2017-07-01

Correlates of Risky Sexual Behavior in the People's Republic of China

Kersti A. Spjut
Brigham Young University

Correlates of Risky Sexual Behavior in

the People's Republic of China

Kersti A. Spjut

A dissertation submitted to the faculty of
Brigham Young University
in partial fulfillment of the requirements for the degree of

Doctor of Philosophy

Scott R. Braithwaite, Chair
Scott Baldwin
Niwako Yamawaki
Patrick Steffen
Robert D. Ridge

Department of Psychology

Brigham Young University

ABSTRACT

Correlates of Risky Sexual Behavior in
the People's Republic of China

Kersti A. Spjut
Department of Psychology, BYU
Doctor of Philosophy

Risky sexual behaviors, or behaviors with the risk of an adverse health outcome, are on the rise. Rates of Sexually Transmitted Infections (STIs) are also on the rise. Research suggests that several variables are closely related to human sexual behavior, namely sexual attitudes, HIV-transmission knowledge, and gender. Individuals with more permissive sexual attitudes tend to engage in riskier sexual behaviors. Studies examining the relationship between sexual knowledge and risky sexual behavior show both positive and negative associations. Although risky behaviors can occur between partners of any gender, the present study focuses on heterosexual relationships. The present study uses data from a nationally representative sample of 3,737 adults living in the People's Republic of China (PRC) who completed a computerized interview about their sexual knowledge, attitudes, and behavior. I used structural equation modeling (SEM) to test a mediation model with permissive sexual attitudes as a mediator between HIV-transmission knowledge and four risky sexual behaviors: number of sexual partners, extradyadic sex, age of first intercourse, and paying for sex. I found significant indirect effects of attitudes on every risky sexual behavior other than age of first intercourse. There was a significant gender moderation such that attitudes predicted stronger effects on behavior for women than for men. These findings have implications for future efforts to create interventions and prevention programs for risky sexual behavior. Although the present study has some limitations, it contributes to a gap in the literature by replicating a Knowledge-Attitude-Behavior (KAB) model of risky sexual behavior a large, representative sample of adults across the PRC.

ACKNOWLEDGMENTS

I would like to thank Dr. Scott Braithwaite for his support on this project and throughout graduate school, as well as all of the members of my committee for helping me produce a better project through their feedback. I would like to thank my husband, Justin Duckwitz, for supporting my passions no matter what. Many thanks to my parents, Karen and Erik Spjut, for setting an example of hard work, kindness, and humor, and for encouraging me to pursue higher education. I also thank Dr. Chongming Yang for his countless hours of consultation on this project.

Table of Contents

LIST OF FIGURES

LIST OF TABLES

Correlates of Risky Sexual Behavior in the People's Republic of China

Human sexual behavior has many health benefits, including reduced social anxiety

(Kashdan, et al., 2013), increased self-esteem, decreased internalizing symptoms (Furman &

Collibee, 2014), and overall psychological and physical health (Brody, 2010; Jannini, Fisher,

Bitzer, & McMahon, 2009). However, these benefits appear to be limited based on behavior

type and context. Some sexual activity, such as having unprotected sex with multiple partners,

puts individuals at a higher risk for contracting Sexually Transmitted Infections (STIs) or

creating unwanted pregnancies. Understanding what influences people to engage in risky

behavior will help in efforts to prevent the behavior and its negative outcomes. The present

study aims to aid this understanding by examining the relationship between sexual knowledge,

sexual attitudes, gender, and risky sexual behavior among a sample of Chinese adults.

Risky Sexual Behavior

In the present study I define risky sexual behavior as sexual behaviors with a risk of

adverse outcomes. These behaviors include, but are not limited to, having casual sex with

multiple partners, having sex without a condom or other forms of birth control, having sexual

intercourse at a young age, and having sex with a sex worker. Risky sexual behaviors may have

negative emotional, physical, legal, financial, occupational, and spiritual consequences

(McBride, Reece, & Sanders, 2008), such as contracting an STI or having an unwanted

pregnancy (Marcus, Fulton, & Turchik, 2011). Although risky behaviors can occur between

partners of any gender, the present study focuses on heterosexual relationships. Rates of

heterosexual transmission of HIV have been steadily increasing (State Council AIDS, 2007;

Zhang, et al., 2013), and in 2013, the majority of new HIV transmission in China in 2014

occurred through heterosexual sexual contact (Tatlow, 2015). While many studies of STI/HIV

transmission in China have focused on sex workers, migrants, men who have sex with men, or other marginalized populations (Cai, et al., 2014; Chen, et al., 2015; Chow, et al., 2015; Huang, Muessig, Zhang, & Maman, 2015; Qiao, et al., 2015; Yang, Kelly, & Yang, 2016), middle-aged middle-class married men are also highly likely to engage in sexual behaviors that lead to the spread of disease (Jeffreys & Yu, 2015). Thus, the present study focuses on a general and more representative Chinese sample rather than targeting specific groups.

Since HIV was introduced to China by a foreign tourist in 1985 (Ruan, 1991), rates of infection have continued to rise despite public health campaigns targeting the spread of HIV. As of 2004, estimated HIV prevalence rates in China ranged from 430,000 to 1.5 million individuals (Steinbrook, 2004). Prevalence of other STIs, including syphilis and chlamydia, continues to increase, with the exception of gonorrhea, which decreased by 30% from 2005 to 2009 (Chen, Peeling, Yin, & Mabey, 2011). China may also have one of the highest abortion rates in the world, with an estimated 9.2 to 13 million abortions performed in 2008 (Jeffreys & Yu, 2015; Oleson, 2011), indicating a high number of unwanted or unexpected pregnancies. Despite these increasing risks of disease and unwanted pregnancy, the frequency of risky sexual behaviors continues to rise. One study of Chinese adults found that having one-night stands, having multiple partners, and having sex with sex workers were all significantly more common in 2010 than 2006 (Huang, et al., 2014). The present study seeks to understand the risk factors and protective factors upon which future interventions may be based.

Chinese Context

Because human sexuality varies across cultures (Irvine, 1995), cultural context matters. Although views on sexuality can be as diverse within a given culture as views across cultures, it can be helpful to understand broad cultural movements over time.

Chinese attitudes toward sexuality have changed widely over China's long history. In Imperial China, dominant philosophies viewed sexual behavior positively: Confucianism portrayed sex as a way to perpetuate a family line through procreation, and Taoism emphasized sex as a way to gain harmony with nature (Zhang & Beck, 1999). Some of the world's oldest sex handbooks were created in China, with three sexological works discovered at the Ma-wang-tui Han Tomb No. 3, dated around 168 B.C. Over twenty sex handbooks were created and circulated from before the Han dynasty until the end of the Tang dynasty (around 202 B.C. to 907 A.D.), containing information on the mystical, health, and sensual benefits of sexual intercourse (Ruan, 2011).

Around the 17th century, Chinese views on sex shifted. The Chinese government began to promote asceticism and the idea that the only acceptable form of sexual expression was heterosexual sexual intercourse within a marriage for the purpose of procreation (Zhang & Beck, 1999). Talking about sexuality publicly became stigmatized. This more conservative view of sexuality persisted for several centuries, including into the Mao years from 1949 to 1976 when sex was portrayed as a selfish, shameful expression of individualism (Zheng et al., 2011). Historians do not have consensus on the portrayal of sex during this period. Jeffreys and Yu (2015) contend with the idea that sex and sexuality were "taboo" during the Mao years, asserting instead that public discussions of sex were frequent and portrayed normative sexuality as "adult, monogamous, heterosexual and marital, rather than pre-marital, casual, extra-marital, homosexual, and commercial" (p. 5). Whether discussions of sex were taboo or acceptable, it is at least clear that public discussions of sex were based on differing values and priorities than present day or historically precedent discussions.

With the Open Door Policy in the late 1970's, China began to have more contact with the West and gradually shifted toward liberal or permissive attitudes toward sexuality (Ng, 1993; Zhang & Beck, 1999), a process often known as detraditionalization (Zheng et al., 2011). This process has not been without resistance, with cohabiting couples or others challenging a married, heterosexual version of sex facing arrest or other consequences (Ruan, 1991). Although western influence may have contributed to detraditionalization, it is only one of many factors contributing to China's shifting sexual climate. This shifting sexual climate coupled with China's large population and rising world prominence make it an important setting for studying sexuality and behavior. Furthermore, a large portion of sexuality research centers on western samples, which may not generalize to other areas.

In condensing thousands of years of history into a brief narrative about Chinese sexuality, it is easy to oversimplify. I will try to avoid using what Foucault described as "the repressive hypothesis", meaning a reification of the narrative that all societies pass through a period of repressive, Victorian-style sexual norms, before moving forward into an enlightened (typically Westernized) view of sexuality (Foucault, 1978; Jeffreys & Yu, 2015). Movement is not always progress; sometimes it is just movement. As Jeffreys and Yu (2015) point out, the one-child policy (changed to a two-child policy in 2015) that has been frequently demonized by Western perspectives actually has a number of benefits for Chinese women who are less constrained by pregnancy and maternal mortality and consequently have longer average life expectancies, freedom to pursue a wider range of careers, and enhanced social status. Certainly policies that limit child-rearing also have significant negative impacts, but portraying any set of sexual standards as all good or all bad will inevitably be incomplete. As such, the present study does

not value one set of sexual attitudes over another[2], but aims to understand risk factors for

negative health consequences in the context of shifting societal views.

Another aspect of Chinese culture to consider is the availability of and views toward sex

education. From around 1950 to 1980, sex education efforts in China were sporadic and

disjointed, with some political leaders pushing for the publication of information booklets about

sex and pre-adolescent instruction in schools, but no systematic and consistent changes. (Ruan,

2011). Ruan (2011) reports that widespread models of sex education in China were not

developed until the 1980s, and even then these models were solely about how contraception

could slow population growth. Sexual informational texts were brief and took a conservative

tone, likely out of deference to the government's conservative stance at the time (Ruan, 2011).

By the mid-1980s, however, government officials began to see the necessity of a more

systematic approach to sex education, due to pressure from influential Chinese researchers,

increasing rates of teenage pregnancy and STIs, increased population growth, and the open door

policy (Ruan, 2011). High school sex education courses were piloted in Shanghai, beginning in

1981, and eventually spread across the country. These courses focused on physiological and

psychological changes during puberty, personal hygiene, and sexual morality. The first college

level sexology course began in May 1988 at China People's University in Beijing (Ruan, 2011).

Several Chinese sexological research organizations were founded in the late 1980s and began

publishing their research—a short-lived phenomenon as the political climate became more

repressive following the incident in Tiananmen Square in June 1989 (Jeffreys & Yu, 2015). In

the mid- to late-1990s, the Chinese Sexology Association (a national organization) was founded

and large exhibitions of sexological research began to take place, although as Jeffreys and Yu

(2015) note, many of the studies published at that time have since been criticized for taking a moralistic and pathologizing approach to sex.

Since the 1990s, most Chinese school children have received some form of sex education in their schools (usually focused on puberty) (Yu-Feng, 2012). As of 2001, a group of Chinese adolescents identified their school teachers and the mass media as their main sources of sexual information (Zhang, Li, & Shah, 2007). Furthermore, the more taboo the topic, the more likely students were to report getting their information from media instead of teachers; for instance, around 45% of students reported getting knowledge about puberty from school teachers but only 18% reported getting knowledge about HIV/AIDS from teachers, compared to 7% for puberty and 28% for HIV/AIDS information from media sources (Zhang, Li, & Shah, 2007). The same study found that sexually active adolescents reported peers as their main source of sexual information, compared to parents and teachers as the main source for sexually inactive adolescents. Recently, Chinese schools started using more scientific and less moralistic manuals for sex education in Chinese schools, a decision that was received with some controversy (Wang & Griffiths, 2017). Considering the history of sex education in China, it is likely that most of the participants in the present study received no formal sex education. Those who did are likely emerging adults whose sex education was focused on pubertal knowledge and sexual morals rather than HIV transmission.

Sexual Knowledge and Behavior

One variable that may be associated with sexual behavior is sexual knowledge, or the possession of factual information about human sexual behavior. For the present study, I will focus on sexual knowledge about the transmission of HIV. Studies examining the association between HIV transmission knowledge and sexual behavior have mixed results. In many cases,

knowledge about HIV-preventative sex was significantly correlated with safer sexual practices.

For example, female sex workers in southern China who had greater knowledge about condoms

were significantly more likely to use condoms with their clients (Lau, Tsui, Siah, & Zhang,

2002). Other studies have failed to show significant connections between HIV transmission

knowledge and risky sexual behavior. Data provided by Taiwanese junior college students

showed no connection between sexual health knowledge and safe sex behaviors in a structural

equation model with excellent fit and high factor loadings (Lou & Chen, 2009). High levels of

knowledge about sex and about HIV/AIDS also failed to predict safe sex behaviors among

Chinese college students living in Hong Kong, with perceived self-efficacy and sexual attitudes

more strongly predicting condom use (Wong & Tang, 2001). This finding may be due to a

relatively sexually inactive sample, with 76.1% of participants reporting abstinence in the past 12

months and only 12.7% reporting frequent sexual intercourse during that time period.

Studies in these areas are difficult to compare, because the populations measured and the

specific types of sexual knowledge and behavior vary widely. Clearly, more research is needed

to understand which types of sexual knowledge are most strongly correlated with which sexual

behaviors. Furthermore, samples of Chinese college students, Chinese female sex workers, and

Taiwanese adults over the age of 65 are not likely generalizable to a broader Chinese adult

population. The present study aims to fill this gap in the existing literature by assessing

correlates of sexual behavior among a large, representative sample of Chinese adults, as the

present author could find no existing study examining the relationship between sexual

knowledge, attitudes, and behavior in a population-based Chinese sample.

Sexual Attitudes and Behavior

As findings about the relationship between sexual knowledge and sexual behavior have been mixed, many researchers have looked at sexual attitudes as an alternative way to understand risky sexual behavior. I define sexual attitudes as a person's beliefs about sexuality, especially beliefs about the purpose of sexual behavior and what types of sexual behavior are appropriate or moral. Sexual attitudes are often described on a scale from liberal to conservative (Fischtein, Herold, & Desmarais, 2007). People with liberal (or permissive) sexual attitudes tend to believe that a wide variety of sexual practices are acceptable and that the primary purpose of sexual behavior is personal satisfaction and fulfillment, even if other secondary purposes such as procreation may matter too. They are more likely to believe that sex need not be limited to a committed romantic relationship. Conversely, people with conservative sexual attitudes tend to believe that a narrower range of sexual behaviors are acceptable, that sexual intercourse should be limited to committed relationships, and that the primary purpose of sex is procreation.

Research across the world has shown that sexual attitudes may be significantly associated with sexual behaviors. A study of U.S. college students found that people with permissive sexual attitudes had a higher likelihood of engaging in sexual intercourse and having multiple sexual partners (Luquis, Brelsford, & Rojas-Guyler, 2011). Other studies of U.S. undergraduates showed positive correlations between liberal sexual attitudes and sexual behaviors such as intercourse prior to age 18, increased number of sexual partners (Weeden & Sabini, 2006), and involvement in casual hookup sex (Katz & Schneider, 2013). Among polytechnic students in Nigeria, students who denied having sexual intercourse in the past six months also reported more conservative sexual attitudes than students who reported engaging in sexual intercourse over the previous six months (Lawal, 2010).

Similar effects have been found among Chinese populations. Among a sample of sexually active Chinese college students, endorsement of certain sexual beliefs predicted less risky sexual behaviors; for example, students who believed that most people are not concerned about the consequences of sex—a more permissive sexual attitude—were less likely to ask about their own partners' sexual history (Cottrell et al., 2005). Middle school students from three schools in China showed that more permissive sexual attitudes a student reported, the more likely they were in to engage in risky sexual behaviors like engaging in unprotected sexual intercourse (Guo, Hou, & Yao, 2013). In some cases, liberal sexual attitudes actually corresponded with less risky sexual behaviors. Among individuals over age 65 living in Taiwan, those who endorsed more liberal attitudes toward sex, such as believing that being sexually active in old age is socially appropriate, were more likely to be sexually active, which is a preventative factor for depression and other diseases (Wang, et al, 2008).

However, not all findings among Chinese populations indicate predictive power of sexual attitudes upon sexual behavior. Some studies have failed to show a correlation between sexual attitudes and sexual behavior among college students in Hong Kong (Wong & Tang, 2001) and junior college students in Taiwan (Lou & Chen, 2009), although as noted previously, these studies may be limited by a restricted range of sexually active participants. Studies that examined sexual attitudes in relation to sexual behavior in Chinese populations were only found among emerging adults and elderly adults, leaving a gap of understanding about the general adult population—a gap which the present study aims to fill. The present sample improves on past research by including adults across the lifespan, the majority of whom are sexually active.

Relationship Between Knowledge, Attitudes, and Behavior

Many studies have examined how sexual attitudes and HIV transmission knowledge relate to sexual behavior separately, but fewer studies in Chinese samples have examined the relationship between sexual knowledge, attitudes, and behavior in a complete model. Lou and Chen (2009) surveyed junior college students in Taiwan and used structural equation modeling to test a mediation model, hypothesizing that sexual attitudes mediated the connection between sexual knowledge and safe sex behaviors (condom usage, avoidance of body fluids, and avoiding other risky behaviors). They found that sexual knowledge had a significant direct effect on sexual attitudes, such that more sexual knowledge was predictive of more permissive attitudes toward sex, with sexual knowledge accounting for 39% of the variance in sexual attitudes. Two types of sexual knowledge showed significant effects on attitudes, with effect sizes of -.62 ($p<.05$) and -.79 ($p<.05$) for pregnancy knowledge and sexual physiological knowledge, respectively. However, Lou and Chen (2009) found no significant direct effect from knowledge to behavior ($\beta=.06$ and -.15, $p>.05$) or from attitudes to behavior ($\beta =.03$, $p>.05$). It is unclear why no effect was found, although study authors hypothesized that it may be due to the developmental stage of their late adolescent sample.

Another study of 2,644 Chinese undergraduate students (ages 17 to 25 years) examined the relationships between sexual knowledge, sexual attitudes, and sexual behavior via the Knowledge-Attitude-Behavior (KAB) framework. Zhang, Chi, and Wu (2012) administered several measures of sexual attitudes and behavior to 1,314 male students and 1,330 female students, including the Sexual Health Knowledge Scale, Brief Sexual Attitude Scale, and Sexual-related Behaviors Questionnaire. Using regression analysis and Sobel testing, they found a significant indirect effect for a mediation model (4.45, $p<.01$), with sexual attitudes partially

mediating the connection between sexual knowledge and sexual behavior. This indirect effect accounted for 25.7% of the variance in male participants' sexual behaviors and 29.8% of the variance in female students' sexual behaviors. These results indicated that students with higher levels of sexual knowledge showed higher rates of risky sexual behaviors. The more permissive the students' attitudes toward sex, the more likely they were to engage in behaviors such as penetrative intercourse without a condom. This finding goes counter to the common perception (and the foundation for many sexual education programs) that the more someone knows about preventing the spread of STIs, the more likely they are to practice safe sex. If such findings can be replicated among a wider range of Chinese adults, it would have implications for public health efforts to prevent risky sexual behavior. Many sexual education programs focus solely on increasing knowledge and neglect any intervention on sexual attitudes, but at least among Chinese undergraduate students this approach may neglect a crucial mediator. Zhang et al. (2012)'s model is an important step toward a more comprehensive understanding of the relationship between sexual attitudes, knowledge, and behavior. I will attempt to replicate this model among a larger and more diverse sample of Chinese adults, extending potential generalizability of findings beyond Chinese undergraduate students.

Gender

Research suggests that gender may be related to sexual attitudes and behavior. For the present study, gender is defined as an individual's self-reported gender, with a forced-choice binary of male or female. Although this approach has limitations, including conflating biological sex with gender and excluding people who identify as neither male nor female, its use is primarily practical, given the way gender has been measured in the prior literature and the archival nature of my data. Fischstein, et al. (2007) examined the predictive power of several

demographic variables (including age, marital status, education, religiosity, and gender) upon

sexual behaviors of Canadian adults. Gender was found to be the strongest predictor of several

sexual behaviors, with men being more to likely than women to have frequent sexual thoughts,

engage in oral sex, have a lower age at first intercourse, have more sexual partners, and consider

casual sex. Lefkowitz, Gillen, Shearer, and Boone (2004) found that gender significantly

predicted attitudes about condom use among emerging adults in the U.S, with men holding more

negative attitudes toward condom use. Yet other studies have shown no gender differences in

sexual attitudes (Guerra, Gouveia, Sousa, Lima, & Freires, 2012; Lawal, 2010). Peplau (2003)

reviewed several studies of gender differences and similarities in human sexuality and found that

men typically have more permissive sexual attitudes than do women. Another review of meta-

analytic results showed evidence of gender differences in sexual attitudes; men were more likely

to hold permissive views of premarital sex, extramarital sex, masturbation, and sexuality in

general. (Petersen & Hyde, 2011). However, careful examination of meta-analytic effect sizes

indicated relatively weak gender differences that seem to be decreasing over time (i.e., male and

female sexual attitudes are becoming more similar).

Research among Chinese samples has suggested similar gender differences in sexual

attitudes, knowledge, and behavior. Male Chinese secondary students endorsed more permissive

sexual attitudes than did female Chinese students, including greater agreement with premarital

intercourse and the use of pressure and force in sexual activity (Ip, Chau, Chang, & Lui, 2001).

Among Chinese junior high students, boys reported significantly more permissive sexual

attitudes than did girls (Guo, et al., 2013). Among the Taiwanese elderly, men were more likely

than women to engage in frequent intercourse (Wang et al., 2008). A review article of Chinese

university students living abroad suggested that women were more likely than men to be sexually

experienced (Yu, 2010). The same review article indicated mixed findings about gender

differences in sexual attitudes, with some studies showing no gender differences and others

showing that men of Chinese origin living abroad tended to have more liberal sexual attitudes

than women of Chinese origin living abroad (with the exception of men holding less permissive

attitudes toward homosexuality).

Theoretical Foundations

   Moderators of attitude-behavior consistency. Social psychologists have long

examined factors influencing attitude-behavior consistency. Fabrigar and Wegener (2010)

examine the literature and suggest several structural moderators of attitude-behavior consistency.

First, *accessibility* means that attitudes are more likely to lead to behaviors when they are readily

and cognitively accessible (Glasman & Albarracín, 2006). In the present study, participants'

completion of a self-report questionnaire relies on content about attitudes that are readily

accessible. Second, *content* suggests that attitudes best predict behavior when they are "based on

information directly relevant to the goals driving the behavior" (Fabrigar & Wegener, 2010, p.

188). I accounted for this factor by selecting items for preliminary analyses based on their

perceived relevance to the outcome variables. The present study used a lengthy interview to

assess a wide range of sexual knowledge, including knowledge about anatomy, female pleasure,

and other topics. Accounting for content means selecting items about knowledge and attitudes

with the most relevance to my outcome behaviors and excluding less relevant items. Because I

am most interested in behaviors that could lead to the spread of STIs or unwanted pregnancy, I

selected items gauging knowledge about the means of STI transmission to measure participants'

sexual knowledge. Finally, *amount* suggests that the more knowledge underpins an attitude, the

more likely the attitude will predict behavior. Based on this principle, I would expect to see high

levels of knowledge predicting less risky sexual behaviors.

Theory of reasoned action. The Theory of Reasoned Action (TRA) is one way of

explaining the relationship between knowledge, attitudes, and behavior. According to this

theory, actions are predicted by intentions to act, and these behavioral antecedents are predicted

by an individual's belief about that behavior as well as the individual's subjective norm about the

behavior, meaning how they perceive this behavior to be viewed by others (Azjen & Fishbein,

1980; Fishbein & Azjen, 1975). Chan and Cheung (1998) tested the TRA among college

students in Hong Kong and found it to be useful in predicting likelihood of engaging in

premarital sex, with sexual attitudes as a more relevant predictor for male students and subjective

norms as a more relevant predictor for female students.

In the present study, no data about perceived behavioral control or subjective norms were

available, making a full replication of the TRA impossible. I did, however, have access to data

about individual beliefs about behavior, or sexual attitudes, which are a central feature of the

TRA. Furthermore, the TRA does not account for fact-based knowledge, which the present

literature review shows is often associated with sexual behavior. Thus, although the full TRA is

not tested in the present study, it has been influential in creation of the present model and the

direction of my hypotheses. If the TRA holds true, then sexual attitudes will be significant

predictors of sexual behavior.

Knowledge-attitude-behavior. The theory of Knowledge-Attitude-Behavior (KAB) is a

foundational model for understanding behavior (Schneider & Cheslock, 2003). According to this

model, increasing knowledge tends to alter attitudes, and attitudes then predict behavior. The

assumption contained in the KAB model that increased knowledge will always lead to safer

health behaviors has been the foundation for many sexual education programs (Baranowski, Cullen, Nicklas, Thompson, & Baranowski, 2003). However, as Baranowski, et al. (2003) point out, the KAB model does not explain how or under what circumstances knowledge changes attitudes. As noted previously, one study of a Chinese sample provided support for the KAB model in predicting risky sexual behavior (Zhang, et al., 2012), while another similar study found insignificant results for the KAB model in a similar sample (Lou & Chen, 2009). The present study attempts to replicate these studies among a larger, more representative Chinese sample.

Sexual script theory. Another way to view the present study is with sexual script theory. According to this theory, sexual scripts are the internal cognitive narratives all people hold about how sexual behavior occurs, which may take at least three forms: cultural, interpersonal, and intrapsychic (Gagnon & Simon, 1973). Cultural scripts are norms about what society as a whole considers acceptable or unacceptable sexual behavior. Interpersonal scripts are applications of cultural scripts to specific interpersonal scenarios. Intrapsychic scripts are the selective application of cultural and interpersonal scripts to oneself—choosing which aspects of those scripts to accept and which to reject. Research suggests that intrapsychic scripts (as opposed to the more general types of scripts) are most strongly correlated with sexual behavior (Krahé & Tomaszewska-Jedrysiak, 2011). Understanding sexual scripts can help us better predict and explain sexual behavior, as well as guiding mental health treatment related to sexuality (McCormick, 2010; Wiederman, 2005).

Sexual scripts may have both descriptive (what people believe usually happens) and normative (what people believe *should* happen) elements. One study found that normative elements of sexual scripts mediate the connection between descriptive sexual scripts and sexual

behavior (in that study, sexual aggression) (Krahé, Bieneck, & Scheinberger-Olwig, 2006). Put another way, risky sexual scripts predict risky sexual behavior only to the degree that a person agrees and identifies with those scripts. To this point, the sexual script literature and the literature about sexual attitudes and behavior predicting sexual behavior have largely remained separate, despite some apparent similarities. I propose that descriptive sexual scripts (knowing the way things are) are analogous to sexual knowledge. I also propose that normative sexual scripts, particularly intrapsychic ones, are essentially equivalent to sexual attitudes as I have described them in the present study. Mapping the present understanding of sexual attitudes and knowledge onto sexual script theory may improve understanding of the underlying mechanisms at work. Specifically, if normative intrapsychic sexual scripts mediate the connection between descriptive scripts and sexual behavior, is it possible that sexual attitudes similarly mediate the connection between sexual knowledge and risky sexual behavior? Sexual script theory and its associated research thus provides us with a reasonable hypothesis about how to combine the sexual attitudes, knowledge, and behavior literature into one coherent model.

Research has also shown many gender differences in sexual scripts. Common sexual scripts for men include wanting the physical aspects of sexual intercourse and always being ready for sex, with women being commonly viewed as the gatekeeper for sexual contact because they are viewed as desiring it less (Wiederman, 2005). Similarly, common sexual scripts for women also assume that women have more relational motives for sexual contact than men do (Hynie, Lydon, Cote, & Wiener, 1998). Hynie, et al. (1998) also found that these relational scripts are significantly less likely to be associated with condom use. Similarly, gendered sexual scripts suggest that men should be responsible for providing condoms (Ross-Bailey, Moring, Angiola, & Bowen, 2014). Thus, sexual script theory supports the previously cited findings

about gender differences in sexual attitudes, knowledge, and risky behavior. If the variables

within the model tend to vary between men and women, it is worth testing whether the model

itself varies between men and women. In addition to testing a possible mediation effect, then, I

will also test for differences in the way these pathways operate between men and women.

      Erotic plasticity. Another relevant theory for understanding human sexual behavior is

erotic plasticity, or the extent to which the human sex drive can be shaped by external factors.

Baumeister (2000) posits a theory of female erotic plasticity, or the idea that women's sexual

attitudes and behavior are more responsive to context than are males'. Baumeister points to three

patterns evident in decades of sexuality research. First, women's sexual attitudes and behaviors

tend to change more than men's do over time. For example, women's frequency of orgasm tends

to vary based on contextual factors, like whether or not they are in a committed relationship,

whereas men's orgasm frequency tends to be more constant (Kinsey, Pomeroy, Martin, &

Gebhard, 1963). Second, women's sexual decision making tends to be more malleable in

response to social and cultural factors, including acculturation after immigration (Ford & Norris,

1993), level of education (Weis, Rabinowitz, & Ruckstuhl, 1992; Wilson, 1975), and religion

(Adams & Turner, 1985; Harrison, Bennett, Globetti, & Alsikafi, 1974). Finally, women tend to

have a greater inconsistency between sexual attitudes and sexual behaviors. This inconsistency

between attitudes and behavior has been documented in the areas of premarital sex (Christensen

& Carpenter, 1962), sexual intercourse among college students (Croake & James, 1973), and

adultery (Hansen, 1987).

      Of Baumeister's three proposed categories of erotic plasticity, the most relevant for the

present study is inconsistency between attitudes and behavior, as change over time and in

response to situational factors are outside the scope of the available data. However, subsequent

examinations of erotic plasticity as a construct have posited that attitude-behavior inconsistency among women may be better attributed to power imbalances in heterosexual relationships, where the woman has less social power and adapts to her environment out of necessity, rather than out of an inherently more malleable sex drive (Shibley-Hyde & Durik, 2000). If this supposition is accurate, it would be expected to play out in a society like China, where most individuals endorse traditional gender roles and power dynamics (Tu & Liao, 2005). Thus, whether it is due to erotic plasticity or power dynamics, I expect to see a greater inconsistency between sexual attitudes and behavior (e.g., holding permissive sexual attitudes but engaging in safe sex behavior) for women than for men in the present study.

Value of Present Study

Understanding Chinese sexual attitudes and their predictors has implications for developing culturally informed psychological treatment (So & Cheung, 2005) and is important for developing cultural competence (Yu, 2007). The present study aims to add to the literature to inform understanding and intervention in these areas. I will do so by examining the correlates of sexual behavior among a large and representative sample of Chinese adults. Previous studies of Chinese sexuality have primarily used narrow samples, such as female sex workers (Lau et al., 2002), emerging adults (Cottrell et al., 2005; Higgins & Sun, 2007; Lou & Chen, 2009), or older adults (Wang et al., 2008), leaving a gap of understanding about Chinese adults as a whole. In addition to using a larger and more generalizable sample, the present study will use statistical techniques that model the associations between variables simultaneously in the form of a structural equation model. These techniques will build upon past research by adding a more holistic view of the predictors of sexual behavior among Chinese adults, thus providing a stronger foundation upon which to base interventions. With the current replication crisis in

psychology (Open Science Collaboration, 2015), it is important to not only test new ideas but to also replicate past findings in a variety of populations.

Research Questions

The present study asks the following questions: (1) Does the KAB model fit a large sample of Chinese adults, such that permissive sexual attitudes mediate the connection between HIV transmission knowledge and four risky sexual behaviors: age of first intercourse, extradyadic sex, number of sexual partners, paying for sex? (2) How does gender impact sexual knowledge, sexual attitudes, and risky sexual behavior? (3) What alternative models may be useful in understanding the relationship between sexual attitudes, sexual knowledge, and risky sexual behavior?

I predict that sexual attitudes will mediate the relationship between HIV transmission knowledge and behavior such that more HIV knowledge will be associated with riskier sexual behavior, with more permissive sexual attitudes mediating this connection. I anticipate that men will be more likely to have permissive attitudes and engage in riskier behavior, consistent with literature on gender differences in sexuality. I also anticipate that women will have a weaker relationship between attitudes and behavior, consistent with the theory of female erotic plasticity.

Methods

Recruiting Participants

The data in the present study are used with permission from the Chinese Health and Family Life Survey (CHFLS), conducted by researchers at the University of Chicago (Parish & Laumann, 2003).

Survey designers divided China into 14 strata, based on the 1990 national population census and public health reports about Sexually Transmitted Disease (STD) infection rates in

China. Coastal regions and large cities were oversampled using known population weights about where STDs tend to concentrate, to intentionally favor urban areas where STDs were more prevalent. Two to six administrative units (urban districts, smaller cities, and counties) were selected from each stratum, with the probability of each unit being selected being proportional to the population of that unit. This resulted in a total of 48 primary sampling units. When survey teams arrived in a unit, they arrayed the subunits in the county or city by population size and again picked one to two subunits (e.g., neighborhoods in cities, villages or towns in counties), for a total of 60 sample communities.

Survey teams then used official community registers of households to array the adult population aged 20 to 64 years in order. They started with a randomly chosen person and then selected individuals at fixed intervals to get about 83 individuals in each community. Figure 1 shows the distribution of all 60 interview sites. Tibet was intentionally excluded from the sampling process, and 12 provinces were excluded by chance. Ten of the 13 excluded sites ranked below the median STD prevalence for all provinces.

When weighted according to sampling fractions, the data set of successful interviews had too few individuals in their 20s and too few in their 50s and 60s, as judged by national census figures and annual population surveys conducted by the government. Accordingly, analysis weights were adjusted to make the age distribution approximate that found in other data sources. Once the weights were fully adjusted, percentage distributions for urban residence, age, and education closely paralleled data available in the national census and other national-level statistics, making the adjusted sample representative of the total adult working-age population.

Measures

    Survey. The CHFLS is an interview covering topics such as personal demographics, physical health, sexual dysfunction, and sexually transmitted diseases (Parish & Laumann, 2003). It was originally written in Chinese and then translated into English for the benefit of English-speaking researchers. The portions of the survey used in the present study are the Attitudes Toward Marriage and Sex scale and individual items from other scales.

    The survey was a computerized interview administered by 39 trained interviewers. Interviewers were mid- to late-career social workers and researchers in their 40s and 50s. Interviewers were paired with respondents of their same sex. For privacy, interviews took place away from the respondent's home. Oral and computer-entered consents were obtained prior to the hour-long interview, which began with the interviewer in control of the computerized interview and ended with the computer controlled entirely by the respondent. Only 13% of respondents needed continued interviewer assistance in this last portion of the interview. Individuals received monetary compensation for their participation.

    Psychometrics. The CHFLS was pretested in China in three field trials. Although dyadic data were not used in the final survey, researchers gave shortened versions of the questionnaire to 50 husband-wife pairs during the field trials to test inter-rater reliability of items related to sexual behavior. Kappa values for husband-wife agreement about shared sexual behavior averaged 0.35 (which is modest but fairly equivalent to kappa values for other aspects of family life, including spousal violence and relative social status of parents, which have average kappa values of 0.27). Another 54 respondents were given repeat interviews after a two-month lapse. The 21 items about sexual behavior had test-retest kappa values ranging from 0.38 to 0.97, with an average of 0.75. All kappa values were statistically significant at the 0.05 level.

The above methods were approved by institutional review boards at the University of Chicago, Chicago, Ill; Renmin University, Beijing, China; and Peking Union Medical College, Beijing, China.

Data Analyses and Results

Data Cleaning and Preparation

I used Stata Version 14.2 to clean and prepare data for use in Mplus 7.3 through the following steps. I first recoded items such that responses previously coded separately as "refused to answer," "I don't know," and "missing data" all appeared as missing data in the sexual attitudes scale. For items on the sexual knowledge scale, I recoded "missing data" and "refused to answer" as missing data, but I recoded "I don't know" as an incorrect response, as these items were testing for factual knowledge. In screening for outliers, I found that the number of sexual partners in addition to current partner (item FL01) ranged from 0 to 666. I capped this item at 80 partners, because only three respondents indicated more than 80 unique partners, and these three responses could have easily been the result of mistyping: 200, 222, and 666. I recoded each outlier as 80.

After eliminating all unnecessary variables from the data set, I converted the data to an Mplus format using the stata2mplus extension in Stata 14.2. The resulting data file is hosted via the Harvard Dataverse repository, and it can be found at the following location: http://dx.doi.org/10.7910/DVN/YPFHS9.

Exclusion criteria. Three participants were excluded from analyses for self-reported dishonesty, measured by responding to item MZ11 ("Please tell us why you were willing to tell us the truth?") with the response "In fact, I didn't tell (all) the truth." Participants who either

identified as homosexual or reported same gender sexual relationships were excluded from the study (total of 81 participants dropped).

Variables. I used the following items from the CHFLS to measure the constructs of interest. A full list of items used in the present study can be found in Appendix 1.

Number of sexual partners. Number of unique sexual partners was measured with item FL01: "Up to this point of your life, how many people did you have sex with (even if you did it with someone only once)? Please include all people, including those you have divorced, separated or those deceased. Please also include people you had sex with who were of the same gender as you."

Ever paid for sex. Use of a sex worker was measured with item XJ04: "Many people pay or give someone valuable gifts in order to have sex with that person. Have you done this? (Not including your spouse or fiancée.)"

Extra-dyadic sex. Extra-dyadic sex was measured by item AX36: "Throughout the sexual relationship with your current partner, have you ever had sex with other people (even if it happened just once)?"

Age of first intercourse. Ideally age of first intercourse would be measured with a single item, such as "What was your age the first time you had sexual intercourse?", but the CHFLS did not include such an item. It did, however, ask about past sexual relationships and when they first began. I created a new variable for age of first intercourse by combining several items: A35 ("When you and your current partner began having sex, how old were you?"); B16 ("What was your age (in full years) when you first had sex with this partner?" [referring to a sexual relationship lasting more than a month]); C07 ("What was your age (in full [Western] years) when you first had sex with this partner?" [referring to a previous sexual relationship lasting less

than a month]); and D05 ("What was your age (in full years) when you first had sex with this

partner? (If you are not sure, please give an estimate.)", referring to the participant's first sexual

partner if that partner had not yet been discussed in the previous items. I used coding logic to

create a single value ("firstsex") identifying the lowest age listed for each participant. This

composite variable may be slightly less accurate than a single item, as some participants might

have misreported their actual age of first intercourse due to potentially confusing skip logic

during the survey. However, because the final question asked the participant to recall their first

sexual partner if it had not previously been discussed, I believe the composite variable makes the

closest possible approximation to age of intercourse based on the available data.

   HIV transmission knowledge. HIV tranmission knowledge was measured using four

items that addressed various means of HIV transmission, including hand shaking, sharing utensil,

blood transfusion, and saliva. For example, item JB18 reads "Can a person contract AIDS if the

person uses the same utensil an HIV positive person has used before?" Items were all yes or no

questions with a factually correct answer.

   Sexual attitudes. Sexual attitudes were measured with four items that addressed the

morality of three behaviors: premarital sex, casual sex, and extradyadic sex. For example, item

JB05 reads "Some say that one can have sex just for pleasure with someone whom he or she is

not in love with. Do you agree?"[3] Items were measured on a Likert scale of one to four:

completely agree, somewhat agree, somewhat disagree, and completely disagree. Higher scores

initially indicated more conservative (less permissive) sexual attitudes. The attitudes scale was

reverse coded during data preparation such that higher scores indicated more permissive sexual

attitudes. The final analyses use the reverse coded attitudes scale and may be interpreted

accordingly, meaning higher scores on the attitudes scale represent more permissive sexual attitudes.

Gender. Gender was measured with item ZJ05: "You are (1) male (2) female." As noted previously, this forced choice response inaccurately captures the full range of gender identities and expressions but is used out of necessity.

Results

Descriptive statistics.

Sample demographics. The sample after applying all exclusion criteria consisted of 3,737 adults of ages 20 to 64 years (mean=38.9 years), and was 50.3% female. Participants were all PRC nationals and came from 18 provinces. Participants reported coming from both rural and urban settings, with 49.0% reporting living in a rural village or township as of age 14, and 50.9% reporting living in a city at or above the county level at the same age. The majority of participants (66.2%) reported their highest level of education as junior high school or senior high school (including vocational schools), with 19.7% reporting completion either no schooling or elementary schooling only, and 14.1% reporting completion of junior college or university (see Table 1). Most participants reported a monthly income between 200 and 900 yuan (52.4%), with 25.8% reporting 1000-4000 yuan, 8.0% reporting 0-100 yuan, and 1.2% reporting 5000-10000 yuan. (Current conversion rate is 0.15 yuan per $1 U.S.; see Table 2) An additional 12.5% of participants declined to report their income due to finding the question inappropriate.

Regarding marital status, 82.1% of participants reported currently being in their first marriage, 2.8% in their second or later marriage, 11.0% unmarried, 1.4% cohabiting, 1.7% divorced, and 1.0% widowed (see Table 3). Fifty participants (1.3%) openly identified as homosexual. In comparing participant gender with gender of reported partners, 0.9% of

participants (20 men and 13 women) reported ever having a sexual partner of the same gender. As noted previously, these participants were excluded from the present analyses.

  Risky sexual behaviors. Reported ages of first intercourse ranged from nine to 56 years with an average of 24.6 years ($SD = 4.06$). The vast majority of participants (96.1%) denied ever paying for sexual intercourse. Around 12% of respondents indicated having intercourse with someone other than their current partner during the course of the relationship. Total reported number of unique sexual partners ranged from one to 81 (M=1.7 partners, SD=3.6). See Table 4 for a more complete description of the sample's reported risky sexual behaviors.

  Measurement invariance. Two of the items selected for use in measuring sexual attitudes had two nearly identical forms that were given at different sites. Version one was given at sites 17-21 and 26-70, and version two was given at sites 1-6 and 22-25 (there are a total of 60 sites, and survey administrators did not number any sites from 7-16). For example, one item had the following two versions, both measured on a Likert scale of agreement from one to four: "JB04: Nowadays in our society, some couples have sex when they are dating, and they eventually get married. Is this a moral issue?" and "JB04a: Some say that as long as two people eventually get married, it doesn't matter whether they have sex before they marry. Do you agree?" For ease of description I will call the sites that received JB04 and JB09 Group One, and I will call the sites that received JB04a and JB09a Group Two. The CHFLS creators did not explain their rationale for administering different versions of these items or how Group One and Group Two were decided upon.

  To assess if the different item formats for sexual attitudes produced equivalent results, I tested for measurement invariance by site, using the steps outlined by van de Schoot, Lugtig, and Hox (2012). I tested the following models for duplicate items: a model where only factor

loadings were equal across groups but intercepts may differ, a model where only intercepts were equal across groups, but factor loadings can differ, a model where both factor loadings and intercepts were constrained to be equal, and a model where residual variances were fixed to be equal across groups. I ran a confirmatory factor analysis (CFA) for sexual attitudes using composite versions of the duplicate items. This initial CFA showed poor model fit (χ^2=301.9, df=12, p<.00; RMSEA=0.11 [.10-.13 CI]; CFI=.95; TLI=0.92).

Item JB05 ("Some say that it is OK to have sex with someone other than your spouse after marriage. Do you agree?") showed measurement invariance (χ^2=0.26, df=1, p=.61), meaning this item did not vary based on site of administration. The other three items, however, did not show measurement invariance (see Table 5). Measurement variance in the two items with different forms (JB04 and JB09) was somewhat anticipated, but measurement variance in JB06 ("Some say that one can have sex just for pleasure with someone whom he or she is not in love with. Do you agree?") was unanticipated, because only one form of this item was administered across sites. This finding suggested that the measurement variance is partially due to site-specific variables rather than solely item wording. Unfortunately, exact site locations were blinded to protect confidentiality of participants, due to the sensitive nature of survey material, making it difficult to determine what site-specific influences may be causing the invariance (i.e., I cannot examine sociogeographic variables without knowing site locations). However, a t-test for site differences based on age showed that Group One was significantly older than Group Two, with an average age of 40.8 years, compared to 38.5 years in Group Two (d=0.20, t=4.85, p<.00).

I computed another CFA for sexual attitudes, this time accounting for age and gender as covariates in a Multiple Indicator Multiple Covariate (MIMIC) model. I included age because I

hypothesized that it might account for the site-specific measurement variance. I included gender because, although Group One and Group Two did not significantly differ in gender (t=.80, p=.42), gender is a well-established correlate with sexual variables, and I intended to use gender as a covariate in the complete model. Both age and gender were unconstrained across groups. Model fit for this CFA was good (χ^2=265.46, df=23, p<.00; RMSEA=0.075 [.067-.083 CI]; CFI=.93; TLI=0.91). All four items showed significant p-values in the measurement invariance test, suggesting a low likelihood that measurement varied significantly by site (see Table 6). Because including age and gender as covariates adequately improved model fit and tempered measurement invariance, and in favor of model simplicity, I elected to not include further covariates at this time.

Measurement model. With measurement invariance established for sexual attitudes, I then added a CFA for sexual knowledge, using the four previously identified sexual knowledge items, to examine the measurement model as a whole (none of the sexual knowledge items had different forms by site). Model fit was good (RMSEA=.03; χ^2=155.01, df=72, p<.00; CFI=.95; TLI=.94).

HIV transmission knowledge. Three out of the four chosen items loaded well onto the latent variable of HIV transmission knowledge (see Table 7). The fourth item (JB19) had a low standardized factor loading of .07 (p=.47). JB19 reads "Can an HIV positive person pass the disease to others through blood transfusion?" While the content of this question appears to get at knowledge about HIV transmission, in practice it appeared to poorly distinguish between participants, as 3364 participants selected the correct answer ("Yes"), with only 10 people selecting "No," and 135 people selecting "Don't know." Based on this response pattern, a likely explanation for the poor factor loading on JB19 is restriction of range. I elected to eliminate

JB19 from the HIV transmission knowledge factor, due to its poor loading and restriction of range. Running the CFA without JB19 did not significantly change model fit (RMSEA=.03; χ^2=133.69, df=55, p<.00; CFI=.95; TLI=.94).

Sexual attitudes. All four chosen items loaded moderately well onto the latent variable of sexual attitudes (see Table 8 for factor loadings).

Missing data. Age and gender showed no missing data. The four items on the sexual attitudes scale had low amounts of missing data, ranging from .13% to .29% of total data after applying exclusion criteria (n=3,737). The three items on the sexual knowledge scale had slightly higher proportions of missing data, all around 8% per item. Of the outcome variables, missing data proportions for number of partners and paying for sex were around 2% and 1%, respectively. Age of first intercourse had around 8% of missing data. As participants had to provide a response to each item on the computerized survey before it would allow them to answer the next item, missing data were all coded by reason for missingness: "I don't know"— meaning participant indicated not knowing the answer, "Inappropriate,"—meaning the participant indicated the question was too inappropriate to answer, "Refused"—meaning the participant declined to answer without a specific reason, and "Legit Skip," meaning the participant was never given a chance to answer the question due to response types on previous items (e.g., participants who denied having a current partner would not then be asked the age of their current partner). The majority of all missing data was coded "Legit Skip."

Variables with less than 10% of missing data were deemed acceptable for use and handled with Full Information Maximum Likelihood (FIML) in all analyses. However, extradyadic sex was above the 10% acceptable threshold for missing data, at 12.1%, composed of 12% "Legit Skip" and .1% "Refused". It thus appears these data were missing at random,

meaning their pattern of missingness was related to independent rather than dependent variables, as skip logic in the survey only allowed participants with current partners to report on extradyadic sex in their current relationship. For this reason I elected to still use extradyadic sex despite its relatively high proportion of missing data, using FIML to account for missingness. See Table 9 for a summary of missing data.

       Initial model—KAB. I conducted structural equation modeling (SEM) with Mplus 7.3. I chose Mplus for my ultimate analyses due to its capacity to appropriately use ordinal and categorical outcome data in SEM, as many of the sexual behaviors used for outcomes in the present study were categorical (e.g., having paid for sex as a yes/no outcome). I used a MIMIC model to test sexual attitudes as a mediator between HIV transmission knowledge and sexual behavior, with age and gender as covariates, as modeled in Figure 2. I tested for mediation following the steps provided in Shrout and Bolger (2002). First, I estimated the main effect, namely, how well sexual knowledge predicts sexual behavior. I then tested the intermediate pathways, establishing separate relationships from HIV transmission knowledge to sexual attitudes and from sexual attitudes to sexual behavior. I then tested the indirect pathway from HIV transmission knowledge to sexual attitudes to sexual behavior. Finally, I estimated the path from HIV transmission knowledge to sexual behavior while holding the path from sexual attitudes to sexual behavior constant. (Note: I will use the word "predicted" when reporting relationships between variables, but this refers solely to statistical prediction based on the implied directionality of SEM, not generalizable causality, as causality cannot be established with cross-sectional data.)

       Typical model fit indices such as RMSEA, CFI, and TLI are not available for the full model due to a count dependent variable (number of partners). I could have broken number of

partners into a categorical variable through splitting it into ranges (e.g., 1-5, 6-10), but much of

the previous research uses number of partners as a count variable. Doing so also increases

clarity in interpreting results. Thus, no goodness of fit indices are available for the present

model.

Path coefficients will be reported as standardized beta weights, unless otherwise

indicated. For count and binary outcomes (number of partners, extradyadic sex, and paying for

sex), an incidence rate ratio or odds ratio will be reported (see Table 10 for explanation).

Reporting outcomes in this way will allow me to show the real world impact of the model rather

than just showing the presence or absence of statistical significance.

Number of partners. Results indicated a significant effect of HIV transmission

knowledge on sexual attitudes, with more knowledge predicting more permissive sexual attitudes

(β =.26, $p<.00$, standardized using Mplus XY standardization) (see Table 11 for standardized and

Exponentiated coefficients). Results also indicated a significant effect of more permissive sexual

attitudes predicting more sexual partners (β =1.04, $p<.00$)[3]. The indirect effect was significant

(.23, $p<.00$) and accounted for 59% of the total effect, suggesting that sexual attitudes effectively

mediate the connection between knowledge and number of partners. (See Table 12 for direct and

indirect effects.)

Extradyadic sex. Results indicated a significant effect of more permissive sexual

attitudes predicting a 71% lower likelihood of extradyadic sex (β =-.84, OR=0.29, $p<.00$),

contrary to my hypothesis. There was a significant direct effect such that higher levels of HIV

transmission knowledge predicted a lower likelihood of extradyadic sex (.16, $p<.05$). The

indirect effect was significant (-.24, $p<.00$), with more HIV transmission knowledge predicting

more permissive sexual attitudes, which in turn predicted a lower likelihood of extradyadic sex, accounting for 63% of the variance in extradyadic sex (R^2=.63, SE=.04, p<.00).

Age of first intercourse. Results failed to show a significant effect of attitudes on age of first intercourse (β = -.03, p = .33). The direct effect of HIV transmission knowledge on age of first intercourse was significant (-.14, p<.00), such that more knowledge was associated with a higher age of first intercourse (β = .11, p<.00). However, the indirect effect was not significant (-.01, p=.36), inconsistent with my hypothesis of mediation.

Ever paid for sex. Results indicated a significant effect of attitudes on paying for sex, with more permissive attitudes predicting an almost five times higher likelihood of paying for sex (β = .76, OR=4.79, p<.00). There was no significant effect of HIV transmission knowledge on paying for sex (-.10, p=.11). However, the indirect effect was significant (.29, p<.00) and accounted for 81% of the variance in paying for sex (R^2=.81, SE=.03, p<.00), consistent with my hypothesis of mediation.

Gender as covariate. Gender was significantly related to sexual attitudes, with women being significantly less likely to have permissive sexual attitudes (β =-.42, p<.00). Women tended to have less HIV transmission knowledge, a statistically significant finding with a small effect size (β =-.07, p<.00). Gender also showed significant effects on paid sex, with women being significantly less likely to have paid someone for sex (β =-.25, p<.00). Women tended to have a slightly lower age of first intercourse (β =-.18, p<.00). No other significant effects of gender on risky sexual behaviors were found (see Table 11).

I elected not to run additional alternative models, such as a full reverse flow model, as Thoemmes (2015) argues that reversing arrows in mediation models does little to distinguish between plausible models in the same equivalence class. Thoemmes ran six alternative

mediation models based on a "true" model and compared each model's indirect effect over the complete parameter space. He discovered that indirect effects of the "incorrect" models were comparable to the true indirect effect, and in some cases even larger. Thoemmes suggests that model distinction needs to be a matter of study design rather than statistical manipulation (see also Lemmer & Golwitzer, 2017). With the present study's cross-sectional data, a reverse flow model would thus add little value. Furthermore, the bulk of the literature and theory on risky sexual behaviors uses attitudes and knowledge as predictors of behavior rather than outcomes of behavior, including the KAB model, sexual scripts theory, and the Theory of Reasoned Action. The combination of cross-sectional study design and theoretical background for using risky sexual behavior as an outcome variable make testing additional models unnecessary in the present study.

Gender moderation. In order to learn whether the KAB model operates differently for men than for women, I ran a multiple groups analysis using a KAB model with gender removed as a covariate and used instead as a moderator (see Figure 4). I first ran this model with factor loadings unconstrained and then ran a second model with all factor loadings constrained to be equal across groups (across women and men).

Results showed several significant moderation effects. Gender significantly moderated the effect of age on number of partners (B=-.05, S.E.=.02, p=.01). Gender moderated two of the predictors of age of first intercourse: sexual attitudes (B=-.27, S.E.=.10, p=.01), and age (B=.05, S.E.=.09, p<.00). The moderating effect of gender on the relationship between attitudes and extradyadic sex was significant (B=-.59, S.E.=.21, p=.01). No other significant moderating effects of gender were found. See Table 13 for full report of gender moderation findings.

Standardized coefficients for the pathways that were moderated by gender are listed in

Table 14. For extradyadic sex and age of first intercourse, sexual attitudes had a stronger impact

on men's sexual behaviors than on women's sexual behaviors. Women with more permissive

attitudes were 57% less likely to engage in extradyadic sex, whereas men with more permissive

attitudes were 76% less likely to engage in extradyadic sex. The effect of attitudes on age of first

intercourse was statistically significant for men (β =-.09, S.E.=.04, p=.04) but not statistically

significant for women (β =-.05, S.E.=.03, p=.13). Finally, gender moderated the effect of age on

number of sexual partners and age of first intercourse (see Table 14). Thus consistent with my

hypothesis, gender had a significant moderating effect on some, but not all, aspects of the KAB

model. Consistent with the theory of erotic plasticity, this moderation often took the form of a

lower effect of attitudes on behavior for women than for men and in a greater impact of age on

women's risky sexual behaviors than on men's.

Discussion

Findings

Results showed that, consistent with my hypothesis, an increased fund of HIV

transmission knowledge was associated with more permissive sexual attitudes, which appeared

to mediate a higher risk for two risky sexual behaviors: higher number of sexual partners and

likelihood of ever having paid for sex. Contrary to my hypothesis, sexual attitudes significantly

mediated the relationship between HIV transmission knowledge and extradyadic sex, such that

more permissive attitudes were actually associated with a lower likelihood of engaging in

extradyadic sex. The fourth risky sexual behavior measured in the present study, age of first

intercourse, did not show a significant mediation effect in any direction, inconsistent with my

hypothesis. Instead, age of first intercourse was more strongly predicted by age (younger

participants tended to have younger ages of first intercourse), gender (with men having younger

ages of first intercourse), and HIV transmission knowledge (with a higher fund of HIV

transmission knowledge being associated with a higher age of first intercourse). These findings

supported the KAB model of behavior for some, but not all risky sexual behaviors.

Why might the KAB model function well for some risky sexual behaviors but not others?

The behavior without a significant mediation effect was age of first intercourse—a behavior that

has been decreasing in China in recent decades (Wang, et al., 2007). Age of first intercourse was

also the only outcome variable upon which the covariate of participant age had a significant

effect. It is likely that cultural shifts over time and their resulting cohort differences may have

influenced this finding, especially considering the sample spans five decades in participant age.

As noted previously, formal sexual education in Chinese schools has varied widely over the past

several decades.

Cultural variables may also play a role in the unexpected finding regarding extradyadic

sex. Why did more permissive attitudes seem to be associated with a lower likelihood of

extradyadic sex? One possibility is that attitudes toward extradyadic sex are relatively

permissive in China; Ruan (2011) reports about a nationwide survey in which 69% of Chinese

adults stated they did not believe extramarital affairs were morally wrong. Similarly, Ruan

(2011) suggests that at least one third of Chinese divorces are caused by infidelity. Zhang,

Parish, Huang, and Pan (2012) found that while rates of infidelity among Chinese men tend to be

on par with the worldwide average, rates of infidelity among Chinese women tend to be

significantly higher than the worldwide average. Thus, social and cultural factors, including

higher rates of Chinese women in the work force due to limited child bearing policies and

cultural norms regarding affairs, may be responsible for the unexpected findings about

extradyadic sex in the present study.

Another interesting finding was that HIV transmission knowledge had no direct effect on

paying for sex (although there was an indirect effect of knowledge through attitudes). This may

be due to restricted range, as only 3.9% of all participants indicated ever having paid for sex. It

may also be related to the more extreme nature of using a sex worker in comparison to the other

outcome behaviors—it is likely more common knowledge that using a sex worker inherently

comes with risks, such as contracting HIV, so it makes sense that those paying for sex would not

change their decision based on increased HIV transmission knowledge.

These findings support sexual scripts theory by showing a mediation of intrapsychic

sexual scripts (sexual attitudes) on the relationship between descriptive scripts (sexual

knowledge) and risky sexual behavior. Further research could make this link more explicit by

using measurement for intrapsychic and descriptive scripts and comparing this measurement to

scales of sexual attitudes and HIV transmission knowledge. As noted, the unique and shifting

cultural climate of Chinese sexuality necessitates greater understanding of these scripts.

The present findings also provide mild support for the Theory of Reasoned Action, as

they suggest a relationship between sexual attitudes and risky sexual behavior. Further research

could more fully test the TRA by including the missing components of normative beliefs and

intentions to act. Additionally, as the present study was only able to assess sexual knowledge

about HIV transmission and sexual attitudes about three behaviors (extradyadic sex, premarital

sex, and casual sex), future studies could assess more facets of sexual knowledge and attitudes to

more fully understand how these constructs interact with one another and relate to risky sexual

behavior. Another relevant theory that builds on the TRA is the Theory of Planned Behavior

(TPB). According to the TPB, an additional component of perceived behavioral control (or how much control an individual believes they have over a given action) could add predictive power for understanding behavior (Madden, Ellen, & Ajzen, 1992). The TPB tends to work best for behaviors that are not perceived to be under the individual's control, so it may be relevant for risky sexual behaviors like condom use, especially if an individual has a perception that condom use depends on their partner's behaviors and is out of their own control.

The present study also provided evidence of gender moderation on several pathways in the KAB model. Consistent with my hypothesis and with the theory of female erotic plasticity, women tended to have a less significant relationship between attitudes and behavior for extradyadic sex and age of first intercourse. This finding could be explained by women having more malleable sex drives (Baumeister, 2000) or by behavior adjustments based on differences in social power (Shibley-Hyde & Durik, 2000). Longitudinal studies that include tests of gender moderation could provide evidence for the other components of erotic plasticity, such as change in sexual attitudes and sexual behavior over time or in response to situational factors. Additionally, the present study examined only heterosexual participants, which—although useful for understanding a significant population to the spread of HIV—excludes participants of differing sexual orientations. This made it impossible for the present research to study an additional component of erotic plasticity: shifts in sexual orientation or attraction over time. Similarly, the forced choice item for gender also did not allow for understanding of varying gender identities (transgender, non-binary, etc.). Future studies would benefit from seeking to identify and understand how sexual knowledge, sexual attitudes, and risky sexual behaviors operate among LGBTQ populations.

Limitations

Inevitably, the present study has limitations. First, the data are cross-sectional, which makes it impossible to establish causality. Although model fit indices suggested good fit for a mediation model, this is not conclusive proof of directionality. It is plausible that participants with more knowledge about transmission of STIs gained that knowledge through engaging in risky sexual behaviors, rather than first gaining knowledge and then engaging in risky sex. Similarly, participants with more permissive sexual attitudes may have initially had conservative sexual attitudes which shifted over time in response to their behaviors, rather than the other way around.

A second limitation relates to measurement. Because the CHFLS was designed to address rising rates of STI prevalence in China, it had items of relevance to the present research. However, these items were in limited numbers and (occasionally) given in different forms across sites, potentially confounding survey results. I believe I effectively addressed questions of measurement invariance through statistical methods. Still, future research would benefit from using more robust scales for sexual attitudes and knowledge (more than three or four items per scale, as in the present study). Similarly, the CHFLS did not inquire about all possible risky sexual behaviors, so the present study only addressed four available behaviors. Other behaviors of interest might be frequency of (correct) condom use, use of other contraceptives, inquiring about partner's STI status, and concurrent use of substances. Additionally, the present study looked at only one facet of sexual knowledge, namely, HIV transmission knowledge. Future studies could examine other facets of this knowledge, including procreative knowledge or knowledge about transmission of other STIs.

The total amount of variance in risky sexual behaviors accounted for by the KAB model differed widely between risky sexual behaviors, ranging from 59 to 81% of variance accounted for. Future studies may test a more complete model to account for a greater proportion of the variance in risky sexual behaviors, such as personal mental health (Zhang, Li, Hong, Su, & Zhou, 2014), degree of social support (Qiao, et al., 2015), and drug use behaviors (Nydegger, Ames, Stacy, & Grenard, 2014). They may also look at subjective beliefs about sexual attitudes, as the more important one perceives an attitude to be, the more likely it is to predict behavior (Fabrigar & Wegener, 2010). It will also be helpful to look at cohort effects, as sex education in China has changed significantly over the past several decades and will likely continue to change. Because of the high stakes of risky sexual behavior, there is a need for replication of these theories among a larger range of populations.

Strengths and Implications

The present findings may have implications for the way we create and implement sexual education programs in China, because they indicate that simply increasing fund of knowledge about the spread of HIV may not be enough, and may even be detrimental, if we do not account for the way this knowledge impacts sexual attitudes. However, because of the cross-sectional data and the limited aspects of sexual knowledge and attitudes measured in the present study, future studies will need to fill in gaps of understanding before the present study's conclusions can be widely generalized. Still, understanding how HIV transmission knowledge is related to sexual behavior is a significant step forward, as the HIV/AIDS epidemic continues to spread in China and worldwide. Gao, Lu, Shi, Sun, and Tsai (2001) provide an example of a sexual education program in China that targeted not only knowledge about AIDS but also attitudes toward individuals with AIDS. Future interventions and studies could build off of Gao et al.

(2001)'s approach by also including measures of conservative/permissive sexual attitudes as they evaluate the success of their program. It may also be useful to identify what it is about permissive attitudes that most impacts risky behaviors or which specific attitudes have the most impact. Perhaps certain permissive attitudes, such as believing that sexual intercourse can have more purposes than just procreation, could actually lead to increased use of contraceptives.

These findings also imply that with certain risky sexual behaviors, increased HIV transmission knowledge may have negligible impact on likelihood of using a sex worker, independent of sexual attitudes (and that this operates differently for men than for women). Thus, interventions aimed at decreasing use of sex workers by heterosexual men may need to target variables other than HIV transmission knowledge or attitudes about premarital sex, extradyadic sex, and casual sex. Similarly, there may be a cohort effect for age of first intercourse, so interventions promoting healthy sexual behavior should seek to understand the current generation's sexual and cultural context. Understanding these mediating and moderating variables is crucial to promoting healthy and low-risk sexual behaviors.

Despite the aforementioned limitations, this study has a number of strengths. It replicated two past studies that tested the KAB model among subsets of Chinese populations, comprised mostly of sexually inactive emerging adults (Lou & Chen, 2009; Zhang, et al., 2012), and found evidence that the model fits among a sexually active, adult population. It is significant for being the first to test the KAB model of risky sexual behavior in a large population-based sample in China, as well as testing for gender moderation. It builds on past research suggesting that certain sexual attitudes have a significant relationship with HIV transmission knowledge and behavior, and that these relationships may operate differently for men than for women in China. It tests a general, heterosexual, adult population—a population which, despite contributing

strongly to the spread of STIs, is rarely targeted for studies of risky sexual behavior. The present

study thus contributes to the literature by building on theory, replicating past findings, and using

a general population to understand correlates of risky sexual behavior in China.

Figure 1. Sampled provinces in the Chinese Health and Family Life Survey[4].
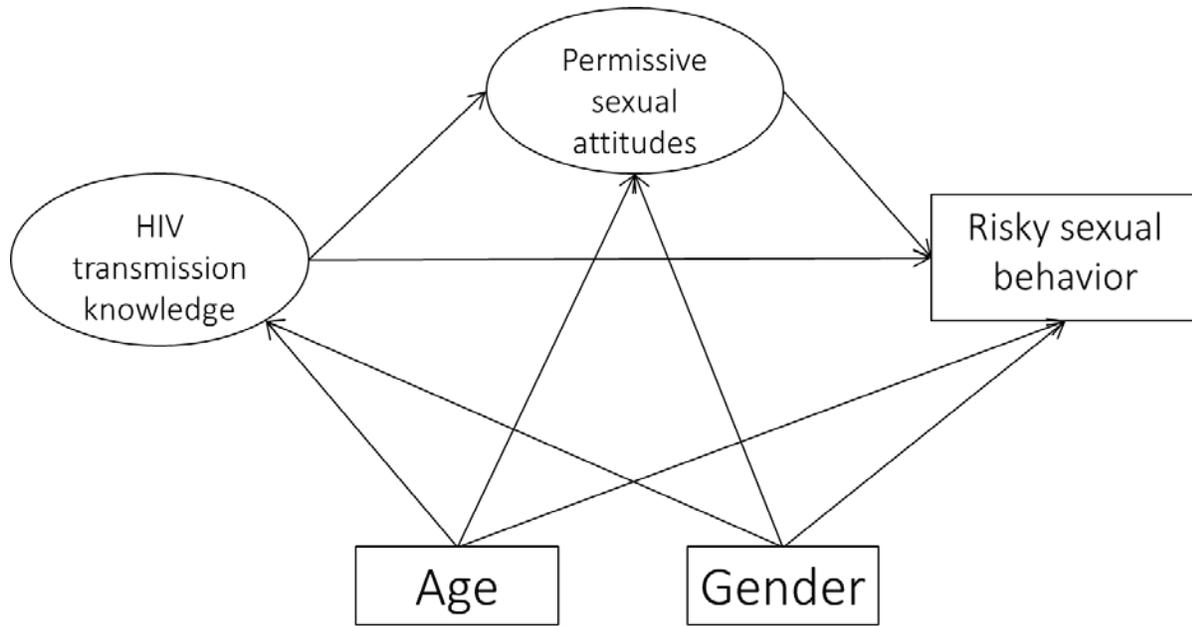
Figure 2. Conceptual Knowledge-Attitude-Behavior (KAB) MIMIC model for predicting risky sexual behavior.
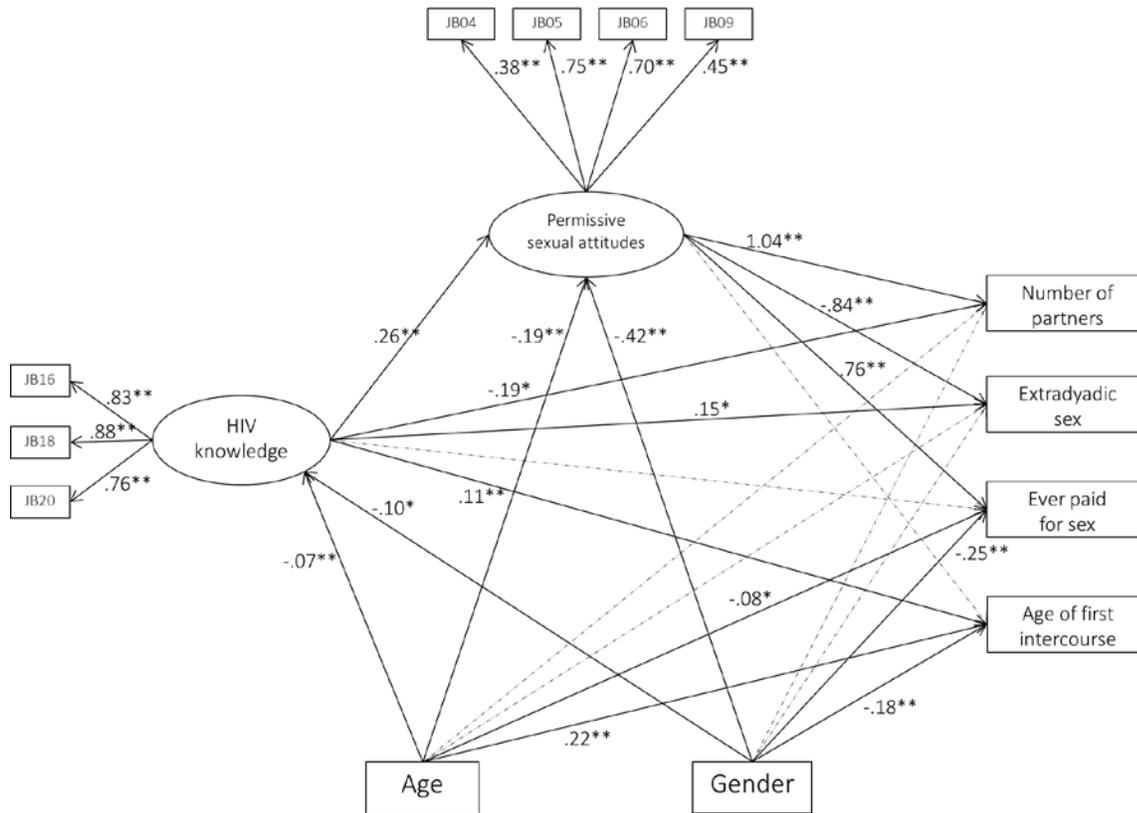
Figure 3.   Standardized estimates for KAB model of risky sexual behavior. Dotted lines indicate *p*>.05. **p*<.05. ***p*<.00.
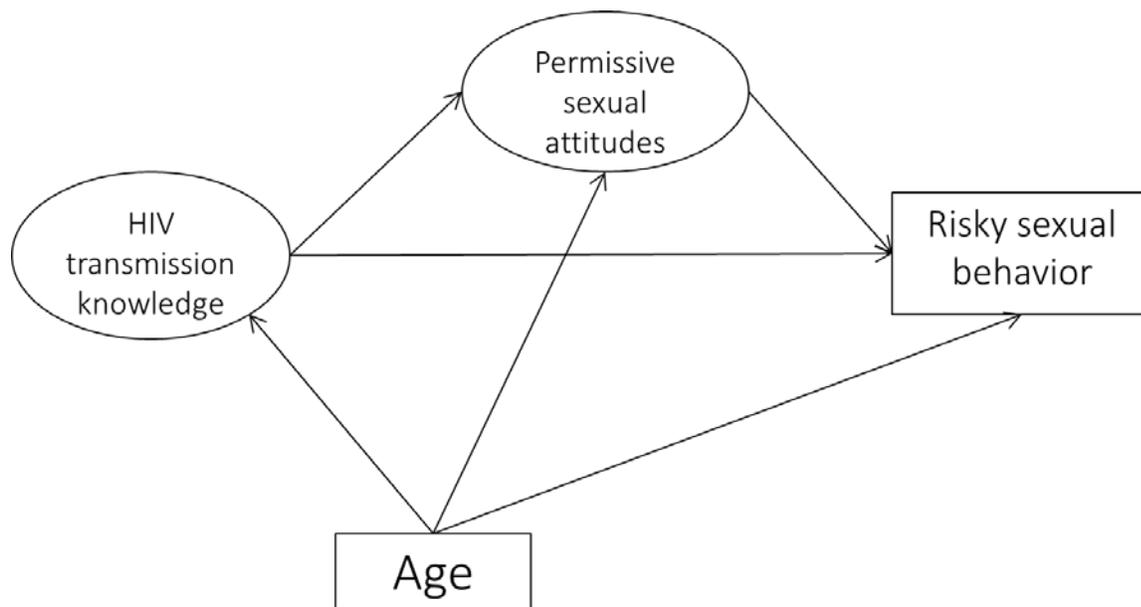
Figure 4. Conceptual KAB model for gender moderation test.

Table 1

Sample Self-Reported Highest Level of Education

Education level	Frequency	Percentage
No schooling	164	4.39
Primary schooling	572	15.31
Low middle school	1,391	37.22
Upper middle school	1,082	28.95
Junior college	358	9.58
University/graduate school	170	4.55

Table 2

Sample Self-Reported Monthly Income

Income range (in Chinese Yuan)	Income range (in U.S. $)	Percentage of sample
0 - 100	0 – 14.63	8.0
200 - 900	29.26 – 131.66	52.4
1000 - 4000	149.29 – 585.15	25.8
5000 - 10000	731.43 – 1462.87	1.2
Declined to answer	--	12.0

Note: Conversion based on rate of 1 Chinese Yuan to 0.15 U.S. dollars as of June 24, 2017.

Table 3

Sample Self-Reported Marital Status

Reported status	Frequency	Percentage
First marriage	3,068	82.1
Second or later marriage	104	2.8
Unmarried	411	11.0
Cohabiting	53	1.4
Divorced	62	1.7
Widowed	39	1.0

Table 4

Summary of Risky Sexual Behaviors

Behavior	Response	Frequency	Percentage
Number of sexual	1	2,873	78.52
partners	2	386	10.55
	3	168	4.59
	4-6	150	4.10
	7-10	36	0.98
	11-20	23	0.63
	21-30	14	0.38
	31-81	9	0.25
Extradyadic sex	Yes	403	12.27
	No	2,882	87.73
Age of first intercourse	9 – 14	11	0.32
(years)	15 – 17	30	0.88
	18 – 20	436	12.73
	21 – 25	1,886	55.07
	26 – 30	929	27.12
	31 – 40	146	4.26
	41 – 50	6	0.18
	51 – 56	2	0.06
Ever paid for sex	Yes	144	3.89
	No	3,554	96.11

Table 5

Measurement Invariance Testing for Attitude Items by Site[a]

Item	χ^2	p
JB04	7.06*	.01
JB05	0.26	.61
JB06	33.31**	.00
JB09	6.43*	.01

Note: *$p<.05$, **$p<.00$. Items with significant results indicate a greater likelihood of varying between sites.

[a]Group One = Sites 17-21, 26-70; Group Two = 1-6, 22-25.

Table 6

Measurement Invariance for Attitudes Items by Site[a],
Accounting for Age and Gender

Item	χ^2	p
JB04	1.19	.28
JB05	0.15	.7
JB06	0.13	.72
JB09	0.60	.44

Note: *$p<.05$, **$p<.00$. Items with significant results indicate a greater likelihood of varying between sites.

[a]Group One = Sites 17-21, 26-70; Group Two = 1-6, 22-25.

Table 7

Confirmatory Factor Analysis for HIV Transmission Knowledge

Item	Initial			After removing JB19		
	β	S.E.	*p*	β	S.E.	*p*
JB16	.57	.43	.20	.58	1.20	.63
JB18	.55	1.33	.67	.35	.49	.48
JB19	.07	.10	.47	--	--	--
JB20	.81	.69	.24	.83	.82	.32

Table 8

Confirmatory Factor Analysis for Sexual Attitudes

Item	β	S.E.	*p*
JB04	.56	.04	.00
JB05	.85	.04	.00
JB06	.79	.03	.00
JB09	.48	.04	.00

Table 9

Missing Data by Variable

Variable	Missing	Percent Missing
Gender	0	0.00
Age	0	0.00
JB04	9	0.24
JB05	5	0.13
JB06	8	0.21
JB09	11	0.29
JB16	306	8.19
JB18	305	8.16
JB20	305	8.16
Extradyadic sex	452	12.10
Number of partners	78	2.09
Paid sex	312	8.35
Age of first intercourse	39	1.04

Table 10

Interpreting Exponentiated Coefficients in the Present Study

Variable	Type	Statistic	Interpretation
Number of partners	Count	Incidence Rate Ratio	How many more partners would be expected based on one unit increase in independent variable.
Extradyadic sex	Binary	Odds Ratio	How many times more/less likely for someone to have extradyadic sex based on one unit increase in independent variable.
Ever paid for sex	Binary	Odds Ratio	How many times more/less likely for someone to have paid for sex based on one unit increase in independent variable.

Table 11

Knowledge-Attitude-Behavior (KAB) Model, Standardized Results

Variable	β	Exponentiated coefficient	S.E.	*p*
Knowledge by				
JB16	.83**		.02	.00
JB18	.88**		.02	.00
JB20	.76**		.02	.00
Attitudes by				
JB04	.38**		.02	.00
JB05	.75**		.01	.00
JB06	.70**		.02	.00
JB09	.45**		.02	.00
Attitudes on				
Knowledge	.26**		.03	.00
Gender	-.42**		.02	.00
Age	-.19**		.19	.00
Knowledge on				
Gender	-.07**		.02	.00
Age	-.10**		.02	.00
Number of partners on				
Knowledge	-.19*	0.89	.07	.01
Attitudes	1.04**	2.40	.04	.00
Gender	-.03	0.89	.05	.54
Age	.03	1.01	.03	.46
Extradyadic sex on				
Knowledge	.15*	1.17	.06	.01
Attitudes	-.84**	0.29	.05	.00
Gender	-.02	0.88	.04	.62
Age	.00	1.00	.04	.91
Paid for sex on				
Knowledge	-.09	0.88	.06	.09
Attitudes	.76**	4.79	.07	.00
Gender	-.25**	0.13	.07	.00
Age	-.08*	0.97	.04	.04
Age of first intercourse on				
Knowledge	.11**		.03	.00
Attitudes	-.03		.03	.33
Gender	-.18**		.02	.00
Age	.22**		.02	.00

*p<.05, **p<.00

Table 12

Direct and Indirect Effects in Knowledge-Attitude-Behavior (KAB) Model

Outcome variable	Two-tailed estimate	S.E.	p
Number of partners			
Indirect effect	.17**	.03	.00
Direct effect	-.12*	.05	.02
Extradyadic sex			
Indirect effect	-.23**	.05	.00
Direct effect	.16*	.07	.03
Paid for sex			
Indirect effect	.29**	.07	.00
Direct effect	-.13	.10	.18
Age of first intercourse			
Indirect effect	-.01	.01	.36
Direct effect	.14**	.03	.00

*p<.05, **p<.00

Table 13

Unstandardized Effects of Gender Moderation on KAB Model

Pathway	B	S.E.	p
Age --> knowledge	-.02	.01	.11
--> Attitudes			
Knowledge	.01	.06	.91
Age	.02	.02	.20
--> Number of partners			
Knowledge	.06	.15	.72
Attitudes	.17	.15	.26
Age	-.05*	.02	.01
--> Extradyadic sex			
Knowledge	.01	.16	.94
Attitudes	-.59*	.21	.01
Age	.00	.02	.96
--> Paid sex			
Knowledge	-.02	.28	.93
Attitudes	1.03	.57	.08
Age	.05	.06	.40
--> Age of first intercourse			
Knowledge	.13	.08	.08
Attitudes	-.27*	.10	.01
Age	.09**	.01	.00

*p<.05, **p<.00

Table 14

Standardized Coefficient Comparisons for Pathways with Significant Gender Moderation

Pathway	Men			Women		
	β (Exponentiated coefficient)	S.E.	*p*	β (Exponentiated coefficient)	S.E.	*p*
- > Extradyadic sex						
Attitudes	-.85** (0.24)	.00	.00	-.67** (0.43)	.12	.00
-> Age of first intercourse						
Attitudes	-.09*	.04	.04	.05	.03	.13
Age	.36**	.03	.00	.09**	.03	.00
-> Number of partners						
Age	-.07 (0.99)	.07	.31	.33* (1.04)	.14	.01

*p<.05, **p<.00.

Footnotes

[1] Primary support was provided by grant RO1 HD34157 from the National Institute of Child Health and Human Development. Additional support was provided by grant P30 HD18288 to the University of Chicago from the National Institute of Child Health and Human Development Population Research Center; grant P30 AI50410 to the University of North Carolina from the National Institutes of Health Fogarty Center; grant D43 TW01039 to the University of North Carolina from the National Institutes of Health Center for AIDS Research; and grant U19 AI31496 to the University of North Carolina from the National Institutes of Health STD Cooperative Research Center. Abbott Laboratories donated the ligase chain reaction testing device (used in part of the survey not discussed in the present study).

[2] The primary researcher is a White, female, middle-class, heterosexual, United States citizen, attending graduate school in Utah. She spent 18 months volunteering in a relatively immersive Chinese environment, working with Chinese individuals from the PRC, Taiwan, Hong Kong, and Singapore. As a result, she has moderate fluency in Chinese language (Mandarin) and culture, but obviously no lived experience as a Chinese native. She is aware of the history of Western imperialism in Asia and has made her best efforts to avoid employing a colonial mindset in the completion of this project, through consultation with Chinese natives and with professionals in the field of multicultural psychology.

[3] Items such as JB05 gauged permissiveness is on whether or not someone agreed an action was moral. On the surface this item might not appear to be getting at the underlying conservativism or permissiveness of someone's sexual attitudes. One could argue that both permissive and conservative viewpoints could see the same issue as a moral one but just have different interpretations of whether the issue is right or wrong. However, as Haidt (2013) points

out, one way to gauge conservativeness is simply whether or not someone believes that an issue

is a moral one.

[4] Typically standardized coefficients are less than one, but number of partners is a count

outcome variable, which requires use of negative binomial regression. Mplus uses the following

equation to compute general standardized coefficients: (Equation 1) $b_k^1 = b_k * \frac{s_{xk}}{s_y}$, where

s=standard deviation and b=unstandardized coefficient. With negative binomial regression, the

standard deviation of y is the natural log of the original values (Equation 2: $\lambda_i = \beta_0 + \beta_1 x_1 +$

ε_1). Plugging this standard deviation into the denominator of Equation 1 results in dividing by a

natural log, which makes it possible in this case for the standardized coefficient to exceed one.

[4] Used with permission from the Social Science Research Computing Center at the

University of Chicago.

References

Adams, C. G., & Turner, B. F. (1985). Reported change in sexuality from young adulthood to old age. *The Journal of Sex Research, 21*(2), 126-141.

Azjen, I., & Fishbein, M. (1980). *Understanding attitudes and predicting social behavior*. Englewood Cliffs, NJ: Prentice-Hall.

Baranowski, T., Cullen, K. W., Nicklas, T., Thompson, D., & Baranowski, J. (2003). Are current health behavioral change models helpful in guiding prevention of weight gain efforts? *Obesity Research, 11*(S10), 23S–43S. https://doi.org/10.1038/oby.2003.222

Baumeister, R. F. (2000). Gender differences in erotic plasticity: The female sex drive as socially flexible and responsive. *Psychological Bulletin, 126*(3), 347–374. https://doi.org/10.1037/0033-2909.126.3.347

Brody, S. (2010). The relative health benefits of different sexual activities. *The Journal of Sexual Medicine*, *7*(4), 1336-1361. http://doi.org/10.1111/j.1743-6109.2009.01677.x

Cai, R., Zhao, J., Cai, W., Chen, L., Richardus, J. H., & Vlas, S. J. de. (2014). HIV risk and prevention behaviors in men who have sex with men and women: A respondent-driven sampling study in Shenzhen, China. *AIDS and Behavior, 18*(8), 1560–1568. https://doi.org/10.1007/s10461-014-0735-x

Chan, D. K. S., & Cheung, S. F. (1998). An examination of premarital sexual behavior among college students in Hong Kong. *Psychology & Health, 13*(5), 805–821. https://doi.org/10.1080/08870449808407433

Chen, X. S., Peeling, R. W., Yin, Y. P., & Mabey, D. C. (2011). The epidemic of sexually transmitted infections in China: Implications for control and future perspectives. *BMC Medicine, 9,* 111. https://doi.org/10.1186/1741-7015-9-111

Chen, Y., Li, X., Shen, Z., Zhou, Y., Tang, Z., & Huedo-Medina, T. B. (2015). Contextual

    influence on condom use in commercial sex venues: A multi-level analysis among female

    sex workers and gatekeepers in Guangxi, China. *Social Science Research, 52*, 124–131.

    https://doi.org/10.1016/j.ssresearch.2015.01.010

Chow, E. P. F., Chen, X., Zhao, J., Zhuang, X., Jing, J., & Zhang, L. (2015). Factors associated

    with self-reported unprotected anal intercourse among men who have sex with men in

    Changsha city of Hunan province, China. *AIDS Care, 27(*10), 1332–1342.

    https://doi.org/10.1080/09540121.2015.1058892

Christensen, H. T., & Carpenter, G. R. (1962). Value-behavior discrepancies regarding

    premarital coitus in three western cultures. *American Sociological Review*, *27*, 66-74/

    doi:10.2307/2089719

Cottrell, L., Li, X., Stanton, B., Harris, C., Dalessandri, D., Sun, Z., …Zhang, H. (2005).

    Perceptions regarding preventive sexual practices and communication with sexual

    partners among Chinese college students. *Preventive Medicine, 40*(2), 189–196.

    doi:10.1016/j.ypmed.2004.05.019

Croake, J. W., & James, B. (1973). A four year comparison of premarital sexual attitudes.

    Journal of Sex Research, 9(2), 91-96. Doi:10.1080/00224497309550784

Fabrigar, R. F., & Wegener, D. T. (2010). Attitude structure. In Baumeister, R. F., & Finkel, E. J.

    (Eds.), *Advanced social psychology: The state of the science* (177-216). New York, NY:

    Oxford University Press.

Fischtein, D. S., Herold, E. S., & Desmarais, S. (2007). How much does gender explain in sexual

    attitudes and behaviors? A survey of Canadian adults. *Archives of Sexual Behavior,*

    36(3), 451–461. doi:10.1007/s10508-006-9157-9

Fishbein, M., & Azjen, I. (1975). *Belief, attitude, intention, and behavior: An introduction to theory and research*. Reading, MA: Addison-Wesley.

Ford, K., & Norris, A. E. (1993). Urban Hispanic adolescents and young adults: Relationship of acculturation to sexual behavior. *Journal of Sex Research, 30*(4), 316-323. doi:10.1080/00224499309551718

Foucault, M. (1978). *The history of sexuality*. New York, NY: Random House.

Furman, W., & Collibee, C. (2014). Sexual activity with romantic and nonromantic partners and psychosocial adjustment in young adults. *Archives of Sexual Behavior, 43*(7), 1327-1341. http://doi.org/10.1008/s10508-014-0293-3

Gagnon, J., & Simon, W. (1973). *Sexual conduct: The social sources of human sexuality*. Chicago, IL: Aldine.

Gao, Y., Lu, Z. Z., Shi, R., Sun, X. Y., & Cai, Y. (2001). AIDS and sex education for young people in China. *Reproduction, Fertility, and Development, 13*(7–8), 729–737.

Glasman, L. R., & Albarracín, D. (2006). Forming attitudes that predict future behavior: A meta-analysis of the attitude-behavior relation. *Psychological Bulletin, 132*(5), 778-822. http://doi.org/10.1037/0033-2909.132.5.778

Guerra, V. M., Gouveia, V. V., Sousa, D. M., Lima, T. J., & Freires, L. A. (2012). Sexual liberalism–conservatism: The effect of human values, gender, and previous sexual experience. *Archives of Sexual Behavior, 41*(4), 1027–1039. doi:10.1007/s10508-012-9936-4

Guo, X., Hou, C. J., & Yao, X. Q. (2013). The prediction function of adolescent sexual attitude to adolescent risk sexual behaviors. *Zhongguo Linchuang Xinlixue Zazhi, 21*(3), 483–485.

Hansen, G. L. (1987). Extradyadic relations during courtship. *Journal of Sex Research, 23*(3),

    382-390. doi:10.1080/00224498709709551376

Harrison, D. E., Bennett, W. H., Globetti, G., & Alsikafi, M. (1974). Premarital sexual standards

    of rural youth. *The Journal of Sex Research, 10*(4), 266-277.

Higgins, L. T., & Sun, C. (2007). Gender, social background and sexual attitudes among Chinese

    students. *Culture, Health & Sexuality, 9*(1), 31–42. doi:10.1080/13691050600963914

Hynie, M., Lydon, J. E., Cote, S., & Wiener, S. (1998). Relational sexual scripts and women's

    condom use: The importance of internalized norms. *Journal of Sex Research, 35*(4), 370–

    380. doi:10.1080/00224499809551955

Huang, Y., Abler, L., Pan, S., Henderson, G. E., Wang, X., Yao, X., & Parish, W. L. (2014).

    Population-based sexual behavior surveys in China: Liuzhou compared with other

    prefectural cities. *AIDS and Behavior, 18*(2), 118–125. https://doi.org/10.1007/s10461-

    013-0645-3

Huang, Y., Muessig, K. E., Zhang, N., & Maman, S. (2015). Unpacking the "structural" in a

    structural approach for HIV prevention among female sex workers: A case study from

    China. *Global Public Health, 10*(7), 852–866.

    https://doi.org/10.1080/17441692.2015.1014823

Irvine, J. M. (1995). *Sexuality education across cultures: Working with differences.* San

    Francisco, CA, US: Jossey-Bass.

Ip, W. Y., Chau, J. P. C., Chang, A. M., & Lui, M. H. L. (2001). Knowledge of and attitudes

    toward sex among Chinese adolescents. *Western Journal of Nursing Research, 23*(2),

    211–223. doi:10.1177/019394590102300208

Jannini, E. A., Fisher, W.A., Bitzer, J., & McMahon, C. G. (2009). Controversies in sexual

   medicine: Is sex just fun? How sexual activity improves health. *The Journal of Sexual*

   Medicine, 6(10), 2640-2648. http://doi.org/10.1111/j.1743-6109.2009.01477.x

Jeffreys, E., & Yu, H. (2015). *Sex in China*. Malden, MA: Polity Press.

Kashdan, T. B., Adams, L. M., Farmer, A. S., Ferssizidis, P., McKnight, P. E., & Nexlek, J. B.

   (2013). Sexual healing: Daily diary investigation of the benefits of intimate and

   pleasurable sexual activity in socially anxious adults. *Archives of Sexual Behavior*, *43*(7),

   1417-1429. Hyyp://doi.org/10.1007/s10508-013-0171-4

Katz, J., & Schneider, M. E. (2013). Casual hook up sex during the first year of college:

   Prospective associations with attitudes about sex and love relationships. *Archives of*

   Sexual Behavior, 42(8), 1451–1462. doi:10.1007/s10508-013-0078-0

Kinsey, A.C., Pomeroy, W. B., Martin, C. E., & Gebhard, P. H. (1953). *Sexual behavior in the*

   human female. Philadelphia: Saunders.

Krahé, B., & Tomaszewska-Jedrysiak, P. (2011). Sexual scripts and the acceptance of sexual

   aggression in Polish adolescents. *European Journal of Developmental Psychology, 8*(6),

   697–712. doi:10.1080/17405629.2011.611034

Krahé, B., Bieneck, S., & Scheinberger-Olwig, R. (2006). The role of sexual scripts in sexual

   aggression and victimization. *Archives of Sexual Behavior, 36*(5), 687–701.

   doi:10.1007/s10508-006-9131-6

Lau, J. T. F., Tsui, H. Y., Siah, P. C., & Zhang, K. L. (2002). A study on female sex workers in

   southern China (Shenzhen): HIV-related knowledge, condom use and STD history. *AIDS*

   Care, 14(2), 219–233. doi:10.1080/09540120220104721

Lawal, A. M. (2010). Gender, religiosity and self-esteem as predictors of sexual attitudes of

    students in a Nigerian tertiary institution. *Gender and Behaviour, 8*(1), 2638-2648.

Lefkowitz, E. S., Gillen, M. M., Shearer, C. L., & Boone, T. L. (2004). Religiosity, sexual

    behaviors, and sexual attitudes during emerging adulthood. *Journal of Sex Research,*

    41(2), 150–159.

Lou, J. H., & Chen, S. H. (2009). Relationships among sexual knowledge, sexual attitudes, and

    safe sex behaviour among adolescents: A structural equation model. *International*

    Journal of Nursing Studies, 46(12), 1595–1603. doi:10.1016/j.ijnurstu.2009.05.017

Luquis, R. R., Brelsford, G. M., & Rojas-Guyler, L. (2011). Religiosity, spirituality, sexual

    attitudes, and sexual behaviors among college students. *Journal of Religion and Health,*

    51(3), 601–614. doi:10.1007/s10943-011-9527-z

Madden, T. J., Ellen, P. S., & Ajzen, I. (1992). A comparison of the theory of planned behavior

    and the theory of reasoned action. *Personality and Social Psychology Bulletin, 18*(1), 3-9.

Marcus, D. K., Fulton, J. J., & Turchik, J. A. (2011). Is risky sexual behavior continuous or

    categorical? A taxometric analysis of the Sexual Risk Survey. *Psychological Assessment,*

    23(1), 282–286. doi:10.1037/a0021842

McBride, K. R., Reece, M., & Sanders, S. A. (2008). Using the Sexual Compulsivity Scale to

    predict outcomes of sexual behavior in young adults. *Sexual Addiction & Compulsivity,*

    15(2), 97–115. doi:10.1080/10720160802035816

McCormick, N. B. (2010). Sexual scripts: Social and therapeutic implications. *Sexual and*

    Relationship Therapy, 25(1), 96–120. doi:10.1080/14681990903550167

Ng, M. L. (1993). Public responses to the sex education series of Radio-Television Hong Kong.

    Journal of Sex Education & Therapy, 19(1), 64-72.

Nydegger, L. A., Ames, S. L., Stacy, A. W., & Grenard, J. L. (2014). Response inhibition

    moderates the association between drug use and risky sexual behavior. *Substance Use &*

    Misuse, 49(11), 1457-1464. doi:10.3109/10826084.2014.912230

Oleson, A. (2011, January 13). China's abortion numbers grow. *The Washington Times*.

    Retrieved from http://www.washingtontimes.com/news/2011/jan/13/chinas-abortion-

    numbers-grow/

Open Science Collaboration. (2015). Estimating the reproducibility of psychological science.

    Science, 349(6251), 1-8.

Parish, W., & Laumann, E. O. (2003). Chinese Health and Family Life Survey. The National

    Opinion Research Center at the University of Chicago (NORC):

    http://popcenter.uchicago.edu/data/chfls.shtml. Accessed March 19, 2013.

Peplau, L. A. (2003). Human sexuality: How do men and women differ? *Current Directions in*

    Psychological Science, 12(2), 37–40.

Petersen, J. L., & Hyde, J. S. (2011). Gender differences in sexual attitudes and behaviors: A

    review of meta-analytic results and large datasets. *Journal of Sex Research, 48*(2-3), 149–

    165. doi:10.1080/00224499.2011.551851

Qiao, S., Li, X., Zhang, C., Zhou, Y., Shen, Z., & Tang, Z. (2015). Social support and condom

    use among female sex workers in China. *Health Care for Women International, 36*(7),

    834–850. https://doi.org/10.1080/07399332.2014.971952

Ross-Bailey, L. L., Moring, J., Angiola, J., & Bowen, A. (2014). The influence of sexual scripts

    and the "better than average" effect on condom re sponsibility. *Journal of College*

    Student Development, 55(4), 408–412. doi:10.1353/csd.2014.0041

Ruan, F. F. (1991). *Sex in china*: *Studies in sexology in Chinese culture.* New York, NY: Plenum

    Press.

Schneider B., & Cheslock N. (2003). *Measuring results: Gaining insight on behavior change*

    strategies and evaluation methods for environmental education, museum, health, and

    social marketing programs. San Francisco, CA: CoEvolution Institute.

Shibley-Hyde, J., & Durik, A. M. (2000). Gender differences in erotic plasticity—evolutionary

    or sociocultural forces? Comment on Baumeister (2000). *Psychological Bulletin, 126*(3),

    375-379. http://doi.org/10.1037//0033-2909.126.3.375

Shrout, P. E., & Bolger, N. (2002). Mediation in experimental and nonexperimental studies: New

    procedures and recommendations. *Psychological Methods, 7*(4), 422-445.

    doi:10.1037/1082-989X.7.4.422

So, H. W., & Cheung, F. M. (2005). Review of Chinese sex attitudes & applicability of sex

    therapy for Chinese couples with sexual dysfunction. *Journal of Sex Research, 42*(2), 93–

    101.

State Council on AIDS Working Committee Office, 2007. A joint assessment of HIV/AIDS

    prevention, treatment, and care in China. Retrieved from

    http://www.unaids.org.cn/uploadfiles/20080725151739.pdf

Steinbrook, R. (2004). The AIDS epidemic in 2004. *New England Journal of Medicine, 351*(2),

    115–117. https://doi.org/10.1056/NEJMp048156

Tatlow, D. K. (2015). Rise in H.I.V. among China's youth draws attention for World AIDS Day.

    New York Times. Retrieved from https://www.nytimes.com/2015/12/01/world/asia/china-

    aids-sexual-transmission.html?_r=0

Tu, S. H., & Liao, P. S. (2005). Gender differences in gender-role attitudes: A comparative

    analysis of Taiwan and coastal China. *Journal of Comparative Family Studies, 36*(4),

    545–566.

van de Schoot, R., Lugtig, P., & Hox, J. (2012). A checklist for testing measurement invariance.

    European Journal of Developmental Psychology, 9(4), 486–492.

    doi:10.1080/17405629.2012.686740

Wang, S., & Griffiths, J. (2017). Shock and praise for groundbreaking sex-ed textbook in China.

    Retrieved from http://www.cnn.com/2017/03/08/health/china-sex-education-textbook-

    children/index.html

Wang, T. F., Lu, C. H., Chen, I. J., & Yu, S. (2008). Sexual knowledge, attitudes and activity of

    older people in Taipei, Taiwan. *Journal of Clinical Nursing, 17*(4), 443–450.

    doi:10.1111/j.1365-2702.2007.02003.x

Weeden, J., & Sabini, J. (2006). Subjective and objective measures of attractiveness and their

    relation to sexual behavior and sexual attitudes in university students. *Archives of Sexual*

    Behavior, 36(1), 79–88. doi:10.1007/s10508-006-9075-x

Weis, D. L., Rabinowitz, B., & Ruckstuhl, M. F. (1992). Individual changes in sexual attitudes

    and behavior within college-level human sexuality courses. *The Journal of Sex Research,*

    29(1), 43-59. http://doi.org/10.2307/3812689?ref=mo-x-

    route:a11610813510afbfdd66940eeb9f11cc

Wiederman, M. W. (2005). The gendered nature of sexual scripts. *The Family Journal, 13*(4),

    496–502. doi:10.1177/1066480705278729

Wilson, W. C. (1975). The distribution of selected sexual attitudes and behaviors among the

adult population of the United States. *The Journal of Sex Research, 11*(1), 46-64.

http://doi.org/10.2307/3811643?ref=no-x-route:1d87c9e6dd95b2ec22970ef95c323d87

Wong, C. Y., & Tang, C. S. K. (2001). Understanding heterosexual Chinese college students'

intention to adopt safer sex behaviors. *Journal of Sex Research, 38*(2), 118–126.

Yang, X. Y., Kelly, B. C., & Yang, T. (2016). Together we have fun: Native-place networks and

sexual risk behaviours among Chinese male rural-urban migrants. *Sociology of Health &*

Illness, 38(4), 559–575. https://doi.org/10.1111/1467-9566.12380

Yu, J. (2007). British-born Chinese teenagers: The influence of Chinese ethnicity on their

attitudes towards sexual behavior. *Nursing & Health Sciences, 9*(1), 69–75.

doi:10.1111/j.1442-2018.2007.00293.x

Yu, J. (2010). Young people of Chinese origin in western countries: A systematic review of their

sexual attitudes and behaviour. *Health & Social Care in the Community, 18*(2), 117–128.

doi:10.1111/j.1365-2524.2009.00906.x

Yu-Feng, Z. (2012). The comparative research on sex education for adolescents of China and the

US. *US-China Education Review A 4*, 408-417.

Zhang, C., Li, X., Hong, Y., Su, S., & Zhou, Y. (2014). Relationship between female sex

workers and gatekeeper: The impact on female sex worker's mental health in China.

Psychology, Health & Medicine, 19(6), 656–666.

https://doi.org/10.1080/13548506.2013.869612

Zhang, K., & Beck, E. J. (1999). Changing sexual attitudes and behaviour in China: Implications

for the spread of HIV and other sexually transmitted diseases. *AIDS Care, 11*(5), 581–

589.

Zhang, L., Li, X., & Shah, I. H. (2007). Where do Chinese adolescents obtain knowledge of sex? Implications for sex education in China. *Health Education 107*(4), 351–363. https://doi.org/http://dx.doi.org/10.1108/09654280710759269

Zhang, N., Parish, W.L., Huang, Y., & Pan, S. (2012). Sexual infidelity in China: Prevalence and gender-specific correlates. *Archives of Sexual Behavior 41*: 861. doi:10.1007/s10508-012-9930-x

Zhang, P. C., Chi, X. L., & Wu, M. X. (2012). A study of characteristics and relationship among sexual health knowledge, sexual attitude, and sex-related behavior in Chinese college students. *Chinese Journal of Clinical Psychology, 20*(6), 849–853.

Zheng, W., Zhou, X., Zhou, C., Liu, W., Li, L., & Hesketh, T. (2011). Detraditionalisation and attitudes to sex outside marriage in China. *Culture, Health & Sexuality, 13*(5), 497–511. doi:10.1080/13691058.2011.563866

Appendix

Items from the Chinese Health and Family Life Survey (CHFLS) Used in the Present Study

ZJ05 You are
>> 1. Male
>> 2. Female

ZJ06 What is your current full age? [full age = Western age reckoning]

ZJ12 When you were 14 years old, you lived in a:
>> 1. Rural: village
>> 2. Rural: town / township [zhen / xiang]
>> 3. County-seat, county-level city
>> 4. City above county-level

[This version was used in sites 17-21, 26-70]

JB04 Nowadays in our society, some couples have sex when they are dating, and they eventually get married. Is this a moral issue? What is your opinion?
>> 1. Definitely not
>> 2. Mostly not
>> 3. Perhaps yes
>> 4. Definitely yes

[This version was used in sites 1-6, 22-25]

JB04A Some say that as long as two people eventually get married, it doesn't matter whether they have sex before they marry. Do you agree?
>> 1. Completely agree
>> 2. Somewhat agree
>> 3. Somewhat disagree
>> 4. Completely disagree

JB05 Some say that it is OK to have sex with someone other than your spouse after marriage. Do you agree?
>> 1. Completely agree
>> 2. Somewhat agree
>> 3. Somewhat disagree
>> 4. Completely disagree

JB06 Some say that one can have sex just for pleasure with someone whom he or she is not in love with. Do you agree?
>> 1. Completely agree
>> 2. Somewhat agree
>> 3. Somewhat disagree
>> 4. Completely disagree

[This version was used in sites 17-21, 26-70]

JB09 Nowadays in our society, some married people have sex with those other than their spouse (extramarital affair, third party). Do you think that each such case should be treated individually or that these people should all be punished?

1. Definitely should be treated individually
2. Maybe should be treated individually
3. Maybe should all be punished
4. Definitely should all be punished

[This version was used in sites 1-6, 22-25]

JB09A Some say that usually those who are married but have sex with other people (extramarital affair, third party) did it with a reason. One should not advocate general punishment for this group of people, but should be treated individually. Do you agree?

1. Completely agree
2. Somewhat agree
3. Somewhat disagree
4. Completely disagree

JB16 Can a person contract AIDS if the person shakes hands with someone who is HIV positive?

1. Yes
2. No
3. Don't know

JB18 Can a person contract AIDS if the person uses the same utensil an HIV positive person has used before?

1. Yes
2. No
3. Don't know

JB19 Can an HIV positive person pass the disease to others through blood transfusion?

1. Yes
2. No
3. Don't know

JB20 Can an HIV positive person pass the disease to others if he / she sneezes in front of others?

1. Yes
2. No
3. Don't know

(Referring to a current sexual partner)

AX36 Throughout the sexual relationship with your current partner, have you ever had sex with other people (even if it happened just once)?

1. Yes

2. No

(Referring to first sexual partner.)
D05 What was your age (in full years) when you first had sex with this partner? (If you are not sure, please give an estimate.)
[If <12 or >ZJ06 (own age), repeat question. If same after repeat, go to next question]

[Repositioned item] [If asked FL01 before, skip to XB01_279]
FL01 Up to this point of your life, how many people did you have sex with (even if you did it with someone only once)? Please include all people, including those you have divorced, separated or those deceased. Please also include people you had sex with who were of the same gender as you.

[paid for sex]
XJ04 Many people pay or give someone valuable gifts in order to have sex with that person. Have you done this? (Not including your spouse or fiancée.)
          1. Yes
          2. No
[If 1, continue. If 2, F2, F3, F4, skip to XJ09_366]

B16 What was your age (in full years) when you first had sex with this partner (Please enter two digits)? ["full" = Western age reckoning]

C07 What was your age (in full [Western] years) when you first had sex with this partner? [Please enter two digits. If you don't remember, please give an estimate.]

A35 When you and your current partner began having sex, how old were you (in full years)? (Please press two numbers in succession.)