

DETERMINANTS OF PREFERENCE/INTENTION TO USE CONDOMS AMONG UNMARRIED YOUTHS IN VIETNAM

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ABSTRACT

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Determinants of preference/intention to use condoms
among unmarried youths in Vietnam
(Under the direction of Allan Steckler)

Introduction: This dissertation examined determinants of “condom preference/intention” by unmarried youths in Vietnam.

Method: Data were collected in August 2004 using interviews with structured questionnaires. Analysis involved 1337 young unmarried people aged 15-24 years. Logistic regression models were used to examine associations of the following independent variables: perceived accessibility to contraceptive and HIV information; exposure to information about contraceptives, HIV and STIs; and discussion about contraceptives, HIV and STIs with “condom preference/intention”. Logistic regression models, together with plotting techniques, were used to examine moderation effects of perceived availability and perceived accessibility to contraceptives on the relationships between conception knowledge, contraceptive awareness, and HIV/STIs knowledge with “condom preference/intention”. Finally, Structural Equation Modeling technique (SEM) was used to examine mediation effects of conception knowledge, contraceptive awareness, and HIV/STIs knowledge on the relationships between each of the independent variables with “condom preference/intention”.

Results: Perceived accessibility to contraceptive information, perceived accessibility to HIV information, and exposure to contraceptive information were found

as the strongest determinants of “condom preference/intention”. Conception knowledge was found to mediate the relationships between perceived accessibility to contraceptive information, perceived accessibility to HIV information, and exposure to contraceptive information with “condom preference/intention”. Contraceptive awareness was found to mediate the relationship between perceived accessibility to HIV information, and exposure to contraceptive information with “condom preference/intention”. HIV/STIs knowledge was found to mediate the relationships between perceived accessibility to contraceptive information, and between perceived accessibility to HIV information with condom preference/intention. Finally, perceived availability of contraceptives was found to moderate the relationship between conception knowledge and condom preference/intention.

Implications: Evaluation needs to pay close attention to the mediation and moderation relationships among factors explaining intended condom use. Interventions should address multiple channels to disseminate and make highly accessible and available the amount of information about conception, contraceptives, HIV, and STIs. Close attention should be paid in order to ensure effective discussions about these topics through different sources. Condoms should be highly available within an effective communication system.

This dissertation is dedicated to my father Trinh Dinh Chien, my mother, Le Thi Mai Dzung, my wife, Pham Quynh Lam, and my daughter, Trinh Quynh Mai for their love, encouragement and hope.

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LIST OF ABBREVIATIONS

HIV	Human Immunodeficiency Virus
IUDs	Inter-uterine Devices
RHYIA	Reproductive Health Initiative for Youth in Asia
SEF	Social Ecological Framework
STI	Sexually Transmitted Infections
UNFPA	United Nations Population Fund

CHAPTER 1

BACKGROUND AND SIGNIFICANCE

Sexuality in young people in Vietnam

Over the last several decades, Vietnamese youths have experienced dramatic changes in social values and norms that influence their premarital sexual attitudes and behaviors. As noted by the Department of Adolescent Health of the World Health Organization, increases in travel, tourism, and migration are contemporary predominant trends bringing with them more opportunities for sexual contacts among youths[7]. This seems also true in Vietnam after the economic reform in 1986 following which the country has built and expanded its relationships with many countries that allowed them to do business and exchange their cultures with their Vietnamese counterparts. Since then, the country has experienced a boom in economic development but also potentially generated within it what is called a “quiet sexual revolution”[8] due to exposure to Western cultures, rapid urbanization and modernization of the society and underlying changes in family and social relationships among youths [9]. Hong (1998) suggests that changes in content in movies, magazines, and television programs as effects of the transcended cultures (global influences) might have exposed youths to more liberal attitudes, values, and norms on premarital sex[10]. Additionally, Vietnamese youths have become more financially independent thanks to their higher educational opportunities,

allowing some to move away from their community and parental supervision, which in turn gives them more freedom to engage in premarital sex[11, 12].

Regardless of the reasonable expectation of the “quiet sexual revolution”, existing data from survey research in Vietnam do not support the expected trend. Many studies on sexual attitudes among unmarried youths suggest that a majority of Vietnamese young people do not support premarital sex[13]. For example, in a study with unmarried urban university students in Hanoi, up to 73.8% males and 97.7% females shared the view that “*sexual intercourse can only take place within marriage*”. This view seems to be reflected through a low prevalence of premarital sex and a late sexual debut as documented by a series of surveys in Vietnam conducted with unmarried young people. Specifically, the mean age for sex debut among youths is 19.6 years (20.0 for young men and 19.4 for young women) [13]. This age is quite high relative to that in other countries in the region. For example, in a study with vocational school students in Thailand, sexual debut is at 16.8 years ranging from 11-20 [14]. In Malaysia, a study with secondary school students aged 12 to 19 years revealed sexual intercourse was initiated at 15 years on average [15]. In developed countries, the sexual debut seems much younger. For example, in a study in Scotland with 14-year-old students, 18% of boys and 15% of girls reported already having sexual intercourse [16], suggesting that sexual debut might be much earlier than what is recorded in Vietnam.

The prevalence of premarital sex among young people in Vietnam is also very low. For example, the Adolescents and Social Change in Vietnam (VASC) survey found that only 10% of male respondents aged 15 to 22 and 5% of females of the same age reported ever having premarital sex[17]. A study with Hanoi’s unmarried urban

university students revealed that 14.8% of male and 2.4% of female respondents reported ever having sexual intercourse. The Survey Assessment of Vietnamese Youth (SAVY) in 2005 showed that only 11.1% of unmarried men and 4% unmarried women admitted being sexually active[13]. By contrast, in a study with vocational school students (mean age of 18.4) in Thailand, premarital sex was reported by almost half of the respondents (64.8% men, 32% women)[14, 18]. In a study conducted in Japan, premarital sex was expected by 90% of male college students and 83% of female college students[19]. Another study in the Pacific Northwest of the US revealed that 43% (40% for boys, 44% for girls) of the tenth graders reported having sex [20].

Based on such a low reported prevalence of premarital sex in Vietnam, some authors have become complacent about Vietnamese adolescent sexuality, stating that “the sexual behavior of unmarried adolescents in Vietnam is not what jeopardizes their health and well-being”[17]. While this statement was justified based on survey data, these data might not reflect the true magnitude of the problem due to a potential social desirability effect which might cause severe underreporting. Even those researchers who feel complacent about adolescent premarital sex also suspect that there might be an underreporting problem [17]. They documented that the prevalence of premarital sex estimated for married respondents is much higher (about half) than that estimated for unmarried women (6%)[17]. SAVY observed the same finding, revealing that married respondents reported a higher rate of premarital sex (22.2%) than that reported by unmarried respondents (7.6%)[13]. This disparity can be explained by the fact that married people feel more confident to disclose their sexual experience while unmarried people hesitate to do so. If this is true, then premarital sex is not a minor trend.

Also most of these studies used surveys (including self-administered questionnaire) but this method might not be well suited for measuring sensitive issues such as sexual behaviors. For example, a longitudinal study in the US raised questions regarding reliability of surveys in measuring self-reported sexual behaviors after finding an inconsistency of sexual initiation as reported by respondents over different data collection points in time[21]. The researchers of this study suggested that this inconsistency might exist due to cultural factors and sensitivity of the survey questions. Therefore, it is possible that in Vietnam, these factors also contribute to the underreporting of sexual debut among young people, given that the society is in general not permissive in regards to premarital sex. While quantitative surveys (even with self-reported questionnaires) are not absolutely effective in accurately measuring sexual behaviors as shown in the above example, qualitative methods seem to be better in this regard. For example, Hong's (1998) qualitative research provides more in-depth exploration of the issue and shows that youths' attitude toward sex in Vietnam [22] is more open than in the past while in quantitative studies, a majority of Vietnamese youths still seem to have conservative attitudes toward premarital sex[13]. This difference suggests that in-depth interviews where the interviewer has adequate time to build rapport and trust with respondents are more likely to elicit in-depth accurate information regarding youths' sexual attitudes and behaviors. This in turn helps inactivate the social desirability effects which cannot be completely removed in quantitative surveys.

While premarital sexuality cannot be ascertained solely based on multiple surveys conducted in Vietnam, it is indirectly indicated through the increased unwanted pregnancies, induced abortions, sexually transmitted diseases, and AIDS or HIV infection

over time. Despite a lack of systematic data on adolescent pregnancies and abortions in Vietnam, several estimates in the last years show increasing trends in these problems. According to Ministry of Health, the annual number of abortions for the 1990-1993 period was 1.2 million [23]. The estimated total abortion rate for 1992 alone was 2.5 abortions per woman's reproductive lifetime, documented as the highest rate in Asia and one of the highest in the world [24]. Adolescent abortions account for 25-30 percent of all abortion cases in Vietnam, or about 300,000 cases per year [3, 5, 6]. In fact, these numbers might not accurately reflect the actual magnitude of the abortion problem due to potential underreporting. This is because unmarried youths tend to go to private facilities where no mechanism exists for recording and reporting abortions, and where they may report a later sexual initiation or purposefully claim to be married while they were not [25].

There is also concern over an increased number of STIs and HIV among young people. As reported by the National Institute of Dermatology and Venereology in 2003, the number of college students having sexually transmissible diseases (STDs) increased significantly from 575 cases (or 0.8% of the total STIs patients) in 1997 to 7391 cases (or 47% of the total STIs patients) in 2003 [26]. The proportion of HIV infection among persons aged between 13 and 19 years steadily increased from none in 1992 to almost 9% of all infected persons in 2003 (from Ministry of Health report on SAVY, 2005) [13]. As of April 2003, Vietnam documented 64,801 HIV cases[27]. Over half of these people (53.9 %) were 20-29 years of age.

As revealed from the data on abortions, and STI/HIV infections, it is hard to believe that premarital sex among young people is a minor problem. So is unprotected

sex which requires effective interventions from concerned stakeholders. Among important factors associated with the above situation is lack of condom use in Vietnam. For example, a survey on ever-married women suggested that condom use was reported by only 12.3% of the respondents despite the fact that most of them were aware of the method. Only 2.5% of married women aged 15-19 years and 7% of married women aged 20-24 reported using condoms [28]. Huynh et al. (1997) reported that 44.2% of sexually active university students did not use any form of contraception[29]. In a study of male clients at a sexually transmitted disease (STD) clinic, 73% had visited a commercial sex worker in the last 3 years, and 70% surveyed had never used a condom[30]. Likewise, in a KAP (Knowledge, Attitude, and Practice) survey conducted by CARE International in Vietnam and the Vietnam's Ministry of Health [31] only 3.6% of unmarried respondents (including sexually active and non-active) had ever used a condom. A qualitative study by Gammeltoft also reveals that condoms are rarely used by unmarried people in Vietnam for protection from unwanted pregnancy or STIs [9].

Another important problem revealed from surveys on youth premarital sexual behaviors is that youths' sexual partners include professional sex workers. For example, a survey on unmarried urban university students in Hanoi revealed that sex workers account for about one-third of all sexual partners of male respondents [12]. In SAVY, 21.5% of sexually active single men reported having sex with commercial sex workers (CSWs) [13]. With much evidence showing the significant association between having sex with sex workers and STI/HIV risk[32], Vietnamese youths are at risk of getting these conditions if they do not employ effective barrier methods during sexual intercourse.

In response to the above situation, in November 2000 Vietnam developed “The National Strategy on Reproductive Health Care 2001-2010”. As a result, the Ministry of Health emphasized sexual and reproductive health of adolescents and youths as a specific long-term target of special attention [66]. Following this strategy, several initiatives have been implemented, focusing on promotion of safe sex among young people. One of the biggest programs of this type is the Reproductive Health Initiative for Youth in Asia (RHIYA) conducted by the United Nations Population Fund (UNFPA)[33]. This initiative was implemented for 2 years (2004-2006) in 7 provinces (Hanoi, Hai Phong, Hoa Binh, Thua Thien Hue, Da Nang, Khanh Hoa, Ho Chi Minh City) with 4 control provinces (Hai Duong, Dien Bien, Quang Binh, Phu Yen). The initiative aimed to improve sexual and reproductive health for adolescents and youth (10-24 years old, both in school and out-of-school) in Vietnam through promoting healthy sexual behaviors and increasing the utilization of reproductive health services by youths in the project areas. The program involved two different projects under the coordination and execution from the Umbrella Program Support Unit/UNFPA and with technical assistance from international NGOs. Project 1 titled “Advocacy and Behavior Change Communication” aimed to improve health behavior, practices, and awareness of young people through advocacy to create an enabling environment to implement Adolescent Reproductive Health policies. Project 2 titled “Promotion of Health Services and Health-Seeking Behavior” provided youth-friendly services, including counseling services, to increase the utilization of Reproductive Health services by youth and adolescents. The program activities were implemented through 22 “Youth-Friendly Reproductive Health Service

Corners” (YFCs) which were established based on the available health centers/clinics at some wards/communes in seven intervention provinces.

Although the program focused on promoting healthy sexual behaviors including condom use by young people, existing data in Vietnam do not allow program managers and policy makers to obtain a holistic understanding of the determinants of condom use by this population. Furthermore, research findings from other countries although quite informative for intervention and evaluation, cannot be used in Vietnamese contexts given that sensitivity and cultural aspects of sexuality vary in different countries and populations [21].

Therefore, the purpose of this dissertation is to examine determinants affecting condom use among unmarried youths in Vietnam based on the RHYIA baseline data provided by UNFPA, Hanoi, Vietnam. However, due to a limited number of sexually active respondents (5% of all respondents from 15-24 years old) condom preference/intention instead of actual condom use was used as the outcome variable. Furthermore, although the survey asked respondents to spontaneously indicate their preference/intention to use different types of contraceptives (condoms, oral pills, IUDs, implants, and injectables), only condoms are effective in preventing both STIs and unwanted pregnancies, and thus are the focus of the analysis.

Determinants of condom use in the world

Research in various parts of the world has explored a wide variety of determinants affecting condom use by young unmarried people of different countries and cultures. Although there is no absolute unanimity in measurement of these determinants, or in

research conclusions, determinants can be categorized into the following major groups: intra-personal determinants, interpersonal determinants, and environmental determinants.

At the intrapersonal level attitudes towards condoms[35-37], perceived condom benefits[14, 38, 39] and barriers[14, 40], perceived risks of HIV/STDS and pregnancies[14, 39, 41], and self-efficacy[14, 39] are most commonly suggested as significant determinants of condom use. Although these terms are used separately according to different studies, there might be some overlap among these determinants, especially between attitudes and perceived condom benefits and barriers. In fact, according to the Theory of Planned Behavior [42] attitudes toward condoms are a product of behavioral beliefs (including condom positive aspects/benefits and negative aspects/barriers), and behavioral outcome evaluation. Therefore measuring attitudes can reflect aspects of both condom benefits and condom barriers. For example, in a study with African adolescents [43], it was found that positive attitudes about condom use were significantly associated with intention to use condoms and with actual condom use. When items composing the attitude scale were analyzed separately, “the fear of contracting HIV/AIDS” and “reducing the risk of pregnancy” emerged as predominant determinants. In such a case, attitudes might better be taken as perceived condom benefits. It is also worth mentioning here that while “perceived condom benefits” in both HIV/STD and pregnancy prevention are significant determinants in condom use, “perceived benefits” against pregnancy is suggested by some researchers as more strongly associated with actual condom use [14, 39]. Similarly, many studies also found positive associations between risks of HIV/STD and pregnancy and condom use [36, 39, 41], with some noting that young people seem more concerned about pregnancy than about HIV/STD[36]. Self-

efficacy, either measured as a combination of dimensions such as confidence to negotiate with sex partners, confidence to purchase and use condoms[39], or self-efficacy for condom use only [44] is often a strong determinant of condom use.

The literature also suggests that knowledge of STD/HIV significantly contributes to condom use in different contexts despite inconsistencies in measurement[14, 37, 45]. However, other research has found no relationship [46] or even in an inverse association [41]. Together with knowledge on STD/HIV, knowledge about conception is also reported as being positively associated with condom use[14]. Additionally, some other researchers found lack of trust with sexual partners[36], and use of other contraceptives, such as oral pills [41], as barriers to condom use.

Interpersonal determinants of condom use include perceived peer norms of condom use, ever communicating with sexual partners, and discussing with someone else about HIV or pregnancy prevention. Specifically, when young people perceived that their peers use condoms, they are more likely to use condoms [18, 47]. Likewise, talking with sexual partners about STIs or pregnancy prevention before sex might guarantee more condom use [16, 41]. Researchers also examined the effect of communication with others about HIV and pregnancy and their findings suggest that this type of communication might be a good determinant of condom use. For example, a study with youths in Madagascar[39] explicitly found that having discussed HIV prevention with someone in the last year was associated with condom use with regular partners among females. Other researchers, while not directly examining the association between communication and condom use, also suggested that communication might be a significant determinant with condom use. For example, a study about access to contraceptive services among

unmarried young people in northeast China suggests that youth might not use condoms due to lack of counseling and privacy provided by service providers [48]. Likewise, a study with inner city women in Denver emphasized the influence of the number of places available to discuss condoms on condom use [37]. Furthermore, another study suggests that youths are ignorant of places for consultations on HIV and sex-related issues, which implies that discussion with others on the issues might increase condom use if sexual consultation were accessible [49].

At the environmental level, research suggests that the availability and accessibility to condoms as determinants of condom use. For example, a study with secondary school students in Australia revealed that condom accessibility is associated with increased condom use[41] while a study in Madagascar suggests that unavailability is negatively associated with condom use[39].

While most studies examined direct associations between those determinants with condom use, some explicitly indicated mediation and moderation effects in the statistical analysis. For example, some authors have found an interaction between knowledge about HIV/STDs and pregnancy and peer norms in predicting condom use[14]. Specifically, the association is only significant for those who believe that their friends also practice preventive behaviors. Other researchers have found a moderation effect between knowledge about STD/HIV and parental education in predicting consistent condom use [45]. Specifically, the association was stronger in low-and-middle educated parents than in highly educated parents. Furthermore, a study with high school students and freshmen in the US suggested a mediated effect of knowledge about sexuality and contraception between cognitive development and contraceptive use [50]. It found that those

adolescents with higher scores on cognitive development and self-esteem scales were more knowledgeable about sexuality and contraception, and were more likely to use contraception.

Determinants of intended condom use in the world

At the intrapersonal level, perceived condom benefits and barriers, attitudes, perceived risks of STD/HIV and pregnancy, and self-efficacy are major determinants of intended condom use. While most research agrees on the predictability of perceived benefits and barriers[18, 50-53], it is worth noting that specification of sexual partners is important in interpretation of the findings. For example, in a study with youths in detention in the US, perceived condom benefits for protection against STDs is positively associated with intention to use condoms with steady partners[51]. By contrast, for casual partners, perceived benefits against pregnancy, but not against STDs, is positively associated with intended condom use. Likewise, a study with vocational students in Thailand found that condom barriers were significantly associated with intended condom use for “sexually naïve students”, but not for intention to use condoms next time with steady partners in sexually active students[18]. Furthermore, it is also important to take into account definition or measurement of condom benefits and barriers versus condom attitudes, as the latter by nature takes into account the balance between benefits and barriers of condom use. Because of this, even though condom benefits and barriers might be revealed as significant determinants of intended condom use when analyzed separately [18], attitudes might not be a determinant when treated alone[53]. In some research, attitudes are clearly defined as negative and positive aspects of condom use [51], and thus become similar to the definition of perceived benefits and barriers of condom use. This

complication requires a common definition of the construct that helps interpretation of the findings.

The literature also discusses the influence of perceived risk for STDs and pregnancy on intended condom use, but results are not consistent. For instance, a study with undergraduate students in the US found overall perceived susceptibility to STDs and pregnancy as positive determinants of intended condom use[51], but a study with vocational students in Thailand suggested the opposite. The latter study suggested that lower perceived risk for STD was significantly associated with intentions to use condoms among “sexually naïve” students[18]. Meanwhile, a study with adolescents in Venda, South Africa found no association between susceptibility of getting HIV, severity and fear of AIDS and intended condom use in a multivariate analysis despite the fact that perceived condom benefit in that study was positive[52]. In such a study, perceived risk of pregnancy might be more important in predicting intended condom use as other researchers have suggested for actual condom use[54].

Disagreement on the impact of self-efficacy on intended condom use is also noted. For example, studies with college students [44] and with ninth graders in the US [47] found that self-efficacy is a significant determinant of intended condom use. However, in another study with junior high school students[46], perceived behavioral control (which is defined as one’s perception of one’s ability to perform a behavior, and thus can be interpreted as self-efficacy), was not associated with intended condom use[52].

Finally, experience with condom use, having multiple sex partners, and use of oral contraceptive pills were also found to predict future condom use. The two former

determinants increase intention to use condom in the future [55] while the latter reduces that intention [54].

Apart from intrapersonal determinants, perceived peer norms of condom use [18, 47] and subjective norms [56] are mentioned in the literature as the two interpersonal determinants of intended condom use. In addition, the literature also examines the relationships of condom availability and negotiation with partners in intended condom use but the findings are not conclusive. For example, a study with Spanish-dominant Latino youths did not find association between condom availability and negotiation skills (as incorporated items of the control belief construct)[56] with intention to use condoms, while in other studies, these have been found to be strong determinants [53].

Condom use determinants in Vietnam

In Vietnam, while much research has examined premarital sex patterns among young people [12, 13], little is known about determinants of contraceptive use by this population. This might be because unmarried young people were not a focus of national program planning until recently. The main determinants of contraceptive use suggested by research in Vietnam include: knowledge about contraceptives, availability of methods, accessibility to information, and planned sex.

As revealed in a qualitative study with young people in Ho Chi Minh City, being able to name a contraceptive method is not enough to ensure safe sex[58]. Actually, young people in Vietnam lack in-depth knowledge about condoms and pills, such as their working mechanisms and their side-effects. This is also supported by a Demographic and Health Survey which found low condom use in ever-married people even though a majority of respondents could name condom use as a protective method[28]. There might

be two explanations for this finding. First, naming contraceptive methods is insufficient to guarantee safe sex, and thus more effort should be made to examine other dimensions of knowledge which might include knowledge about reproduction and about HIV/AIDS. Second, there might be some uncontrolled variables that moderate the relationship between naming contraceptive methods and condom use, and thus blurring the influence of this type of knowledge on condom use. Possible moderators might include perceived accessibility and availability of contraceptives.

Vietnamese data also address the interpersonal aspects of sexuality such as communication with peers about sexuality, but do not try to link this determinant with condom use. For example, a study with unmarried urban college students in Hanoi found that most of the respondents reported that peers were the most common source of information [12]. This seems to be consistent with other research showing that young people do not pay attention to information provided by parents and professionals[58]. However, peers might not be a reliable source of knowledge; therefore obtaining informational support from other sources is essential for youths to gain correct knowledge about sexuality. This provides more rationale to test the relationship between communication with others about contraceptives and HIV/STIs with preference/intention to condoms.

Some authors suggest that the availability of a contraceptive method might increase actual use of the method. For example, based on secondary data accumulated over decades in Vietnam, Daniel and Thuc Anh (1997) attributed increased condom use in married couples to high condom availability and accessibility [60]. In the same manner, Nguyen in 2002 also suggested that easier access to contraceptives has been

shown to be an essential factor in the success of family planning programs in Vietnam[61]. However, as discussed above, these two variables might moderate the relationship between knowledge of contraceptives and HIV/STIs and intended condom use. Therefore, more effort should be made to test this potential moderation effect, but not just examining if they are significant determinants of intended condom use.

Accessibility to information is also explored in some studies. For example, a study with single women who had an abortion in Hanoi suggests that lack of information sources is one of the main reasons leading to unprotected sex and subsequently to abortions in Vietnam [59]. This study also attributes abortions partly to the social taboo associated with premarital sex and pregnancy, which might lead to unplanned sex, and was mentioned as one of the reasons for not using condoms[58].

Theories on intended and actual condom use

Effort has been made in constructing theoretical models to predict intended and actual condom use. Among theories discussed in the literature are the Health Belief Model (HBM) [14, 44, 46], Theory of Reasoned Action (TRA)/Theory of Planned Behavior (TPB)[37, 43, 52, 56] and Protection Motivation Theory (PMT)[52]. The TPB seems to predict these outcomes much better than HBM. For example, a study with African adolescents used TPB to predict condom intention and use among adolescents and suggests that the theory explained 67% of the variance in intention to use condoms [43]. Likewise, in a study with Spanish-dominant Latino adolescents in the US, TPB composed of attitudes toward condom use, subjective norms, and self-efficacy for condom use explained 60% of the variance in intention to use condoms [56]. By contrast, evidence about predictability of HBM is not supportive. For example, in a study with

vocational school students in Thailand, the theory explained only 27% of the variation in condom use after controlling for modifying variables[18]. In a study of college students in the US, self-efficacy was the only construct of HBM that was significant in explaining intended condom use [44]. PMT was used together with TPB, to predict intended condom use in a study with adolescents in Venda, South Africa [52]. In this study both theories combined could explain only 23% of the variance of the outcome variables. Furthermore, the PMT, although significantly predicting intended condom use, only response efficacy of condom use (i.e., “Using condoms will protect me against becoming infected with HIV.”) was significant while vulnerability (susceptibility) of getting HIV, severity, fear of AIDS, and self-efficacy were non-significant determinants in multivariate analysis (although most of them were significant in univariate analysis). In fact, there is some overlap between variables of the two theories. For example, attitudes in TPB might reflect part of response efficacy as attitude is a product of behavioral beliefs and behavioral outcome evaluation which addresses condom benefits and condom barriers. Therefore, in case response efficacy (perceived condom efficacy) is significant, it implies that condom benefits might outweigh barriers. Based on these findings, TPB was judged to be sufficient for that study.

Note that even in studies which suggest high predictability of TPB in condom use and intention, analysis shows that examining each construct separately might be wise in order to understand how the theory might work. For example, in the study with African adolescents[43], although the theory explained 67% of the variance in intention, elaborated analysis showed that only subjective norm and self-efficacy were significantly associated with intention while attitude and perceived control were not. Family was

found to be the most significant influence within the subjective norm construct. Further analytic effort based on attitude and control beliefs revealed that “the fear of contracting HIV/AIDS” and “reducing the risk of pregnancy” were among the items which were significantly associated with intention to use condoms. In fact, these items reflect condom benefits in HIV and pregnancy prevention, and therefore can also be treated as condom benefits as has been done in other studies [18, 51]. Similarly, in the study with Spanish-dominant Latino youth [56] only subjective norms, behavioral beliefs (especially about prevention of pregnancy and STDs/HIV), and self-efficacy of the theory are significant determinants of intentions to use condom. These variables explain over 60% of the intention variance. However, separate analysis with behavioral beliefs and control beliefs revealed that only prevention beliefs and impulse control beliefs (“the belief that participants could control themselves enough to use condoms, even when sexually aroused” [56]), are significantly associated with condom use intentions. This suggests that prevention beliefs (i.e., perceived condom benefits and barriers) are the strongest determinants. Thus, caution should be used in concluding that TPB predicts condom use. Rather, components of each construct should be thoroughly examined and the validity of each construct should be tested to avoid errors in measurement and interpretation.

In summary, much research has examined determinants of condom use and intention to use condoms either through a theoretical basis or by examining determinants in a multivariate analysis. Literature discussed application of various theoretical models (HBM, TPB, and PMT) in explaining intended and actual condom use, but none of them shows obvious advantages over the others in predicting the outcome variables. Therefore, it is reasonable to propose another model which explains intended and actual condom use

from a broader perspective based on different determinants suggested by the literature. While the definition for each determinant is not always consistent, there is clear agreement on a social ecological framework which sees condom use and condom intention in three different levels: intrapersonal, interpersonal, and environmental level. Furthermore, as intended condom use predicts condom use [14, 57], determinants of condom use and intended condom use might be interpreted in the same fashion.

Accordingly, the framework predicting condom use can be seen as for intended condom use and vice versa (See Figure 1). Specifically, at the intrapersonal level, perceived condom benefits and barriers, perceived risk of STD/HIV and pregnancy, perceived self-efficacy in negotiation and in condom use, and knowledge about STD/HIV and pregnancy are found to be determinants of both intended and actual condom use.

At the interpersonal level, the strongest determinants are peer norm of condom use, and subjective norm (i.e., role of family). Communication with partners and with others about HIV/AIDS, pregnancy and contraception, defined as belonging to the interpersonal level, has also been examined by some researchers, but more evidence is needed before conclusions about the influence of these determinants can be made.

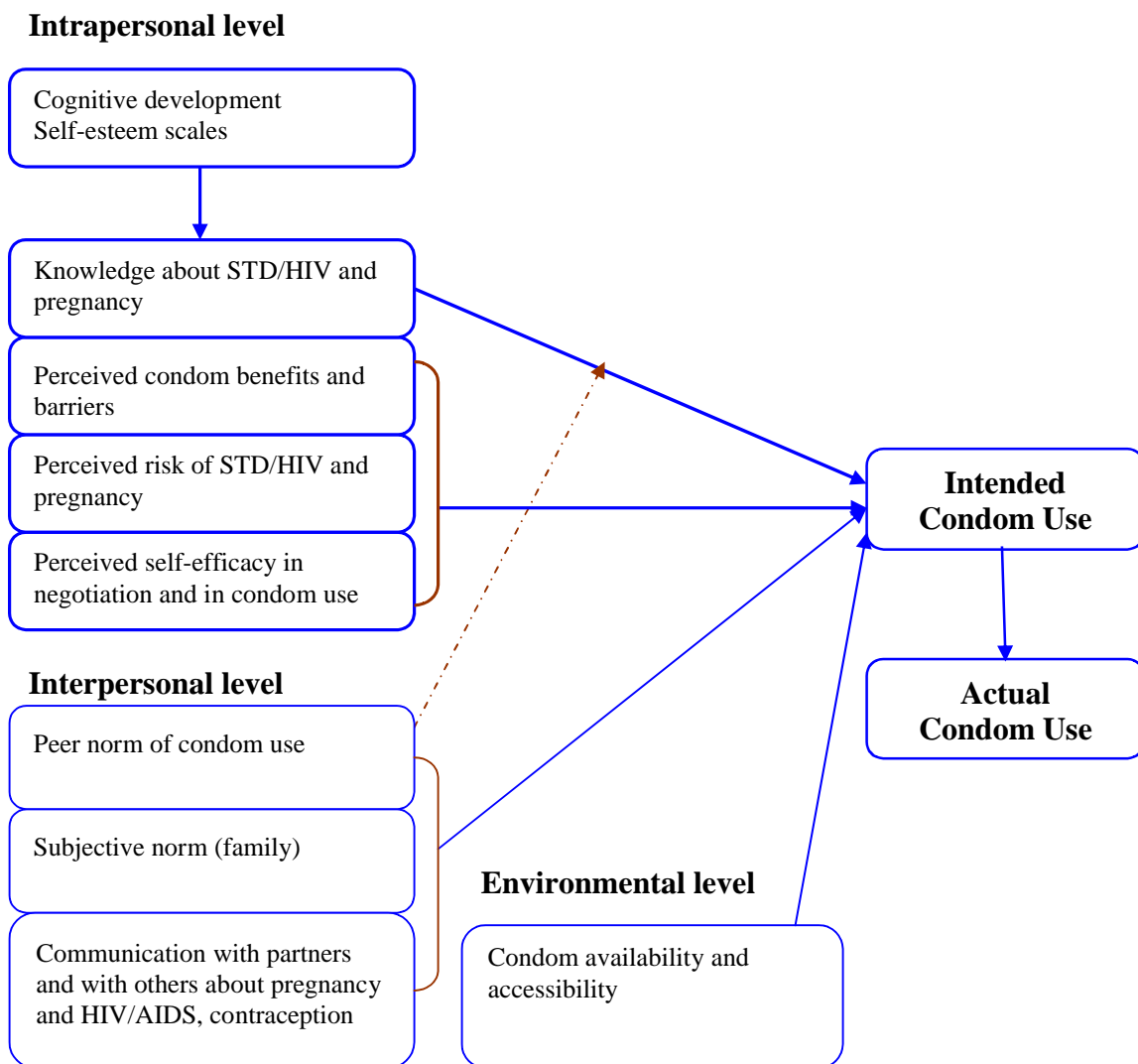
At the environmental level, an effort has been made to examine the influence of condom availability and accessibility on intended and actual condom use. Results are inconclusive, and thus further research is needed.

Besides, the framework suggests peer norms, parental education and income as moderators for the relationship between knowledge about HIV/STDs and pregnancy and intended condom use based on evidence from different research [14, 45]. Knowledge of

HIV/STDs and pregnancy is also suggested as mediating the relationship between cognitive development and intended condom use [50].

The determinants of intended and actual condom use suggested by the literature are displayed in Figure 1.

Figure 1: Literature on determinants of intended and actual condom use



There is no clear-cut literature about determinants of preference to use condom use. However, it is assumed that the preference of condom use might be a pre-determinant of intention to use condoms. Therefore, determinants of intention to use condoms can be used as those of condom preference/intention. Accordingly, the dissertation treats preference/intention to use condoms in the framework of intention to use condoms.

Importance and innovation of the dissertation

Although literature suggests a broad set of determinants for intended condom use, research in the past focuses on the intrapersonal level and neglects some interpersonal and environmental aspects. For example, research shows that communication with sexual partners is an important determinant of condom use and intended condom use [16, 41], but little is known about the contribution of communication with other people such as school teachers, health professionals, and parents in predicting the outcome variables. Moreover, research does not usually examine three levels (intrapersonal, interpersonal, and environmental) of SEF in one study, therefore making it hard to see the dynamic contribution of these levels in explaining condom use. Additionally, although research has addressed knowledge of reproduction and HIV/STIs as a mediating variable between cognitive development and self-esteem scales and condom use [14, 45, 50], it has not examined knowledge as a mediator for the relationships between other potential independent variables and intended and actual condom use. These potential independent variables might include perceived accessibility to contraceptive and HIV information, exposure to information on contraceptives and HIV/STIs, and communication with others about contraceptives and HIV/STIs. In fact, these independent variables were available in

the RHYIA data, and thus analyzed in the dissertation for mediation models which tested knowledge as the mediator to explain intended condom use. At the same time, while perceived availability and perceived accessibility of contraceptives might moderate the relationship between knowledge and intended contraceptive use, research has only examined them in direct associations with the outcome variable and ignored these potential moderation effects. Because of this, the dissertation also tested these moderation effects.

Considered in Vietnamese context, existing data in the country do not allow for a comprehensive examination or conclusions about determinants of condom use in unmarried young people. This is partly because research is mostly based on secondary data which has not been collected using frameworks strictly focused on examining contraceptive use determinants, or has used qualitative research without using statistical analysis for testing hypotheses. Furthermore, when compared with studies conducted elsewhere in the world, Vietnamese data fail to address most of the sociological and attitudinal attributes that might be determinants of condom use such as perceived benefits and barriers of condom use, perceived risk or susceptibility of HIV/STDs and pregnancy, perceived self-efficacy, perceived peer norms and subjective norms. Additionally, all determinants of condom use in Vietnam as discussed above have not been statistically tested, and thus lack rigor that would allow for generalization. As a partial response to this gap, with an available secondary data set of RHYIA provided by the United Nations Population Fund in Hanoi, the dissertation examined determinants of preferred/intended condom use among unmarried youths in Vietnam through a SEF perspective using statistical tests. The variables to be analyzed in the dissertation are categorized into three

levels of SEF. The intrapersonal level includes perceived accessibility to contraceptive information, perceived accessibility to HIV information, conception knowledge, contraceptive awareness, and HIV/STIs knowledge. The interpersonal determinants include communication with others regarding contraceptives, HIV and STIs. Environmental determinants include exposure to information about contraceptives, HIV and STIs, perceived availability and accessibility of contraceptives.

Although the current data do not allow for testing all possible determinants suggested by the literature as shown in Figure 1, the dissertation study enriched the literature by examining two additional variables at intrapersonal level: perceived accessibility to contraceptive information and perceived accessibility to HIV information. More importantly, it tested moderation and mediation effects that have been ignored or not thoroughly examined by the past research as discussed earlier. Specifically, the dissertation tested the moderation effect of perceived availability and perceived accessibility to contraceptives on the relationships between conception knowledge, contraceptive awareness, and HIV/STIs knowledge with condom preference/intention. The dissertation also tested the mediation effects of these three types of knowledge in causal paths between perceived accessibility to information about contraceptives and HIV, exposure to information about contraceptives, HIV, and STIs, and communication with others about these subjects, with condom preference/intention.

CHAPTER 2

RESEARCH QUESTIONS, HYPOTHESES, AND CONCEPTUAL FRAMEWORKS

Research questions

Three research questions to be addressed in this dissertation are:

1. Are perceived accessibility to information about contraceptives and HIV; exposure to information about contraceptive methods, HIV and STIs; and discussion with others about contraceptive methods, HIV/AIDS, and STIs associated with condom preference/intention among unmarried youths in Vietnam?
2. Are the associations of perceived accessibility to information about contraceptives and HIV; exposure to information about contraceptive methods, HIV and STIs; and discussion with others about contraceptive methods, HIV/AIDS, and STIs with condom preference/intention among unmarried youths in Vietnam mediated by conception knowledge, contraception awareness, and HIV/STIs knowledge?
3. Are the associations between conception knowledge, contraceptive awareness and HIV/STIs knowledge with condom preference/intention among unmarried youths in Vietnam moderated by perceived availability and perceived accessibility of contraceptives?

Hypotheses

In correspondence with the above research questions, the following hypotheses were statistically tested:

Hypothesis 1: Those youths who perceive it is easy to get information about contraceptives and HIV will be more likely to prefer/intend to use condoms than those who perceive it is difficult or impossible to get the information.

Hypothesis 2: As the amount of exposure to information about contraceptives, HIV and STIs in the last 6 months increased, youths will be more likely to prefer/intend to use condoms.

Hypothesis 3: The more types of people with whom youths discuss contraceptives, HIV, and STIs in the last 6 months, the more likely they will be to prefer/intend to use condoms.

Hypothesis 4: The relationship between perceived accessibility to contraceptive information and perceived accessibility to HIV information with condom preference/intention will be mediated by conception knowledge, contraceptive awareness and HIV/STIs knowledge such that those who perceive that it is easy to get information about contraceptives and about HIV tend to have higher knowledge on these subjects, and thus are more likely to prefer/intend to use condoms than those who perceive it is difficult or impossible to get the information.

Hypothesis 5: The relationship between exposure to information about contraceptives, HIV, and STIs with condom preference/intention will be mediated by conception knowledge, contraceptive awareness and HIV/STIs knowledge such that the more sources from which youths received information about contraceptives, HIV, and

STIs in the last 6 months, the more knowledge about these subjects they will gain, and thus, they will be more likely to prefer/intend to use condoms.

Hypothesis 6: The relationship between discussion with others about contraceptives, HIV, and STIs with condom preference/intention will be mediated by conception knowledge, contraceptive awareness, and HIV/STIs knowledge such that the more people with whom youths discussed contraceptives, HIV, and STIs in the last 6 months, the more knowledge about the subjects they will gain, and thus they will be more likely to prefer/intend to use condoms.

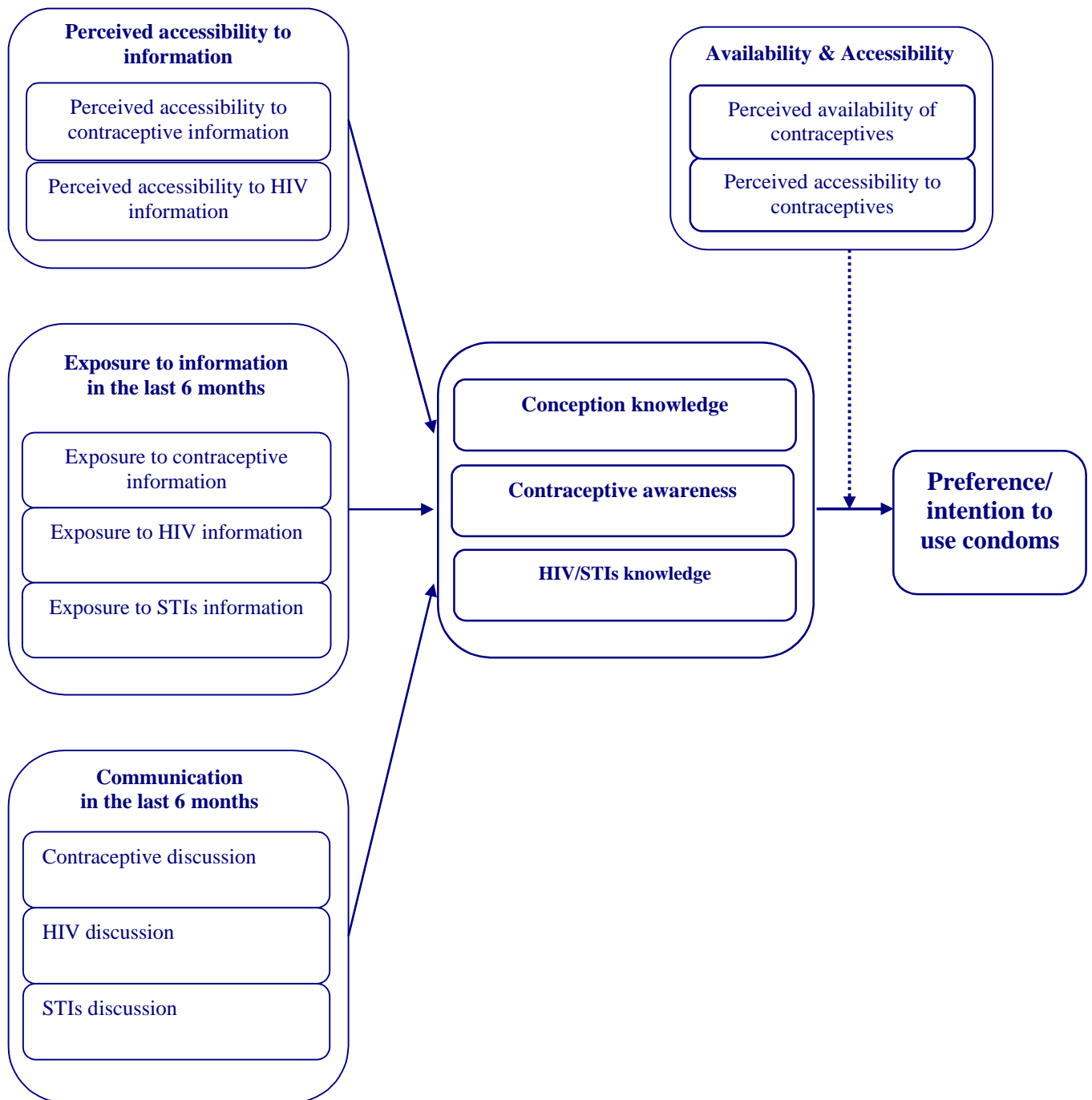
Hypothesis 7: The relationship between youth's conception knowledge, contraceptive awareness, and HIV/STIs knowledge with their condom preference/intention is moderated by their perceived availability of contraceptives such that the relationship will be stronger for those who are aware of at least one place to get a contraceptive method than for those who are not aware of any place to get a contraceptive method.

Hypothesis 8: The relationship between youth's conception knowledge, contraceptive awareness, and HIV/STIs knowledge with their condom preference/intention is moderated by their perceived accessibility to contraceptives such that the relationship will be stronger for those who think it is easy to get a contraceptive method than for those who think it is difficult or impossible to get a contraceptive method.

The hypotheses are displayed in the conceptual framework in Figure 2. This framework hypothesizes relationships between three levels of SEF: intrapersonal, interpersonal, and environmental determinants with condom preference/intention. The

intrapersonal determinants are perceived accessibility to contraceptive information, perceived accessibility to HIV information, conception knowledge, contraceptive awareness, and HIV/STIs knowledge. The interpersonal determinants are contraceptive discussion (or communication with others regarding contraceptives), HIV discussion (or communication with others about HIV), and STIs discussion (or communication with others about STIs). Environmental determinants are exposure to contraceptive information, exposure to HIV information, exposure to STIs information, and perceived availability and accessibility of contraceptives. The analysis not only tested direct associations of each determinant with the intended contraceptive use, but also examined the interaction and moderation effects among these some components of the framework. Specifically, perceived accessibility to information, communication with others, and exposure to information might help youths gain more knowledge about reproduction (conception and contraceptive awareness) and HIV/STIs which in turn will increase the likelihood that youths will prefer/intend to use condoms. However, increased knowledge might not help increase such likelihood if condoms are not highly available. Therefore, perceived accessibility and perceived availability are hypothesized to moderate the relationship between knowledge and the outcome variable. In short, the dissertation analysis has advantages over previous research by incorporating perceived accessibility to contraceptive and HIV information, exposure to information about contraceptives, HIV, and STIs while further examining communication with others about these topics, and exploring potential interaction and mediation between some components of the framework.

Figure 2: Conceptual framework for preference/intention to use condoms



Rationale for the research questions and hypotheses

Rationale for research question 1 and hypotheses 1, 2, 3:

The three types of variables addressed by research question 1 are perceived accessibility to contraceptive and HIV information; exposure to information about contraceptives, HIV and STIs; and discussion about contraceptives, HIV, and STIs.

One reason for including these variables in the framework is that the RHYIA intervention program has some components that work to promote sexual communication between youths and others such as parents, teachers, and health workers about contraceptives, HIV and STIs, and to increase their access to different sources of information and services of reproductive health. Subsequently, these activities were expected to promote healthy sexual behaviors by young people (including condom use). For this reason, the dissertation study tested these determinants to provide a more insightful background for the program evaluation. Furthermore, examining effects of perceived accessibility and exposure to information would provide more statistical basis for what was suggested by some previous studies that lack of information sources might explain unprotected sex among young people in Vietnam [12, 59]. While previous research suggested discussion about pregnancy and HIV as a determinant of condom use [16, 18, 41, 47], it did not explicitly suggest so for intended condom use. Therefore, examining discussion variables would provide a chance to see how this might be associated with condom preference/intention.

Rationale for research question 2 and hypotheses 4, 5, 6

Although research suggests that knowledge about reproduction and HIV/STDs are associated with intended and actual condom use [14, 45, 49], knowledge has often been

seen as an independent variable, but not as a mediator which might be an effect of other pre-determinants. Furthermore, research has suggested that cognitive development and self-esteem are pre-determinants of knowledge[50], but there might be more such pre-determinants in reality which have been undiscovered. According to Israel Spiegler, knowledge is a transformed version from data and information [64], and thus factors that lead to data and information can be considered as predeterminants of knowledge as well. The three variables addressed in research question 1 (perceived accessibility to contraceptive and HIV information, exposure to information about contraceptives, HIV and STIs, and communication with others about contraceptives, HIV and STIs) may help youths to gain information, and thus serve as predeterminants of knowledge on these subjects. Specifically, when people perceive that it is difficult for them to get information, they might not proceed to get it, or fail to get it. Otherwise, if they perceive they could get information easily (perceived accessibility to information), they will tend to acquire it, and thus will gain more knowledge about the subject. Subsequently, they will be more likely to prefer/intend to use condoms (hypothesis 4).

As information is a predeterminant of knowledge which predisposes individuals to perform behaviors as discussed above, it can be inferred that the more information they receive, the more knowledge they will gain. In other words, the more sources from which they receive information (exposure to information) about contraceptives, HIV and STIs, the more knowledge they will gain, and thus will be more likely to prefer/intend to use condoms (hypothesis 5).

Similarly, discussing contraceptives, HIV and STIs with other people (communication with others) is a way for young people to get information, and thus helps

them to build up their knowledge on the subjects. Therefore, it is hypothesized that the more types of people with whom young people discuss contraceptives, HIV and STIs, the more knowledge about these subjects they will gain, and thus they will be more likely to prefer/intend to use condoms (hypothesis 6). As such, this hypothesis looks beyond the testing of the direct association between communication with others and the intended/preferred condom use as suggested by literature [39].

Rationale for research question 3 and hypotheses 7, 8

The moderators addressed in research question 3 are perceived availability and perceived accessibility to contraceptives. The reason to include these variables is because the RHIYA intervention also provided young people with reproductive services including contraceptives through youth-friendly centers, to increase their actual accessibility and availability of contraceptives. As such, the program managers and stakeholders might be interested in the influence of perceived availability of and accessibility to contraceptives. The literature suggested the accessibility and availability might facilitate contraceptive use [56, 60]. However, when put together with knowledge in predicting preferred/intended condom use, this association might not always hold true. Specifically, people may be knowledgeable about contraceptives and willing to use them if they perceive that it is easy for them to get the contraceptive method or that the method is made available to them. If they perceive otherwise, they might not perform the behavior. This explanation leads to hypothesis 7 and hypothesis 8 proposing that the relationship between knowledge and preferred/intended condom use might be stronger for those who perceive contraceptive availability and easy accessibility.

CHAPTER 3

RESEARCH METHODS

Dissertation data

The dissertation data were part of the baseline data within the RHIYA program by UNFPA, Vietnam. The survey questionnaires were adapted from the version developed by the University of Louvain to fit Vietnamese conditions and cultural contexts [33]. The data were collected in August 2004 by local trained interviewers under coordination of central-level researchers and supervision of UNFPA staff members. Data collection tools included face-to-face interviews using structured questionnaires for young people aged 10-24 years and their parents; and self-administered questionnaires with local leaders, teachers, and health employees. Double entry was performed using EPI Data 3.2 software. The dissertation only used the data with unmarried young people 15-24 years old for analysis.

The survey data include conception knowledge, contraceptive awareness, STD/HIV knowledge; perceived accessibility to information about contraceptives and HIV; exposure to information about contraceptives, HIV and STIs; communication with others about contraceptives, HIV and STIs; and perceived availability and accessibility to contraceptives. The outcome variable is condom preference/intention. Furthermore,

although the data cover young people from 10-24 years, this analysis only focused on the 15-24 year-old age group due to late sexual initiation in Vietnam[13].

Sample size and sampling techniques

Sample size

The sample selected for analysis included 1337 unmarried individuals (50.4% males and 49.67% females) aged 15-24 out of the total sample of 1390 youths and adolescents (both married and unmarried).

Sampling technique

The multi-stage clustering was applied in selecting the respondents [33]. As a total, 11 provinces (7 intervention and 4 control provinces) were purposely selected. The seven intervention provinces are Hanoi, Hai Phong, Hoa Binh, Thua Thien Hue, Da Nang, Khanh Hoa, and Ho Chi Minh City. The 4 control provinces are Hai Duong, Dien Bien, Quang Binh, and Phu Yen. All the control provinces are rural. These 11 provinces are located in 4 ecological regions of Vietnam: Red River Delta, Northwest, Northern Central, and Southern Central. The criteria for selecting the control provinces include similar geographic and ecological-economic region [33]. In the intervention provinces, wards (in urban areas) and communes (in rural areas) were also purposely selected for intervention in each province (designated prior to interventions). But households with 15-24 year-old children within each of these wards or communes were randomly selected as clusters by the walking method (Selecting a household based on a mapping system) [33]. In each control province, one commune which shared similar socio-economical

characteristics with one rural commune in the intervention areas was selected. From these control communes, households were also randomly selected by the walking method. As a result, a total of 22 wards/communes were designated from the intervention provinces and 4 communes were selected from the 4 control provinces. On average, in each survey province, 50-60 households were randomly selected with an exception of Ho Chi Minh City and Hanoi with nearly 100 households selected. Once a household was selected, all youths aged 15-24 years old within that household were interviewed if they and their parents agreed to participate. Those who temporarily migrated away from home were not included in the sample. The response rate was 98% as documented in the baseline RHIYA report [33].

Variables and measurement

Independent variables

The three sets of independent variables addressed in this dissertation study are perceived accessibility to information, exposure to information; and communication with others (or discussion). Each set addresses different sub-topics: contraceptives, HIV, and/or STIs and involves more than one variable. Table 1 summarizes the distribution of the independent variables upon single imputation (see more in the missing value section).

Table 1: Distribution of independent variables

Variables used for analysis	Male		Female		Total	
	N	%	n	%	N	%
Categorical variables:						
1. Perceived accessibility of contraceptive information (1 missing individual)						
Yes	528	78.3	544	82.1	1,072	80.2
Otherwise	145	21.5	119	17.9	264	19.7
2. Perceived accessibility of HIV information (2 missing individuals)						
Yes	573	85.0	572	86.3	1,145	85.6
Otherwise	99	14.7	91	13.7	190	14.2
Continuous variables:						
	n	Mean	Std	Range		
3. Exposure to contraceptive information	1335	2.65	1.71	0-8		
4. Exposure to HIV information	1335	3.10	1.69	0-8		
5. Exposure to STIs information	1332	2.36	2.01	0-8		
6. Contraceptive discussion	1335	1.32	1.59	0-8		
7. HIV discussion	1335	1.53	1.73	0-8		
8. STIs discussion	1335	1.24	1.70	0-8		

Note: this table was produced before the single imputation

Perceived accessibility to information: This set consists of perceived accessibility to contraceptive information and perceived accessibility to HIV information. For both types of accessibility, youths were asked to provide their opinion on whether it is easy, difficult, or impossible for someone of their age to get the corresponding information (about contraceptives and about HIV respectively). There is a “don’t know” option for those who do not know the answer. For the purpose of analysis, the four categories of each variable were collapsed into two main categories: “easy” and “otherwise” which includes all those who select any of the other three categories.

Descriptive analysis (Table 1) shows that for perceived accessibility to contraceptive information, 1072 individuals (80.2%) perceived easy access while 264 individuals (19.7%) perceived otherwise with only 1 individual having no data on this

variable. For perceived accessibility to HIV information, the equivalent numbers are 1,145 (85.6%) and 190 (14.2%) respectively with only 2 individuals having no data on the variable.

Exposure to information: This set consists of three variables: exposure to contraceptive information, exposure to HIV information, and exposure to STIs information. For each variable, youths were asked whether they received information (about contraceptives, about HIV, and about STIs respectively) from different sources such as radio, TV, newspapers, pamphlets/posters, community meeting, schools, workplaces, and youth centers during the last 6 months. In this dissertation, each of these variables was treated as a continuous variable (i.e., a total number of sources from which a youth received information). The actual scores ranged from 0-8 for each variable and their means range from 2.36 to 3.10 as shown in Table 1.

Discussion: This set consists of three variables: contraceptive discussion, HIV discussion and STIs discussion. For each variable, youths were asked whether they discussed with other people (health workers, peer educator, counsellor, teacher, mother/father, brother/sister, husband/partner, other relatives, and friend/colleagues) about contraceptives, HIV, or STIs during the last 6 months. In this dissertation, each of these variables was treated as a continuous variable measured as the total number of types of people with whom a youth discussed those topics during the last 6 months. The actual scores ranged from 0-8 for each variable and their means range from 1.24 to 1.53 as shown in Table 1.

Mediator variables

The mediators used for this dissertation include three types of knowledge: conception knowledge, contraceptive awareness, and HIV/STIs knowledge. Distribution of these variables is shown in Table 2.

Table 2: Distribution of mediator variables

Mediators	N	Mean	Std	Range
1. Conception knowledge	1337	2.13	1.33	0-4
2. Contraceptive awareness	1337	1.95	1.01	0-5
3. HIV/STIs knowledge	1336	12.91	4.51	0-24

Note: this table was produced before the single imputation

Conception knowledge is the total sum of correct responses from the following questions: 1-Can a woman become pregnant the first time she has sexual intercourse? 2-Can a girl become pregnant before she experiences her first menstrual period? 3-From one menstrual period to the next, is there a time when a woman is more likely to become pregnant if she has sexual relations? 4-Is this time just before her period begins, during her period, right after her period has ended, or half way between two periods? As such, this variable was treated as a continuous variable, ranging from 0-4 (mean: 2.13, std: 1.33).

Similarly, contraceptive awareness is the total sum from “yes” responses for each of the five modern contraceptives (condom, pills, IUDs, injectables and implants). The scores for this variable ranges from 0-5 (mean: 1.95, std: 1.01).

HIV/STIs knowledge is composed of four types of knowledge (susceptibility to a sexually transmitted disease; HIV/STIs awareness; knowledge on HIV transmission; knowledge on STIs prevention). The composite measure was supposed to range from 0-

26. However the descriptive analysis (Table 2) shows that the actual range was from 0-24 (mean: 12.91, std: 4.51). Following describes how each sub-dimensions of HIV/STIs knowledge was measured:

- Susceptibility to a sexually transmitted disease: This variable was measured based on the following question “Do you think it is possible to contract an infection/disease through sexual contact?” Three response categories are “yes” or “no” or “don’t know”. For the purpose of the analysis, the three categories of susceptibility were collapsed to make up the two-category variable “yes” and “no” which incorporates the “don’t know” responses. The score ranged from 0-1.

- HIV/STIs awareness: For this variable, respondents were asked to provide spontaneous responses on whether they ever heard of any infection or disease that a person can contract through sexual contact. The expected responses include HIV/AIDS, chlamydia, gonorrhea, syphilis, chancroid, genital herpes, genital warts, and trichomoniasis. The variable was calculated as a total sum of the “yes” responses for any of those infections/conditions. The total score for this variable ranges from 0-8.

- Knowledge on HIV transmission. This set of knowledge consists of 8 items asking youths to provide their opinion on different transmission modes of HIV and preventive measures (see details in Appendix 1). The total sum of correct responses was calculated to measure this variable. This score ranges from 0-8.

- Knowledge of STIs prevention: Youths were asked to provide their spontaneous responses concerning what they think people use to prevent STIs. Nine different items were expected (see details in Appendix 1). Each of them addresses one way that people can prevent getting a sexually transmitted infection. The variable was measured by

summing up all possible correct ways that are listed that a youth mentioned. This score ranges from 0-9.

Moderator variables

The moderator variables examined in the dissertation study are perceived availability of contraceptives and perceived accessibility of contraceptives. For perceived availability of contraceptives, youths were asked if they know any place to get a contraceptive method. Their responses are spontaneous and the expected options include: hospital/clinic, health centers, family planning association, pharmacy, shop/market, and friend. The variable was measured as dichotomous: “Aware” for those who select any of the above option, and “unaware” for those who do not mention any of the above options. Descriptive analysis (Table 3) shows that 1,049 individuals (78.5%) reported as aware of at least one contraceptive supplying place versus 276 individuals (20.6%) reported as unaware. To serve an elaborate moderation analysis, this measure was also measured as a composite score by summing up all yes-responses to the above items. The score ranges from 0-6 (mean: 1.81, std: 1.29).

Perceived accessibility to contraceptives: youths were asked to state whether it is easy, difficult, impossible, or don’t know, for them to get and use a contraceptive method for avoiding pregnancy. The variable was measured by collapsing the four categories into two main options: “easy” for those who state so and “otherwise” for those who state otherwise. Descriptive analysis (Table 3) shows that 827 individuals (61.9%) perceived easy to contraceptives versus 498 individuals (37.2%) in the otherwise category.

Table 3: Distribution of moderator variables

Variables used for analysis	Male		Female		Total	
	n	%	n	%	N	%
1. Perceived availability of contraceptives (12 missing individual-0.9%)						
Aware	525	77.9	524	79.0	1049	78.5
Unaware	142	21.1	134	20.2	276	20.6
2. Perceived accessibility of contraceptives (12 missing individuals-0.9%)						
Yes	427	63.4	400	60.3	827	61.9
Otherwise	240	35.6	258	38.9	498	37.2

Note: this table was produced before the single imputation

Outcome variable

The outcome variable is condom preference/intention. This variable has two levels: whether a respondent prefers/intends to use condoms. Based on the survey question “Which method do you think you or your partner/wife would use if you needed to delay or avoid getting pregnant?” for males and “Which method do you think you would use if you needed to delay or avoid getting pregnant?” for females, youths were asked to spontaneously respond to the question with more than possible answers. Accordingly, their responses were grouped into four different groups: 1) Prefer/intend to use condoms only; 2) Prefer/intend to use condoms together with other contraceptives; 3) Prefer/intend to use other contraceptives rather than condoms; 4) Do not have preference/intention to use any contraceptives. For the purpose of this dissertation, the first two categories were collapsed to form the “yes” level of condom preference/intention while the last two categories were collapsed to form the “no” level of the preference/intention. Details about this collapsing step and frequency distribution can be seen in Table 4 which shows 63.3% of individuals preferring/intending to use condoms to prevent pregnancy.

Table 4: Construction of condom preference/intention

Condom preference/intention	Male		Female		Total	
	N	%	n	%	N	%
<u>Level Yes: Prefers/Intends to use condoms:</u>						
1. Condom only	328	48.7	133	20.1	461	34.5
2. Condom with other methods	164	24.3	226	34.1	390	29.2
<i>Prefers/Intends to use condoms</i>	<i>492</i>	<i>73.0</i>	<i>359</i>	<i>54.1</i>	<i>851</i>	<i>63.6</i>
<u>Level No: Not prefer/Not intend to use condoms:</u>						
3. Other methods but no condom	47	7.0	144	21.7	191	14.3
4. No method at all	128	19.0	155	23.4	283	21.2
<i>Not prefers/Not intends to use condoms</i>	<i>175</i>	<i>26.0</i>	<i>299</i>	<i>45.1</i>	<i>474</i>	<i>35.5</i>

Note: there were 7 individuals with missing data for this variable

Control variables

The following variables are used as control variables for all hypotheses in the dissertation: gender, education, school attendance, family income, and age. Although these variables do not fit the proposed theoretical model, they might distort the relationships among the variables proposed in the conceptual framework (Figure 2), and thus were treated as control variables to eliminate their confounding effects if any. Frequency distribution and central tendency of the control variables are reported in Table 5.

The dissertation is only focused on unmarried youths aged from 15-24. The sample is quite equally distributed for both genders (50.4% male and 49.6% female). The mean age for the sample is 18.43 (n=1335; std: 2.55) with most of the individuals were from 15-20 (77.4%). This reflects another fact that the sample captures more school attendants than out-of-school youths (64.5% versus 33.6% respectively). Unmarried youths in the sample were quite different in education levels with most obtaining at least

secondary or high school level. Only 11.2% of them obtained the elementary level.

Family income was calculated as the sum of the items in the family with the maximum score of 8. The mean observed for family income is 5.32 with a standard deviation of 1.47.

Note that the 11 provinces were purposively selected and thus treated as a fixed-effect variable. Accordingly, all hypothesis testing strategies claimed for this effect by placing the province variable as a categorical measure or 10 dummy-coded variables in the models together with other control variables.

Table 5: Distribution of control variables

Control variables	Male		Female		Total	
	N	%	n	%	N	%
Categorical variables:						
Education levels (24 missing individuals-1.8%)						
<i>Elementary graduate at most</i>	101	15.0	49	7.4	150	11.2
<i>Secondary school graduate</i>	301	44.7	321	48.4	622	46.5
<i>High school graduate</i>	263	39.0	278	41.9	541	40.5
Gender						
<i>Male</i>					672	50.3
<i>Female</i>					663	49.7
Attending school (25 missing individuals-1.9%)						
<i>Attend</i>	425	63.1	438	66.1	863	64.5
<i>Not Attend</i>	241	35.8	208	31.4	449	33.6
Continuous variables:						
Family income		5.33		1.47		0-8
Age		18.43		2.55		15-24

Note: This table was produced upon the single imputation

Missing values

The missing values of the variables used for analysis in the original data are considered trivial. Overall, no observation misses all variables and only 3.2% (43 respondents) of the 1337 individuals had missing values on at least one of all variables of interest. Therefore, a single imputation approach [67] was used to generate estimated values for the missing values taking into account the values of other variables involved in the analysis. For example, knowledge on HIV and STIs is composed of four different types of knowledge. Each type was measured as the sum of a set of items in the original data. For any reason, there were some missing values for some of the items. The single imputation technique helped produce estimated values for these missing values before the actual analysis was conducted.

Data analysis

Data analysis was conducted using SAS Version 8.2 (Cary, NC: SAS Institute, Inc.) and Mplus Version 4.2 (Muthen & Muthen). Descriptive univariate analysis was performed to inspect frequency distributions (for categorical variables) and central tendency parameters such as mean, min, max, and standard deviation (for continuous variables). For ease of analysis and interpretation, those categorical variables with “yes” or “no” or “don’t know” options (i.e., with numerous items on different types of knowledge - Appendix 1) were collapsed into two categories “yes” and “otherwise”. As for perceived availability of contraceptives, responses were collapsed as “aware” and “unaware” of any place to get a contraceptive method (see more in the measurement section). Consistency filters were taken into account so as to recode the data

appropriately without mistakenly treated missing values. For example, any respondents who said “no” to question 302 in the survey questionnaire which asks “Do you know any place where you could find a method?” was coded as reporting “no” to question 303 (to measure contraceptive availability) which asks “Where could you or your partner/wife (husband for female questionnaire) go to get a contraceptive method?”

The following sections describe the statistic procedures applied to test the hypotheses. Logistic regression models were used to test hypothesis 1, 2, 3, 7, and 8 while SEM was used to test hypothesis 4, 5, and 6. Details were discussed below:

Research question 1

This question involved testing the following three hypotheses:

Hypothesis 1 states that those youths who perceive it is easy to get information about contraceptives and HIV will be more likely to prefer/intend to use condoms than those who perceive it is difficult or impossible to get the information.

Hypothesis 2 states that as the amount of exposure to information about contraceptives, HIV and STIs in the last 6 months increases, youths will be more likely to prefer/intend to use condoms.

Hypothesis 3 states that the more types of people with whom youths discuss contraceptives, HIV and STIs in the last 6 months, the more likely they will be to prefer/intend to use condoms.

An analytic strategy was performed to examine association of each independent variable with condom preference/intention. For each hypothesis, logistic regression models were performed to examine the association between each of the independent variables with condom preference/intention in the absence and in the presence of control

variables respectively. After that, all independent variables for each hypothesis (or independent variables of similar categories) were placed in the same logistic regression models both in the absence and in the presence of the control variables. This strategy allowed for examining the association in various angles: each independent variable alone, combined with one or two other independent variables of a similar categories, and either in the absence or in the presence of the control variables. The final step included all independent variables (from the three hypotheses) together with all control variables to examine the association of each independent variable with condom preference/intention in the presence of other independent variables and control variables.

The Analysis of Maximum Likelihood Estimates were used to identify significant determinants for these three hypotheses at the significant level of $p < .05$. For convenience of interpretation of the significance, the significant estimates were transformed into odds ratio values with a 95% confidence interval. This was followed by an examination of potential shared variance among composite-measured independent variables such as exposure to information and discussion about contraceptives, HIV, and STIs. This further step allowed for explaining part of the absence of significant associations among some of the composite determinants when treated together.

Research question 2

The following three hypotheses were examined to seek answers to this research question:

Hypothesis 4 states that the relationship between perceived accessibility to contraceptive information and perceived accessibility to HIV information with condom preference/intention will be mediated by conception knowledge, contraceptive awareness

and HIV/STIs knowledge such that those who perceive that it is easy to get information about contraceptives and about HIV tend to have higher knowledge on these subjects, and thus are more likely to prefer/intend to use condoms than those who perceive it is difficult or impossible to get the information.

Testing hypothesis 5 states that the relationship between exposure to information about contraceptives, HIV, and STIs with condom preference/intention will be mediated by conception knowledge, contraceptive awareness and HIV/STIs knowledge such that the more sources from which youths received information about contraceptives, HIV, and STIs in the last 6 months, the more knowledge about these subjects they will gain, and thus they will be more likely to prefer/intend to use condoms.

Testing hypothesis 6 states that the relationship between discussion with others about contraceptives, HIV, and STIs with condom preference/intention will be mediated by conception knowledge, contraceptive awareness, and HIV/STIs knowledge such that the more types of people with whom youths discussed contraceptives, HIV, and STIs in the last 6 months, the more knowledge about the subjects they will gain, and thus they will be more likely to prefer/intend to use condoms.

Testing these hypotheses involved examining multiple independent variables and multiple mediators, and thus requiring multiple regression models if these independent variables were treated separately. However, the advent of the SEM technique allowed for testing multiple regression models simultaneously while controlling for estimation errors that might incur due to running separate regression models [68, 69]. Therefore, SEM instead of logistic regression models was used for this research question.

Accordingly, all determinants, mediators, and control variables were placed in a structural equation model using probit regression models in Mplus Version 4.2. The variables were specified so that the determinants (independent variables) were hypothesized to affect condom preference/intention through conception knowledge, contraceptive awareness, and HIV/STIs knowledge, and that categorical variables were dummy-coded for convenience of interpretation. Consequently, this process generated the following parameters which were needed for examining mediation effects: 1) Total effect from each of the independent variables on the outcome variable; 2) Direct effect from each of the independent variables on the outcome variable; 3) Total indirect effects for all mediators that might play in the causal path from the independent variables to the outcome variables; and 4) Specific indirect effect for each mediator variable.

Basically, the total effect is measured as the point estimate for a particular independent variable without taking into account any potential mediator that might explain the causal path to the outcome variable. The total effect is the sum of indirect and direct effects. The direct effect is the point estimate for the independent variable left over after controlling for the mediators involved in the model. Indirect effects, or mediation effects, are equivalent to the product of the point estimate for the independent variable in explaining the mediator (α), and the point estimate for the mediator in explaining the outcome controlling for the independent variable (β). The total indirect effects are the sum of all indirect effects by all mediators together. The 95% confidence intervals were calculated to determine whether each type of such parameters is significantly different from zero. A mediation effect was considered significant if the following criteria were

met (MacKinnon, 1993) [63]: α is significantly different from zero; β is significantly different from zero; Z-score of the $\alpha * \beta$ product is greater than 1.96 at alpha level of .05.

Research question 3

The following two hypotheses were tested to answer this research question:

Hypothesis 7 states that the relationship between youth's conception knowledge, contraceptive awareness, and HIV/STIs knowledge with their condom preference/intention is moderated by their perceived availability of contraceptives such that the relationship will be stronger for those who are aware of at least one place to get a contraceptive method than for those who are not aware of any place to get a contraceptive method.

Hypothesis 8 states that the relationship between youth's conception knowledge, contraceptive awareness, and HIV/STIs knowledge with their condom preference/intention is moderated by their perceived accessibility to contraceptives such that the relationship will be stronger for those who perceive that it is easy to get a contraceptive method than for those who think it is difficult or impossible to get a contraceptive method.

The same analytic strategy was applicable to testing hypothesis 7 and hypothesis 8. For these hypotheses, the independent variables include conception knowledge, contraceptive awareness, and HIV/STIs knowledge. To test for moderation effects, Patricia [68] suggested including all of the independent variables, control variables, interaction terms (products of each type of knowledge with each of the two moderators) in the same model. The significant interaction terms were identified based on the coefficient estimates which were reported from the model as significantly different from

zero at the alpha level of at least .05. Patricia suggested keeping the interaction terms in the model even in case some or all of them are non-significant but strongly theoretically oriented. Therefore, non-significant interaction terms were not excluded from the analysis.

Follow-up tests including plotting and a regression approach [68] were performed to examine the nature of the following significant interaction terms: 1) contraceptive awareness and perceived contraceptive availability (dichotomous measure); and 2) conception knowledge and perceived contraceptive availability (composite measure). Specifically, plotting of conditional probabilities of the outcome variable for each combination of each type of knowledge with each level of perceived contraceptive availability regardless of whether this moderator was treated as a dichotomous or a composite measure. The regression approach allowed for determining whether the regression slope for the relationship between each type of knowledge with condom preference/intention at each level of perceived contraceptive availability significantly differed from zero or differed from one another, and thus specifying the nature of the interaction.

CHAPTER 4

RESULTS

This section represents answers to the three research questions through testing 8 underlying hypotheses. For each of the hypotheses, a general overview of the testing strategies and models involved will be introduced, followed by concrete results and a conclusion for that specific hypothesis. Additional statements or conclusions will also be made to conclude each research question before moving to another question or sections.

All analytic strategies used logistic or probit regression models with condom preference/intention coded as “Yes” versus “No” categories. Therefore, all interpretations were made based on the “Yes” level of the outcome variable. The data used for the analysis were single-imputed to resolve the missing values which were trivial in this study as explained in the method chapter.

Research question 1

The first research question aims to examine associations between a set of independent variables with condom preference/intention among unmarried youths in Vietnam. These independent variables include perceived accessibility of contraceptive information; perceived accessibility of HIV information; exposure to contraceptive information; exposure to HIV information; exposure to STIs information; contraceptive discussion; HIV discussion; and STIs discussion.

Answers to this question involve testing three hypotheses (1, 2, and 3) as introduced in the Research Question and Hypotheses chapter. Each of the hypotheses in turn requires examining associations of independent variables of similar categories (i.e., perceived accessibility to information; exposure to information; and discussion) with the outcome variable. Details are presented in the following sections.

Testing hypothesis 1:

Analytic procedures were performed to determine whether those youths who perceive that it is easy to get information about contraceptives and HIV will be more likely to prefer/intend to use condoms than those who perceive that it is difficult or impossible to get the information.

Two independent variables involved in the analysis include perceived accessibility to contraceptive information and perceived accessibility to HIV information. They were both treated as dichotomous measures which have two levels: “yes” or easy access and “otherwise” (difficult or impossible to access the information).

A model-building logistic regression approach was employed to test the hypothesized relationship of each of the two independent variables with condom preference/intention. The analytic steps are outlined in Synopsis 1:

Synopsis 1: A model-building approach for testing hypothesis 1

H1A-Testing the association between perceived accessibility to contraceptive information with condom preference/intention:

- Model H1.1: Without adjusting for control variables
- Model H1.2: Adjusting for control variables

H1B-Testing the association between perceived accessibility to HIV information with condom preference/intention:

- Model H1.3: Without adjusting for control variables
- Model H1.4: Adjusting for control variables

H1C-Testing the association between perceived accessibility to HIV information and to contraceptive information together with condom preference/intention:

- Model H1.5: Without adjusting for control variables
- Model H1.6: Adjusting for control variables

H1A-Testing perceived accessibility to contraceptive information with condom preference/intention:

Two logistic regression models were conducted to test the proposed relationship between perceived accessibility to contraceptive information with condom preference/intention. The first model (H1.1) tested the relationship without considering effects of control variables while the second (H1.2) took into account these effects.

The Analysis of Maximum Likelihood Estimates in Table 6 revealed a significant effect of the easy access level of perceived accessibility to contraceptive information with

an estimate of 1.07 ($p < .0001$). The equivalent odds ratio for the “easy access” level is 2.91 (95% CI: 2.21, 3.84). This odds ratio allows for concluding that without taking into account other control variables, those respondents who perceived easy access to contraceptive information were almost three times as likely to prefer/intend to use condoms to avoid pregnancy in future sexual intercourse than who perceived otherwise (difficult or impossible to access the information).

Table 6: Estimates and odds ratio for perceived accessibility to contraceptive information alone.

Variables	Estimate	SE	P value	OR (95% CI)
Intercept	-0.26	0.12	*	N/A
Perceived accessibility (Easy)	1.07	0.14	***	2.91 (2.21-3.84)

*Note: *** $p < .001$; ** $p < .01$; * $p < .05$; OR= odds ratio;*

According to the above statistics, the association between perceived accessibility to contraceptive information and condom preference/intention can be displayed as follows:

$$\text{Log odds of condom preference/intention} = -0.26 + 1.07 * \text{Easy access to contraceptive Information.}$$

When adjusting for the control variables (Model H1.2) which include education level, gender, age, school attendance, income, and provinces, the association remained significant. Table 7 indicates that the coefficient estimate for the easy access level is significantly different from zero with a value of 1.02 ($p < .001$) and an odds ratio of 2.78 (95% CI: 2.05-3.77). This odds ratio is decreased a bit, but still largely significant for concluding that equal on the control variables, those respondents who perceived easy

access to contraceptive information were almost three times as likely to prefer/intend to use condoms as those who perceived otherwise.

Table 7: Estimates and odds ratios for perceived accessibility to contraceptive information with control variables

Variables	Estimate	SE	P-value	OR (95% CI)
Intercept	-2.95	0.76	***	
Perceived accessibility of contraceptive information (Easy access)	1.02	0.16	***	2.78 (2.05, 3.77)

*Note: *** $p < .001$; ** $p < .01$; * $p < .05$; OR= odds ratio; Controlling for education, gender, age, school attendance, income, and provinces*

H1B- Testing perceived accessibility to HIV information with condom preference/intention:

The same analytic pattern was applied for testing the association between perceived accessibility to HIV information with condom preference/intention. The first model (Model H1.3) examined the main effect of the easy access level for perceived accessibility to HIV information without taking into account effects of control variables. The second model (Model H1.4) adjusted for control variables.

The Analysis of Maximum Likelihood Estimates Model H1.3 (Table 8) revealed a significant effect of the easy access level of perceived accessibility to HIV information with a value of 1.11 ($p < .001$). The odds ratio for the easy access level of 3.04 (95% CI: 2.22, 4.17) allows for concluding that those respondents who perceived easy access to HIV information were about 3 times as likely to prefer/intend to use condoms for avoiding pregnancy as those who perceived otherwise.

According to the above statistics, the association between perceived accessibility to HIV information and condom preference/intention can be displayed as follows:

$$\text{Log odds of condom preference/intention} = -0.36 + 1.11 * \text{Easy access to HIV information.}$$

Table 8: Estimates and odds ratio for perceived accessibility to HIV information alone.

Variables	Estimate	SE	P-value	OR (95% CI)
Intercept	-0.36	0.15	*	N/A
Perceived accessibility of HIV information (Easy access)	1.11	0.16	***	3.04 (2.22-4.17)

*Note: *** p<.001; ** p<.01; * p<.05; OR= odds ratio*

The effect of the easy access to HIV information remained significant after adjusting for the control variables with a point estimate of 1.01 (p<.001). The corresponding odds ratio of 2.75 (95% CI: 1.94, 3.92) allows for concluding that equal on the control variables, those respondents who perceived “easy access” were 2.75 times as likely to prefer/intend to use condoms to avoid pregnancy as those who perceived otherwise.

Table 9: Estimates and odds ratios for perceived accessibility to HIV information with control variables.

Variables	Estimate	SE	P-value	OR (95% CI)
Intercept	-2.99	0.76	***	
Perceived accessibility to HIV information (Yes)	1.01	0.18	***	2.75 (1.94, 3.92)

*Note: *** p<.001; ** p<.01; * p<.05; OR= odds ratio; Controlling for education, gender, age, school attendance, income, and provinces*

H1C-Testing perceived accessibility to HIV information and to contraceptive information together with condom preference/intention:

When the two independent variables (perceived accessibility to contraceptive and HIV information) were placed together in the same logistic regression model, the relationship remained significant for both of the variables. Model H1.5 examined the relationship in the presence of both independent variables without adjusting for the control variables. The Analysis of Maximum Likelihood Estimates from this model revealed significant effects from both of these variables (Table 10). The estimates for these two variables are .77 for easy access to contraceptive information and .67 for easy access to HIV information ($p < .01$).

Table 10: Estimates and odds ratios for perceived accessibility to contraceptive and HIV information together without control variables

Variables	Estimate	SE	P-value	OR (95% CI)
Intercept	-0.59	0.16	***	
Perceived accessibility of contraceptive information	0.77	0.16	***	2.16 (1.57-2.98)
Perceived accessibility of HIV information	0.67	0.19	***	1.95 (1.35-2.80)

*Note: *** $p < .001$; ** $p < .01$; * $p < .05$; OR= odds ratio*

Model H1.6 further examined the relationship adjusting for the control variable effects. The results also showed significant effects for both independent variables (Table 11). The coefficient estimate for easy access to contraceptive information is .78 and for easy access to HIV information is .59. Both were significant at $p < .01$. The corresponding odd ratios for these variables are 2.19 (95% CI: 1.55, 3.08) and 1.81 (1.22-2.70) respectively. Based on this statistics, it can be concluded that equal on all control variables, those unmarried youths who perceived easy access to contraceptive

information were 2.19 times as likely to prefer/intend to use condom than those who perceived otherwise. Likewise, those unmarried youths who perceived easy access to HIV information were 1.81 times as likely to prefer/intend to use condoms than those who perceived otherwise. The equation representing the relationships between these two independent variables and the outcome variable can be written as follows:

$$\begin{aligned} \text{Log odds of condom} & & + .78 \text{ Easy access to contraceptive Information} \\ \text{preference/intention} & = -3.04 & + .59 \text{ Easy access to HIV information} \\ & & + \text{Control variable effects.} \end{aligned}$$

Table 11: Estimates and odds ratios for perceived accessibility to contraceptive and HIV information with control variables

Variables	Estimate	SE	P-value	OR (95% CI)
Intercept	-3.04	0.76	***	
Perceived accessibility of contraceptive Information	0.78	0.18	***	2.19 (1.55-3.08)
Perceived accessibility of HIV information	0.59	0.20	**	1.81 (1.22-2.70)

*Note: *** $p < .001$; ** $p < .01$; * $p < .05$; OR= odds ratio; Controlling for education, gender, age, school attendance, income, and provinces*

Conclusion for Hypothesis 1:

The analysis confirmed Hypothesis 1 that those youths who perceive it is easy to get information about contraceptives and about HIV will be more likely to prefer/intend to use condoms than those who perceive it is difficult or impossible to get the information. The hypothesis holds true when these types of accessibility were analyzed separately or in the same model, and either with or without adjusting for control variables.

In the presence of both independent variables and adjusting for all control variables, it can be concluded that, those unmarried youths who perceived easy access to contraceptive information were 2.19 times as likely to prefer/intend to use condoms than those who perceived otherwise. In the same lens, those who perceived easy access to HIV information were approximately 1.81 times as likely to prefer/intend to use condoms than those who perceived otherwise.

Testing hypothesis 2:

Analytic procedures were performed to test the following hypothesis: as the amount of exposure to information about contraceptives, HIV and STIs, youths will be more likely to prefer/intend to use condoms.

The three independent variables involved in the analysis include exposure to contraceptive information, exposure to HIV information, and exposure to STIs information. They were all treated as composite variables.

A logistic regression approach was employed to test the hypothesized relationship of each independent variable and condom preference/intention. The steps are outlined as in Synopsis 2.

Synopsis 2: A model-building approach for testing hypothesis 2

H2A-Testing association between exposure to contraceptive information with condom preference/intention:

- Model H2.1: Without adjusting for control variables
- Model H2.2: Adjusting for control variables

H2B-Testing association between exposure to HIV information with condom preference/intention:

- Model H2.3: Without adjusting for control variables

- Model H2.4: Adjusting for control variables

H2C-Testing association between exposure to STIs information with condom preference/intention:

- Model H2.5: Without adjusting for control variables
- Model H2.6: Adjusting for control variables

H2D-Testing association between exposure to information about contraceptives, HIV, and STIs together with condom preference/intention:

- Model H2.7: Without adjusting for control variables
- Model H2.8: Adjusting for control variables

H2A-Testing association between exposure to contraceptive information with condom preference/intention:

Two logistic regression models were conducted to test the proposed relationship between exposure to contraceptive information with condom preference/intention. The first model (H2.1) tested the relationship without adjusting for control variables while the second (H2.2) adjusted for these effects. Statistics from both models indicated a significant association between exposure to contraceptive information with the outcome variable.

The Analysis of Maximum Likelihood Estimates for Model H2.1 (Table 12) showed that the point estimate for this type of information exposure was 0.34 ($p < .001$). A corresponding odds ratio of 1.40 (1.30-1.50) allows for concluding at this stage that for each additional source from which unmarried youths received contraceptive information, the likelihood to prefer/intend to use condoms for avoiding pregnancy increased 1.40 times.

Table 12: Estimates and odds ratio for exposure to contraceptive information alone

Variables	Estimate	SE	P-value	OR (95% CI)
Intercept	-0.26	0.11	*	N/A
Exposure to contraceptive information	0.34	0.04	***	1.40 (1.30-1.50)

Note: *** $p < .001$; ** $p < .01$; * $p < .05$; OR= odds ratio

Based on the statistics provided in Table 12, the relationship between exposure to contraceptive information and condom preference/intention can be displayed as follows:

$$\text{Log odds of condom preference/intention} = -0.26 + 0.34 * \text{Exposure to contraceptive information}$$

When adjusting for the control variables (Model H2.2), the association remained significant (Table 13) with a value of .35 ($p < .001$) and an odds ratio of 1.42 (1.31-1.55). This odds ratio in the presence of the control variables strengthens the conclusion that: for each additional source from which unmarried youths received contraceptive information, the likelihood to prefer/intend to use condoms for avoiding pregnancy increased about 1.42 times.

Table 13: Estimates and odds ratio for exposure to contraceptive information with control variables

Variables	Estimate	SE	P-value	OR (95% CI)
Intercept	-2.95	0.76	***	
Exposure to contraceptive information	0.35	0.04	***	1.42 (1.31-1.55)

Note: *** $p < .001$; ** $p < .01$; * $p < .05$; OR= odds ratio;

Controlling for education, gender, age, school attendance, income, and provinces

H2B-Testing association between exposure to HIV information with condom preference/intention:

Two logistic regression models were conducted to test the proposed relationship between exposure to HIV information with condom preference/intention. The first model (Model H2.3) tested the relationship without adjusting for effects of control variables. The second (H2.4) adjusted for these effects. Both models indicated a significant association between exposure to HIV information with the outcome variable.

The Analysis of Maximum Likelihood Estimates for Model H2.3 (Table 14) revealed a significant point estimate for this type of information exposure with a value of 0.24 ($p < .001$) and a corresponding odds ratio of 1.27 (1.18-1.36). This statistics allows for concluding at this stage that for each additional source from which unmarried youths received HIV information, the likelihood to prefer/intend to use condoms for avoiding pregnancy increased 1.27 times.

Table 14: Estimates and odds ratio for exposure to HIV information alone

Variables	Estimate	SE	P-value	OR (95% CI)
Intercept	-0.14	0.12		
Exposure to HIV information	0.24	0.04	***	1.27 (1.18-1.36)

*Note: *** $p < .001$; ** $p < .01$; * $p < .05$; OR= odds ratio*

Based on the statistics provided in Table 14, the relationship between exposure to HIV information and condom preference/intention can be displayed as follows:

$$\text{Log odds of condom preference/intention} = -0.14 + 0.24 * \text{Exposure to HIV information}$$

When adjusting for the control variables (Model H2.4), the association remained significant (Table 15) with a value of .25 ($p < .001$) and an odds ratio of 1.29 (95% CI: 1.19, 1.39). This odds ratio in the presence of the control variables strengthens the conclusion that: for each additional source from which unmarried youths received HIV information, the likelihood to prefer/intend to use condoms for avoiding pregnancy increased 1.27 times.

Table 15: Estimates and odds ratio for exposure to HIV information with control variables

Variables	Estimate	SE	P-value	OR (95% CI)
Intercept	-2.98	0.75	***	
Exposure to HIV information	0.25	0.04	***	1.29 (1.19-1.39)

*Note: *** $p < .001$; ** $p < .01$; * $p < .05$; OR= odds ratio; Controlling for education, gender, age, school attendance, income, and provinces*

H2C-Testing association between exposure to STIs information with condom preference/intention:

Two logistic regression models were conducted to test the proposed relationship between exposure to STIs information with condom preference/intention. The first model (Model H2.5) tested the relationship without adjusting for effects of control variables. The second (H2.6) adjusted for these effects. Both models indicated a significant association between exposure to STIs information with the outcome variable.

The Analysis of Maximum Likelihood Estimates for Model H2.5 (Table 16) showed a significant estimate for this type of information exposure with a value of 0.18 ($p < .001$) and an odds ratio of 1.19 (95% CI: 1.13, 1.27). This statistics allows for concluding at this stage that for each additional source from which unmarried youths

received STIs information, the likelihood to prefer/intend to use condoms for avoiding pregnancy increased 1.2 times.

Table 16: Estimates and odds ratio for exposure to STIs information alone

Variables	Estimate	SE	P-value	OR (95% CI)
Intercept	0.18	0.09	*	
Exposure to STIs information	0.18	0.03	***	1.19 (1.13-1.27)

*Note: *** p<.001; ** p<.01; * p<.05; OR= odds ratio*

Based on the statistics provided in Table 16, the relationship between exposure to STIs information and condom preference/intention can be displayed as follows:

$$\text{Log odds of condom preference/intention} = -0.18 + 0.18* \text{Exposure to STIs information}$$

When adjusting for the control variables (Model H2.6), the association remained significant. Table 17 indicates a significant coefficient estimate for exposure to STIs information with a value of .19 (p<.001) and an odds ratio of 1.22 (95% CI: 1.13, 1.30). This odds ratio in the presence of the control variables strengthens the conclusion that for each additional source from which unmarried youths received STIs information, the likelihood to prefer/intend to use condoms for avoiding pregnancy increased about 1.22 times.

Table 17: Estimates and odds ratio for exposure to STIs information with control variables

Variables	Estimate	SE	P-value	OR (95% CI)
Intercept	-2.70	0.75	***	
Exposure to STIs information	0.19	0.04	***	1.22 (1.13-1.30)

*Note: *** p<.001; ** p<.01; * p<.05; OR= odds ratio;*

Controlling for education, gender, age, school attendance, income, and provinces

H2D-Testing association between exposure to information about contraceptives, HIV, and STIs together with condom preference/intention:

In an attempt to test the relationship of all three types of exposure to information with the outcome variable, another two logistic regression models were conducted. The first model (Model H2.7) treated the three independent variables simultaneously without adjusting for effects of control variables while the second (H2.8) took into account these effects. Results show that in both models, only exposure to contraceptive information was significantly associated with the outcome variable.

The Analysis of Maximum Likelihood Estimates for Model H2.7 which did not include the control variables (Table 18) showed that a significant point estimate for exposure to contraceptive information with a value of 0.34 ($p < .001$). This value is equivalent to an odds ratio of 1.40 (95% CI: 1.26-1.55). This odds ratio allows for concluding that for each additional source from which unmarried youths received contraceptive information while controlling for the other two types of information exposure, the likelihood to prefer/intend to use condoms for avoiding pregnancy increased 1.4 times.

Table 18: Estimates and odds ratios for three types of exposure simultaneously without control variables

Variables	Estimate	SE	P-value	OR (95% CI)
Intercept	-0.26	0.12	*	
Exposure to contraceptive information	0.34	0.05	***	1.40 (1.26-1.55)
Exposure to HIV information	-0.01	0.06		0.99 (0.89-1.11)
Exposure to STIs information	0.01	0.04		1.01 (0.93-1.10)

*Note: *** $p < .001$; ** $p < .01$; * $p < .05$; OR= odds ratio*

Likewise, the Analysis of Maximum Likelihood Estimates from Model H2.8 adjusting for the control variables (Table 19) indicated that this association remained significant for exposure to contraceptive information, but not for the other two types of exposure. The point estimate for exposure to contraceptive information is .32 ($p < .001$). The corresponding odds ratio was 1.38 (95% CI: 1.23, 1.55), approximately the same odds ratio as in the absence of the control variables.

Table 19: Estimates and odds ratios for three types of exposure simultaneously with control variables

Variables	Estimate	SE	P-value	OR (95% CI)
Intercept	-2.92	0.76	***	
Exposure to contraceptive information	0.32	0.06	***	1.38 (1.23-1.55)
Exposure to HIV information	0.01	0.06		1.01 (0.90-1.13)
Exposure to STIs information	0.04	0.05		1.04 (0.95-1.14)

*Note: *** $p < .001$; ** $p < .01$; * $p < .05$; OR= odds ratio; Controlling for education, gender, age, school attendance, income, and provinces*

Conclusion for testing Hypothesis 2:

When tested separately from one another, all the three types of information exposure were shown as significantly associated with the log odds of the outcome variable. This association remained significant either in the absence or in the presence of the control variables. However, the attempt to place all of the three independent variables in one logistic regression model (either in the presence or in the absence of the control variables) repeatedly revealed that only exposure to contraceptive information was significantly associated with the log odds of the condom preference/intention. The absence of significance for the other two types of exposure in the simultaneous attempt can be partly explained by the shared variance among these three variables. Table 30

shows that the correlation between each pair of the three types of exposure ranges from .64 to .74 ($p < .0001$).

In short, based on the above results, it can be concluded that Hypothesis 2 is confirmed for all of the three types of exposure to information when they were treated separately. However, when treated together, the hypothesis holds true only for exposure to contraceptive information.

Testing hypothesis 3:

Analytic procedures were performed to test the following hypothesis: The more types of people with whom youths discuss contraceptive methods, HIV, and STIs, the more likely they will be to prefer/intend to use condoms.

The three independent variables involved in the analysis include contraceptive discussion, HIV discussion, and STIs discussion. They were all treated as composite variables.

A logistic regression approach was employed to test the hypothesized relationship of each independent variable and condom preference/intention. The steps are outlined as in Synopsis 3.

Synopsis 3: A model-building approach for testing hypothesis 3

H3A-Testing association between contraceptive discussion with condom preference/intention:

- Model H3.1: Without adjusting for control variables
- Model H3.2: Adjusting for control variables

H3B-Testing association between HIV discussion with condom preference/intention:

- Model H3.3: Without adjusting for control variables
- Model H3.4: Adjusting for control variables

H3C-Testing association between STIs discussion with condom preference/intention:

- Model H3.5: Without adjusting for control variables
- Model H3.6: Adjusting for control variables

H3D-Testing association between contraceptive discussion, HIV discussion, and STIs discussion together with condom preference/intention:

- Model H3.7: Without adjusting for control variables
- Model H3.8: Adjusting for control variables

H3A-Testing association between contraceptive discussion with condom preference/intention:

Two logistic regression models were conducted to test the proposed relationship between contraceptive discussion with condom preference/intention. The first model (H3.1) tested the relationship without adjusting for effects of control variables. The second model (H3.2) adjusted for these effects. Both models indicated a significant association between contraceptive discussion with the outcome variable.

The Analysis of Maximum Likelihood Estimates for Model H3.1 (Table 20) showed a significant point estimate for this type of discussion with a value of 0.34 ($p < .001$) and an odds ratio of 1.41 (1.29-1.54). This statistics allows for concluding at this stage that for each additional type of person with whom unmarried youths discussed contraceptives, the likelihood to prefer/intend to use condoms for avoiding pregnancy increased 1.41 times.

Table 20: Estimates and odds ratio for contraceptive discussion alone

Variables	Estimate	SE	P-value	OR (95% CI)
Intercept	0.18	0.07	*	N/A
Contraceptive discussion	0.34	0.04	***	1.41 (1.29-1.54)

*Note: *** p<.001; ** p<.01; * p< .05; OR= odds ratio*

Based on the statistics provided in Table 20, the relationship between contraceptive discussion and the outcome variable can be displayed as follows:

$$\text{Log odds of condom preference/intention} = .18 + .34 * \text{Contraceptive discussion}$$

When adjusting for the control variables (Model H3.2), the association remained significant. Table 21 indicates a significant coefficient estimate for contraceptive discussion with a value of .36 (p<.001) and an odds ratio of 1.43 (95% CI: 1.30, 1.57).

Table 21: Estimates and odds ratio for contraceptive discussion with control variables

Variables	Estimate	SE	P-value	OR (95% CI)
Intercept	-2.82	0.76	***	
Contraceptive discussion	0.36	0.05	***	1.43(1.30-1.57)

*Note: *** p<.001; ** p<.01; * p< .05; OR= odds ratio; Controlling for education, gender, age, school attendance, income, and provinces*

H3B-Testing association between HIV discussion with condom preference/intention:

Two logistic regression models were conducted to test the proposed relationship between HIV discussion with condom preference/intention. The first model (Model H3.3) tested the relationship without considering effects of control variables while the second

(H3.4) took into account these effects. Both models revealed a significant association between HIV discussion with the outcome variable.

The Analysis of Maximum Likelihood Estimates for Model H3.3 (Table 22) showed a significant estimate for HIV discussion with a value of 0.27 ($p < .001$) and an odds ratio of 1.31 (95% CI: 1.22 < 1.42). This statistics allows for concluding at this stage that for each additional type of people with whom unmarried youths talk about HIV, the likelihood to prefer/intend to use condoms for avoiding pregnancy increased 1.31 times.

Table 22: Estimates and odds ratio for HIV discussion alone

Variables	Estimate	SE	P-value	OR (95% CI)
Intercept	0.20	0.08	**	N/A
HIV discussion	0.27	0.04	***	1.31(1.22-1.42)

*Note: *** $p < .001$; ** $p < .01$; * $p < .05$; OR = odds ratio*

Based on the statistics provided in Table 22, the relationship between HIV discussion and condom preference/intention can be displayed as follows:

$$\text{Log odds of condom preference/intention} = .20 + 0.27* \text{ HIV discussion}$$

When adjusting for the control variables (Model H3.4), the relationship remained significant. Table 23 showed a significant estimate for HIV discussion with a value of .32 ($p < .001$) and an odds ratio of 1.38 (95% CI: 1.26, 1.50).

Table 23: Estimates and odds ratio for HIV discussion with control variables

Variables	Estimate	SE	P-value	OR (95% CI)
Intercept	-2.79	0.76	***	
HIV discussion	0.32	0.04	***	1.38 (1.26-1.50)

Note: *** $p < .001$; ** $p < .01$; * $p < .05$; OR= odds ratio;
Controlling for education, gender, age, school attendance, income, and provinces

H3C-Testing association between STIs discussion with condom

preference/intention:

Two logistic regression models were conducted to test the proposed relationship between STIs discussion with condom preference/intention. The first model (Model H3.5) tested the relationship without considering effects of control variables while the second (H3.6) adjusted for these effects. Both models revealed a significant association between STIs discussion with the outcome variable.

The Analysis of Maximum Likelihood Estimates for Model H3.5 (Table 24) showed a significant estimate for STIs discussion with a value of 0.28 ($p < .001$) and an odds ratio of 1.33 (95% CI: 1.23, 1.44). This odds ratio allows for concluding at this stage that for each additional type of people with whom unmarried youths talk about STIs, the likelihood to prefer/intend to use condoms for avoiding pregnancy increased 1.3 times.

Table 24: Estimates and odds ratio for STIs discussion alone

Variables	Estimate	SE	P-value	OR (95% CI)
Intercept	0.27	0.07	***	
STIs discussion	0.28	0.04	***	1.33 (1.23-1.44)

Note: *** $p < .001$; ** $p < .01$; * $p < .05$; OR= odds ratio

Based on the statistics provided in Table 24, the relationship can be displayed as follows:

$$\text{Log odds of condom preference/intention} = .27 + 0.28* \text{ STIs discussion}$$

When adjusting for the control variables (Model H3.6), the association remained significant. Table 25 indicates a significant estimate for STIs discussion with a value of .31 ($p < .001$) and an odds ratio of 1.37 (95% CI: 1.36, 1.50). This odds ratio in the presence of the control variables strengthens the conclusion that for each additional type of people with whom unmarried youths discuss STIs, the likelihood to prefer/intend to use condoms for avoiding pregnancy increased about 1.37 times.

Table 25: Estimates and odds ratio for STIs discussion with control variables

Variables	Estimate	SE	P-value	OR (95% CI)
Intercept	-2.69	0.76	***	
STIs discussion	0.32	0.05	***	1.37 (1.26-1.50)

Note: *** $p < .001$; ** $p < .01$; * $p < .05$; OR= odds ratio; Controlling for education, gender, age, school attendance, income, and provinces

H3D-Testing association between contraceptive discussion, HIV discussion, and STIs discussion together with condom preference/intention:

In an attempt to test the relationship of all three types of discussion with the outcome variable, another two logistic regression models were conducted. The first one (Model H3.7) treated all three types of discussion simultaneously without considering effects of control variables. The second model (H3.8) adjusted for these effects. Results showed that in both models, only contraceptive discussion was significantly associated with the outcome variable.

The Analysis of Maximum Likelihood Estimates for Model H3.7 (Table 26) revealed a significant point estimate for contraceptive discussion with a value of 0.23 ($p < .001$) and an odds ratio of 1.26 (95% CI: 1.11, 1.43). This statistics allows for concluding that for each additional type of people with whom unmarried youths talk about contraceptives while controlling for the other two types of discussion, the likelihood to prefer/intend to use condoms for avoiding pregnancy increased 1.26 times.

Table 26: Estimates and odds ratios for three types of discussion alone

Variables	Estimate	SE	P-value	OR (95% CI)
Intercept	0.13	0.08		
Contraceptive discussion	0.23	0.06	***	1.26 (1.11-1.43)
HIV discussion	0.05	0.06		1.05 (0.93-1.19)
STIs discussion	0.10	0.06		1.10 (0.97-1.25)

*Note: *** $p < .001$; ** $p < .01$; * $p < .05$; OR= odds ratio*

Likewise, when adjusting for the control variables, the Analysis of Maximum Likelihood Estimates from Model H3.8 (Table 27) also indicated that only contraceptive discussion is significantly associated with the outcome variable. The estimate for contraceptive discussion from this model is .19 ($p < .001$). The corresponding odds ratio is 1.21 (95% CI: 1.06, 1.38).

Table 27: Estimates and odds ratios for three types of discussion with control variables

Variables	Estimate	SE	P-value	OR (95% CI)
Intercept	-2.76	0.76	***	
Contraceptive discussion	0.19	0.07	**	1.21 (1.06-1.38)
HIV discussion	0.12	0.07		1.12 (0.98-1.29)
STIs discussion	0.11	0.07		1.12 (0.98-1.28)

Note: *** $p < .001$; ** $p < .01$; * $p < .05$; OR= odds ratio;

Controlling for education, gender, age, school attendance, income, and provinces

Conclusion for testing Hypothesis 3:

When tested separately from one another (bivariate associations), all the three types of discussion (contraceptive, HIV, and STIs discussion) were shown as significantly associated with the log odds of the outcome variable. This association remained significant either when each of the independent variables was treated alone or in the presence of the control variables. However, the attempt to place all of the three independent variables in one logistic regression model (either at the presence or at the absence of the control variables) repeatedly revealed that only contraceptive discussion was significantly associated with the log odds of the condom preference/intention. The absence of significance for the other two types of discussion in the simultaneous attempt can be partly explained by the shared variance among these three variables. Table 30 shows that the correlation between each pair of the three types of discussion is at least .80 ($p < .0001$).

In short, based on the above results, it can be concluded that Hypothesis 3 is confirmed for all of the three types of discussion when they were treated separately from each other. However, when treated together, the hypothesis holds true only for exposure to contraceptive information.

Testing all independent variables simultaneously

The final attempt was performed to examine the associations of all the independent variables together with the outcome variable in two separate logistic regression models. The first model treated all of the independent variables alone without adjusting for control variables (Table 28). The second model added all the control variables. In the first model, four independent variables were shown as significantly associated with the log odds of the outcome variable. They include perceived accessibility to contraceptive information with an odds ratio of 1.71 (95% CI: 1.22, 2.38), perceived accessibility to HIV information with an odds ratio of 1.62 (95% CI: 1.10, 2.40), exposure to contraceptive information with an odds ratio of 1.29 (95% CI: 1.15-1.44), and contraceptive discussion with an odds ratio of 1.14 (95% CI 1.01-1.30).

Table 28: Model to test relationship of all IVs and outcome without control variables

Variables	Estimate	SE	P-value	OR (95% CI)
Intercept	-0.81	0.17	***	
Perceived accessibility of contraceptive information	0.53	0.17	**	1.71 (1.22-2.38)
Perceived accessibility of HIV information	0.48	0.20	*	1.62 (1.10-2.40)
Exposure to contraceptive information	0.25	0.06	***	1.29 (1.15-1.44)
Exposure to HIV information	-0.06	0.06		0.94 (0.84-1.06)
Exposure to STIs information	-0.08	0.05		0.93 (0.84-1.02)
Contraceptive discussion	0.13	0.07	*	1.14 (1.01-1.30)
HIV discussion	0.00	0.07		1.01 (0.88-1.15)
STIs discussion	0.11	0.07		1.11 (0.96-1.29)

Note: *** $p < .001$; ** $p < .01$; * $p < .05$; OR= odds ratio; IVs= Independent variables

Table 29: Model to test relationship of all IVs and outcome adjusting for control variables

Variables	Estimate	SE	P-value	OR (95% CI)
Intercept	-3.01	0.78	***	
Perceived accessibility of contraceptive information	0.55	0.18	**	1.73 (1.21, 2.48)
Perceived accessibility of HIV information	0.42	0.21	*	1.52 (1.00, 2.31)
Exposure to contraceptive information	0.24	0.06	***	1.27 (1.13, 1.43)
Exposure to HIV information	-0.06	0.06		0.94 (0.83, 1.07)
Exposure to STIs information	-0.04	0.05		0.97 (0.87, 1.07)
Contraceptive discussion	0.11	0.07		1.12 (0.98, 1.28)
HIV discussion	0.08	0.07		1.08 (0.94, 1.25)
STIs discussion	0.10	0.08		1.11 (0.95, 1.29)
Education (High School)	0.55	0.24	*	1.73 (1.07, 2.80)
Education (Secondary School)	0.29	0.23		1.33 (0.85, 2.08)
Gender (Male)	1.20	0.14	***	3.32 (2.54, 4.33)
Age	0.03	0.03		1.04 (0.97, 1.11)
School Attendance (Attending)	-0.42	0.17	*	0.65 (0.47, 0.91)
Income	0.04	0.05		1.04 (0.94, 1.14)
Province 1	0.64	0.44		1.90 (0.81, 4.45)
Province 2	0.95	0.39	*	2.60 (1.22, 5.53)
Province 3	0.80	0.39	*	2.22 (1.02, 4.80)
Province 4	1.01	0.39	*	2.74 (1.27, 5.92)
Province 5	0.36	0.40		1.44 (0.66, 3.13)
Province 6	0.22	0.40		1.25 (0.57, 2.72)
Province 7	0.49	0.45		1.63 (0.68, 3.90)
Province 8	1.27	0.51	*	3.55 (1.31, 9.64)
Province 9	0.88	0.53		2.40 (0.85, 6.80)
Province 10	-0.08	0.50		0.92 (0.35, 2.46)

Note: *** $p < .001$; ** $p < .01$; * $p < .05$; OR= odds ratio;

When adjusting for the control variables, only perceived accessibility to contraceptive information and exposure to contraceptive information remained strongly associated with the outcome variable (Table 29). Perceived accessibility to HIV information became barely significant with an odds ratio of 1.52 (95% CI: 1.00, 2.31).

In addition to the three significant independent variables, education level, gender, and school attendance were repeatedly revealed as significantly associated with condom preference/intention. Specifically, in a full model (Table 29), youths obtaining the high school level were more likely than those obtaining the elementary school (OR=1.73); male youths were more likely than female youths (OR=3.32); and youths currently attending schools were less likely than out-of-school youths (OR=.65) to prefer/intend to use condoms to avoid pregnancy. Also, there were differences in point estimates between some provinces (i.e., provinces 2, 3, 4, and 8 versus province 11). By the contrary, income and age were shown as non-significantly associated with the outcome variable.

Table 30 was produced to examine the correlation coefficients among all variables with composite measures involved in the analysis, and thus helping understand more about their shared effects of the independent variables in explaining the outcome variable.

Table 30: Pearson Correlation Coefficients among composite variables

Variables	IV1	IV2	IV3	IV4	IV5	IV6	MD1	MD2	MD3
IV1- Exposure to contraceptive information	1.00								
IV2-Exposure to HIV information	0.74	1.00							
IV3-Exposure to STIs information	0.64	0.68	1.00						
IV4-Contraceptive discussion	0.56	0.51	0.49	1.00					
IV5-HIV discussion	0.55	0.57	0.52	0.75	1.00				
IV6-STIs discussion	0.53	0.52	0.67	0.72	0.80	1.00			
MD1-Conception knowledge	0.33	0.30	0.29	0.24	0.23	0.22	1.00		
MD2-Contraceptive awareness	0.40	0.34	0.37	0.29	0.28	0.30	0.40	1.00	
MD3-HIV/STIs knowledge	0.44	0.44	0.64	0.31	0.30	0.43	0.45	0.49	1.00

Note: all variables are significantly correlated with one another at alpha < .0001.

IV=Independent variables; MD=Mediator variables;

CONCLUSION FOR RESEARCH QUESTION 1:

The following conclusions were made on Research Question #1 based on results from testing Hypothesis 1, 2, and 3.

Hypothesis 1:

Results were consistent with Hypothesis 1 which proposed that those youths who perceive it is easy to get information about contraceptives and HIV will be more likely to prefer/intend to use condoms than those who perceive it is difficult or impossible to get the information. The hypothesis holds true either when analyzing these types of accessibility separately or in the same model, and either with or without control variables.

Hypothesis 2:

When treated separately from each other (either in the presence or in the absence of the control variables), all three types of exposure to information (contraceptive information, HIV information, and STIs information) were significantly associated with

the log odds of condom preference/intention. Specifically, we can conclude that as the amount of exposure to information about contraceptives, HIV and STIs in the last 6 months increased, youths would be more likely to prefer/intend to use condoms. However, when the three variables were treated together, the hypothesis holds true only for exposure to contraceptive information.

Hypothesis 3:

When treated separately from each other (either in the presence or in the absence of the control variables), all three types of discussion (contraceptive, HIV, and STIs discussion) were significantly associated with the log odds of condom preference/intention. Specifically, the more types of people with whom youths discussed contraceptive methods, HIV/AIDS, and STIs in the last 6 months, the more likely they will be to prefer/intend to use condoms. However, when the three variables were treated together, the hypothesis holds true only for contraceptive discussion.

Testing all independent variables simultaneously

In an attempt to examine associations of all independent variables simultaneously with the outcome variable, after controlling for all control variables, we are quite comfortable to conclude that perceived accessibility to contraceptive information, perceived accessibility to HIV information are three strongest determinants of condom preference/intention.

Across the different models trying out different strategies to examine the proposed hypotheses in research question 1, it was found that education level, gender, school attendance, and province were significantly associated with condom preference/intention.

In short, we can display the relationships between independent variables and condom preference/intention in the following equation:

$$\text{Log odds of condom preference/intention} = -3.01 + .55*\text{Access to contraceptive information} + .42*\text{Access to HIV information} + .24*\text{Exposure to contraceptive information} + \text{control variable effects.}$$

Findings on associations between independent variables and condom preference/intention in various perspectives are summarized in Table 31.

Table 31: Summary of findings on hypothesis 1, hypothesis 2, and hypothesis 3 from different perspectives

Hypothesis and variables	Bivariate association		Independent variables with similar categories		All independent variables together	
	Without controls	With controls	Without control	With controls	Without controls	With controls
Hypothesis 1:						
Perceived accessibility of contraceptive information	1.07***	1.02***	.77***	.78***	.53***	.55**
Perceived accessibility of HIV information	1.11***	1.01***	.67***	.59**	.48*	.42*
Hypothesis 2:						
Exposure to contraceptive information	.34***	.35***	0.34***	0.32***	.25***	.24**
Exposure to HIV information	.24***	.25***	-.01	.01	-.06	-.06
Exposure to STIs information	.18***	.19***	.01	.04	-.08	-.04
Hypothesis 3:						
Contraceptive discussion	.34***	.36***	.23***	.19**	.13*	.11
HIV discussion	.27***	.32***	.05	.12	.00	.08
STIs discussion	.28***	.32***	.10	.11	.11	.10

Note: *** $p < .001$; ** $p < .01$; * $p < .05$

The numbers within the table indicate the point estimates for each variable in explaining the outcome variables based on logistic regression models.

“Bivariate association” indicates when independent variables within one hypothesis were treated separately from each other;

“Independent variables with similar categories” indicates when independent variables within one hypothesis were treated in the same model.

Research question 2

The aim of this question is to examine potential mediation effects of the three types of knowledge (conception knowledge, contraceptive awareness, and HIV/STIs knowledge) on the relationship between each of the eight independent variables and condom preference/intention. Three hypotheses (4, 5, and 6) were tested to seek the answers to this question.

One SEM model using probit regression models which incorporate all 8 independent variables, 3 mediators, the outcome variable, and the control variables was performed. Statistics from this model were utilized to produce tables and figures in order to illustrate how each of the three mediators explained the relationship between each independent variable and the outcome variable. Although all the statistics were produced at one time, the tables and figures are displayed separately under each hypothesis for convenience of interpretation.

Testing hypothesis 4

Hypothesis 4 proposed that the relationship between perceived accessibility to contraceptive information and perceived accessibility to HIV information with condom preference/intention will be mediated by conception knowledge, contraceptive awareness, and HIV/STIs knowledge such that those who perceive that it is easy to get contraceptive information, and HIV information tend to have higher knowledge on these subjects, and thus are more likely to prefer/intend to use condoms than those who perceive it is difficult or impossible to get the information.

Statistics generated from the overall SEM model as mentioned above were extracted to examine potential mediation effects of the three types of knowledge on relationships between each type of information accessibility with condom preference/intention. An examination scheme is shown in Synopsis 4. Relevant statistics are shown in Table 32 and Table 33. The relationships among the core variables forming hypothesis 4 are displayed in Figure 3.

Synopsis 4: Testing mediation effects on the relationship between perceived accessibility to contraceptive and HIV information with condom preference/intention

Testing scheme

H4.1- Testing mediation effects on the relationship between perceived accessibility to contraceptive information with condom preference/intention

H4.2- Testing mediation effects on the relationship between perceived accessibility to HIV information with condom preference/intention

Interpretation steps

1. Examining total indirect effects on each relationship between an independent variable with the outcome variable
2. Examining specific indirect effects on the relationship
 - a. Testing mediation effect of conception knowledge on the relationship
 - b. Testing mediation effect of contraceptive awareness on the relationship
 - c. Testing mediation effect of HIV/STIs knowledge on the relationship

Criteria for significant mediation effects

1. Point estimate for an independent variable (α) is significantly different from zero in a probit regression with a mediator.
2. Point estimate related to the mediator, the increment in standard deviations for each unit of the mediator to the predicted probit index of the outcome variable (denoted as β) adjusted for the independent variable is also significantly different from zero.
3. Z-score of the $\alpha*\beta$ product is greater than 1.96 at alpha level of .05.

H4.1- Testing mediation effects on the relationship between perceived accessibility to contraceptive information with condom preference/intention

Table 32 summarizes important statistics which allows for examining mediation effects of the three proposed mediators on the relationship between perceived accessibility to contraceptive information (ACI) with condom preference/intention (CP/I). The summary of the table shows that the total effect of ACI on CP/I is significantly different from zero with a point estimate of .339 (95% CI: .059, .619), but the direct effect of this independent variable is non-significant with a point estimate of .099 (95% CI: -.189, .387). This non-significance is explained by a significant total indirect effect through three proposed mediators. The point estimate of the total indirect effect is .240 (95% CI: .121, .359) which explains 70.8% of the total effect of perceived accessibility to contraceptive information on condom preference/intention. Therefore, it can be concluded that at least one of the three mediators mediates the relationship between perceived accessibility to contraceptive information and condom preference/intention.

Further analysis examined specific indirect effects attributable to each of the three mediators. Table 32 displays the point estimates to determine the significance of the mediation based on the criteria provided in Synopsis 4. According to these criteria, only conception knowledge and HIV/STIs knowledge are shown as mediating the relationship between ACI and CP/I with point estimates of .130 (95% CI: .061, .198) and .078 (95% CI: .013, .143) respectively. The positive signs of the mediation in all three mediators allows for concluding that the relationship between perceived accessibility to contraceptive information and condom preference/intention will be mediated by

conception knowledge and HIV/STIs knowledge such that those who perceive that it is easy to get the information about contraceptives tend to have higher knowledge on conception and HIV/STIs, and thus are more likely to prefer/intend to use condoms than those who perceive it is difficult or impossible to get the information.

By the contrary, contraceptive awareness does not significantly contribute to the explanation of the relationship between perceived accessibility to contraceptive information and condom preference/intention.

Table 32: Mediation effects on the relationship between perceived accessibility to contraceptive information (ACI) and condom preference/intention (CP/I)

Mediation Effects	Point estimate (95% CI)	% mediated in total effect	Significant (p<.05)
Through conception knowledge (CK)			
Regress CK on ACI (α)	.653 (.421, .885)		(+)
Regress CP/I on CK (β) controlled for ACI and other variables	.199 (.121, .277)		(+)
<i>Mediated effect ($\alpha*\beta$)</i>	<i>.130 (.061, .198)</i>	38.35*	(+)
Through contraceptive awareness (CA)			
Regress CA on ACI (α)	.177 (.006, .349)		(+)
Regress CP/I on CA (β) controlled for ACI and other variables	.182 (.080, .285)		(+)
<i>Mediated effect ($\alpha*\beta$)</i>	<i>.032 (-.004, .068)</i>	9.44	(-)
Through HIV/STIs knowledge (H/SK)			
Regress H/SK on ACI (α)	1.88 (1.34, 2.42)		(+)
Regress CP/I on H/SK (β) controlled for ACI and other variables	.042 (.009, .074)		(+)
<i>Mediated effect ($\alpha*\beta$)</i>	<i>.078 (.013, .143)</i>	23.01*	(+)
Summary:			
Total effect of ACI on CP/I:	.339 (.059, .619)		(+)
Direct effect of ACI on CP.I:	.099 (-.189, .387)		(-)
Total indirect effects through CK, CA, H/SK:	.240 (.121, .359)	70.80*	(+)

Note: * significant at $\alpha < .05$; (+) significant; (-) not significant;

The estimates were probit regression parameters

Controlling for education, gender, age, school attendance, income, and provinces

H4.2-Testing mediation effects on the relationship between perceived accessibility to HIV information (AHI) and condom preference/intention (CP/I)

Table 33 summarizes important statistics which allow for examining mediation effects of the three proposed mediators on the relationship between perceived accessibility to HIV information (AHI) and condom preference/intention (CP/I). The summary of the table shows that the total effect of AHI on CP/I is not significantly different from zero with a point estimate of .256 (95% CI: -.069, .581). Nor is the direct effect of this independent variable with a point estimate of .033 (95% CI: -.297, .363). However, the total indirect effect through three proposed mediators is significant with a point estimate of .224 (95% CI: .090, .358). This total indirect effect explains 87.50% of the total effect. Therefore, it can be concluded that at least one of the three mediators mediates the relationship between perceived accessibility to HIV information and condom preference/intention.

Further analysis examined specific indirect effects attributable to each of the three mediators on the relationship between AHI and CP/I. Table 33 displays the point estimates to determine the significance of the mediation based on the criteria provided in Synopsis 4. According to these criteria, all three types of knowledge: conception knowledge (CK), contraceptive awareness (CA) and HIV/STIs knowledge (H/SK) are shown as mediating the relationship between AHI and CP/I with point estimates of .066 (95% CI: .008, .123), .056 (95% CI: .006, .106), .102 (95% CI: .019, .186) respectively. The positive signs of the mediation in both mediators allow for concluding that the relationship between perceived accessibility to HIV information and condom preference/intention will be mediated by conception knowledge, contraceptive awareness

and HIV/STIs knowledge such that those who perceive that it is easy to get HIV information tend to have higher knowledge about conception, contraceptives and HIV/STIs, and thus are more likely to prefer/intend to use condoms than those who perceive it is difficult or impossible to get the information.

Table 33: Mediation effects on the relationship between perceived accessibility to HIV information (AHI) and condom preference/intention (CP/I)

Mediation Effects	Point estimate (95% CI)	% mediated in total effect	Significant (p<.05)
Through conception knowledge (CK)			
Regress CK on AHI (α)	.330 (.070, .590)		(+)
Regress CP/I on CK (β) controlled for AHI	.199 (.121, .277)		(+)
<i>Mediated effect ($\alpha*\beta$)</i>	<i>.066 (.008, .123)</i>	25.78*	(+)
Through contraceptive awareness (CA)			
Regress CA on AHI (α)	.307 (.092, .523)		(+)
Regress CP/I on CA (β) controlled for AHI	.182 (.080, .285)		(+)
<i>Mediated effect ($\alpha*\beta$)</i>	<i>.056 (.006, .106)</i>	21.88*	(+)
Through HIV/STIs knowledge (H/SK)			
Regress H/SK on AHI (α)	2.46 (1.87, 3.10)		(+)
Regress CP/I on H/SK (β) controlled for AHI	.042 (.009, .074)		(+)
<i>Mediated effect ($\alpha*\beta$)</i>	<i>.102 (.019, .186)</i>	16.41*	(+)
Summary:			
Total effect of AHI on CP/I:	.256 (-.069, .581)		(-)
Direct effect of AHI on CP/I:	.033 (-.297, .363)		(-)
Total indirect effects through CK, CA, H/SK:	.224 (.090, .358)	87.50*	(+)

Note: * significant at $\alpha<.05$; (+) significant; (-) not significant;

The estimates were probit regression parameters

Controlling for education, gender, age, school attendance, income, and provinces

Conclusion about hypothesis 4:

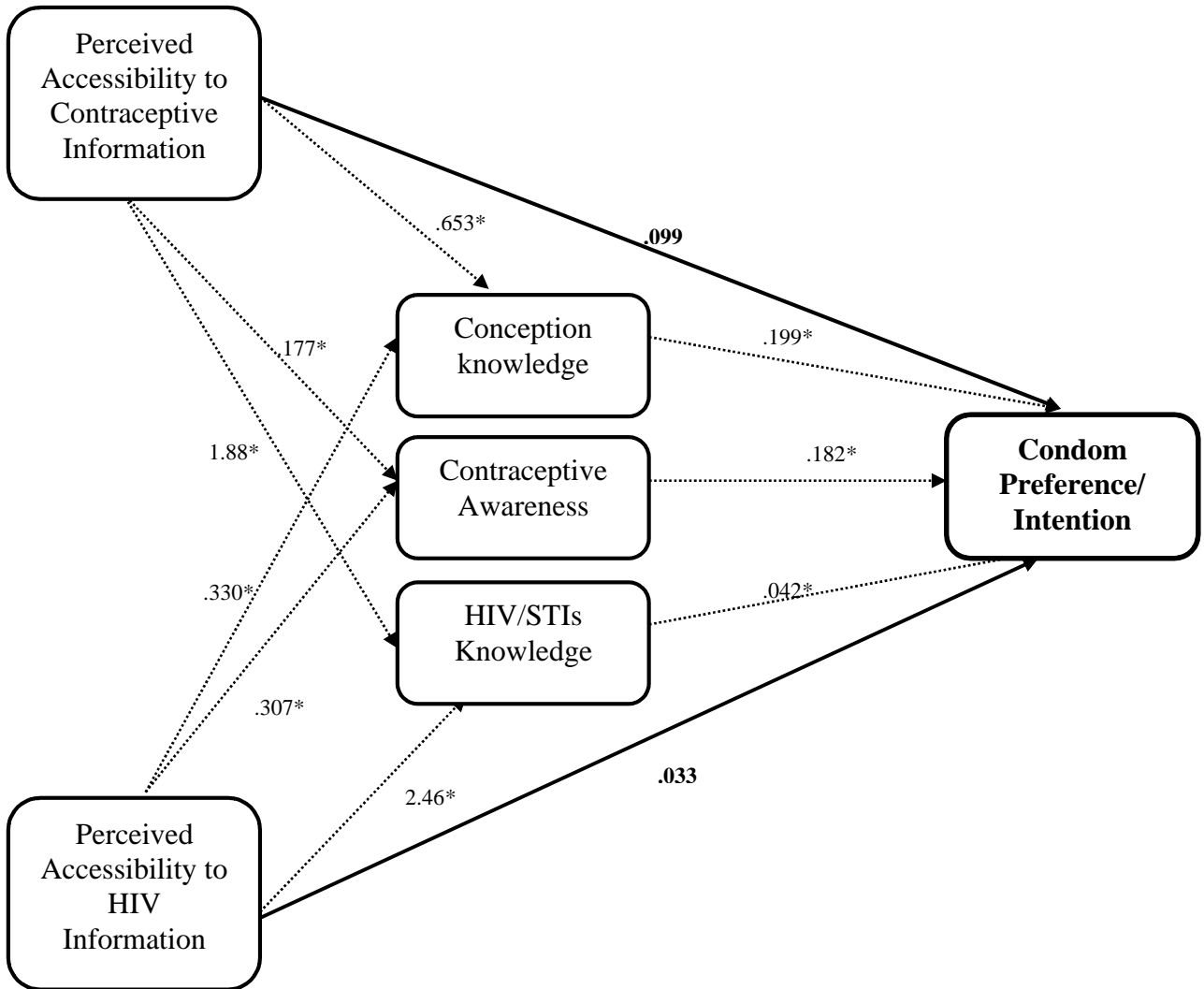
For perceived accessibility to contraceptive information:

The relationship between perceived accessibility to contraceptive information and condom preference/intention is mediated by knowledge of conception and HIV/STIs such that those who perceive that it is easy to get information about contraceptives tend to have higher knowledge on conception and HIV/STIs, and thus are more likely to prefer/intend to use condoms than those who perceive it is difficult or impossible to get the information.

For perceived accessibility to HIV information:

The relationship between perceived accessibility to HIV information and condom preference/intention is mediated by conception knowledge, contraceptive awareness and HIV/STIs knowledge such that those who perceive that it is easy to get HIV information tend to have higher knowledge on conception, contraceptives and HIV/STIs, and thus are more likely to prefer/intend to use condoms than those who perceive it is difficult or impossible to get the information.

Figure 3: Mediation effects on the relationship between perceived accessibility to information and condom preference/intention



Note: * significant at $\alpha < .05$; (+) significant; (-) not significant;
 Controlling for education, gender, age, school attendance, income, and provinces;
 Solid lines indicate direct effect
 Dotted line indicate regression coefficients between variables
 Estimates were based on probit regression

Testing hypothesis 5:

Hypothesis 5 proposed that the relationship between the amount of exposure to contraceptive, HIV and STIs information with condom preference/intention will be mediated by conception knowledge, contraceptive awareness, and HIV/STIs knowledge such that the more sources from which youths receive information about contraceptives, HIV, and STIs in the last 6 months, the more knowledge about these subjects they will gain, and thus, they will be more likely to prefer/intend to use condoms.

Statistics generated from the overall SEM model were extracted to examine potential mediation effects of the three types of knowledge on relationships between each type of information exposure with condom preference/intention. An examination scheme is shown in Synopsis 5. Relevant statistics are shown in Table 34, Table 35, and Table 36. The relationships among the core variables forming hypothesis 5 are displayed in Figure 4.

Synopsis 5: Testing mediation effects on the relationship between exposure to information and condom preference/intention

Testing scheme

H5.1-Testing mediation effects on the relationship between exposure to contraceptive Information and condom preference/intention

H5.2-Testing mediation effects on the relationship between exposure to HIV information and condom preference/intention

H5.3-Testing mediation effects on the relationship between exposure to STIs information and condom preference/intention

Interpretation steps

1. Examining total indirect effects on each relationship between an independent variable and the outcome variable
2. Examining specific indirect effects on the relationship

- a) Testing mediation effect of conception knowledge on the relationship
- b) Testing mediation effect of contraceptive awareness on the relationship
- c) Testing mediation effect of HIV/STIs knowledge on the relationship

Criteria for significant mediation effects

1. Point estimate for an independent variable (α) is significantly different from zero in a probit regression with a mediator.
2. Point estimate related to the mediator, the increment in standard deviations for each unit of the mediator to the predicted probit index of the outcome variable (denoted as β) adjusted for the independent variable is also significantly different from zero.
3. Z-score of the $\alpha*\beta$ product is greater than 1.96 at alpha level of .05.

H5.1-Testing mediation effects on the relationship between exposure to contraceptive Information (ECI) and condom preference/intention (CP/I)

Table 34 summarizes important statistics which allow for examining mediation effects of the three proposed mediators on the relationship between exposure to contraceptive information (ECI) and condom preference/intention (CP/I). The summary of the table shows that both the total and direct effects of ECI on CP/I are significantly different from zero with a point estimates of .141 (95% CI: .049, .234) and .103 (95% CI: .012, .193) respectively. Also, the total indirect effect through three proposed mediators is significant with a point estimate of .042 (95% CI: .009, .074) which explains 29.79% of the total effect. Therefore, it can be concluded that at least one of the three mediators mediates the relationship between ECI and CP/I.

Further analysis examined specific indirect effects attributable to each of the three mediators on the relationship between ECI and CP/I. Table 34 displays the point estimates for evaluating the significance of the mediation based on the criteria provided

in Synopsis 5. According to these criteria, only conception knowledge (CK) and contraceptive awareness (CA) are shown as mediating the relationship between ECI and CP/I with point estimates of .020 (95% CI: .003, .038) and .020 (95% CI: .005, .035) respectively. The positive signs of the mediation in both mediators allow for concluding that the relationship between the amount of exposure to contraceptive information and condom preference/intention is mediated by conception knowledge and contraceptive awareness such that the more sources from which youths receive information about contraceptives in the last 6 months, the more knowledge about these subjects they will gain, and thus, they will be more likely to prefer/intend to use condoms. By the contrary, HIV/STIs knowledge does not contribute to the explanation of the relationship between exposure to contraceptive information and condom preference/intention.

Table 34: Mediation effects on the relationship between exposure to contraceptive information (ECI) and condom preference/intention (CP/I)

Mediation Effects	Point estimate (95% CI)	% mediated in total effect	Significant ($p < .05$)
Through conception knowledge (CK)			
Regress CK on ECI (α)	.103 (.027, .179)		(+)
Regress CP/I on CK (β) controlled for ECI	.199 (.121, .277)		(+)
<i>Mediated effect ($\alpha*\beta$)</i>	.020 (.003, .038)	14.18*	(+)
Through contraceptive awareness (CA)			
Regress CA on ECI (α)	.111 (.056, .166)		(+)
Regress CP/I on CA (β) controlled for ECI	.182 (.080, .285)		(+)
<i>Mediated effect ($\alpha*\beta$)</i>	.020 (.005, .035)	14.18*	(+)
Through HIV/STIs knowledge (H/SK)			
Regress H/SK on ECI (α)	-.051 (-.236, .134)		(-)
Regress CP/I on H/SK (β) controlled for ECI	.042 (.009, .074)		(+)
<i>Mediated effect ($\alpha*\beta$)</i>	-.002 (-.010, .006)	5.00	(-)
Summary:			
Total effect of ECI on CP/I:	.141 (.049, .234)		(+)
Direct effect of ECI on CP/I:	.103 (.012, .193)		(+)
Total indirect effects through CK, CA, H/SK:	.042 (.009, .074)	29.79*	(+)

Note: * significant at $\alpha < .05$; (+) significant; (-) not significant;
 The estimates were probit regression parameters;
 Controlling for education, gender, age, school attendance, income, and provinces

H5.2-Testing mediation effects on the relationship between exposure to HIV information (E-HIV) and condom preference/intention (CP/I)

Table 35 summarizes important statistics which allow for examining mediation effects of the three proposed mediators on the relationship between exposure to HIV information (E-HIV) and condom preference/intention (CP/I). The summary of the table shows that all three types of effects: total, direct, and total indirect effects are non-significantly different from zero. This absence of mediation effects is elaborated through further examining specific effects for each of the three types of knowledge as detailed in Table 35.

Table 35: Mediation effects on the relationship between exposure to HIV information (E-HIV) and condom preference/intention (CP/I)

Mediation Effects	Point estimate (95% CI)	% mediated	Significant (p<.05)
Through conception knowledge (CK)			
Regress CK on E-HIV (α)	.005 (-.007, .08)		(-)
Regress CP/I on CK (β) controlled for E-HIV	.199 (.121, .277)		(+)
<i>Mediated effect ($\alpha*\beta$)</i>	<i>.001 (-.014, .017)</i>	<i>2.50</i>	<i>(-)</i>
Through contraceptive awareness (CA)			
Regress CA on E-HIV (α)	-.021 (-.081, .040)		(-)
Regress CP/I on CA (β) controlled for E-HIV	.182 (.080, .285)		(+)
<i>Mediated effect ($\alpha*\beta$)</i>	<i>-.004 (-.015, .007)</i>	<i>10.00</i>	<i>(-)</i>
Through HIV/STIs knowledge (H/SK)			
Regress H/SK on E-HIV (α)	-.166 (-.365, .033)		(-)
Regress CP/I on H/SK (β) controlled for E-HIV	.042 (.009, .074)		(+)
<i>Mediated effect ($\alpha*\beta$)</i>	<i>-.007 (-.017, .003)</i>	<i>17.50</i>	<i>(-)</i>
Summary:			
Total effect of E-HIV on CP/I:	-.040 (-.139, .060)		(-)
Direct effect of E-HIV on CP/I:	-.030 (-.128, .068)		(-)
Total indirect effects through CK, CA, H/SK:	-.010 (-.035, .015)	25.00	(-)

Note: * significant at $\alpha < .05$; (+) significant; (-) not significant;
 The estimates were probit regression parameters
 Controlling for education, gender, age, school attendance, income, and provinces

H5.3-Testing mediation effects on the relationship between exposure to STIs information (E-STI) and condom preference/intention (CP/I)

Table 36 summarizes important statistics which allow for examining mediation effects of the three proposed mediators on the relationship between exposure to STIs information (E-STI) and condom preference/intention (CP/I). The summary of the table shows that both the total and direct effects of E-STIs on CP/I are non-significant. However the total indirect effect is shown to be significant with a point estimate of .059 (95% CI: .016, .101), indicating that at least one of the three mediators mediates the relationship between E-STIs and CP/I.

Further analysis examined specific indirect effects attributable to each of the three mediators on the relationship between E-STIs and CP/I. Table 35 displays the point estimates for evaluating the significance of the mediation based on the criteria provided

in Synopsis 5. According to these criteria, only HIV/STIs knowledge is shown as mediating the relationship between E-STIs and CP/I with a point estimate for the indirect effect of .045 (95% CI: .009, .080). The positive signs of both alpha and beta allow for concluding that the relationship between the amount of exposure to STIs information and condom preference/intention is mediated by HIV/STIs knowledge such that the more sources from which youths receive information about STIs in the last 6 months, the more knowledge about HIV/STIs they will gain, and thus, they will be more likely to prefer/intend to use condoms.

By the contrary, conception knowledge and contraceptive awareness do not contribute to the explanation of the relationship between exposure to STIs information and condom preference/intention.

Table 36: Mediation effects on the relationship between exposure to STIs information (E-STI) and condom preference/intention (CP/I)

Mediation Effects	Point estimate (95% CI)	% mediated	Significant (p<.05)
Through conception knowledge (CK)			
Regress CK on E-STIs (α)	.025 (-.044, .094)		(-)
Regress CP/I on CK (β) controlled for E-STI	.199 (.121, .277)		(+)
<i>Mediated effect ($\alpha*\beta$)</i>	.005 (-.009, .019)	22.73	(-)
Through contraceptive awareness (CA)			
Regress CA on E-STIs (α)	.051 (-.002, .104)		(-)
Regress CP/I on CA (β) controlled for E-STI	.182 (.080, .285)		(+)
<i>Mediated effect ($\alpha*\beta$)</i>	.009 (-.002, .020)	40.91	(-)
Through HIV/STIs knowledge (H/SK)			
Regress H/SK on E-STIs (α)	1.074 (.903, 1.246)		(+)
Regress CP/I on H/SK (β) controlled for E-STI	.042 (.009, .074)		(+)
<i>Mediated effect ($\alpha*\beta$)</i>	.045 (.009, .080)	204.55*	(+)
Summary:			
Total effect of E-STIs on CP/I:	-.022 (-.105, .061)		(-)
Direct effect of E-STIs on CP/I:	-.080 (-.170, .010)		(-)
Total indirect effects through CK, CA, H/SK:	.059 (.016, .101)	268.18*	(+)

Note: * significant at $\alpha<.05$; (+) significant; (-) not significant;
The estimates were probit regression parameters
Controlling for education, gender, age, school attendance, income, and provinces

Conclusion about hypothesis 5:

For exposure to contraceptive Information:

The relationship between the amount of exposure to contraceptive information and condom preference/intention is mediated by conception knowledge and contraceptive awareness such that the more sources from which youths receive information about contraceptives in the last 6 months, the more knowledge about these subjects they will gain, and thus, they will be more likely to prefer/intend to use condoms.

By the contrary, HIV/STIs knowledge does not contribute to the explanation of the relationship between exposure to contraceptive information and condom preference/intention.

For exposure to HIV information:

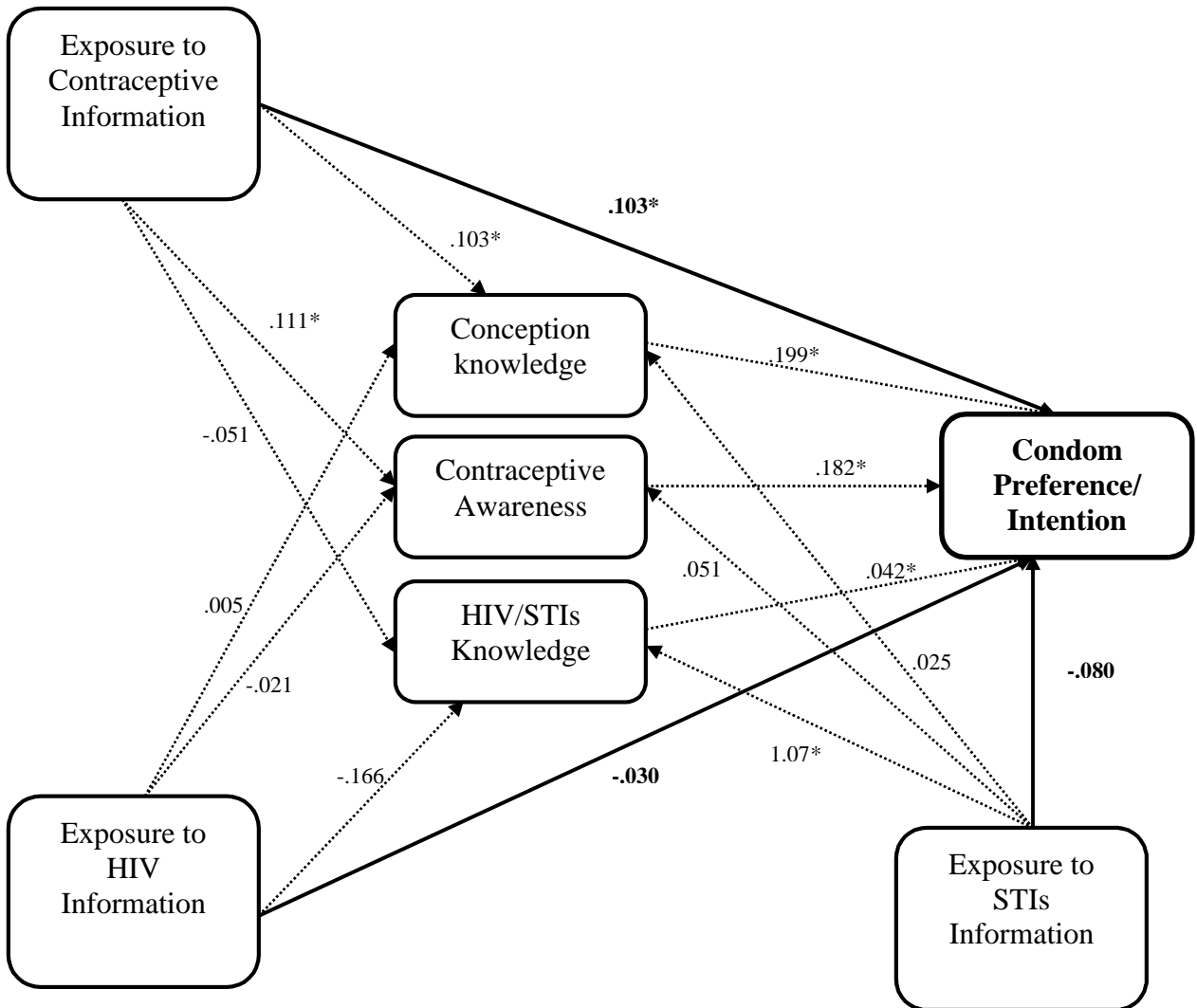
All three types of knowledge: conception knowledge, contraceptive awareness, and HIV/STIs knowledge do not contribute to the explanation of the relationship between exposure to HIV information and condom preference/intention.

For exposure to STIs information:

The relationship between the amount of exposure to STIs information and condom preference/intention is mediated by HIV/STIs knowledge such that the more sources from which youths receive information about STIs in the last 6 months, the more knowledge about HIV/STIs they will gain, and thus, they will be more likely to prefer/intend to use condoms.

By the contrary, conception knowledge and contraceptive awareness do not contribute to the explanation of the relationship between exposure to STIs information and condom preference/intention.

Figure 4: Mediation Effects on the relationship between Exposure to Information and condom preference/intention



Note: * significant at $\alpha < .05$; (+) significant; (-) not significant;
 Controlling for education, gender, age, school attendance, income, and provinces;
 Solid lines indicate direct effect
 Dotted line indicate regression coefficients between variables
 Estimates were based on probit regression

Testing hypothesis 6:

Hypothesis 6 proposed that the relationship between contraceptive discussion, HIV discussion, and STIs discussion with condom preference/intention will be mediated by conception knowledge, contraceptive awareness, and HIV/STIs knowledge such that the more types of people with whom youths discussed contraceptives, HIV and STIs in the last 6 months, the more knowledge about the subjects they will gain, and thus they will be more likely to prefer/intend to use condoms.

Statistics generated from the overall SEM model were extracted to examine potential mediation effects of the three types of knowledge on relationships between each type of discussion with condom preference/intention. An examination scheme is shown in Synopsis 6. Relevant statistics are shown in Table 37, Table 38 and Table 39. The relationships among the core variables forming hypothesis 6 are displayed in Figure 5.

Synopsis 6: Testing mediation effects on the relationship between contraceptive, HIV, and STIs discussion with condom preference/intention (CP/I)

Testing scheme

H6.1-Testing mediation effects on the relationship between contraceptive discussion and condom preference/intention

H6.2-Testing mediation effects on the relationship between HIV discussion and condom preference/intention

H6.3-Testing mediation effects on the relationship between STIs discussion and condom preference/intention

Interpretation steps:

1. Examining total indirect effects on each relationship between an independent variable and the outcome variable
2. Examining specific indirect effects on the relationship
 - a) Testing mediation effect of conception knowledge on the relationship
 - b) Testing mediation effect of contraceptive awareness on the relationship
 - c) Testing mediation effect of HIV/STIs knowledge on the relationship

Criteria for significant mediation effects

1. Point estimate for an independent variable (α) is significantly different from zero in a probit regression with a mediator.
2. Point estimate related to the mediator, the increment in standard deviations for each unit of the mediator to the predicted probit index of the outcome variable (denoted as β) adjusted for the independent variable is also significantly different from zero.
3. Z-score of the $\alpha*\beta$ product is greater than 1.96 at alpha level of .05.

H6.1-Testing mediation effects on the relationship between contraceptive discussion (C-Dis) and condom preference/intention (CP/I)

Table 37 summarizes important statistics which allow for examining mediation effects of the three proposed mediators on the relationship between contraceptive discussion (C-Dis) and condom preference/intention (CP/I). The summary of the table shows that all three types of effects: total, direct, and total indirect effects are non-significantly different from zero. This means that there is neither an association between C-Dis with CP/I nor a mediation effect of any of the three types of knowledge on the relationship between C-DIS and CP/I. This absence of mediation effects is elaborated through further examining specific effects for each of the three types of knowledge as detailed in Table 37. This elaboration also indicates the absence of significance for any specific indirect effect.

Table 37: Mediation effects on the relationship between contraceptive discussion (C-Dis) and condom preference/intention (CP/I)

Mediation Effects	Point estimate (95% CI)	% mediated	Significant (p<.05)
Through conception knowledge (CK)			
Regress CK on C-Dis (α)	.049 (-.034, .132)		(-)
Regress CP/I on CK (β) controlled for C-Dis	.199 (.121, .277)		(+)
<i>Mediated effect ($\alpha*\beta$)</i>	.010 (-.007, .027)	15.15	(-)
Through contraceptive awareness (CA)			
Regress CA on C-Dis (α)	.039 (-.021, .100)		(-)
Regress CP/I on CA (β) controlled for C-Dis	.182 (.080, .285)		(+)
<i>Mediated effect ($\alpha*\beta$)</i>	.007 (-.005, .019)	10.61	(-)
Through HIV/STIs knowledge (H/SK)			
Regress H/SK on C-Dis (α)	.038 (-.203, .279)		(-)
Regress CP/I on H/SK (β) controlled for C-Dis	.042 (.009, .074)		(+)
<i>Mediated effect ($\alpha*\beta$)</i>	.002 (-.009, .012)	3.03	(-)
Summary:			
Total effect of C-Dis on CP/I:	.066 (-.033, .165)		(-)
Direct effect of C-Dis on CP/I:	.048 (-.053, .149)		(-)
Total indirect effects through CK, CA, H/SK:	.018 (-.007, .044)	27.27	(-)

Note: * significant at $\alpha<.05$; (+) significant; (-) not significant;
 The estimates were probit regression parameters
 Controlling for education, gender, age, school attendance, income, and provinces

H6.2-Testing mediation effects on the relationship between HIV discussion (H-Dis) and condom preference/intention (CP/I)

Table 38 summarizes important statistics which allow for examining mediation effects of the three proposed mediators on the relationship between HIV discussion (H-Dis) and condom preference/intention (CP/I). The summary of the table shows that all three types of effects: total, direct, and total indirect effects are non-significantly different from zero. This means that there is neither an association between H-Dis with CP/I nor are there any mediation effects of any of the three types of knowledge on the relationship between H-Dis and CP/I. This absence of mediation effects is elaborated through further examining specific effects for each of the three types of knowledge as detailed in Table 38. This elaboration also indicates the absence of significance for any specific indirect effect.

Table 38: Mediation effects on the relationship between HIV discussion (H-Dis) and condom preference/intention (CP/I)

Mediation Effects	Point estimate (95% CI)	% mediated	Significant ($p < .05$)
Through conception knowledge (CK)			
Regress CK on H-Dis (α)	.018 (-.073, .110)		(-)
Regress CP/I on CK (β) controlled for H-Dis	.199 (.121, .277)		(+)
<i>Mediated effect ($\alpha*\beta$)</i>	<i>.004 (-.015, .022)</i>	7.27	(-)
Through contraceptive awareness (CA)			
Regress CA on E-HIV (α)	.003 (-.071, .066)		(-)
Regress CP/I on CA (β) controlled for H-Dis	.182 (.080, .285)		(+)
<i>Mediated effect ($\alpha*\beta$)</i>	<i>.000 (-.013, .012)</i>	0	(-)
Through HIV/STIs knowledge (H/SK)			
Regress H/SK on H-Dis (α)	-.345 (-.571, -.119)		(+)
Regress CP/I on H/SK (β) controlled for H-Dis	.042 (.009, .074)		(+)
<i>Mediated effect ($\alpha*\beta$)</i>	<i>-.014 (-.029, .000)</i>	25.45	(-)
Summary:			
Total effect of H-Dis on CP/I:	.050 (-.064, .163)		(-)
Direct effect of H-Dis on CP/I:	.061 (-.051, .172)		(-)
Total indirect effects through CK, CA, H/SK:	-.011 (-.041, .018)	20.00	(-)

Note: * significant at $\alpha < .05$; (+) significant; (-) not significant;

The estimates were probit regression parameters

Controlling for education, gender, age, school attendance, income, and provinces

H6.3-Testing mediation effects on the relationship between STIs discussion (S-Dis) and condom preference/intention (CP/I)

Table 39 summarizes important statistics which allow for examining mediation effects of the three proposed mediators on the relationship between STIs discussion (S-Dis) and condom preference/intention (CP/I). The summary of the table shows that all three types of effects: total, direct, and total indirect effects are non-significantly different from zero. This means that there is neither an association between S-Dis with CP/I nor are there any mediation effects of any of the three types of knowledge on the relationship between S-Dis and CP/I. This absence of mediation effects is elaborated through further examining specific effects for each of the three types of knowledge as detailed in Table 39. This elaboration also indicates the absence of significance for any specific indirect effect.

Table 39: Mediation effects on the relationship between STIs discussion (S-Dis) and condom preference/intention (CP/I)

Mediation Effects	Point estimate (95% CI)	% mediated	Significant (p<.05)
Through conception knowledge (CK)			
Regress CK on S-Dis (α)	-.058 (-.158, .042)		(-)
Regress CP/I on CK (β) controlled for S-Dis	.199 (.121, .277)		(+)
<i>Mediated effect ($\alpha*\beta$)</i>	-.012 (-.032, .009)	21.43	(-)
Through contraceptive awareness (CA)			
Regress CA on S-Dis (α)	-.005 (-.076, .065)		(-)
Regress CP/I on CA (β) controlled for S-Dis	.182 (.080, .285)		(+)
<i>Mediated effect ($\alpha*\beta$)</i>	-.001 (-.014, .012)	1.79	(-)
Through HIV/STIs knowledge (H/SK)			
Regress H/SK on S-Dis (α)	.239 (-.020, .499)		(-)
Regress CP/I on H/SK (β) controlled for S-Dis	.042 (.009, .074)		(+)
<i>Mediated effect ($\alpha*\beta$)</i>	.010 (-.003, .023)	17.86	(-)
Summary:			
Total effect of S-Dis on CP/I:	.056 (-.060, .171)		(-)
Direct effect of S-Dis on CP/I:	.058 (-.056, .172)		(-)
Total indirect effects through CK, CA, H/SK:	-.003 (-.035, .029)	5.36	(-)

Note: * significant at $\alpha<.05$; (+) significant; (-) not significant;
 The estimates were probit regression parameters
 Controlling for education, gender, age, school attendance, income, and provinces

Conclusion about hypothesis 6:

For contraceptive discussion:

All three types of knowledge (conception knowledge, contraceptive awareness, and HIV/STIs knowledge) do not mediate the relationship between contraceptive discussion and condom preference/intention.

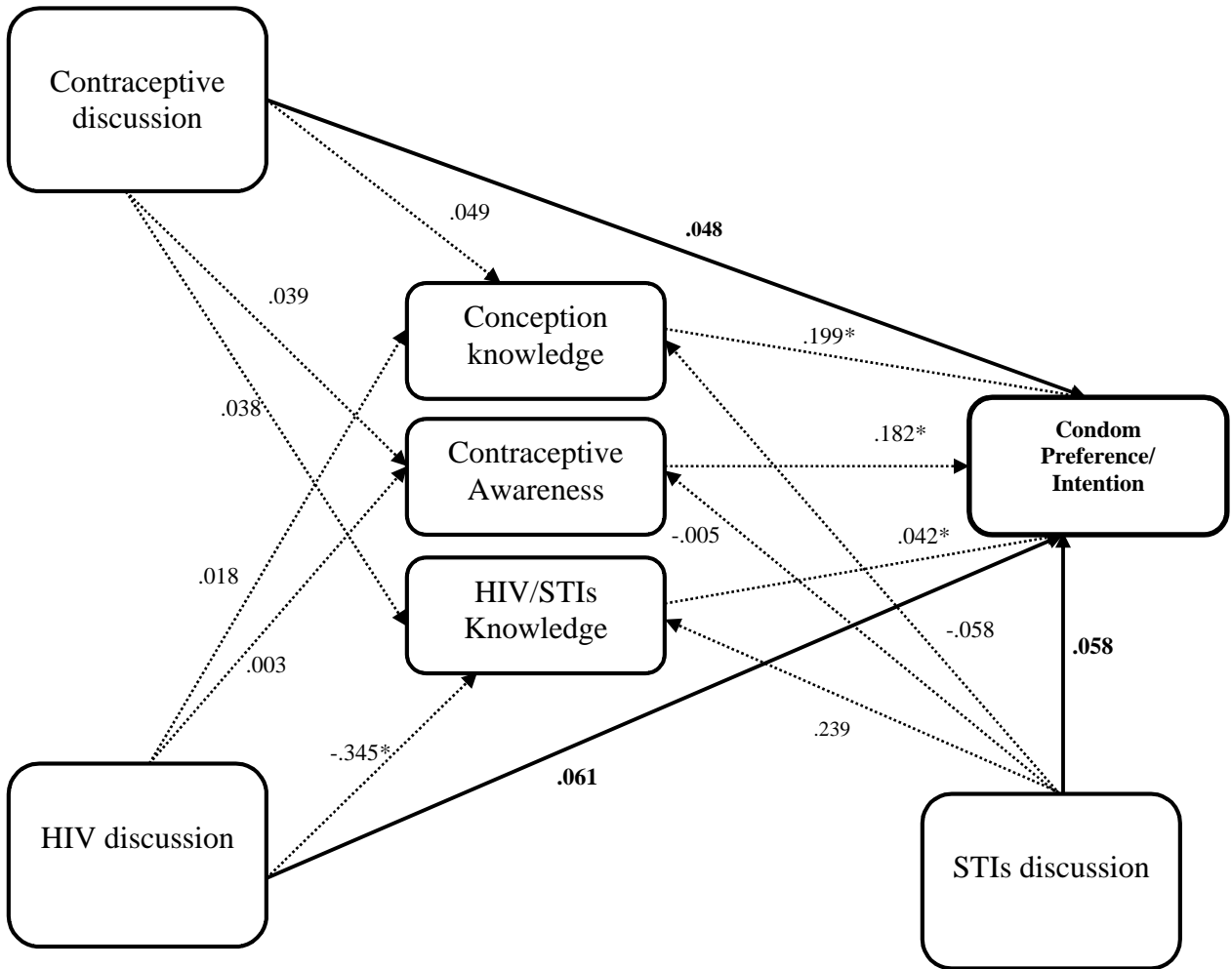
For HIV discussion:

All three types of knowledge (conception knowledge, contraceptive awareness, and HIV/STIs knowledge) do not mediate the relationship between HIV discussion and condom preference/intention.

For STIs discussion:

All three types of knowledge (conception knowledge, contraceptive awareness, and HIV/STIs knowledge) do not mediate the relationship between STIs discussion and condom preference/intention.

Figure 5: Mediation Effects on the relationship between discussion on contraceptives, HIV, and STIs and condom preference/intention



Note: * significant at $\alpha < .05$; (+) significant; (-) not significant;
 Controlling for education, gender, age, school attendance, income, and provinces;
 Solid lines indicate direct effect
 Dotted line indicate regression coefficients between variables
 Estimates were based on probit regression

CONCLUSIONS FOR RESEARCH QUESTION 2:

Research question 2 was examined through testing three hypotheses (4, 5, and 6). All of these three hypotheses involved testing mediation effects of multiple mediators: conception knowledge, contraceptive awareness, and HIV/STIs knowledge on the relationships of each of the eight independent variables and condom preference/intention. SEM was conducted to test multiple mediation effects in the presence of all independent variables and control variables. Following conclusions were made based on statistics for each of the three hypotheses:

Hypothesis 4:

This hypothesis tested whether each of the three types of knowledge: conception knowledge, contraceptive awareness, and HIV/STIs knowledge mediates the relationship between perceived accessibility to contraceptive information and perceived accessibility to HIV information respectively with condom preference/intention. The simultaneous SEM analysis suggested that:

For perceived accessibility to contraceptive Information:

The relationship between perceived accessibility to contraceptive information and condom preference/intention is mediated by knowledge about conception and HIV/STIs (but not by contraceptive awareness) such that those who perceive that it is easy to get contraceptive information tend to have higher knowledge on conception and HIV/STIs, and thus are more likely to prefer/intend to use condoms than those who perceive it is difficult or impossible to get the information.

For perceived accessibility to HIV Information:

The relationship between perceived accessibility to HIV information and condom preference/intention is mediated by conception knowledge, contraceptive awareness and HIV/STIs knowledge such that those who perceive that it is easy to get HIV information tend to have higher knowledge on conception, contraceptives and HIV/STIs, and thus are more likely to prefer/intend to use condoms than those who perceive it is difficult or impossible to get the information.

Hypothesis 5:

This hypothesis tested whether each of the three types of knowledge (conception knowledge, contraceptive awareness, and HIV/STIs knowledge) mediates the relationship between exposure to contraceptive information, exposure to HIV information, and exposure to STIs information respectively with condom preference/intention. The simultaneous SEM analysis suggested that:

For exposure to contraceptive information:

The relationship between exposure to contraceptive information and condom preference/intention is mediated by conception knowledge and contraceptive awareness such that the more sources from which youths received information about contraceptives in the last 6 months, the more knowledge about these subjects they will gain, and thus, they will be more likely to prefer/intend to use condoms.

By the contrary, HIV/STIs knowledge does not contribute to the explanation of the relationship between exposure to contraceptive information and condom preference/intention.

For exposure to HIV information:

All three types of knowledge: conception knowledge, contraceptive awareness, and HIV/STIs knowledge do not contribute to the explanation of the relationship between Exposure to HIV information and Condom preference/intention.

For exposure to STIs information:

The relationship between amount of exposure to STIs information and condom preference/intention is mediated by HIV/STIs knowledge such that the more sources from which youths received information about STIs in the last 6 months, the more knowledge about HIV/STIs they will gain, and thus, they will be more likely to prefer/intend to use condoms.

By the contrary, conception knowledge and contraceptive awareness do not contribute to the explanation of the relationship between exposure to STIs information and condom preference/intention.

Hypothesis 6:

This hypothesis tested whether each of the three types of knowledge (conception knowledge, contraceptive awareness, and HIV/STIs knowledge) mediates the relationship between contraceptive discussion, HIV discussion, and STIs discussion respectively. The simultaneous SEM analysis suggested that:

For contraceptive discussion:

All three types of knowledge (conception knowledge, contraceptive awareness, and HIV/STIs knowledge) do not mediate the relationship between contraceptive discussion and condom preference/intention.

For HIV discussion:

All three types of knowledge (conception knowledge, contraceptive awareness, and HIV/STIs knowledge) do not mediate the relationship between HIV discussion and condom preference/intention.

For STIs discussion:

All three types of knowledge (conception knowledge, contraceptive awareness, and HIV/STIs knowledge) do not mediate the relationship between STIs discussion and condom preference/intention.

Note that:

In the SEM procedure, all three types of knowledge were shown to be significantly associated with condom preference/intention with a significant point estimate of a positive sign. Therefore, it can also be concluded that the more knowledge about conception, contraceptives and HIV/STIs they have, the more likely they will prefer/intend to use condoms for avoiding pregnancy.

Findings for all possible mediation effects are summarized in Table 40.

Table 40: Summary about mediation effects between mediators and independent variables adjusted for control variables

Independent variables	Mediators			Total indirect effects	Total effect
	<i>Estimate (% mediated)</i>				
	Conception knowledge	Contraceptive awareness	HIV/STIs knowledge		
Hypothesis 4:					
Perceived accessibility of contraceptive information	<i>.130</i> (38.35)*	<i>.032</i> (9.44)	<i>.078</i> (23.01)*	.240 (70.80)*	.339 (100)*
Perceived accessibility of HIV information	<i>.066</i> (25.78)*	<i>.056</i> (21.88)*	<i>.102</i> (16.41)*	.224 (87.50)*	<i>.256</i> (100)
Hypothesis 5:					
Exposure to contraceptive information	<i>.020</i> (14.18)*	<i>.020</i> (14.18)*	<i>-.002</i> (5.00)	.042 (29.79)*	.141 (100)*
Exposure to HIV information	<i>.001</i> (2.50)	<i>-.004</i> (10.00)	<i>-.007</i> (17.50)	<i>-.010</i> (25.00)	<i>-.040</i> (100)
Exposure to STIs information	<i>.005</i> (22.73)	<i>.009</i> (40.91)	<i>.045</i> (204.55)*	<i>.059</i> (268.18)**	<i>-.022</i> (100)
Hypothesis 6:					
Contraceptive discussion	<i>.010</i> (15.15)	<i>.007</i> (10.61)	<i>.002</i> (3.03)	<i>.018</i> (27.27)	<i>.066</i> (100)
HIV discussion	<i>.004</i> (7.27)	<i>0.00</i> (0.00)	<i>-.014</i> (25.45)	<i>-.011</i> (20.00)	<i>.050</i> (100)
STIs discussion	<i>-.012</i> (21.43)	<i>-.001</i> (1.79)	<i>.010</i> (17.86)	<i>-.003</i> (5.36)	<i>.056</i> (100)

Note: The numbers in italics indicate mediation estimate ($\alpha^* \beta$) based on probit regression models from a SEM procedure

The mediation effect (%) is calculated by dividing a significant specific mediation effect by the total effect of each independent variable on condom preference/intention multiplied by 100.

*: significant at $\alpha < .05$; **: negative mediation effect (the direct effect goes away from zero)

Research question 3

This research question aims to test whether perceived accessibility to and perceived availability of contraceptives moderate the relationship between three types of knowledge (conception knowledge, contraceptive awareness, and HIV/STIs knowledge) with condom preference/intention. The testing involved two hypotheses (7 and 8) as follows:

Testing hypothesis 7: The relationships between youths' conception knowledge, contraceptive awareness and HIV/STIs knowledge with their condom preference/intention are moderated by their perceived availability of contraceptives such that the relationship will be stronger for those who are aware of at least one place to get a contraceptive method than for those who are not aware of any place to get a contraceptive method.

Testing hypothesis 8: The relationships between youths' conception knowledge, contraceptive awareness and HIV/STIs knowledge with their condom preference/intention are moderated by their perceived availability of contraceptives such that the relationship will be stronger for those who perceive it is easy to get a contraceptive method than for those who think it is difficult or impossible to get a contraceptive method.

Testing hypothesis 7 and 8:

A logistics regression model including all determinants, moderators, control variables and interaction terms was first performed. Significant interaction terms were identified based on the point estimates from the Maximum Likelihood Analysis. Regression slopes of knowledge on the outcome variable for different levels of the moderator(s) and plotting techniques were then used to display the nature of the interaction terms. The moderation testing procedures were outlined in Synopsis 7.

Synopsis 7: A model-building approach for testing moderation effects

H7.1- The model included the following sets of variables

- Three types of knowledge (conception knowledge, contraceptive awareness and HIV/STIs knowledge),
- Moderators: perceived availability to contraceptives, perceived accessibility to contraceptives
- Control variables
- Six interaction terms (product of each type of knowledge and each moderator)

Interpretation of interaction terms:

- Plotting
- Calculating regression slopes of knowledge on condom preference/intention for different levels of the moderator involved in the significant interaction term.

Treating perceived availability of contraceptives as a dichotomous measure

First, the model (Synopsis 7) treated perceived availability of contraceptives as a dichotomous measure. Statistics from the model (Table 41) shows a significant interaction term (between contraceptive awareness and perceived availability of contraceptives) with a point estimate of -.39, $df=1$, $p<.05$). This indicates that the association between contraceptive awareness with condom preference/intention is different for the two levels of the perceived availability of contraceptives (“Aware”=Aware of at least one place to provide contraceptives, and “Otherwise”=Unaware of any such place or don’t know). This revelation suggested further analysis to interpret the nature of the interaction.

Table 41: Moderators with control variables and interactions

Variables	Estimate	SE	P-value
Intercept	-2.82	0.85	***
Perceived availability of contraceptives	1.03	0.45	*
Perceived accessibility of contraceptives	0.84	0.47	
Conception knowledge	0.19	0.14	
Contraceptive awareness	0.55	0.17	***
HIV/STIs knowledge	-0.01	0.04	
Conception knowledge * perceived contraceptive availability	0.04	0.15	
Contraceptive awareness * perceived contraceptive availability	-0.39	0.20	*
HIV/STIs knowledge * perceived contraceptive availability	0.06	0.04	
Conception knowledge * perceived contraceptive accessibility	0.08	0.12	
Contraceptive awareness* perceived contraceptive accessibility	0.04	0.17	
HIV/STIs knowledge * perceived contraceptive accessibility	-0.05	0.04	

Note: *** $p<.001$; ** $p<.01$; * $p<.05$; Estimated based on logistics regression Controlling for education, gender, age, school attendance, income, and provinces

As perceived availability of contraceptives has two levels, a two-step regression approach suggested by Patricia (2004) was performed to examine the nature of the interaction significance. In step 1, perceived availability of contraceptives was coded so that level “Otherwise” was the reference group (coded as 0) and the “Aware” level was coded as 1. All other related variables and interaction terms were also included in the model. According to this scheme, the effects of the other variables included would be interpreted for the “Unaware” group. In Step 2, the perceived availability of contraceptives was coded so that the “Aware” level became the reference group (coded as 0) and the “Otherwise” group was coded as 1. All other variables were also included. For Step 2, coefficient coefficients of other variables would be interpreted based on the “Aware” group. The difference between the two levels can then be revealed based on the regression slope of contraceptive awareness on each level of perceived availability of contraceptives. Note that as perceived accessibility of contraceptives was involved in an interaction term with contraceptive awareness in the model, it was effect-coded to account for conditional effects of contraceptive awareness on different levels of perceived availability of contraceptives.

Table 42 summarizes results from those 2 steps. In general, for an average contraceptive awareness score, it is expected that the log odds of the outcome variable for the “Aware” group is 1.03 times higher than the “Otherwise” group. Furthermore, it is noticeable that contraceptive awareness is significantly associated with condom preference/intention for the “Otherwise” group (Step 1), but not for the “Aware” group (Step 2). Specifically, for those who were not aware of any contraceptive-supplying place, it is expected that the log odds of the outcome variables increases 0.58 time

($p < .001$) for an awareness of an additional contraceptive method. By contrast, the effect of contraceptive awareness remained unchanged for those who were aware of at least one place to provide contraceptives. This finding conflicts with the hypothesis which proposed that the association would be stronger for those who were aware at least of one place.

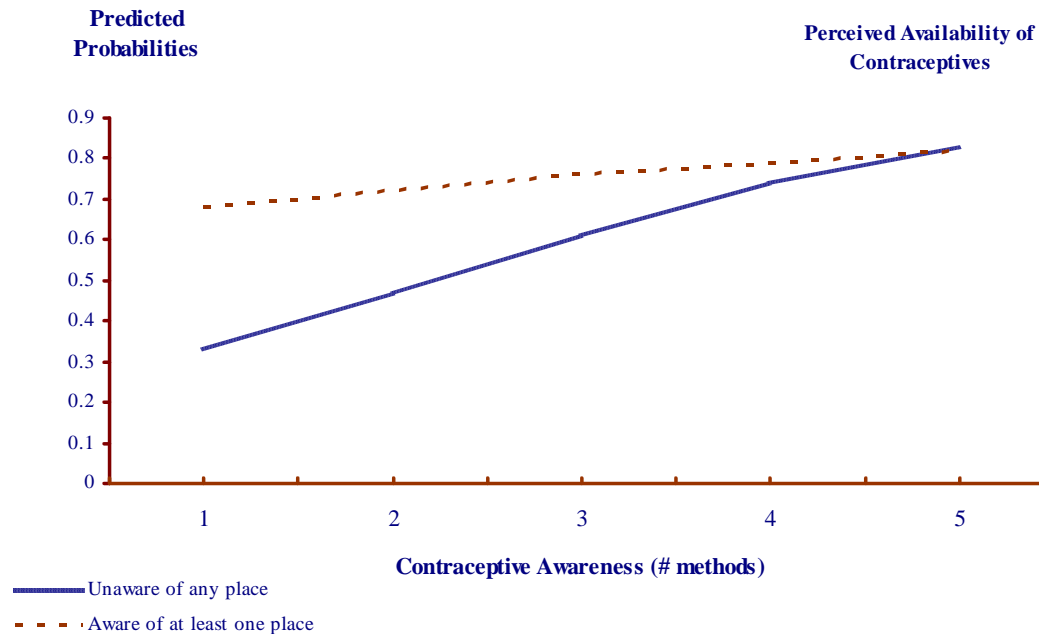
Table 42: Conditional effects of contraceptive awareness on different levels of perceived availability of contraceptives

Variables	Estimate	SE	P-value
<i>When “aware” was coded as 1 and “unaware” as 0.</i>			
Perceived availability of contraceptives	1.03	0.45	*
Contraceptive awareness	0.58	0.17	***
Contraceptive awareness*contraceptive availability	-0.39	0.20	*
<i>When “aware” was coded as 0 and “unaware” as 1.</i>			
Perceived availability of contraceptives	-1.03*	0.45	*
Contraceptive awareness	0.18	0.14	
Contraceptive awareness*contraceptive availability	0.39	0.20	*

Note: *** $p < .001$; ** $p < .01$; * $p < .05$; Estimated based on logistics regression Controlling for education, gender, age, school attendance, income, and provinces; Averaged on the two levels of perceived accessibility of contraceptives

The finding was further confirmed by plotting the conditional probabilities of the outcome variable and contraceptive awareness for the two levels of perceived contraceptive availability. The interaction is shown in Figure 6.

Figure 6: Contraceptive awareness and perceived contraceptive availability interaction



The finding was inconsistent with Hypothesis 7 and prompted further attempts to look at the distribution of the two levels of perceived contraceptive availability. This analysis showed that there were 1054 respondents in the “Aware” group and 283 respondents in the “otherwise” or the “unaware” group. In fact, the “otherwise” group was coded so that it included 259 respondents who said “no” to Question 302: “*Do you know any place where you could find a method?*” The “otherwise” group also included 24 respondents who reported “no” to question 205: “*Is there something a woman or a man who have sexual relations can do to delay or avoid getting pregnant?*” There were 15 respondents who said “no” to both question 302 and question 205, which resulted in a total of 274 (96.8%) of 283 respondents in the “otherwise” group. There was no method to make sure that all of those who reported “no” to these two questions were really not

aware of any contraceptive place. Therefore, there might be a possibility that some or many of them actually knew at least one place. If this assumption was true, there was not enough credibility to conclude that the association between contraceptive awareness and condom preference/intention was significant only in the “otherwise” group. This doubt suggested considering treating perceived availability of contraceptives as a composite measure instead of seeing it as a dichotomous measure.

Treating perceived availability of contraceptives as a composite measure

Perceived availability of contraceptives was also treated as a composite score in examining the nature of the moderation effect of this variable on the relationship of three types of knowledge with the outcome variable. Question 303 in the male survey questionnaire asks “*Where could you or your partner/wife (husband for female questionnaire) go to get a method?*” and the respondents were asked to provide their spontaneous responses to any place they can go to get a method. This allows summing up the number of places they suggested to make up a composite score.

The same logistic regression model was then applied to examine the moderation effect of this composite score on the proposed relationships. This model (Table 43) included three types of knowledge, two moderators, all control variables, and the six interaction terms (product of each type of knowledge and each moderator).

Statistics from the model revealed (Table 43) the only significant interaction between conception knowledge and perceived composite contraceptive availability ($p < .05$). This indicates that the association between conception knowledge with condom preference/intention varies across different values of the perceived availability of

contraceptives, ranging from 0-6, equivalent to seven levels of contraceptive availability. However, at this stage, it is hard to tell how the association varies across different levels of the contraceptive availability, and thus prompting further analysis to interpret the nature of the interaction.

Table 43: Logistic regression model with composite contraceptive availability and interaction terms

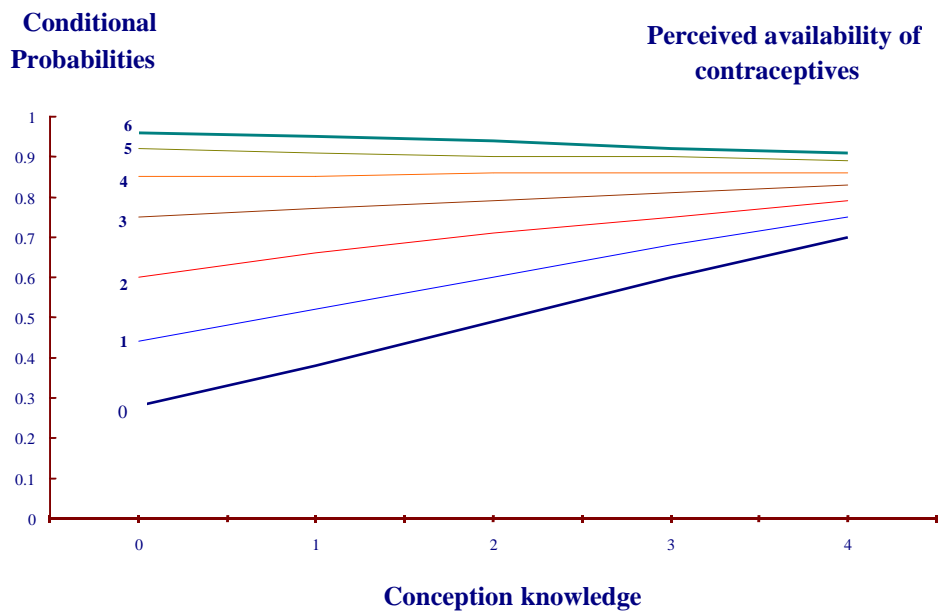
Variables	Estimate	SE	P-value
Intercept	-2.90	0.84	**
Contraceptive availability	0.72	0.20	**
Contraceptive accessibility	0.85	0.49	
Conception knowledge	0.35	0.11	**
Contraceptive awareness	0.37	0.14	*
HIV/STIs knowledge	0.01	0.03	
<i>Conception knowledge * perceived contraceptive availability</i>	-0.11	0.05	*
Contraceptive awareness * perceived contraceptive availability	-0.08	0.06	
HIV/STIs knowledge * perceived contraceptive availability	0.01	0.02	
Conception knowledge * perceived contraceptive accessibility	0.14	0.12	
Contraceptive awareness * perceived contraceptive accessibility	0.01	0.17	
HIV/STIs knowledge * perceived contraceptive accessibility	-0.06	0.04	

Note: *** $p < .001$; ** $p < .01$; * $p < .05$; Estimated based on logistics regression Controlling for education, gender, age, school attendance, income, and provinces

The plotting technique was used to display the interaction between perceived availability and conception knowledge in influencing condom preference/intention. Accordingly, conditional probabilities of the outcome variable were generated from the above logistic regression model based on averaged values from all variables in the model. These probabilities were plotted against the values of conception knowledge for 7

different values of perceived availability (0-6). The interaction is displayed in Figure 7. From this display, we can see that the relationship between conception knowledge and condom preference/intention tends to be stronger at lower values of perceived availability of contraceptives. This means that for those youths who were less aware of places to provide contraceptives, the more they know about the conception, the more likely they prefer/intend to use condoms. This also turns out to be inconsistent with Hypothesis 7.

Figure 7: Interaction between conception knowledge and perceived contraceptive availability (as a composite measure)



To precisely indicate the cut-point of the significance, a contrast function was performed to examine individual regression slopes of conception knowledge on the conditional probabilities of condom preference/intention at the seven levels of perceived availability of contraceptives. Results in Table 44 show that only the slopes at level 0 and level 1 of the perceived availability were significantly different from zero. The values

were .35 (95% CI: .14, .57) and .25 (95% CI: .07, .42) respectively. This means that for those youth who were not aware of any place or aware of only one place to provide contraceptives, the more they know about conception, the more they prefer/intend to use condoms to prevent pregnancy. By contrast, there is no association between conception knowledge and condom preference/intention at higher levels of perceived contraceptive availability (2, 3, 4, 5, and 6).

Table 44: The significant cut-point for the interaction between conception knowledge and contraceptive availability in influencing condom preference/intention

Slopes for conception knowledge at different levels of contraceptive availability	Estimate (95% CI)	SE	P-value
Availability level 0	.35 (.14, .57)	.11	**
Availability level 1	.25 (.07, .42)	.09	**
Availability level 2	.14 (-.05, .33)	.10	
Availability level 3	.03 (-.21, .28)	.12	
Availability level 4	-.07 (.24, .65)	.16	
Availability level 5	-.18 (-.58, .22)	.21	
Availability level 6	-.29 (-.78, .21)	.25	

*Note: *p<.05; ** p< .01; *** p<.001; Estimated based on logistic regression*

Table 45 summarizes moderation effects of perceived accessibility and availability of contraceptives on relationships between each of the three types of knowledge on condom preference/intention.

Table 45: Moderation effects on the knowledge-outcome variable relationships

Moderators	Three types of knowledge		
	Conception knowledge	Contraceptive awareness	HIV/STIs knowledge
When contraceptive availability was treated as a dichotomous variable:			
<i>Hypothesis 7:</i>			
Perceived availability of contraceptives (dichotomous measure)	.04	-.39*	.06
<i>Hypothesis 8:</i>			
Perceived accessibility to contraceptives	.08	.04	-.05
When contraceptive availability was treated as a composite variable:			
<i>Hypothesis 7:</i>			
Perceived availability of contraceptives (composite measure)	-.11*	.08	.01
<i>Hypothesis 8:</i>			
Perceived accessibility to contraceptives	.14	.01	-.06

Note: * $p < .05$; ** $p < .01$; *** $p < .001$; Estimated based on logistics regression

CONCLUSIONS ABOUT RESEARCH QUESTION 3:

Conclusions on research question 3 were made based on results of testing hypotheses 7 and 8.

Hypothesis 7 states that: The relationship between youths' conception knowledge, contraceptive awareness, and HIV/STIs knowledge with their condom preference/intention are moderated by their perceived availability of contraceptives such that the relationship will be stronger for those who are aware of at least one place to get a contraceptive method than for those who are not aware of any place to get a contraceptive method.

The analysis showed only one interaction term (i.e., between contraceptive awareness and contraceptive availability) which indicates an opposite direction to what was hypothesized. Specifically, for those youth who were not aware of any contraceptive-supplying place, the more contraceptive methods they are aware of, the more likely they prefer/intend to use condoms.

However, due to a lack of credibility in the dichotomous measure for contraceptive availability, this variable was treated as a composite measure in an elaborate analysis. According to this strategy, only the interaction between conception knowledge and perceived contraceptive availability was found significant. Specifically, for those who were not aware of any place or aware of only one place to provide contraceptives, the more they know about conception, the more they prefer/intend to use condoms to prevent pregnancy. By contrast, there is no association between conception knowledge and condom preference/intention at higher levels of contraceptive availability (2, 3, 4, 5, and 6).

Provided that composite measures are often more reliable than dichotomous measures [70] and that there is the lack of credibility in measuring the dichotomous contraceptive availability, it is comfortable to follow the conclusions made based on the composite perceived contraceptive availability.

Hypothesis 8 states that: The relationships between youths' conception knowledge, contraceptive awareness, and HIV/STIs knowledge with their condom preference/intention are moderated by their perceived accessibility to contraceptives such that the relationship will be stronger for those who think it is easy to get a contraceptive method than for those who think it is difficult or impossible to get a contraceptive method. Statistics indicated that perceived accessibility to contraceptives is not a moderator for any relationship between three types of knowledge and condom preference/intention.

It should be noted that for either situation whether perceived contraceptive availability was treated as a dichotomous or composite measure, conception knowledge and contraceptive awareness were found significantly associated with the log odds of the outcome variable in the main effect model. By contrast, HIV/STIs knowledge was not significantly associated with condom use in the two situations. Nor was the latter found as significantly interacting with any of the two proposed moderator in influencing condom preference/intention.

CHAPTER 5

DISCUSSION

The dissertation study examined direct associations of various independent variables belonging to three major components of determinants: perceived accessibility to contraceptive and HIV information; exposure to contraceptive, HIV, and STIs information; and contraceptive, HIV, and STIs discussion with condom preference/intention. It also examined potential mediation effects from three types of knowledge: conception knowledge, contraceptive awareness, and HIV/STIs knowledge on relationships between each of the proposed independent variables and condom preference/intention. Finally, it explored moderation effects of perceived availability and accessibility to contraceptives on the relationship between the three types of knowledge as described and condom preference/intention.

This chapter discusses the main findings around direct determinants, mediators, and moderators in explaining condom preference/intention. This is followed by a discussion of limitations and strengths of the dissertation study, and implications for future research and practice in Vietnam's context.

Independent variables

Eight independent variables examined as potential determinants of condom preference/intention include perceived accessibility to contraceptive information; perceived accessibility to HIV information; exposure to contraceptive information; exposure to HIV information; exposure to STIs information; contraceptive discussion; HIV discussion; and STIs discussion. These variables formed three main determinant components: Component 1) accessibility to information; Component 2) exposure to information; and Component 3) discussion about contraceptives, HIV, and STIs with condom preference/intention. Analysis was performed taking into account various control variables (education level, gender, age, income, school attendance, and provinces).

Overall, all eight independent variables were found strongly associated with condom preference/intention in bivariate models and in models with one independent variable at a time adjusting for control variables. This finding suggests that when examined alone, each of the eight independent variables would be a strong determinant of condom preference/intention regardless of the presence of the control variables of interest.

However, when the independent variables in each component were analyzed in the same model (a combined fashion either with or without adjusting for control variables), some of the independent variables became non-significant. Specific non-significant determinants in combined fashions are exposure to HIV information and exposure to STIs information (in Component 2); and HIV discussion and STIs discussion (in Component 3). All other independent variables maintained strongly significant (at least with $p < .01$). One possible reason for the absence of significance is that there is a

shared variance among those variables which might cancel out each variable's unique contribution [70] in influencing the likelihood of condom preference/intention. This shared variance might have resulted from the possibility that youths seek different information from the same sources or discuss different subjects from the same people, and thus there is potential overlap of the information they obtain.

The shared variance pattern was repeated when attempts were made to examine all the eight independent variables both with and without adjusting for the control variables together. In the model without control variables, four independent variables maintained significant. They are perceived accessibility to contraceptive information, perceived accessibility to HIV information; exposure to contraceptive information, and contraceptive discussion. However, when adjusting for the control variables, only perceived accessibility to contraceptive information, perceived accessibility to HIV information and exposure to contraceptive information remained obviously significant. This suggests that these are the strongest determinants out of the eight independent variables proposed in research question 1.

Accessibility to contraceptive and HIV information

As hypothesized, the results suggest that those youths who perceive that it is easy to get information about contraceptives and HIV will be more likely to prefer/intend to use condoms than those who perceive it is difficult or impossible to get the information. While international research has not examined associations between perceived accessibility to contraceptive and HIV information with condom intention, this finding

indirectly supports a previous study in Vietnam which suggested that youths' unprotected sexual behaviors might be due to limited access to information [59].

Exposure to contraceptive, HIV, and STIs information

Consistent with hypothesis, all three types of exposure to information (contraceptive information, HIV information, and STIs information) were found to be significant determinants of condom preference/intention when they were examined in separate models (either with or without adjusting for control variables). Specifically, as the amount of exposure to information about contraceptive methods, HIV and STIs in the last 6 months increases, youths will be more likely to prefer/intend to use condoms. However, when they were examined together in the same model, only exposure to contraceptive information remained significant. Again, this can be explained by a high shared variance among these three determinants.

As exposure to information was measured as the total number of sources from which youths get information about contraceptives, HIV, and STIs, it can be seen as actual access to information about these topics. As such, this finding strengthens the suggestion from a study previously conducted in Vietnam regarding potential effects from sources to reproductive health information and unprotected sexual behaviors [59]. Despite the fact that the frequency in which youths access different sources might vary, this finding suggests that the collective effects from different sources are definitely important in raising the knowledge level (except for HIV information), which in turn promotes condom preference/intention. Therefore, interventions should address various

channels which are highly accessible to youths for the sake of increasing their knowledge and condom intention.

Contraceptive, HIV, and STIs discussion

Finally, all three types of discussion (contraceptive, HIV, and STIs discussion) were found to be significant determinants of condom preference/intention when they were examined in separate models (either with or without adjusting for control variables). Specifically, the more types of people with whom youths discuss contraceptive methods, HIV, and STIs, the more likely they will be to prefer/intend to use condoms.

However, when the three variables were treated together, only contraceptive discussion remained significant. Even when the three discussion variables were examined together with other independent variables adjusted for the control variables, none of them remained significant. As explained above, this absence of significance is due to a high shared variance among these three determinants. In the presence of such shared variance, it is impossible to rule out that there is no association between HIV and STIs discussion with condom preference/intention due to the fact that youths might seek and gain different types of information from the same sources.

While research has suggested that discussion with sex partners on pregnancy and HIV/STIs [39, 48] were associated with condom use, little has been known on whether this variable is also associated with intended condom use. The dissertation adds to this literature by suggesting that discussion about pregnancy and HIV/STIs is not a statistical determinant of intended condom use. However, there might be some overlap between categories for sources and categories for discussion, and thus rendering it impossible to

precisely rule out that there is no functional association between any type of discussion with condom preference/intention. For example, categories for sources include: radio, TV, newspaper/magazines, pamphlets/posters, community meetings, school, work place, and youth center. Categories for discussion include: health worker, peer educator, counselor, teacher, parent, siblings, husband/wife/partner, other relatives, and friends/colleagues. It is easy to notice that there is a room for confusion between school (as a source of information) and teachers and/or friends (as a discussion category). The same is the case between workplace as a source and friend/colleagues as a type of people for discussion and so on. For this confusion, youths might mistake between sources of information as types of people with whom they discuss the topics or vice versa, and thus, there is no clear-cut distinction between the two measures. Interventions therefore should address both sources of information and discussion in promoting condom use.

Furthermore, the current dissertation measured discussion as the total types of people with whom youth discusses contraceptives, HIV, and STI. Therefore, it provides an important comparative value relative to other research in Vietnam which shows that adolescents and youths prefer to talk with their friends/peers rather than with professionals [12, 58]. The finding from this dissertation does not deny such suggestions but emphasizes that even though friends might be the most frequented network for youths to talk about these topics, the collective effects from different types of people definitely affects their condom preference/intention. Interventions therefore need to address different types of people as communicators or educators of such information in promoting condom use among youths.

Control variables

In addition, education level, gender, and school attendance were found as significantly associated with condom preference/intention. Specifically, youths obtaining the high school level were more likely than obtaining the elementary school; male youths are more likely than female youths; and youths currently attending schools are less likely than out-of-school youths to report preferring/intending to use condoms to avoid pregnancy. Also, there are noticeable differences in likelihood of condom preference/intention across provinces such as province 2, 3, 4, and 8 versus province 11. However, income and ages were found as non-significantly associated with condom preference/intention.

Findings from control variables are worth some discussion for future research and interventions. Youths at high school level might be more knowledgeable in general, and on contraceptives, HIV, and STIs in particular, and thus are more likely to report than those at elementary school. If that assumption holds true, education level should affect condom preference/intention through contraception knowledge, contraceptive awareness, and HIV/STIs knowledge. Future research might look further on this hypothesis. The difference in likelihood of condom preference/intention between the two genders might be explained by a possibility that condoms in Vietnam are commonly known as a male-specific protective measure together with male sterilization. Thus when asked to select a method, males were more likely to select the method that best suits them. Furthermore, the fact that out-of-school youths are more likely to report condom preference/intention might be because this group of youths is more ready to have sex than those at schools and thus more aware of the need to use protective measures when they confront sex. At the

same time, eleven provinces were located in different ecological regions of Vietnam and thus experiencing different level of condom preference/intention.

In short, it can be concluded that all the eight independent variables were strong determinants of condom preference/intention either on their own or with control variables. The absence of significant associations between some of the independent variables (i.e. composite measures) in combined fashions might be due either to a strong shared variance or to strong mediation effects (i.e., for perceived accessibility to HIV information; exposure to STIs information). Given the potential overlap among measures, this absence of significance should not be interpreted as equivalent to the absence of association between those independent variables and condom preference/intention.

Without looking at the wording of the questions, shared variance and mediation effects, it is likely to make misleading conclusions. To this regard, it might be tempting to state that only accessibility to contraceptive information or exposure to information are strongly associated with condom preference/intention while the other independent variables (i.e., HIV or STI-related variables) are not. This conclusion might be acceptable in a sense that it is consistent with previous research which suggests that pregnancy-related knowledge might be more important than HIV/STIs knowledge in predicting condom intention [36, 54]. However, in the context of shared variance and mediation effects, there might have been more to explore before drawing such a conclusion.

Mediation effects

The dissertation study examined potential mediation effects of three types of knowledge: conception knowledge, contraceptive awareness, and HIV/STIs knowledge on relationships between each of the independent variables as discussed above with condom preference/intention in the presence of the control variables. This introduces an innovative perspective to look at the role of knowledge as mediators on relationships between such independent variables and intended condom use.

In fact, much research in the past has seen knowledge on pregnancy and HIV as a significant determinant with intention and actual use of condoms. However, such knowledge was often treated as independent from other independent variables that might be predeterminants of knowledge such as exposure to information or discussion. In one study, knowledge was suggested as a mediator between cognitive development with intended condom use [50]. This dissertation therefore examined knowledge in another mediation pathway within the same context of reproductive health.

In this dissertation study, all types of knowledge were found as significantly associated with condom preference/intention, but they should not be simply treated as significant determinants. Rather, they are actual mediators on the relationships between various independent variables and condom preference/intention. Overall, knowledge was found to mediate the relationships between most of the determinants forming perceived accessibility and exposure to information with condom preference/intention. Specifically, contraception knowledge and HIV/STIs knowledge mediate the relationship between perceived accessibility and condom preference/intention while all three types of knowledge were found to mediate the relationship between perceived accessibility to

HIV information. It is interesting to note that there is a cross effect on the relationships between perceived accessibility to contraceptive and HIV information with condom preference/intention through the three types of knowledge. While it is obvious that easy perceived accessibility to contraceptive information is associated with increased conception knowledge, it was also found to associate with increased HIV/STIs knowledge. Likewise, easy perceived accessibility to HIV information was found to associate with increased conception knowledge and contraceptive awareness. However, this pattern was not observed for the three independent variables in the exposure to information group. Specifically, the more exposure to contraceptive information leads to more conception knowledge and contraceptive awareness, and more exposure to STIs information leads to higher knowledge of HIV/STI, which in turn increases likelihood of condom preference/intention. This finding suggests that those youths who reported easy perceived access to both types of information might have the same motivation to seek information of both types, leading to the increase in knowledge in both areas. As for actual exposure to information, such motivation might be more randomly distributed among respondents and thus. Therefore, each type of exposure affects knowledge and then condom preference/intention in its own way.

Nevertheless, no mediation was found for the relationship between exposure to HIV information, contraceptive discussion, HIV discussion, and STIs discussion with condom preference/intention. In this regard, it is tempting to conclude that these four variables should be treated merely as determinants of condom preference/intention. While it was quite obvious that knowledge seems to be the endpoints from data to information, then to knowledge as discussed by Israel Spiegler [64], care must be taken in

examining this pattern in the context of condom use among unmarried youths in Vietnam. The reasons underlying this caution are related to the fact that exposure to HIV information, contraceptive discussion, HIV discussion, and STIs discussion were not found to associate with any type of knowledge in the way we expect to occur. Provided that all of these variables were found strongly associated with condom preference/intention when treated in separate models, they are by no means useless in condom promotion intervention. The absence of the mediation effects through these variables might be attributable to a possibility that the content and quality of the information conveyed through the discussions were not enough to affect knowledge about conception, contraceptives, and HIV/STIs. However, regardless of their quality, the discussions might have already sensitized youths to possibilities of getting STIs or pregnancy, and thus increasing the likelihood of condom preference/intention. Furthermore, the data for this dissertation were collected at the baseline of the program when no concrete intervention was implemented yet. Therefore, the contents of information from different types of communicators might not have been accurate or adequate, and thus having no effect on knowledge level. This relationship might change upon some time of implementation which provided accurate and adequate information through different communication channels and sources of information. As such, a step further for future research is to look at the content and quality of the communication with different communicators as well before effective interventions can be implemented. Also, this absence of association might be due to the shared variance between all discussion variables with exposure to contraceptive information. Therefore, future research should pay attention to developing measures that precisely capture the nature of each construct.

Moderation effects

Finally, the dissertation study examined the effect of perceived contraceptive availability and accessibility as potential moderators on the relationship between knowledge and condom preference/intention. As such, knowledge was once again treated as independent variable in such relationships to provide more insights on the contributions of knowledge in a condom intention study.

In this dissertation, it was found that while perceived accessibility to contraceptives did not play a moderation effect, there is a critical point for discussion of how perceived contraceptive availability might play as a moderator on relationships between different types of knowledge and condom preference/intention. Specifically, when perceived contraceptive availability was treated as dichotomous (aware and unaware of at least one place), it was found that there was a significant interaction between contraceptive awareness and perceived contraceptive availability. The interaction suggested that for those youth who were not aware of any contraceptive-supplying place, the more contraceptive methods they are aware of, the more likely they prefer/intend to use condoms. This direction of the moderation is opposite to the original hypothesis which proposed that the relationship between contraceptive awareness and condom preference/intention is stronger for those who are aware of at least one place. Alternatively, perceived contraceptive availability was treated as a composite measure in an elaborate analysis. This resulted in a significant interaction between conception knowledge and perceived contraceptive availability. This new interaction suggested that for those who were not aware of any place or aware of only one place to provide contraceptives, the more they know about conception, the more they prefer/intend to use

condoms to prevent pregnancy. By contrast, no association between conception knowledge and condom preference/intention was found for those youths who were aware of at least 2 places to provide a contraceptive. This moderation effect is also in opposite direction with the hypothesis which anticipated that the relationship is stronger in those who were aware of more places. Provided that composite measures often bring more reliability than do dichotomous measures [70] and that there might be lack of credibility in measuring dichotomous contraceptive availability due to a limited number of respondents and the post-data-collection coding for the unaware group as discussed in the result section, it is comfortable to follow the conclusions made based on the composite contraceptive availability.

The moderation opposite to the hypothesis as just discussed can be explained by a possibility that those youths who are unaware or aware of only one contraceptive-supplying place, conception knowledge alone is strong enough to motivate them to prefer/intend to use condom. However, in those youths who were aware of at least 2 such places, conception knowledge became no longer important relative to their perception of contraceptive availability in influencing their preference/intention to use condoms.

Additionally, the different findings revealed from the two different ways of treating perceived availability of contraceptives also raise an issue of quality of dichotomous measures in measuring perceived availability. While collapsing the variables into a dichotomous variable seems more convenient for analysis, it may risk blurring the truth that a composite measure might underlie.

Limitations and strengths

Limitations

First, the dissertation data do not include a number of variables that have been shown by previous research as determinants of condom intention and actual use such as self-efficacy, perceived benefits and barriers of condom use, perceived risk of getting HIV infection, pregnancy, and peer norms. The absence of such data makes it hard to compare findings of this analysis with those of studies conducted elsewhere in the world. Future research should therefore develop and incorporate more of these missing constructs into the research framework.

Second, the question asking about preference/intention to use contraceptives *“Which method do you think you or your partner/spouse would use if you needed to delay or avoid getting pregnant?”* is more directed at pregnancy prevention than addressing both pregnancy and HIV/STIs prevention. Therefore, respondents might respond to the question taking into account pregnancy-related contexts while underestimating or ignoring their opinion regarding HIV prevention. For this reason, future research should only ask their intention or actual use of condoms without specifying whether it is for pregnancy or HIV/STIs prevention.

The third pitfall generated from the outcome question is that it is not clear-cut regarding whether the question wants to measure contraceptive intention or preference. Therefore, the outcome variable “condom preference/intention” which was developed based on responses from youths to the above question is not satisfactorily specific to either preference or intention. Furthermore, the question asks youths to spontaneously

provide their opinion regarding preference/intention and their responses can be more than one contraceptive. This approach might be biased in that youths might immediately select the method(s) they know most of while ignoring or not paying enough attention to other methods. Besides, the wording of the question does not allow youths to consider thoroughly on different levels of intention to use each of the contraceptive methods, and thus might have missed a wide range of intention intensity between the two extremes “yes” or “no”. Moreover, even though a youth selects two methods (i.e., condom and pills), one cannot say which method he/she prefers to the other. Therefore, future research should separate out different contraceptives into separate questions and explicitly asks either for intention or for preference. A Likert scale can be used for each contraceptive method. For example, in stead of asking youths which methods they would use, researchers can ask them to select the number in the scale (i.e. from 1 to 7) that accurately indicates their intention to use condoms, oral pills, and IUDs in separate questions. This approach is more advantageous in that it allows for measuring each method separately from another, and also for examining multiple outcome variables in the same analytic models such as SEM [68, 69].

Another area of improvement is related to sex partners of the target group. Specifically, previous research suggested that factors influencing condom intention might vary according to different groups of their sex partners (i.e., sex workers, steady sex partners, unstable sex partners) [18, 51]. Therefore, the question measuring condom intention and use should specify the potential sex partners youths might have. This way will allow researchers to examine the different models to explain condom intention and use, and thus more beneficial for intervention and evaluation research.

Furthermore, the study design is a cross-sectional survey, and thus not ideal for examining mediation effects among the determinants. This is because this type of study design does not fully control for the temporality of the relationships. Therefore, the observed relationships between some of the independent variables and the three types of knowledge can be interpreted in either way. For example, the dissertation findings suggested that the more sources from which youths receive information about contraceptives, the more knowledge about conception they gain, and thus they will be more likely to prefer/intend to use condoms. However, it might also be true that the more knowledgeable they are, the more they try to seek information about the topics from different or more sources of information. This explanation might also be true for the relationships between different types of discussion, knowledge, and condom preference/intention.

Another limitation is that the 11 provinces and communes/wards were purposively selected; therefore the selected sample might not be representative of the young population in the country. Because of this, interpretation of the findings might only be generalized to the population of the selected provinces, but not to the entire country.

Strengths

Despite the above limitations, the current data exhibit some strengths. This is the first study to examine the of determinants of “preference/intention” to use condoms among Vietnamese unmarried young people. Therefore, it provides program developers and managers with an objective understanding about this aspect in developing and

evaluating programs promoting condom use by this target group in Vietnam. Second, the study offers a chance to examine the relationship between perceived and actual access (exposure) to contraceptive, HIV, and STIs information with condom preference/intention, which has never been discussed in the literature. Moreover, it allows for further exploring the association between discussion with others about contraceptives, HIV, and STIs which has inadequately been addressed in the past. In Vietnam's contexts, the composite measures of exposure and discussion variables opened a new perspective on collective benefits of information exposure and discussion on condom intention.

Last but not least, while offering a holistic approach to examine determinants of condom preference/intention through the perspective of the social ecological framework, the data allow for testing moderation and mediation effects between different components of the framework. Specifically, the study tested the moderation effect of perceived availability and accessibility to contraceptives on the relationship between knowledge and condom preference/intention. While perceived accessibility was found to be solely a direct determinant, perceived contraceptive availability interacts with conception knowledge in informing condom preference/intention. This is innovative to literature on condom intention determinants.

In addition, the dissertation study examined potential mediation effects of conception knowledge, contraceptive awareness, and HIV/STIs knowledge on the relationships between various independent variables (perceived accessibility to contraceptive and HIV information; exposure to contraceptive, HIV, and STIs information; and contraceptive, HIV, and STIs discussion) with condom

preference/intention. This mediation analysis provided a new way to look at potential underlying causal relationships among condom intention determinants.

The last merit of the study lies in sample size which is over 1000 respondents. This number is large enough for all the tests conducted in the analysis.

Implications for research

First, the dissertation provides a framework for evaluating interventions targeting condom intention and condom use. In the context of the RHIYA program, the findings suggest that evaluation needs to pay close attention to the mediation and moderation relationships among determinants of condom intention. For example, just looking at the point estimates to determine whether perceived accessibility to information and exposure to information as potential direct determinants of condom preference/intention would risk excluding the possibility that these variables are actual determinants if the point estimates are found non-significant due to the mediation through conception knowledge, conception, contraceptive awareness, and HIV/STIs knowledge. This care should also be paid to interpretation of effects from other variables (exposure to information and discussion).

Besides, the mediation analysis allows for evaluating short-term changes such as knowledge before it actually increases the likelihood of condom intention. Therefore, in evaluation, looking at knowledge change could inform the condom preference/intention. For example, at some point in time following the interventions, researchers evaluate the program and find that conception knowledge, contraceptive awareness, and HIV/STIs knowledge is increased relative to the baseline, however, condom intention might not be

increased. They then have a reason to believe that this is a matter of time before condom intention is increased.

The fact that the three types of discussion addressed in this dissertation data were found as not significantly associated with conception knowledge, contraceptive awareness, and HIV/STIs knowledge in a proposed mediation pathway to condom preference/intention suggests that the way the discussion dimensions were measured might not capture the quality of the discussion. Future researchers should therefore develop appropriate measures to accurately measure discussion dimensions.

At the same time, the present analysis has raised the issue of shared variance among determinants due to the fact that youths might get different information from the same sources or people, and due to the potential overlap in measurements of both information sources and discussion. Without taking into account the shared variance among the composite variables, the dissertation study might have concluded that some of the composite variables (HIV and STIs discussion) do not contribute to condom preference/intention at all while they functionally do.

As all of the proposed composite independent variables were correlated, it is advised to develop a pool of items that appear to belong to each of these variables in the same format such as Likert scales. Factor analysis will then be performed to verify latent variables that precisely reflect those variables. This way will help avoid the shared variance issue in interpreting research results.

In addition, as the dissertation data did not include a number of variables that have been shown by previous research as determinants of condom intention and actual use such as self-efficacy, perceived benefits and barriers of condom use, perceived risk of

getting HIV infection, pregnancy, and peer norms, future research should incorporate these constructs into research frame as well. Moreover, more attention should be paid to measuring the outcome variable (condom intention) taking into account different sexual partners of the target group and clear wording for condom use in prevention of both pregnancy and HIV.

Last but not least, future research or evaluation should also pay attention to the roles of education, gender, school attendance, and differences across provinces. These variables need to be taken into account in interpretation of the changes following interventions.

Implications for practice

Although only perceived accessibility to contraceptive information, perceived accessibility to HIV information, and exposure to contraceptive information were found as significant determinants of condom preference/intention, interventions should address all of the suggested independent variables due to potential functional association among them. These independent variables include perceived accessibility to contraceptive and HIV information; exposure to contraceptive, HIV, and STIs information; contraceptive, HIV, and STIs discussion.

Furthermore, due to the collective effects of multiple sources of information, interventions should address multiple channels to disseminate and make highly accessible and available the amount of the information about conception, contraceptives, HIV, and STIs. As such, all of the categories listed in the questionnaire regarding sources of information (radio, TV, newspaper/magazines, pamphlets/posters, community meetings, school, work place, youth center) are all good examples of information channels of which

the youth centers under the RHYIA program is one. Given that, not all youths might go to the youth centers, conveying information through different sources is more likely to generate collective effects on condom intention/use. In this regard, places youths frequent such as school billboards, clubs, library and classrooms might be appropriate to post appropriate information about these topics.

Furthermore, various types of people with whom youths could discuss contraceptives, HIV, and STIs also produce collective effects on their likelihood of condom preference/intention. However, as noted in the section of research implication, the lack of discussion quality might be a reason for the absence of association between discussion and different types of knowledge. Therefore, interventions should pay close attention to ensure effective discussions through training of core communicators such as peers, teachers, health-care providers and parents. Given that youths in many countries including Vietnam [12, 13, 58] prefer to talk with friends over other sources, interventions targeting peers/friends at schools and communities might work effectively in general. Addressing other networks of communication would add up the effects on what peer networks can do to promote safe sex.

Making condoms highly available is also crucial in promoting condom intention and use. However, in those places where condoms or other contraceptives are provided, there should be an effective communication system to ensure youths get accurate information regarding condom use. The idea of the youth center in the RHYIA program fit well with this aspect.

APPENDICES

Appendix 1: Variables and measurements

Variables	Items	Measures/Level of measurement	Notes	
INDEPENDENT VARIABLES				
Perceived accessibility to information				
<u>1-Perceived accessibility to contraceptive information</u>				
Do you think it is easy, difficult or impossible for someone of your age to get information on methods to delay or avoid getting pregnant?	Q211	<i>Dichotomous:</i> Easy and otherwise (difficult, impossible, don't know)		
<u>2-Perceived accessibility to HIV information</u>				
In general, do you think it is easy, difficult, or impossible for someone of your age to get information on HIV/AIDS?	Q509	<i>Dichotomous:</i> Easy and otherwise (difficult, impossible, don't know)		
Exposure to information				
<u>1-Exposure to contraceptive information</u>				
In the last 6 months, have you received any information on methods to delay or avoid getting pregnant from the following sources or at the following places?	Q208	<i>Composite:</i> The total number of sources a youth mentioned from which he/she got information about contraceptives in the last 6 months. The score ranges from 0-8	Information sources: 1-Radio 2-TV 3-Newspaper/magazines 4-Pamphlets/posters 5-Community meetings 6-School 7-Work place 8-Youth center	
<u>2- Exposure to HIV information</u>				
In the last 6 months, have you received any information on HIV/AIDS from the following sources or at the following places?	Q506	<i>Composite:</i> The total number of sources a youth mentioned from which he/she got information about HIV/AIDS in the last 6 months. The score ranges from 0-8		
<u>3- Exposure to STIs information</u>				
522-In the last 6 months, have you received any information on sexually transmitted infections from the following sources or at the following places?	Q522	<i>Composite:</i> The total number of sources a youth mentioned from which he/she got information about STIs in the last 6 months. The score ranges from 0-8.		
Communication with others				
<u>1- Contraceptive discussion</u>				
In the last 6 months, have you discussed methods to delay or avoid getting pregnant with the following persons?	Q209	<i>Composite:</i> The number of types of people with whom a youth discussed a contraceptive in the last 6 months. The score ranges from 0-9.	People with whom youths discuss: 1-Health worker 2-Peer educator 3-Counselor 4-Teacher 5-Parent 6-Siblings 7-Husband/wife/partner 8-Other relatives 9-Friends/colleagues	
<u>2- HIV discussion</u>				
In the last 6 months, have you discussed about sexually transmitted infections with the following persons?		<i>Composite:</i> The number of types of people with whom a youth discussed HIV/AIDS in the last 6 months. The score ranges from 0-9.		
<u>3- STIs discussion</u>				
	Q523	<i>Composite:</i> The number of types of		

Variables	Items	Measures/Level of measurement	Notes
In the last 6 months, have you discussed about sexually transmitted infections with the following persons?		people with whom a youth discussed STIs in the last 6 months. The score ranges from 0-9.	
MEDIATORS			
Knowledge on reproduction			
<u>1-Conception knowledge</u>		Composite: The following variables were incorporated into a composite score to measure conception knowledge.	
Can a woman get pregnant the first time she has sexual intercourse?	Q201	Dichotomous: Whether a youth correctly says “Yes”.	
Can a girl get pregnant before she experiences her first menstrual period?	Q202	Dichotomous: Whether a youth correctly says “No”.	
From one menstrual period to the next, is there a time when a woman is more likely to become pregnant if she has sexual relations?	Q203	Dichotomous: Whether a youth correctly says “Yes”.	Sum up from Q201-Q204, ranging from 0-4
Is this time just before her period begins, during her period, right after her period has ended, or half way between two periods?	Q204	Dichotomous: Whether a youth correctly specifies “Halfway”	
<u>2- Contraceptive awareness</u>		Composite: The total number of modern contraceptives that a youth spontaneously mentioned. The score ranges from 0-5.	Modern contraceptives: 1-Pill 2-Condoms 3-Injection 4-Implants 5-IUD.
Which method(s) that a woman or a man can use to delay or avoid getting pregnant have you heard of?	Q206		
HIV/STIs Knowledge		Composite: The four following dimensions were incorporated into a composite score to measure knowledge on HIV/STDs. The score ranges from 0-26.	
<u>1-Susceptibility of STIs</u>		Dichotomous: Whether a youth correctly specifies “Yes”	
Do you think it is possible to contract an infection/disease through sexual contact?	Q501		
<u>2- Awareness of HIV/STIs</u>		Composite: The total number of STIs (including HIV) that a youth mentions (<i>without guidance from interviewers</i>). The score ranges from 0-9.	HIV/STIs: 1-HIV/AIDS, 2-Chlamydia, 3-Gonorrhoea, 4-Syphilis 5-Chancroid, 6-Genital Herpes, 7-Genital warts, 8-Trichomoniasis, 9-Hepatitis B
Which infections or diseases that a person can contract through sexual contact have you heard of?	Q502		
<u>3-Knowledge on HIV transmission modes</u>		Composite: The total number of ways a youth correctly and spontaneously mentioned that one can get infected or reduce chance of getting infected a youth. The score ranges from 0-8.	Correct responses for items from 512-518: 511-yes 512-no 513-yes 514-no 515-yes
Can people reduce their chance of getting AIDS by having just one sex partner who is not infected and who has no other partners?	Q511-518		
512- Can people get the HIV/AIDS virus from			

Variables	Items	Measures/Level of measurement	Notes	
mosquito bites?			516-no 517-yes 518-yes	
513- Can people reduce their chances of getting the HIV/AIDS virus by using a condom every time they have sex?				
514- Can people get the HIV/AIDS virus by sharing food with a person who has AIDS?				
515- Can people reduce their chance of getting the HIV/AIDS virus by not having sex at all?				
516- Can people get the HIV/AIDS virus because of witchcraft or other supernatural means?				
517- Is it possible for a healthy-looking person to have the HIV/AIDS virus?				
518- Can the HIV/AIDS virus be transmitted from a mother to a child?				
<i>4-Knowledge on STIs prevention modes</i>				
525-What a person can do to avoid getting sexually transmitted infections?			Corrects responses to items (1-9):	
1-Abstain from sex			1-correct	
2-Use condoms			2-correct	
3-Limit sex to 1 4-partner/stay faithful to 1 partner			3-correct	
4-Limit # of sex partner	Q525	Composite: The total number of ways a youth correctly mentions that one can use to avoid getting sexually transmitted infections. The score ranges from 0-9.	4-correct	
5-Avoid sex with prostitutes			5-correct	
6-Avoid sex with persons who have many partners			6-correct	
7-Avoid sex with homosexuals			7-correct	
8-Avoid kissing			8-wrong	
9-Seek protection from traditional healer			9-wrong	
MODERATORS				
<u>Perceived availability of contraceptives (Dichotomous)</u>				Contraceptive supplying places:
Where could you or your partner/wife go to get a method?	Q303		Dichotomous: “Aware” for those who state any of the enlisted places where they or their partner/spouse can get a contraceptive; “Unaware” for those who do not mention any of the enlisted places”.	1-Hospital/clinic 2-Health center 3-Family planning association 4-pharmacy 5-Shop/market 6-Friend
<u>Perceived accessibility of contraceptives</u>				
Overall, if you or your partner/wife needed to use a method to delay or avoid getting pregnant, do you think it would be easy, difficult or impossible for you to <u>get and use</u> such a method?	Q306	Composite: The total number of places of the enlisted places youths stated where they or their partner/spouse can get a contraceptive. The score ranges from 0-6		
		Dichotomous: “Easy” for those who state that it is easy to get and use the method, “Otherwise” for those who state it is difficult, impossible, or don’t know.		
OUTCOME VARIABLES				
<i>Condom preference/intention</i>	Q3042	Dichotomous: Indicates whether a	See details in the variable and	

Variables	Items	Measures/Level of measurement	Notes
		youth/partner intends to use condom	measurement section
CONTROL VARIABLES			
1. Gender	N/A	<i>Dichotomous:</i> Whether a youth is male or female	
2. Education	108	<i>Categorical:</i> Indicates three levels of education youths obtain as the highest attainment: elementary, secondary, and high school levels.	
3. School attendance	106	<i>Dichotomous:</i> Whether a youth is currently attending school	
4. Family income	115	<i>Composite:</i> The total number of domestic appliances a youth mentions his/her household has, ranging from 0-8.	Domestic appliances: 1-Electricity 2-Radio 3-Television 4-Bicycle 5-Motorcycle 6-Car/truck/van 7-Telephone 8-Refrigerator
5. Age	103	<i>Composite:</i> Ranging from 15-24	

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