missing data were observed in the dataset, but no variable was missing in more than 10% of cases. As the pattern could not be shown to be missing completely at random, full information maximum likelihood was used for statistical analyses (Allison, 2003).

Analyses were conducted using the lavaan package 0.5-12 (Rosseel, 2012) for R (R Foundation for Statistical Computing).

Results

Mean Differences and Correlations

Mean difference comparisons showed that Chinese women had significantly lower mean SESII-W Excitation scores compared to Euro-Caucasian women (see Table 2). However, no significant mean differences were seen between Chinese and Euro-Caucasian women for SESII-W Inhibition. Chinese women also showed significantly lower mean SDI Dyadic Desire, SDI Solitary Desire, SAI-E Arousal, DSFI Experience, DSFI Drive, DSFI Liberal Attitudes, DSFI Fantasy, and SOI-R. Similarly, Chinese women showed significantly higher DSFI Conservative Attitudes. For social desirability,



	Euro-Cauca- sian M±SD	Chinese $M \pm SD$	t value	Cohen's d
SESII Excitation	2.77 (.41)	2.48 (.44)	6.96*	.69
SESII inhibi- tion	2.68 (.43)	2.71 (.39)	-0.66	.07
DSFI Att Con	28.68 (6.41)	35.49 (7.74)	-10.12*	96
DSFI Att Lib	57.99 (6.41)	52.14 (7.47)	8.86*	.82
SDI Dyadic	27.56 (9.14)	16.94 (10.01)	9.34*	1.08
SDI solitary	12.10 (7.27)	8.73 (7.24)	4.60*	.46
SAI-E arousal	84.65 (25.17)	72.70 (31.28)	4.31*	.42
DSFI experi- ence	16.91 (7.56)	9.93 (8.68)	9.30*	.86
DSFI drive	23.04 (6.48)	17.29 (7.31)	8.76*	.83
DSFI fantasy	7.07 (3.91)	4.77 (4.32)	6.04*	.56
SOI-R total	3.53 (1.57)	1.97 (1.29)	11.07*	1.08
M-CSDS	5.49 (2.82)	5.52 (2.66)	-0.09	.01

SESII Sexual Excitation Sexual Inhibition Inventory for Women, SDI Sexual Desire Inventory, SAI-E Sexual Arousability Inventory-Expanded, DSFI Derogatis Sexual Function Inventory, Att attitudes, Con conservative, Lib liberal, SOI-R Sociosexual Orientation Inventory-Revised, M-CSDS Marlow—Crowne Social Desirability Scale

*p < .002; Bonferroni correction used to control for type 1 error inflation

Chinese and Euro-Caucasian women did not differ significantly on mean M-CSDS scores. Although Chinese and Euro-Caucasian women showed a mean difference in age, this was not statistically significant.

Pearson's r correlations were conducted separately among Chinese and Euro-Caucasian women (see Table 3). SESII-W Excitation and SESII-W Inhibition were marginally negatively correlated in Euro-Caucasian women (r = -.21) and were not correlated in Chinese women (r = -.04). In Euro-Caucasian women, SESII-W Excitation was significantly positively correlated with SDI Dyadic Desire, SDI Solitary Desire, SAI-E Arousal, DSFI Liberal Attitudes, DSFI Drive, DSFI Experience, DSFI Fantasy, and SOI-R. SESII-W Excitation was also significantly DSFI Conservative Attitudes. Meanwhile, SESII-W Inhibition was significantly negatively correlated with SOI-R. In Chinese women, SESII-W Excitation was similarly significantly positively correlated with DSFI Dyadic Desire, SDI Solitary Desire, SAI-E Arousal, DSFI Liberal Attitudes, DSFI Drive, DSFI Experience, DSFI Fantasy, and SOI-R. Excitation was also similarly negatively correlated with DSFI Conservative Attitudes. SESII-W Inhibition was significantly negatively correlated with SOI-R. Controlling for the effect of SESII-W Inhibition and age did



Table 3 Correlations for sexual excitation and sexual inhibition with conservative and liberal sexual attitudes, sexual desire, arousability, experiences, drive, fantasy, sociosexual orientation in Euro-Caucasian (n=201) and Chinese (n=270) women

	Euro-Caucasian		Chinese	
	Excitation	Inhibition	Excitation	Inhibition
SESII Inhibition	r =20, p = .004		r = .01, p = .870	
DSFI attitudes con	r =35, p < .001*	r = .18, p = .011	r =40, p < .001*	r = .01, p = .868
DSFI attitudes lib	r = .48, p < .001*	r =16, p = .023	r = .43, p < .001*	r = .09, p = .140
SDI Dyadic	r = .55, p < .001*	r =18, p = .012	r = .61, p < .001*	r =02, p = .871
SDI solitary	r = .42, p < .001*	r =18, p = .013	r = .37, p < .001*	r =06, p = .695
SAI-E arousal	r = .64, p < .001*	r =11, p = .123	r = .70, p < .001*	r = .01, p = .534
DSFI drive	r = .50, p < .001*	r =13, p = .067	r = .42, p < .001*	r =08, p = .219
DSFI experience	r = .24, p < .001*	r =06, p = .397	r = .61, p < .001*	r =07, p = .472
DSFI fantasy	r = .49, p < .001*	r =10, p = .171	r = .46, p < .001*	r =03, p = .806
SOI-R total	r = .45, p < .001*	r =31, p < .001*	r = .40, p < .001*	r =22, p < .001*

SESII Sexual Excitation Sexual Inhibition Inventory for Women, SDI Sexual Desire Inventory, SAI-E Sexual Arousability Inventory-Expanded, DSFI Derogatis Sexual Function Inventory, Con conservative, Lib liberal, SOI-R Sociosexual Orientation Inventory-Revised

Table 4 Partial correlations for sexual excitation with conservative and liberal sexual attitudes, sexual desire, arousability, experiences, drive, fantasy, sociosexual orientation in Euro-Caucasian (n=201) and Chinese (n=270) women, controlling for sexual inhibition, age, and social desirability responding

	Euro-Caucasian	Chinese
DSFI attitudes con	r =32, p < .001*	r=40, p<.001*
DSFI attitudes lib	r = .46, p < .001*	r = .43, p < .001*
SDI dyadic	r = .55, p < .001*	r = .62, p < .001*
SDI solitary	r = .40, p < .001*	r = .31, p < .001*
SAI-E arousal	r = .65, p < .001*	r = .70, p < .001*
DSFI drive	r = .57, p < .001*	r = .61, p < .001*
DSFI experience	r = .24, p < .001*	r = .43, p < .001*
DSFI fantasy	r = .47, p < .001*	r = .46, p < .001*
SOI-R total	r = .40, p < .001*	r = .41, p < .001*

SESII Sexual Excitation Sexual Inhibition Inventory for Women, SDI Sexual Desire Inventory, SAI-E Sexual Arousability Inventory-Expanded, DSFI Derogatis Sexual Function Inventory, Con conservative, Lib liberal, SOI-R Sociosexual Orientation Inventory-Revised

not notably attenuate associations between SESII-W Excitation and other variables (Table 4).

Structural Equation Models

SEMs were used to examine the hypothesized models (Models 1, 2, and 3) shown in Fig. 1. Figure 2 shows the best fitting version of Model 1, wherein a latent sexual excitation factor explains the impact of ethnicity on all observed sexuality variables. This model did not pass the chi-square test of fit ($\chi^2[39] = 209.47$, p < .001), but showed adequate fit

(CFI = .94; RMSEA = .09; SRMR = .05). This model showed significant residual correlations between some manifest variables, most notably between DSFI Conservative Attitudes and DSFI Liberal Attitudes. Significant residual correlations were also seen between SESII-W Excitation, SAI-E Arousal, SOI-R, DSFI Drive, and DSFI Experience. For relative model fit, AIC = 10,777.93.

Figure 3 shows the best fitting version of Model 2, wherein a latent sexual attitudes factor partially mediates the association between ethnicity and latent sexual excitation. Effects on latent sexual excitation are manifest through the variability seen in the other observed sexual behavior and response variables. This model did not pass the chi-square test of fit $(\chi^2[37] = 153.33, p < .001)$, but showed adequate fit (CFI = .95; RMSEA = .09; SRMR = .04). Notably, DSFI Fantasy was loaded onto both the latent excitation and latent attitudes factors. Significant residual correlations were seen between SESII-W Excitation, SAI-E Anxiety, SOI-R, DSFI Drive, and DSFI Experience. No models depicting full mediation (i.e., without any direct paths from ethnicity to latent excitation) or no mediation (i.e., without any indirect paths from ethnicity to latent excitation through latent attitudes) displayed acceptable fit. For relative model fit, AIC = 10,735.79; Model 2 had the lowest AIC and thus best fit of all three models.

Figure 4 shows the best fitting version of Model 3, wherein a latent sexual activity factor is associated with but distinguished from latent sexual excitation. Ethnicity has an impact on latent attitudes, which then impacts latent excitation. Latent excitation is directly associated with latent activity, and ethnicity also separately directly acts on activity. This model did not pass the chi-square test of fit (χ^2 [37] = 172.68, p < .001), but showed adequate fit (CFI=.94; RMSEA=.09; SRMR=.05). Significant residual correlations were seen between SESII-W



^{*}p<.002; Bonferroni correction used to control for type 1 error inflation

^{*}p < .002; Bonferroni correction used to control for type 1 error inflation

Fig. 2 SEM of hypothetical Model 1 (see Fig. 1) in Chinese (n=271; coded as 1) and Euro-Caucasian (n = 201; coded as 0) women. Model displays adequate fit: $\chi^2(39) = 209.47$, p < .001; CFI = .93; RMSEA = .10; SRMR = .05; AIC = 10,777.93. DSFI Derogatis Sexual Functioning Inventory, SESII Sexual Excitation and Inhibition Inventory for Women, SAI-E Sexual Arousability Inventory-Expanded, SDI Sexual Desire Inventory, SOI-R Sociosexual Orientation Inventory-Revised, Att attitudes, Lib liberal, Con conservative

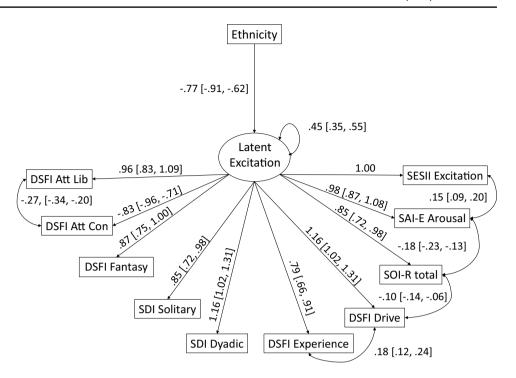
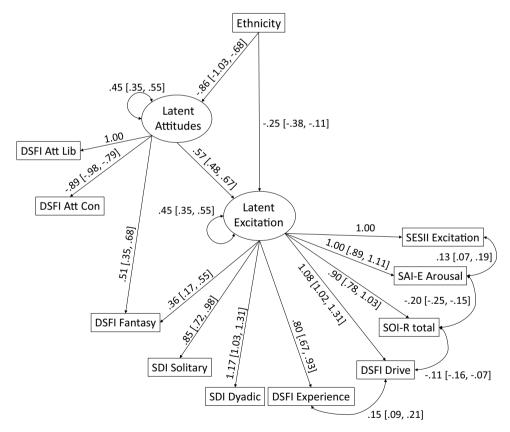


Fig. 3 SEM of hypothetical Model 2 (see Fig. 1) in Chinese (n=271; coded as 1) and Euro-Caucasian (n = 201; coded as 0) women. Model displays adequate fit: $\chi^2(37) = 153.33$, p < .001; CFI = .95; RMSEA = .09; SRMR = .04; AIC = 10,735.79. DSFI **Derogatis Sexual Functioning** Inventory, SESII Sexual Excitation and Inhibition Inventory for Women, SAI-E Sexual Arousability Inventory-Expanded, SDI Sexual Desire Inventory, SOI-R Sociosexual Orientation Inventory-Revised, Att attitudes, Lib liberal, Con conservative

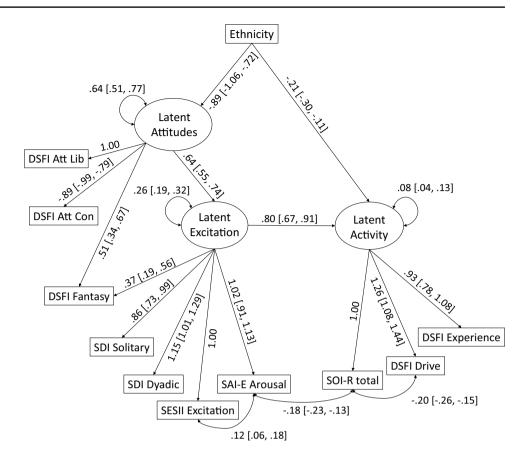


Excitation, SAI-E Arousal, SOI-R, DSFI Drive, and DSFI Experience. Adding a direct path from ethnicity to latent excitation did not improve the model fit, and models without direct

paths between latent variables did not display acceptable fit. For relative model fit, AIC = 10,745.14; Model 3 had better fit than Model 1 but worse fit than Model 2.



Fig. 4 SEM of hypothetical Model 3 (see Fig. 1) in Chinese (n=271; coded as 1) and Euro-Caucasian (n = 201; coded as 0) women. Model displays adequate fit: $\chi^2(37) = 172.68$, p < .001; CFI = .94; RMSEA = .09; SRMR = .05;AIC = 10,745.14. DSFI **Derogatis Sexual Functioning** Inventory, SESII Sexual Excitation and Inhibition Inventory for Women, SAI-E Sexual Arousability Inventory-Expanded, SDI Sexual Desire Inventory, SOI-R Sociosexual Orientation Inventory-Revised, Att attitudes, Lib liberal, Con conservative



Discussion

The current study sought to apply the dual control model to understand the ethnic difference between reported levels of sexual response and behaviors among young Chinese and Euro-Caucasian women in Canada. We expected Chinese women to score lower on sexual excitation and related variables than their Euro-Caucasian peers. We also examined three models (Fig. 1) of how Chinese ethnicity, sexual attitudes, sexual excitation, and sexual responses and behaviors might interact. We found that Chinese women reported lower levels of sexual excitation, response, and behaviors than their Euro-Caucasian peers. Examination of SEMs suggested that group differences between Chinese and Euro-Caucasian women on sexual response and behaviors can be explained by differences in a latent sexual excitation factor.

In support of our hypotheses, Chinese participants reported on average lower sexual desire, arousability, experience, current activity, fantasies, and interest in casual sex. Chinese participants also reported more conservative and less liberal sexual attitudes. These effects replicated prior research in this area (e.g., Brotto et al., 2005; Meston et al., 1996). The greater numbers of participants that reported being sexually active among Euro-Caucasian women, compared to Chinese women, were also consistent with past findings contrasting these two groups (e.g., Ahrold & Meston, 2010; Cain et al.,

2003). As expected, Chinese participants reported significantly lower levels of sexual excitation on the SESII-W than Euro-Caucasian participants. Sexual excitation was significantly associated with all sexual outcome variables, even after controlling for sexual inhibition, among both groups. Controlling for age did not notably influence these patterns.

Role of Sexual Excitation

Examination of SEMs provided further elaboration of these relationships. The more parsimonious Model 1 was shown to have adequate fit for the data, but the more complex Models 2 and 3 had somewhat better fit. These models suggested that the observed differences on sexual desire, arousability, and SESII-W Excitation between Chinese and Euro-Caucasian women could be conceptualized broadly as reflecting group mean differences on an underlying latent excitation factor. Latent excitation was seemingly distinct from conservative and liberal attitudes, which emerged as a separate but linked latent sexual attitudes factor. Observed variables related to sexual behaviors or activities, such as sexual experience and drive, produced marginally better model fit when incorporated into the latent excitation factor as well, but could also be seen as reflective of a separate more behaviorally oriented latent factor while still producing acceptable model fit. The relation between experiential aspects of sexual excitation



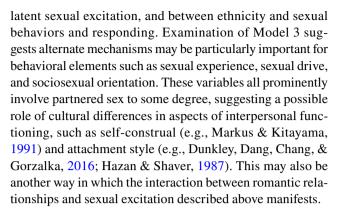
(i.e., desire and arousal) with sexual activities and behavior thus appeared consistent with the reciprocal and cyclical association between sexual arousal, desire, and behaviors seen in most current conceptualizations of the female sexual response cycle (e.g., Basson, 2000). All models revealed residual correlations between the measured sexuality variables beyond the ones predicted, suggesting that our hypothesized interrelation between the observed variables is a supported but incomplete representation of the interactions present.

This investigation represented the first application of the dual control model to the examination of sexual behaviors and response in Chinese young women. Our findings suggest that it may be appropriate to consolidate past findings in this area as being related to group differences in an underlying sexual excitation factor. This is somewhat consistent with the limited information in the literature. Among Euro-Caucasian women, that awareness and enjoyment of sexual excitation often must be developed through motivated attention to internal experiences and external contextual cues (Basson, 2000; Brotto, Heiman, & Tolman, 2009; Tolman, 1994). Chinese individuals in Canada reflected that they rarely ever had the opportunity to address sexuality with others (Dang et al., 2017), and Asian youth frequently report receiving little communication about sexuality from their families (Kim & Ward, 2007). For Chinese women, any discussion about sexuality, as positive or negative, may often be restricted by avoidance due to social taboo. This avoidance may then impede opportunities to cultivate and gain awareness of their own signs of excitation.

Another mechanism by which culture and ethnicity may impact sexual excitation is through the interaction of sexual activity with romantic relationships. The Chinese women were less likely to report being currently in a romantic relationship or currently sexually active. It is possible that the lower rates of sexually active Chinese women reflect the lower levels of sexual excitation. However, it is also possible that lower levels of sexual excitation are the result of lower levels of romantic and sexual relationships, as relational factors and previous sexual experiences can have an impact on arousal and responsive desire (Basson, 2000). This is consistent with traditional prohibitions against non-marital sexual activity common in East Asian cultures (e.g., Higgins, Zheng, Liu, & Sun, 2002; Okazaki, 2002). Indeed, the lower frequency of sexual activity and romantic relationships in this population may represent the sociocultural environmental context wherein lower levels of sexual excitation are maintained.

Interaction of Excitation and Attitudes

The current results showed that sexual attitudes partially, but not fully, mediated the association between ethnicity and



This is consistent with past research on how reportable attitudes often correlate with but do not entirely explain motivated behaviors in a variety of sexual and non-sexual domains (e.g., Albarracin, Johnson, Fishbein, & Muellerleile, 2001; Kraus, 1995); other trait and environment factors are also often important. For young Chinese and Euro-Caucasian women, this demonstrates that sexual conservatism and liberalism, at least on the level of overt reportable attitudes about sexual topics, are not sufficient to entirely explain the ethnic and cultural difference. Kim and Ward (2007) also found that communication about sexual topics by Asian parents often involved nonverbal and implicit signaling; these messages may facilitate less sexual activity without translating into overtly reportable sexual attitudes. This cultural norm around sexuality may also interact with low sexual excitation to result in sex being experienced as less important by Chinese women (Cain et al., 2003). Contextual factors, such as the women leaving partners in their home countries when studying abroad, may also play a role regardless of individual differences in sexual attitudes or excitation.

Role of Sexual Inhibition

We did not find a significant difference between Chinese and Euro-Caucasian women on sexual inhibition. Sexual inhibition was not reliably associated with most sexual outcome variables. The exception was sociosexual orientation, where sexual inhibition may be particularly important in facilitating conscious decisions to avoid casual sex in order to meet social demands or personal goals. Conversely, many sexual outcome variables, such as desire or arousal, overlap conceptually with sexual excitation as they all directly address activation of the sexual response cycle (Bancroft & Janssen, 2000; Graham et al., 2006). As previously discussed, facilitation of sexual excitation, and especially the motivation to seek excitatory stimuli and to attend internal experiences of desire and arousal, appears particularly important for high sexual response in women; the current findings are consistent with this and suggest that these same process is highly relevant to both Western and Chinese cultural contexts.



However, it is also possible that sexual inhibition plays a larger role than we had observed among other sexuality variables. Factors more directly related to avoidance or disengagement from sex, such as sexual guilt (Woo et al., 2011), may display greater involvement of inhibitory processes. Furthermore, a more detailed examination about the types of inhibition (e.g., concerns about sexual performance vs. concerns about social appropriateness) may reveal more subtle differences between Chinese and Euro-Caucasian women in this domain. This can include differential roles of fear of sexual performance difficulties concern versus fear of external threat and negative consequences, as highlighted by the Sexual Inhibition Scale/Sexual Excitation Scale (SIS/SES; Bancroft & Janssen, 2000).

Cross-Cultural Generalizability of Sexuality Constructs

One important consideration for the current study was the cross-cultural generalizability of the constructs of sexual response, excitation, and inhibition. Chinese individuals may have reported lower levels of sexual responding and behaviors due to not identifying with Western culturally bound sexuality concepts. Malavige et al. (2013) reported several concepts of the SIS/SES did not have a clear semantic translation into various (non-Chinese) Asian languages. In our study, the SESII-W correlated similarly with other sexual response variables among Chinese and Euro-Caucasian participants, providing some evidence of concurrent validity of this scale among the Chinese women. Exploratory factor analysis of the SESII-W (see "Appendix") showed that most items did load onto the appropriate excitation or inhibition factors in both subsamples. However, only the Euro-Caucasian women replicated the eight-factor model described in Graham et al. (2006). This suggested that the SESII-W may have had a somewhat different factorial structure or semantic meaning for Chinese participants, which may limit the comparability of the two subsamples. The current sample of Chinese women was also exposed to both Chinese and Canadian cultural conceptualizations of sexuality, and their experiences might fit neither with a purely Chinese nor with a purely Western model.

Limitations

Our models describe a causal process wherein ethnicity and culture impacts attitudes, which impacts latent sexual excitation, which is then reflected in other aspects of sexual responding. The hypothesized directionality of the relationship between our latent factors is unknown due to the correlational approach. It is possible that higher levels of sexual activity and experience could instead motivate adoption of less restrictive and more liberal sexual attitudes, and contribute to an overall sense of increased sexual excitation. For example, individuals who are intrinsically more prone to experiencing sexual excitation may be more inclined to seek out and identify with sexually liberal perspectives. The pattern of associations between these complex variables may indeed be multifaceted, reciprocal, and interactive.

Another limitation was the use of ethnicity as a proxy for culture, and the lack of well-accepted quantitative measures of the content of cultural themes and attitudes that are applicable for cross-group comparisons. Unfortunately, this limits our ability to contrast specific elements of Chinese and Western cultures that could contribute to the patterns seen in sexual responding and behaviors, as well as definitively examine whether between-group differences are due to entirely cultural (vs. potential biological) factors. This is particularly important given the dual control model's original emphasis on evolutionary context and nervous system-level conceptualizations (Bancroft & Janssen, 2000).

The current study was also limited to focus on a particular cohort of young adults currently residing in Canada. We used a self-selected sample of Chinese and Euro-Caucasian university women, who may be on average younger and have higher education compared to the general population. Therefore, our results may not generalize to other groups of Chinese or Euro-Caucasian women, especially with regards to age, education level, or generation. Notably, the findings should not be interpreted as a cross-country study. Cohort effects also influence the interpretations within the current sample; specifically, the DSFI Experience scale, although well-validated and frequently used in past studies on this topic, notably was created before the advent of prominent Internet and smartphone use (e.g., for online dating) among young adults.

Response bias with reporting sexual responding, activities, and problems presented another barrier to interpretability, particularly among individuals who may have had more conservative and less liberal sexual attitudes. The presence of response and selection biases is prominent issues in all self-report studies in voluntary samples. Though we did not detect a significant difference in general social desirability responding between the two ethnic groups, it is still possible that Chinese individuals could be less likely to disclose specific sexuality-related experiences due to cultural factors. Differential patterns of volunteer bias between Chinese and Euro-Caucasian women may have also impacted the patterns seen (Woo, Brotto, & Yule, 2010).

Clinical Implications

The results highlighted the role of low sexual excitation as a potential clinical treatment for sexual difficulties among young Chinese women. This suggested that, in this population, helping patients enhance their experiences of excitation



may be a credible treatment for desire and arousal disorders even when the difficulties are partially maintained by cultural factors. This could be alongside challenging restrictive sexual attitudes. However, it is currently not well understood if Chinese women, in comparison with their Euro-Caucasian peers, are more distressed about low sexual excitation, especially if it is culturally normative. Therefore, even though Chinese women on average reported markedly lower levels of sexual activity and experience than their Euro-Caucasian peers, this does not represent the presence of sexual dysfunction in an individual woman if it does not cause her clinically significant distress or impairment.

Conclusion

The current study connected previous findings on differences between Chinese and Euro-Caucasian young women in sexual response and behaviors to a well-established model of sexual response, the dual control model. Our findings replicated the existing literature on this topic, wherein Chinese women reported lower levels of sexual responding and behaviors. Chinese women reported lower levels of sexual excitation but similar levels of sexual inhibition as their Euro-Caucasian peers. Various mean differences were adequately explained by differences in an underlying latent

sexual excitation variable. Differences in levels of sexual excitation may be a primary component of the previously observed group differences in sexual response and behaviors between Chinese and Euro-Caucasian women. Restrictive sexual attitudes were important mediators, but likely not the sole cause, of differences in sexual response and excitation. The current results demonstrated the role of sexual excitation as an area of future research and intervention for female sexual difficulties among Chinese individuals.

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Appendix

Exploratory factor analyses (EFA) for Sexual Excitation and Sexual Inhibition Inventory for Women in Euro-Caucasian (n=201) and Chinese (n=270) women. Consistent with Graham et al. (2006), an eight-factor model was extracted using maximum likelihood EFA with varimax rotation. For Euro-Caucasian women, the model explained 46.11% of the variance in the scale, while for Chinese women the model explained 44.77% of the variance. Only the largest factor loading per item is shown.

	F1	F2	F3	F4	F5	F6	F7	F8
Euro-Caucasian		1			1		,	,
Excitation items								
Arousability								
Seeing an attractive partner's naked body really turns me on	.471							
Just being physically close with a part- ner is enough to turn me on	.469							
I get very turned on when someone really wants me sexually	.415							
Fantasizing about sex can quickly get me sexually excited	.593							
When I think about someone I find sexually attractive, I easily become	.748							
With a new partner I am easily aroused	.423							
If I see someone dressed in a sexy way, I easily become sexually aroused	.581							
Certain hormonal changes definitely increase my sexual arousal	.330							
Sometimes I am so attracted to some- one, I cannot stop myself from	.550							
Partner characteristics								
Someone doing something that shows he/she is intelligent turns me on					.625			
If I see a partner interacting well with others, I am more easily sexually					.718			



	F1	F2	F3	F4	F5	F6	F7	F8
Seeing a partner doing something that shows his/her talent can make me		,			.618			
Eye contact with someone I find sexually attractive really turns me on					.450			
Sexual power dynamics								
It turns me on if my partner "talks dirty" to me during sex						.408		
Feeling overpowered in a sexual situation by someone I trust increases						.959		
If a partner is forceful during sex, it reduces my arousal						- .495		
Dominating my partner sexually is arousing to me						.254		
Smell								
Particular scents are very arousing to me								.611
Often just how someone smells can be a turn-on								.943
Setting (unusual or unconcealed)								
Having sex in a different setting than usual is a real turn-on for me			368					
If it is possible someone might see or hear us having sex, it is more			.732					
I find it harder to get sexually aroused if other people are nearby			.791					
I get really turned on if I think I may get caught while having sex			644					
Inhibition items								
Concerns about sexual function								
If I am concerned about being a good lover, I am less likely to become				.637				
If I think about whether I will have an orgasm, it is much harder for me				.588				
Sometimes I feel so "shy" or self-conscious during sex that I cannot				.591				
If I am worried about taking too long to become aroused, this can				.587				
Arousal contingency								
It is difficult for me to stay sexually aroused							.536	
When I am sexually aroused the slightest thing can turn me off							.569	
Unless things are "just right" it is difficult for me to become sexually							.712	
Relationship importance								
If I think that a partner might hurt me emotionally, I put the brakes on		.486						
It would be hard for me to become sexually aroused with someone who is		.571						
If I think that I am being used sexually it completely turns me off		.653						
It is easier for me to become aroused with someone who has		.528						
If I am uncertain about how my partner feels about me, it is harder for me		.643						



	F1	F2	F3	F4	F5	F6	F7	F8
I really need to trust a partner to become fully aroused		.675						
Chinese								
Excitation items								
Arousability								
Seeing an attractive partner's naked body really turns me on	.439							
Just being physically close with a part- ner is enough to turn me on	.469							
I get very turned on when someone really wants me sexually	.613							
Fantasizing about sex can quickly get me sexually excited	.557							
When I think about someone I find sexually attractive, I easily become			.436					
With a new partner I am easily aroused			.560					
If I see someone dressed in a sexy way, I easily become sexually aroused			.658					
Certain hormonal changes definitely increase my sexual arousal			.274					
Sometimes I am so attracted to someone, I cannot stop myself from			.518					
Partner characteristics								
Someone doing something that shows he/she is intelligent turns me on					.644			
If I see a partner interacting well with others, I am more easily sexually					.559			
Seeing a partner doing something that shows his/her talent can make me					.731			
Eye contact with someone I find sexually attractive really turns me on						.406		
Sexual power dynamics								
It turns me on if my partner "talks dirty" to me during sex	.588							
Feeling overpowered in a sexual situation by someone I trust increases	.566							
If a partner is forceful during sex, it reduces my arousal				.225				
Dominating my partner sexually is arousing to me	.340							
Smell								
Particular scents are very arousing to me						.714		
Often just how someone smells can be a turn-on						.721		
Setting								
Having sex in a different setting than usual is a real turn-on for me	.456							
If it is possible someone might see or hear us having sex, it is more							.703	
I find it harder to get sexually aroused if other people are nearby							.739	
I get really turned on if I think I may get caught while having sex							462	



	F1	F2	F3	F4	F5	F6	F7	F8
Inhibition items								
Concerns about sexual function								
If I am concerned about being a good lover, I am less likely to become			.362					
If I think about whether I will have an orgasm, it is much harder for me				.517				
Sometimes I feel so "shy" or self-conscious during sex that I cannot				.554				
If I am worried about taking too long to become aroused, this can				.668				
Arousal contingency								
It is difficult for me to stay sexually aroused				.477				
When I am sexually aroused the slightest thing can turn me off				.469				
Unless things are "just right" it is dif- ficult for me to become sexually								.755
Relationship importance								
If I think that a partner might hurt me emotionally, I put the brakes on		.582						
It would be hard for me to become sexually aroused with someone who is		.585						
If I think that I am being used sexually it completely turns me off		.681						
It is easier for me to become aroused with someone who has		.444						
If I am uncertain about how my partner feels about me, it is harder for me		.619						
I really need to trust a partner to become fully aroused		.591						

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