

# **HIV/AIDS knowledge, contraceptive knowledge, and condom use among unmarried youth in China**

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## **Abbreviations**

HIV: human Immunodeficiency Virus

AIDS: acquired Immunodeficiency Syndrome

ARRM: AIDS Risk Reduction Model

YARHC: the 2009 Survey of Youth Access to Reproductive Health in China

UNAIDS: the Joint United Nations Programme on HIV/AIDS

WLSMV: weighted least square parameter estimates using a diagonal weight matrix with standard errors and mean- and variance adjusted chi-square test statistic that use a full weight matrix

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**Abstract** **Purpose:** We aim to describe HIV/AIDS knowledge, contraceptive knowledge, and their relationship to condom use among unmarried youth in China. We also aim to further disentangle these relationships through the mediating effect of consciousness. **Methods:** Using the AIDS Risk Reduction Model as the conceptual framework, we studied a sample of sexually active unmarried youth who responded to the 2009 Survey of Youth Access to Reproductive Health in China. **Results:** About 30% of unmarried youth had not used a condom during their most recent intercourse. Levels of both HIV/AIDS knowledge and contraceptive knowledge among this group were low. HIV/AIDS knowledge was not significantly associated with condom use, and the disconnection between HIV/AIDS consciousness and condom use was the key reason for this. Contraceptive knowledge was more closely related to condom use. **Conclusions:** These results suggest that programs aimed at increasing condom use should make more of an effort to improve knowledge of contraception among unmarried youth and should emphasize the double effect of condoms in terms of preventing both HIV/AIDS and conception. More information should be provided to help youth build a store of systematic HIV/AIDS knowledge and realize their personal vulnerability to HIV/AIDS through unsafe sex.

**Keywords** HIV/AIDS knowledge; Contraceptive knowledge; Consciousness; Condom use

## Implications and Contribution

This paper used the first nationally representative data on sexual and reproductive health of Chinese unmarried youth. We found contraceptive knowledge related more closely to condom use than HIV/AIDS knowledge did, and the disconnection between consciousness and behavior was the key reason for youth failing to translate HIV/AIDS knowledge into condom use.

## 1 Introduction

Since the first AIDS case was reported in 1985, the number of people living with HIV/AIDS in China has increased to around 740,000 at the end of 2009 [1], with the majority of these being young people [2]. Sex has become the predominant mode of transmission of HIV/AIDS in China, surpassing intravenous drug use and blood transmission. Researchers further estimate that heterosexual transmission accounted for 44.7% of new infections in 2007 [3], which highlights the necessity to promote condom use among heterosexual youth.

Equipping youth with HIV/AIDS knowledge is a core element of most interventions or policies aimed at increasing condom use among youth. However, except for a few studies [4-5], most research has shown a nonsignificant relationship or a weak relationship between greater HIV/AIDS knowledge and increased condom use [6-10]. A meta-analysis also concluded that the effect of HIV/AIDS knowledge on condom use, though positive and significant, was small [11]. Thus, some researchers have argued that HIV/AIDS knowledge might be necessary but insufficient for changing condom use behavior [12-13].

The AIDS Risk Reduction Model (ARRM) was developed from existing social psychological models to characterize people's efforts to change their sexual behaviors related to HIV transmission. According to the ARRM, HIV/AIDS knowledge does not influence condom use behavior directly but through youth's cognitive process, such as in terms of perceived risk and intention to use condoms [14]. This is in line with other widely used models or theories, including the health belief model. However, few studies have embodied this indirect relationship between knowledge and condom use through either their conceptual framework or statistical methods [6-7, 9-10, 15]. Yet the few papers that are consistent with the ARRM indicate that there is a pathway from knowledge to condom use through attitudes and norms [16].

In addition to preventing sexually transmitted disease, avoiding pregnancy is an important reason for using condoms [10, 17-18]. Both qualitative and quantitative research has implied that condoms are used primarily for contraception [19-20]. In this case, contraceptive knowledge would be expected to have an effect on condom use. However, only a handful of papers have investigated HIV/AIDS knowledge, contraceptive knowledge, and condom use simultaneously [11, 15, 21].

Although Many studies have discussed the relationship between knowledge and condom use among youth, only a small number of these have focused on China. Those that have have focused primarily on certain subgroups, such as migrants [22-23], college students [16, 24-25], or sex workers [26-27]. To date, no study has examined Chinese youth as a whole, which impedes the process of developing effective intervention or policy aimed at increasing condom use among youth in China.

Therefore, we used nationally representative survey data to analyze these variables among Chinese unmarried youth as a whole. In addition to providing data on this topic, this paper adds to the knowledge base in two important ways: (1) We included both HIV/AIDS knowledge and contraceptive knowledge in the analysis to determine their respective relationships with condom use. We sought to understand, given the relatively low prevalence of HIV/AIDS in China, which type of knowledge has the greater effect on condom use. (2) We used the ARRM to carry out a path model and incorporated consciousness variables to mediate the relationship between knowledge and condom use. By so doing, we aimed to pinpoint where and how youth were failing to translate knowledge into healthy condom use behavior.

## **2 Methods**

### **2.1 Sample**

This study used data from the 2009 Survey of Youth Access to Reproductive Health in China (YARHC), the first nationally representative survey of unmarried youth on this topic. The target population were unmarried youth aged 15 to 24 living in 30 provinces/autonomous regions/municipalities of mainland China<sup>1</sup> and divided into three subpopulations: school youth, household youth, and youth living in collective households. The survey used mixed sampling methods that combined stratified, multi-stage, and probability proportional to size sampling in the three subpopulations. The general refusal rate was 24.9%. Ultimately, there were 22288 respondents, with 50.3% being male.

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<sup>1</sup> Excluding Tibet.

Multiple methods were used to ensure respondents' privacy, including independent environment in which a respondent answered the questions without others around besides interviewer and assurance of anonymity. Furthermore, although face-to-face interviews were used for most of the survey, self-administration was used for the part related to sex and pregnancy experience. The study protocol was reviewed and approved by Institutional Review Board (IRB) of Peking University Health Science Center.

We focused on condom use among unmarried youth in their most recent heterosexual vaginal intercourse with their most recent boyfriend or girlfriend. Thus, the sample was restricted to 3591 cases. Another 206 cases were dropped because of missing data. Respondents removed in listwise deletion were not significantly different at the 0.05 level from remaining respondents in terms of gender or age. Moreover, respondents who lived in urban areas, those who were students, and those who were educated beyond junior college were more likely to be dropped. Ultimately, 3385 valid cases were retained for the analysis.

## 2.2 Measures

Figure 1 indicates the conceptual framework adapted from the ARRM, which includes three stages: (1) In the **labeling stage**, individuals recognize and label their sexual behaviors as involving a high risk for contracting HIV; (2) in the **commitment stage**, individuals commit to reducing high-risk sexual behaviors and increasing low-risk sexual activities; (3) in the **enactment stage**, individuals seek out and enact strategies for achieving these goals [14]. In this paper, we focus on the labeling stage, which involves the basic hypothesis that knowledge does not impact condom use directly but through cognitive change. Thus, we measured the following variables.

**Condom use** was assessed with a single item (i.e., "Did you or [your sexual partner] use a condom in your last sexual intercourse?"). Response options were "yes" and "no." As previously discussed, this question referred to the unmarried youth's condom use during his or her most recent heterosexual vaginal intercourse with his or her most recent boyfriend or girlfriend.

### Labeling Stage Variables

**HIV/AIDS knowledge.** Comprehensive knowledge related to HIV/AIDS was evaluated with a 5-item scale recommended by UNAIDS (2008). This scale assessed respondents' ability to correctly identify ways of preventing the sexual transmission of HIV and to reject major misconceptions about HIV transmission. Response options were "yes," "no," and "don't know/not sure" (Table 1). Correct answers were coded as 1, and all others were coded as 0. As the internal consistency for these five items was low (Cronbach's  $\alpha = 0.46$ ), they were entered separately into the model.

**Contraceptive knowledge.** Contraceptive knowledge was examined with three variables. **(a) Pregnancy probability.** Respondents could answer "true," "false," or "don't know/not sure" for the statement "A woman may get pregnant once she has sexual intercourse." The correct answer (true) was coded as 1, and all other answers were collapsed into 0. **(b) Contraception methods.** The number of modern reversible methods of contraception<sup>2</sup> that respondents specified before the investigator's prompt was summed and then categorized as more than one (1) or other (0). **(c)**

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<sup>2</sup> These methods included the oral contraceptive pill, injectable contraceptives, condoms, emergency contraceptive pills, the intrauterine device, contraceptive jelly/foam, and any other correct methods respondents listed.

**Abortion impact.** Respondents were asked to respond to the statement “Abortion can’t impact a woman’s future pregnancy.” Answers were dichotomized into the correct option (false) coded as 1 and all others (true or don’t know/not sure) coded as 0.

**Consciousness of HIV/AIDS.** Respondents were asked “Were you ever concerned that you might catch AIDS or another sexually transmitted disease from [your sexual partner]?” They could answer “very concerned,” “somewhat concerned,” “not concerned” or “never thought about it”. Choosing the last option (1) showed that respondents had no consciousness of their risk of contracting HIV. The other responses were coded as 0.

**Consciousness of contraception.** Respondents were asked whether they agreed with the following statement: “I never want things like abortion to happen to myself or my sexual partner.” Response options were “agree,” “disagree,” and “uncertain.” We used this item to measure consciousness of contraception, because almost 90% of pregnancies among unmarried Chinese youth end in abortion, according to YARHC. Responses were dichotomized, with “agree” being defined as having a consciousness of contraception (1) and the remaining options being combined into another category (0).

### **Commitment Stage Variables**

Two variables were created in this stage. **(a) Belief about the condom’s double effect.** If respondents picked the condom out of six options (i.e., condom, the pill, periodic abstinence, withdrawal, other, and don’t know) in response to the question “Which method do you know can effectively prevent pregnancy and also sexually transmitted diseases and HIV/AIDS?”, they were regarded as believing in the condom’s double effect. **(b) Condom use at first sexual encounter.** We used a single item to measure whether respondents or their partners used a condom at the sexual encounter when they lost their virginity, with response options of “yes” (1) and “no” (0).

### **Enactment Stage Variables**

Three variables were created in this stage. **(a) Condom availability.** Respondents were asked whether they could get condoms when they needed them. “Yes” indicated condom availability and was coded as 1. **(b) Relationship status.** We measured the relationship status of the respondents and their most recent girlfriend or boyfriend. “Casual relationship” was coded as 1, and “serious relationship but with no intention of marriage,” “important/might lead to marriage,” and “engaged to be married,” were coded as 0.<sup>3</sup> **(c) Communication about contraception.** This was measured with a single item about whether respondents had ever discussed contraception with their sexual partner. “Before first intercourse” and “after first intercourse” were regarded as yes (1), and “never” was regarded as no (0).

### **Background Variables**

We also included several background variables in the model. These were gender (dichotomous), age (dichotomous: 15–19 or 20–24 years old), education (three categories: low education, “junior high school or less”; middle education, “senior middle school/technical secondary school”; high education, “junior college or above”), and youth type (three categories:

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<sup>3</sup> The response option of “other type” of relationship specified by the respondent included many situations, which was hard to coded as any single category, and was thus treated as missing values.

school youth, “youth who are in school”; youth outside school, “youth who are out of school and have local hukou<sup>4</sup> registration; migrant youth, “youth who are out of school and migrants”).

### **2.3 Statistical Methods**

In bivariate analysis, unadjusted odds ratios and 95% confidence intervals were calculated, and the chi-square test was used. In multivariate analysis, path analysis (Model 1) was used to examine the mediating effect of consciousness between knowledge and condom use. Because the outcome variables were categorical variables, we used MPLUS 5.0 as the statistical software, WLSMV as the estimator, and Theta as the parameterization method. WLSMV is a robust weighted least squares estimator that uses a diagonal weight matrix with standard errors and mean and a variance-adjusted chi-square test statistic that uses a full-weight matrix [28]. We also ran a probit model (Model 2) without the mediating effect to compare against Model 1 to determine whether path analysis was more accurate. To increase the comparability, we estimated Model 2 using the same method as Model 1. Moreover, we applied sample weights in all analyses and the bootstrap resampling technique in the multivariate analysis. There were a lot of strata and primary sampling units per stratum in the YARHC survey, and bootstrapping is helpful for taking into account the design effect and estimating sample variances under these circumstances [29].

## **3 Results**

### **3.1 Descriptive results**

Of the respondents, 53.2% were male and 23.5% were 15 to 19 years old. Table 2 shows that about 30% had not used a condom during their most recent intercourse. There were obvious disparities among rates of correct answers to the five HIV/AIDS knowledge questions (SD = 16.21). “Can a person reduce the risk of getting HIV by using a condom every time they have sex?” had the highest rate of correct answers (81.3%) and “Can a person get HIV from mosquito bites?” had the lowest (42.6%). In terms of contraceptive knowledge, only 62.8% of respondents knew that a woman may get pregnant once she has sexual intercourse, 76.9% could name more than one modern reversible contraception methods, and only 57.4% knew that abortion can impact a woman’s future pregnancy. Only half had ever thought about their risk of contracting HIV from their sexual partners, and about 80% showed consciousness of contraception.

### **3.2 Bivariate analysis**

Though providing correct answers to the five HIV/AIDS knowledge questions tended to relate to HIV/AIDS consciousness, with odds ratios greater than 1, only three indicators reached statistical significance (Table 3). All three indicators of contraceptive knowledge showed a positive relationship with consciousness of contraception. Youth who had consciousness of HIV/AIDS or contraception were more likely to have used a condom during their most recent intercourse.

The direct relationship between knowledge and condom use was also examined. Three out of five HIV/AIDS knowledge indicators and all three contraceptive knowledge indicators had positive and significant associations with condom use.

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<sup>4</sup> Hukou system is a kind of household registration system in China, which dates back to 1950s. Under this system, each individual is required to register in one and only one place of residence.

### 3.3 Multiple analysis

Model 1 showed that of the five HIV/AIDS knowledge questions, two had significant and positive relationships with HIV/AIDS consciousness (i.e., “Can a person reduce the risk of getting HIV by using a condom every time they have sex?” and “Can a person get HIV from mosquito bites?”). The other three questions seemed to have no such impact (Table 4).

When youth could name at least two modern reversible contraception methods and knew about the negative impact of abortion on a woman’s future pregnancy, they tended to express consciousness of contraception. Knowledge of pregnancy probability did not affect consciousness of contraception, even though the sign was positive.

Youth with consciousness of contraception were also more likely to have used a condom during their most recent intercourse. Having consciousness of contraception significantly increased the latent continuous variable underlying using a condom during the most recent intercourse by 0.24. And, consciousness of contraception had the third strongest influence on condom use following communication about contraception between sexual partners (0.74) and condom use at first sexual encounter (0.56). HIV/AIDS consciousness, however, had no relationship with condom use.

Model 2 showed that there were no direct associations between any of the five HIV/AIDS knowledge indicators and condom use. The relationships between contraceptive knowledge and condom use in Model 2 were also weaker than those in Model 1. Moreover, after we included the knowledge variables directly, the impacts of consciousness of HIV/AIDS or contraceptive became smaller. Generally speaking, the results indicated that knowledge was related more to consciousness than to condom use.

## 4 Discussion

This study extends the existing literature in three ways: (1) It used the first nationally representative survey data on sexual and reproductive health among unmarried Chinese youth, (2) it analyzed the effects of not only HIV/AIDS knowledge but also contraceptive knowledge on condom use in the same model, and (3) it further disentangled the relationships between knowledge and condom use through the mediating effect of consciousness variables. All of these factors potentially have practical applications in terms of helping programs and initiatives improve the rate of condom use among unmarried youth in China.

Respondents’ HIV/AIDS knowledge was worrying and did not influence condom use behavior, even when mediated by HIV consciousness. The large range in rates of correct answers to the five HIV/AIDS knowledge questions reflects youth’s unsystematic knowledge. Misconceptions about HIV transmission existed among many respondents, with rates of correct answers to two questions well below the global average level [30]; this is also reflected in other studies [26]. Consistent with other studies in China [23-25, 31], youth’s HIV/AIDS consciousness was low. Almost half had never considered their risk of contracting HIV from their sexual partners.

The nonsignificant relationship between HIV/AIDS knowledge and condom use in this study is in line with the literature [15, 32]. Though the weak link between HIV/AIDS knowledge and

consciousness needs attention, results from the path model imply that the key reason for this nonsignificance is that HIV/AIDS consciousness failed to increase youth's condom use. The prevalence of HIV/AIDS in China is low, at approximately 1 person out of every 1900 [3]. Moreover, most youth regard HIV/AIDS as a disease that affects specific subgroups, for example the homosexual population or intravenous drug users [24, 26]. Thus, even youth may have thought about their risk of contracting HIV, the misconception that there is little chance that they will get HIV and concerns about interrupted sexual enjoyment or the inconvenience of using condom may deter youth from using condoms [33-34].

The unmarried youth in this study with greater contraceptive knowledge tended to have significantly higher consciousness of contraception and condom use. This is consistent with other findings from China. A study of university students in eastern China reported that 95.1% of students chose contraception as the main purpose for condom use, a much higher percentage than chose HIV prevention (30.6%) or prevention of sexually transmitted diseases (41.3%) [25]. Furthermore, though only a few studies have discussed both HIV/AIDS and contraceptive knowledge, pregnancy prevention motivation has shown medium to strong effect sizes on condom use compared to other influencing factors [11]. Another study also found that when people used other methods of contraception, condom use was particularly low [10].

This study has two limitations. First, because of limitations in the data, we did not include intention and self-efficacy for condom use in the analysis, even though these two factors have exhibited an important influence on condom use in other studies [35]. Lacking these two variables may have affected the relationship between HIV/AIDS or contraceptive knowledge and condom use, which was the focus of this study. Second, because of the cross-sectional nature of data, we cannot conclude a causal relationship between the factors studied and condom use.

In conclusion, contraceptive knowledge has a strong association with condom use, and the key reason for HIV/AIDS knowledge failing to increase condom use lies in the disconnection between HIV/AIDS consciousness and condom use. These results suggest that programs aimed at increasing condom use should make more of an effort to improve contraceptive knowledge among unmarried youth (especially knowledge about the negative impact of abortion) and to emphasize the double effect of the condom in terms of preventing both HIV/AIDS and conception. In addition, more information should be provided to help youth build a store of systematic HIV/AIDS knowledge and realize their personal vulnerability to HIV/AIDS given that sex is the most common mode of transmitting HIV/AIDS in China. These conclusions are also meaningful for countries that, like China, have a relatively low prevalence of HIV/AIDS and a high number of HIV/AIDS cases among specific subgroups.

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