Risk Perceptions, Cognitive Behavioral Models and HIV-related Risk Behaviors among Non-institutionalized Male Injecting Drug Users in China

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Abstract (English)

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Introduction

Risk perception, a core element of key health behavioral theories and health interventions, is assumed to motivate people to avoid risk behaviors. Mixed findings however prevail in the literature due to methodological issues. Many of such studies are cross-sectional, using global risk perception measures that do not condition on type of risk behavior or partnership which may affect the level of risk.

Male injecting drug users (IDU) are driving the HIV epidemic in China and bridge HIV transmission to non-IDU female populations; they may be at risk of both unprotected sex and syringe sharing. HIV prevention targeting male IDU is greatly warranted and would benefit from understanding of the relationships between risk perceptions and behaviors, in the context of health behavioral theories such as the Health Action Process Approach (HAPA) model, which had not been applied to studies targeting IDU.

Objectives

This study refined the concepts and measures of HIV-related risk perception, conditioning on different types of behaviors and partners, and extended it to include others-directed risk perceptions. The relationship between such conditional risk

perception measures and both prior risk behaviors and behavioral intention to avoid sex-related and drug-related risk behaviors in the future were investigated and were compared to those involving global unconditional risk perception measures. The nature of the aforementioned relationships, being motivational or reflective was investigated. A longitudinal component validated the predictive power of behavioral intention over actual future behaviors.

Subjects and methods

A total of 456 sexually active male IDU were recruited from Dazhou, Sichuan and Hengyang, Hunan, via snowball sampling. With informed consent, anonymous face-to-face interviews were conducted by trained and experienced staff of the local CDC in privacy settings.

Results

Almost 90% of the respondents had had unprotected sex though <20% shared syringes with others in the last 6 months. Prior syringe sharing but not unprotected sex in the last 6 months was significantly associated with global unconditional risk perception measures. The picture is totally different when risk perception measures conditioned on type of sex partner and unprotected sex or syringe sharing were used instead of the global measures - higher levels of the conditional risk perception measures were significantly associated with higher levels of behavioral intention for consistent condom use and avoidance of syringe sharing, thus supporting the motivational hypothesis. Conditional others-directed risk perceptions (perceived risk of transmitting HIV to others via unprotected sex and syringe sharing) were also associated with the aforementioned behavioral intentions to avoid risk behaviors. A

pilot longitudinal study showed that behavioral intentions strongly predict actual future behaviors. Other HAPA-based variables such as self-efficacy and outcome expectancies had predictive effects on behavioral intentions, independent from those of risk perceptions.

Conclusion

The significance of risk perception in predicting behavioral intention, hence actual future behaviors, is therefore evident. Conditional measures need to be used. HIV prevention can employ conditional risk perception approaches. Health behavioral theories can be strengthened by using such conditional measures on risk perceptions. The results add to this new and growing area of risk behavior research.

Abstract (Chinese)

論文摘要（中文）

中國社區男性靜脈注射吸毒者之風險認知、行爲認知理論模型
及愛滋病相關高危行爲研究

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介紹

　　風險認知是健康行為理論及健康干預中的重點概念。很多研究者假設提高風險認知，能減少高危行爲。風險認知與高危行為的關係時常產生矛盾的研究結果。這類研究大部分是透過橫斷面調查，及應用一般性的風險認知的評估方法進行的。中國男性靜脈注射吸毒者（IDU）是感染愛滋病的主要人群。他們時常面對因高危性行為及共用針具而感染愛滋病的風險。

目的

　　此項研究細化了與愛滋病有關的風險認知的概念及量度方法。這些方法考慮了不同種類的高危行為及參與行為的夥伴間的互相影響，包括對將疾病傳播給其他人的風險認知。此項研究比較了經改良的方法及一般性的風險認知量度方法，並希望澄清風險認知與高危行為之間的關係－究竟是前者影響後者，抑或後者影響前者？

對象和方法

　　此項研究從四川省達州市及湖南省衡陽市透過滾雪球的方法，招募了456

名性活躍的男性 IDU。在取得受訪者知情同意後，由當地的疾病預防控制中心
（CDC）的工作人員進行面對面的問卷調查。

結果

有 90%的受訪者曾在過去的 6 個月內進行不安全性行為, 有少於 20%的受訪者曾在過去六個月內與他人共用針具。一般性的風險認知與過去 6 個月的針具共用行為有顯著的相關性。但與過去 6 個月的不安全性行為卻沒有顯著的相關性。在應用改良了的量度方法之後，高程度的風險認知與在將來每次性交都用安全套的意圖，及在將來避免共用針具的意圖，都有顯著的相關性。受訪者對將愛滋病傳播及其他人的風險認知，亦與以上的各種未來行為的意圖有顯著的相關性。縱向調查的結果亦表明未來行為的意圖能預測未來行為。除了認知之外， HAPA 模型中其他的變量亦對未來行為意圖有獨立的預測能力。

結論

此項研究證明了風險認知對預測未來意圖的重要性，亦證明了未來行為意圖能預測在未來發生的行為。在預防愛滋病的活動之中，應用這些改良了的風險認知的概念，會有一定的幫助。研究結果亦加強了對健康行為理論的了解。

Acknolwedgements

First and foremost, I would like to send my deepest gratitude to my supervisor, Professor Joseph Tak Fai Lau for his continuous guidance, intellectual stimulation, and endless support. I learned a great deal from him throughout all these years. This dissertation would not have been completed without his help and support.

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I am indebted to the Center for Disease Control and Prevention of the two study sites in Dazhou, Sichuan and Hengyang, Hunan that helped in the data collection. Thanks are extened to all respondents of the study.

Lastly but not the least, I would like to send my heartful thanks to all my family members, friends, and colleagues for their support.

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CHAPTER 1 Introduction

1.1. Background and rationale of the study

1.1.1. Injecting drug users (IDU) as a driving force of the HIV epidemic in China

The population size of male IDU in China is huge. IDU have the unique characteristics that their risk of HIV acquisition and transmission can occur through both injecting and sexual risk behaviors. By the end of 2008, there were at least 1 million registered male drug users in the country [1]. Until recently, sexual risks of male IDU have been under-emphasized [2,3]. Male injecting drug users (IDU) play a key role in the spread of HIV in mainland China e.g.,[4,5]. They form a 'bridge' for transmission of HIV between populations, from high-risk male IDU to their low-risk general female sex partners.

The recent nationwide scaling up of harm reduction programs such as methadone maintenance treatment [6] primarily aiming at changing risky injection practices. Theory-based HIV behavioral interventions targeting IDU are very limited in China [7]. To curb the HIV epidemic in China, understanding of factors that influence both sexual and injecting risk behaviors of male IDU is warranted. The use of a theoretical framework to guide the investigation can facilitate intervention development.

1.1.2. Risk perception as an important guiding concept of HIV prevention

HIV-related risk perception is often measured in terms of one's perceived likelihood of contracting HIV. It is a core element in prevailing health behavior theories [8], such as the Health Action Process Approach (HAPA) [9, 10], and the Health Belief Model [11, 12]. It is hence a key guiding concept for understanding HIV-related behaviors and developing HIV research and interventions. An increased level of risk perception for HIV infection is believed to prompt an individual to take precautionary measures and/or to refrain from risk behaviors. Hence, raising awareness or modifying the individuals' risk perception has been a common strategy in many intervention efforts [13, 14]. In the HIV literature, risk perception has hence remained one of the most popular research topics since the virus first became known two decades ago [15-23].

1.1.3. Issues on risk perception research

Despite the significance of the risk perception concept, empirical findings investigating associations between risk perception and risk behaviors have been mixed and inconclusive. Some studies found a positive association between HIV-related perceived HIV risk and adoption of preventive behaviors. This is in line with what has been suggested by most health behavior theories. Negative and null associations were however, reported in other studies [24-27]. Further investigation of the usefulness of HIV risk perception in promoting HIV preventive behaviors is therefore still warranted and had been investigated in this study.

Some reviews have offered plausible explanations for the lack of consistent supportive evidence between HIV-related risk perception and preventive or risk

behaviors[24-26, 28]. First, many previous studies failed to differentiate between risk perception as an outcome and as a predictor of preventive or risk behaviors [24, 28]. Many researchers treated current risk perception as a predictor of prior behaviors, behaviors that were practiced in the past, while they interpret the meaning of the correlations between risk perception and preventive or risk behaviors. Such correlations are often obtained from cross-sectional studies. The conceptualization and study design may introduce temporal bias and hence some logical flaws. It is possible that risk behaviors affect risk perception, rather than the reverse is happening. Second, risk perception is often conceptualized and measured as a global construct [26]. There is no consensus on how to assess risk perception. A very commonly used global measure asks individuals "What do you think is your chance of getting infected with HIV?" [24, 25]. This global risk perception measures fails to solicit the perception of HIV-related risk resulted from particular types of risk behavior explicitly (e.g. risk of HIV transmission via unprotected sex or via syringe sharing). It is argued that the use of conditional measures (e.g. perceived risk of contracting HIV if unprotected sex were practiced or if syringe sharing takes place) would be more appropriate when investigating whether heightened risk perception motivates preventive behaviors [29]. Third, the commonly used global measures do not take into account the type of partnership involved in the risk behaviors. For instance, perceived risk for HIV transmission via unprotected sex with regular partners (RP) might be lower than that via unprotected sex with non-regular sex partners (NRP) or female sex workers (FSW). Existing risk perception measures hence often overlook the characteristics of the source of HIV-related risk [30].

There is a dearth of systematic investigations on these conceptual and methodological issues concerning HIV-related risk perceptions. Only a handful of studies made an explicit attempt to tackle these issues and such studies were

conducted among heterosexual visitors of STD clinics [29], college students [30], and adolescents [27]. Very few studies on injecting drug users (IDU) used risk perception measures which were conditional on specific types of behaviors and/or specific type of partnership. No studies have applied global and conditional measures of risk perceptions to the same sample of IDU respondents and compare their relationships with HIV-related and preventive behaviors. This study fills in this important information gap.

1.1.4. Novel research questions

Another novel research question of this study is to look at risk perception from another angle. Most of the studies look at risk perception from the angle of self-protection – one's risk of contracting HIV (self-directed risk perception). Altruism may also be a factor and risk perception can be understood from the angle of preventing others to be infected with HIV via one's behavior. The risk perception for the chance of transmitting HIV to others (others-directed risk perceptions) may also be important in determining adoption of preventive or risk behaviors. There are only a few studies on others-directed risk perception. All of them were limited to studying HIV positive individuals, but not high risk groups that are not HIV positive (e.g. IDU). The relationship between others-directed risk perception and HIV-related behaviors has tremendous implications on HIV prevention. This study investigated the associations between conditional self-directed as well as others-directed risk perceptions and HIV-related behaviors, hence contributing to this new area of research.

No single factor alone can explain everything. Ascertaining the relationship between HIV-related risk perceptions and behaviors in isolation is of limited

practical use. It is necessary to know whether and how risk perception affects behavior in the context of other factors. In this study, a theoretical framework, the relatively new Health Action Process Approach (HAPA) model was used to link the perception-behavior relationship with other social cognitive variables. HAPA is an ideal choice for the purpose as both risk perceptions and behavioral intentions are key constructs of the model. According to the HAPA, risk perception, self efficacy, and outcome expectancies determine the formation of behavioral intention, which in turn, lead to the actual enacting of a given behavior. HAPA has received a growing interest in research and interventions, but very few studies have applied it to investigating HIV-related behaviors among Chinese at risk populations. To the best of our knowledge, no such study has been done among Chinese male IDU.

1.1.5. Importance of health behavioral models in HIV prevention

As discussed, male IDU is a driving force of the HIV epidemic in China and serves as a bridge population for transmitting HIV form one population to another as members of this population may face dual sources of risk. It is hence important to understand the role of risk perception (both self-directed and others-directed) in influencing the two types of risk behaviors involved – unprotected sex and syringe sharing. Such information has direct implications on the formulation of effective HIV prevention programs targeting this important study population.

Risk perception, being a key conception in health research and interventions, has been widely used but seldom studied in depth. Both conceptual and measurement issues are involved. This is one of the few studies addressing these issues. As this study population has different types of risk behaviors and types of sex partner, it is an ideal case to develop refined conditional risk perception measures and test their

association with behavioral intention. The results of these analyses add to the knowledge about risk perception in the international research community and fills up some important knowledge gaps.

The application of HAPA to investigate HIV-related behaviors is also a new attempt and can provide insights to both model builders and HIV workers. Many studies are cross-sectional in nature and measured prior risk behaviors retrospectively. Our study established the relationship between behavioral intention and actual behaviors to be adopted in the future, supporting the use of behavioral intention as a proxy of future behaviors in HIV-related research.

Though this is a HIV study, risk perceptions, behavioral intentions and the HAPA are used in many fields of health behavioral research. The insights gained by this study may also be applicable to other fields of study.

1.2. Goals and aims of the Study

The ultimate goal of this study is to contribute to the preventing the spread of HIV by developing more effective and targeted interventions. The first specific aim of this study is to refine the concepts and measurement of risk perception on contracting HIV in explaining two types of HIV-related risk/preventive behaviors among male IDU in China (i.e. whether using condoms during sex with different types of sex partners and whether share syringes with others for injecting drug use). The motivational hypothesis, which states that a higher level of risk perception would enhance the motivation to adopt preventive behaviors and to avoid risk behaviors, was tested in this study. An alternative hypothesis is known as the accuracy hypothesis, which states that risk perceptions are reflective of the behaviors

practiced in the past. In this study, it is argued that unconditional global risk perception measures (i.e. overall measures that have not take into account of the type of risk behaviors and the type of sex partners) are difficult to interpret and in fact, potentially misleading. Refined risk perception measures that are conditional on types of HIV-related risk behavior and partnership were developed in this study.

Second, the relationships between these refined conditional risk perception measures, as well as the simple unconditional global risk perception measure which has been commonly used in the literature were investigated in this study. Comparisons of the directions of associations between these conditional/unconditional measures and HIV-related behaviors (condom use and syringe sharing) among male IDU in China were performed in this study.

Third, an extension was made to develop the concept of others-directed risk perception. Its predictive power for HIV-related behaviors was also assessed.

Fourth, to enhance our understanding on the role of risk perception on determining preventive or risk behaviors, the construct of risk perception was embedded into a newly health behavioral theory (HAPA). Hypotheses on whether the conditional risk perceptions developed in this study would have predictive utility on HIV-related behaviors that is independent from those of other variables derived from constructs of the HAPA were tested.

Finally, the problem that many studies used current risk perception to 'predict' prior preventive or risk behaviors which occurred in the past was addressed in this study, by using behavioral intention as the outcome variable. In this study, a pilot attempt was made to look at the longitudinal relationship between behavioral

intention and actual behaviors taking place in the future. The hypothesis that risk perceptions affect future behaviors via behavioral intention (mediator) was also tested.

1.3. Implications and significance of the study

To our best knowledge, no single study has explicitly investigated these conceptual and measurement issues of risk perception regarding these two types of risk behaviors among male IDU. Neither had the HAPA been applied to investigate risk behaviors among male IDU. Our study will hence refine these concepts and theories, and put them to empirical testing among male IDU in China.

Many male IDU are sexually active and are potential bridges for cross-population transmission of HIV. Sexual behaviors among these male IDU were under-researched. Evidence-based HIV prevention strategies are hence highly warranted. This study hence investigated an important research question – whether increase in self-directed (chance of contracting HIV from others) and others-directed (chance of transmitting HIV to others) would result in behavioral intention to adopt preventive behaviors and to avoid risk behaviors. Affirmative results will guide future HIV prevention activities, ensuring that such activities should change risk perceptions. Factors in association with risk perceptions were also relevant and were investigated in this study. The role of other variables basing on the HAPA, such as self-efficacy and outcome expectancies on condom use and syringe sharing behaviors were also investigated. Such variables can also be translated into intervention strategies for HIV prevention.

One single study cannot tackle all issues related to the complexity of this construct. The present study aims to make one of few attempts to disentangle the construct, add to the current knowledge about its construct, and contribute to its future use and 'place' in health behavior theories or intervention developed based on these theories. This study attempted to address the issue from both measurement and conceptual aspects.

1.4. Organization of the thesis

Chapter 1 of this thesis serves as an introduction. Chapter 2 presents the background information and literature review about the study. The methodologies of the study are discussed in Chapter 3. In Chapter 4, the profiles of the respondents of this study are described and comparisons are made between those male IDU who are sexually active or inactive. The relationships between background characteristics and the HIV-related behaviors (condom use and syringe sharing) taking place in the last 6 months (prior behaviors) and between such background variables and behavioral intentions for consistent condom use and avoidance of syringe sharing in the coming 6 months are investigated in Chapter 5.

The second part of the thesis focuses on risk perception. In Chapter 6, the conceptual and measurement issues on the relationships between risk perceptions and relevant preventive or risk behaviors are discussed in detail. Different types of risk perception measures were developed, including those which are unconditional and global and those which are conditional on particular types of risk behaviors and partnership. The key independent variables used in this Chapter included both

conditional and conditional risk perceptions that are related to condom use and syringe sharing. The dependent variables include both prior behaviors that occurred in the last 6 months and behavioral intention for practicing the relevant behaviors in the future 6 months. Comparisons of the associations using different types of risk perception measures and dependent variables were made, to test the appropriateness of the aforementioned motivational hypothesis and the accuracy hypothesis.

In Chapter 7, an exploratory analysis was performed on the association between conditional others-directed risk perception variables and behavioral intentions for consistent condom use and avoidance of syringe sharing. In Chapter 8, conditional risk perceptions and behavioral intentions for consistent condom use and avoidance of syringe sharing are used as part of the HAPA model. Other constructs of the HAPA model which are determinants of behavioral intention, namely positive and negative outcome expectancies and self-efficacy, were added to the analysis to inspect whether the conditional risk perception variables remains significantly associated with the behavioral intention variables in the presence of other HAPA-related variables.

In Chapter 9, the results of a pilot longitudinal study capturing actual condom use and syringe sharing behaviors were presented. The associations between risk perception, behavioral intention and other HAPA models for prediction of actual HIV-related behaviors were tested.

In the final Chapter (Chapter 10), discussions about the limitation, interpretation and significance of the results were made.

CHAPTER 2 General Background of the Study

2.1. Updating the HIV epidemic

2.1.1. The global HIV epidemic

By the end of year 2008, it was estimated that 33.4 million people worldwide were living with HIV, according to the 2009 AIDS Epidemic Update [31]. The total number of new HIV infections in 2008 was 2.7 million. Wide variations in epidemic trends between different countries have been observed, though the global HIV prevalence seems to be stabilizing since 2000 [31]. Thus far, sub-Saharan Africa remains the most badly hit region, accounting for a share of 67% of all HIV infections. However, an alarming growth in the number of HIV infections was observed in some populous countries in other regions of the world, such as Indonesia, Vietnam, and the Russian Federation. A steady rise in HIV cases also has been observed in mainland China and Bangladesh [32]. Overall in Asia, there was an estimated 4.7 million people living with HIV in 2008 and the number of new HIV infections in the same year was 0.35 million [31].

2.1.2. The HIV epidemic in mainland China

2.1.2.1. Reported number of HIV infections

By the end of October 2007, the cumulative number of reported HIV/AIDS cases in China totaled to 223,501, including 39,866 new infections during January to

October 2007. Of these reported HIV/AIDS cases, 38.5% were infected via injecting drug use, 23.63% was via blood/plasma donation or transfusion, 17.8% was via heterosexual transmission, 1% was via homosexual transmission, 1.2% was though mother-to-child transmission, and 17.9% with unknown transmission mode. Among these reported HIV carriers, over 80% (82.2%) were in the age of 20 to 49 years and 71.3% were males [33].

Across the country, the highest number of HIV infections was reported in Sichuan, Guangdong, Xinjiang, Guangxi, Henan, and Yunnan provinces, with Yunnan province having the highest number of HIV carriers. Together, they accounted for 80.5% of HIV/AIDS cases reported in the country [33]. Figure 2.1 describes the annual infection of reported HIV/AIDS cases in mainland China during the period from 1985 to October 2007.
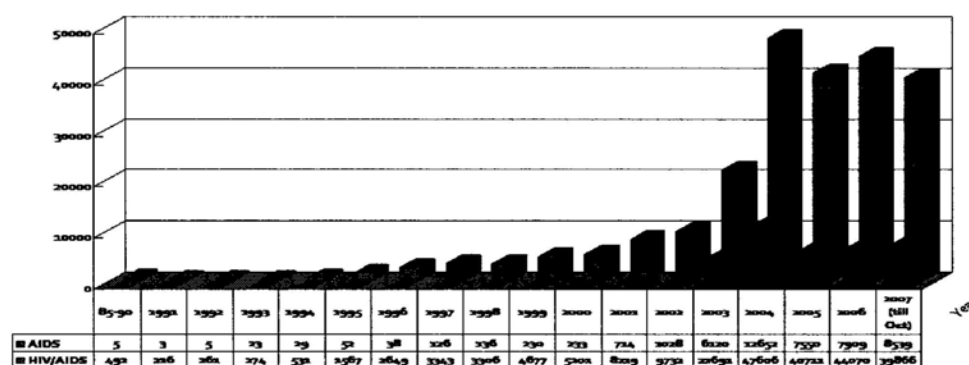
Figure 2.1 Annual reported HIV/AIDS cases in China (1985 to October 2007)

2.1.2.2. Estimated number of HIV infections

By the end of December 2007, it was estimated that there were 0.7 million

(0.55-0.8 million) of people living with HIV in China [33]. Figure 2.2 summarizes the main transmission route of the estimated HIV cases. The two major routes are injecting drug use and heterosexual transmission, respectively accounting for 38% and 41% of the estimated HIV cases in the country.
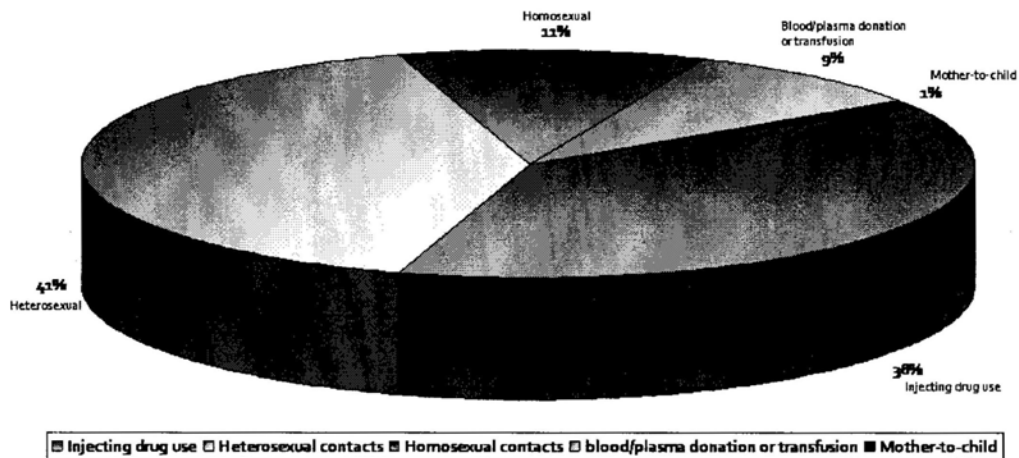
Figure 2.2 Main transmission mode of estimated HIV cases in mainland China (as of end 2007)[33]

2.1.2.3. IDU as one of the two driving forces of the HIV epidemic in China

IDU have been the primary driver of HIV transmission in China since the start of the epidemic in 1989 [5, 34, 35]. IDU, as compared to non-injecting drug users, often reported higher levels of HIV prevalence and risk behaviors [36-39] The HIV prevalence in IDU in China has been reported to be 8.1% [32]. The spread of HIV among IDU is significant. In a 12-month follow-up cohort study of IDU, the HIV incidence rate was 3.17 per 100 person-years (95% confidence interval: 0.98-5.37) [40]. Until recently, sexual transmission has outnumbered drug injection to become the leading transmission route of HIV infection in the country [33]. Together, drug injection and sexual transmission are the two driving forces for the HIV epidemic in China.

IDU play a key role in the spread of the HIV epidemic through their drug-use

and sexual behaviors. Sharing of (contaminated) injection equipments and unprotected sexual intercourse (with an infected person) are two leading means for HIV transmission [41, 42]. IDU engaging in unsafe injecting practices and unsafe sexual behaviors are hence facing double risk of HIV infection [43]. They also form a potential 'bridge' for transmitting HIV from high-risk population such as other IDU to low-risk general population such as non-drug using sex partners [44]. To curb the HIV epidemic, it is important to understand the injecting as well as sexual risk behaviors of IDU.

2.2. Male injecting drug users (IDU): double risk for HIV transmissions

2.2.1. Male IDU in mainland China

The present study focuses on the male IDU population only. Male IDU also differ from female IDU in their risk behaviors and associated factors of HIV infection[45-49]. Different subgroups of drug users might have differing needs that require diverse program efforts. Male IDU represent the largest population at risk for HIV acquisition and transmission in China. By the end of 2008, there were 1.13 million registered drug addicts in the country. Among them, 85.1% (or 0.96 million) are males, 92.3% aged between 18 and 45, and 77.5% were addicted to heroin [1]. A recent systematic review of the global epidemiology of injecting drug use reported an extrapolated estimate of as large as 2.9 million IDU in China [50]. Though the exact number of male IDU in China is not known, it is certain that the absolute size of the population is huge and poses a significant public health problem.

2.2.2. Risk behaviors among male IDU

2.2.2.1. Injecting risk behaviors in male IDU

Risky injecting behaviors have been reported among male IDU in different parts of the world [51-56]. For instance, more than two-thirds of the male IDU in Philippines reported having shared needles with others for drug injection in the last 6 months[51]. Another study in India found that about half of them shared needles and syringes in the past month [52]. Male IDU in China also reported similar injecting risk behaviors [5, 57-59].

2.2.2.2. Level of sexual activity in male IDU

Sexual transmission of HIV among IDU is significant but often overlooked [60]. This is partly due to the common belief that IDU have low level of sexual activity or that the use of some types of drugs such as heroin results in disinterest in sex [61, 62]. Intervention efforts targeting IDU have primarily focused on reduction of their injection risk only.

Previous studies, however, revealed that many male IDU are indeed sexually active [3, 53, 59, 63-65]. For instance, a recent study of 314 male IDU recruited from the community and a drug rehabilitation center in a city in Yunnan, China found that 64.3% of them were sexually active in the past 6 months [3]. Another study in Vietnam found that 73.2% of the surveyed male IDU aged between 18 and 45 had had sex with at least a female in the past 6 months prior to the survey [63]. In contrast to

believing that IDU has nothing to do with this part of sexually-driven epidemics of HIV, the opposite might be true.

2.2.2.3. High level of sexual risk behaviors in male IDU

Until recently, sexual risk behaviors among IDU have been under-studied [66]. Growing evidence shows that male IDU engaged in high level of sexual risk behaviors [51, 53, 54, 63, 67]. For instance, close to two third of the surveyed sexually active male IDU in Philippines reported never used a condom in the last 6 months [51]. Another study of male IDU in Vietnam reported a similar proportion (76.3%) of using condoms inconsistently with regular sex partners and 29.5% used condoms inconsistently with female sex workers [63]. Similarly high level of sexual risk behaviors were observed in male IDU in China [2, 3, 65]. For instance, inconsistent condom use in the last 6 months was reported by 42.7% to 76.2% of the surveyed male IDU [2].

What makes the situation more alarming is the overlapping injecting and sexual risk behaviors among male IDU [65, 68]. For instance, a recent study found that those who had shared needles with others were about 1.7 times more likely than those who had not to have engaged in unprotected sex [68].

2.3. Intervention efforts targeting IDU in mainland China

2.3.1. Harm reduction strategies: MMT and SEP

Recently, scaling up of the voluntary counseling and testing (VCT) services has been observed. Other intervention efforts include distribution of HIV education materials and free condoms, etc. [6]. However, theory-based programs modifying psychosocial cognitive factors of HIV risk behaviors of IDU remain scant in China. Methadone Maintenance Treatment (MMT) and Syringe Exchange Programs (SEP) are the two primary HIV intervention efforts targeting IDU in mainland China [6]. MMT and SEP aim at reducing the harmful consequences associated with (injecting) drug use. MMT, in general terms, refers to the use of methadone as a substitute treatment for drug users addicted to heroin and SEP refers to the provision of free new syringes in exchange for used ones for IDU.

The Chinese government has adopted nationwide policies to implement MMT and SEP programs since a few years ago. The development of MMT and SEP programs in China follow a quite similar history. MMT was firstly introduced into the country as a pilot project (with 8 clinics established in five provinces) in 2004 [69]. Preliminary promising results in drug-related risk reduction were obtained in this first phase of MMT programs [70]. The program has then been scaled up. By the end of 2008, there were a total of 600 MMT clinics in the country. Regarding SEP, it was firstly introduced into China in 1999. Similarly, the program has been scaled up after initial encouraging results have been obtained from an intervention trial [69, 71]. By the end of 2008, there were a total of 897 SEP in the country.

Despite the initial evidence of MMT and/or SEP as effective harm reduction strategies for IDU in China, conclusive evidence about their usefulness is yet to come. For instance, MMT is associated with challenges of high drop-out rate,

non-adherence, and low coverage [72]. Further, many IDU in fact continue using drugs while on MMT. With respect to SEP, the case is a little bit different. The cost of a new syringe has been going down and becomes more affordable. Many IDU hence do not need to join SEP for new syringes, and we lose the chance to deliver related HIV preventive messages to them.

Besides, MMT and SEP, the Chinese government has greatly expanded the free HIV testing services across the country since 2003. Yet, it is noted that the counseling component has sometimes been left out [73]. This might be partially explained by the fact that these VCT are offered by medical workers of CDC who have limited training in this regard.

2.3.2. Overall effectiveness of interventions targeted IDU

Overall, HIV prevention programs targeting IDU, including the use of MMT, SEP, or other behavioral interventions, have achieved some success in reducing their injecting risk behaviors [74-77].

Yet, less promising results have been reported regarding the effectiveness of sexual risk reduction in IDU [76, 78-80]. For instance, in a 19-year prospective cohort study of drug users in Amsterdam [74], the percentage of borrowing needles among IDU decreased from 47% in 1986 to 9% in 2004. Similar reduction in needle-sharing among IDU was reported in another 10-year study of IDU in Miami, Florida [75]. However, in both studies, reduction in sexual risk behaviors among IDU is not evident, warranting more investigation in this regard.

2.3.3. Lack of theory-based interventions targeting IDU in China

The fact that IDU are facing double risk of HIV infection warrants programs addressing not only their drug-using behaviors, but their sexual risk behaviors as well. MMT and SEP mainly work on the part related to drug use, and there is a lack of clear direct evidence on sexual risk reduction in IDU. These programs (MMT and SEP) also might not be able to exert direct influence to bring about favorable change in psychosocial cognitive factors of HIV risk behaviors among IDU. Behavioral interventions other than MMT and SEP are hence warranted. There are very limited, if any, theory-based HIV behavioral interventions for IDU in China. Theory-based interventions are shown to be more effective. The use of a theory to guide design intervention and relevant research is warranted.

2.4. HIV-related risk perceptions among IDU

Previous studies have showed that IDU engaging in injecting risk behaviors (e.g., sharing of injection equipments), as compared to those who had not, indicated a higher level of overall risk perception of HIV infection [81-83]. The linkage between sexual behaviors and HIV risk perception is less clear. Some found that the practices of sexual risk behaviors (e.g., unprotected casual sex) were not related to perceived risk of contracting HIV [16, 83], whereas others reported a significant association [84].

Previous studies have identified some factors that are in association with HIV risk perception among drug users, including IDU. For instance, having IDU sex

partners, having multiple sex partners, using drugs with someone, ever tested for HIV antibodies, knowing someone infected with HIV, and lower education level were found to be associated with a higher level of perceived risk of contracting HIV [16, 21, 85, 86]. Studies conducted among lower-risk general populations found that ethnicity, religious belief, and HIV-related knowledge, etc. were also predictive of HIV risk perception [14, 87].

2.5. The use of HAPA as a basic study framework

2.5.1. Overview of HAPA

Ascertaining in isolation the risk perception-behavior relation may be of limited practical use if other potentially useful factors are not considered at the same time. A conceptual framework helps guide the design and conduct of the study, and interpretation of findings. Theory-based interventions are advocated to be more effective in bringing about desirable behavioral change. After a careful review of existing individual-level social-cognitive health behavior theories, the Health Action Process Approach (HAPA), which has risk perception as one of its main constructs, is used as a basic conceptual framework in this study [9, 10] to understand condom use intention of male IDU in China.

HAPA is a relatively new social cognitive model and has been found useful in some other health behaviors such as physical activity, dietary behaviors, alcohol drinking, dental flossing, seat belt use, testicular self-examination, etc. [88-93]. A recent study comparing the ability of several prevailing social-cognitive health behavior

theories (including Health Belief Model [11], Theory of Planned Behavior [94], and HAPA) in predicting intentions to engage in resisting dieting and breast self-examination found that HAPA has the best performance/highest predictive utility [95]. To date, no studies have investigated the applicability of the HAPA in understanding condom use behaviors of male Chinese IDU. If proven useful, it could help the planning and development of evidence-based intervention programs in the future.

The HAPA model suggests that behavioral change is a process including pre-intentional and post-intentional phases. According to the HAPA, risk perception, outcome expectancies, and self-efficacy are key proximal determinants for the formulation of behavioral intention (the pre-intentional phase). This in turn, together with other post-intentional factors, transforms into actual enacting of a given behavior (the post-intentional phase). When an intention has been formed, a number of postintentional factors (recovery and maintenance self-efficacy and planning) will transform the intention into actual behavior (Figure 2.3).

Health Action Process Approach (HAPA)

|--------- Motivational phase---------| |------- Action phase ------|
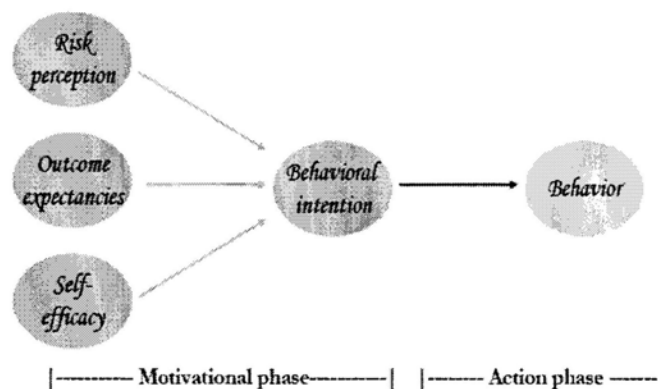
A simplified version of Schwarzer et al. (2003).

Figure 2.3 Constructs of Health Action Process Approach (HAPA)

Whilst the preintentional motivation phase can be assessed by cross-sectional studies, the postintentional volition phase is best investigated by a longitudinal study design. The present study will focus on the pre-intentional phase only as condom use intention is used as the dependent outcome measure.

2.5.2. Constructs of the HAPA

2.5.2.1. Risk perception

Risk perception, as mentioned earlier, is a fundamental element in many prevailing health behavior theories such as the Health Belief Model [11], in addition to HAPA. It is postulated to serve as a motivational force for the adoption of preventive behaviors or refraining from risk behavior. It sets the stage for behavioral change. In the context of HIV/AIDS, those who perceive to be at-risk of getting infected with HIV are motivated to adopt preventive measures, such as condom use. In previous Chapters, it has been consistently showed that risk perception is predictive of intended condom use behavior and that the improved measures investigated in this thesis perform better than a global measure that is commonly used in many other studies.

According to the HAPA, risk perception is often considered to be a necessary but not sufficient condition. Yet, the conclusion is mainly drawn from findings obtained with the use of a general global measure. The relative importance of risk perception, using an improved measure, is yet to be determined. Also, the relative importance of an improved measure of risk perception in relation to other HAPA constructs in

understanding condom use behaviors remains unknown and will be investigated in this study.

2.5.2.2. Self efficacy

Self efficacy refers to an individual's perceived capability of performing a given behavior. It is the third (but not the least) determinant of behavioral intention in the HAPA model. It has been found to be one of the strongest predictor of numerous health behaviors including HIV ones. An individual who perceives himself or herself to be capable of performing a behavior (in our case, use a condom) is more likely than others to have actually used a condom during sexual encounters.

2.5.2.3. Outcome expectancies

Outcome expectancies refer to the pros and cons of a given behavior. It has been found quite useful in a number of studies. For instance, those who believed that condom use would bring about positive outcomes, such as prevention of HIV infection, were more likely to use a condom. Similarly, those who thought that condom use would result in undesirable negative outcomes, such as reduce in sexual pleasure, were less likely to use a condom. Usually, the former one is referred to as positive outcome expectancy, and the latter one as negative outcome expectancy. The likelihood of forming an intention to act or not act depends on the evaluation of the pros and cons of performing a particular behavior.

2.5.3. Comparing HAPA to other health behavioral theories and rationale to use

it as the study framework

It is well acknowledged that there are other prevailing health behavior theories. In particular, the Theory of Reasoned Action (TRA; [96]) or its extension, the Theory of Planned Behavior (TPB; [94]) has been quite widely used in studies of HIV risk behaviors and interventions. Key elements of these models include attitudes, subjective norms, perceived behavioral control (in TPB only), and behavioral intention, which in turn, determines the enacting of the behavior. However, risk perception, which is a core component in many HIV prevention programs, is not included in these models. Only a limited number of such studies have attempted to investigate the theory's applicability across different types of sex partners in a single study [97]. The TRA and TPB but not the HAPA has indeed included another important factor, subjective norm. Yet, sex-related topics have remained pretty much a subject matter that would seldom be discussed openly in the Chinese societies.

HAPA incorporates several most influential known factors of (HIV) preventive behaviors to date, including behavioral intention, self-efficacy, and outcome expectancies. Hence, the use of HAPA as a basic conceptual framework not only allows the re-examination of the role of HIV risk perception, but also its relations with other important factors of HIV behaviors. HAPA also has differentiated three phase-specific self-efficacy (action, maintenance, and recovery self-efficacy) which further helps make more precise understanding of behaviors.

2.6. Lack of longitudinal studies

Most of the studies concerning risk perception and male IDU are cross-sectional in nature as it is relatively difficult to follow up this study population. Behavioral intention is an alternative outcome variable, which does not depend on behaviors that had already occurred. It is known that behavioral intention is a strong predictor of actual behavior. A meta-analysis reports that this variable alone accounts for 30-50% variance of the actual behaviors of concern. Such validations have not been done in Chinese HIV-related studies and this study attempted to provide investigate how well behavioral intention predicts actual behaviors.

CHAPTER 3   Study Methodologies

3.1. Study design

The present study entails two parts. First, the main study is a cross-sectional survey. Second, a pilot longitudinal part is included to a 1-month follow-up of respondents reporting to have had sex with at least a female in the last 6 months (referred to as being "sexually active") prior to the main survey.

3.2. Study participants

3.2.1. Cross-sectional (main) study

The study population comprised non-institutionalized male injecting drug users (IDU) aged between 18 and 45, who reported having injected drugs in the last 6 months, whose HIV status is self-reported as negative or unknown, and who agreed to join the study. Respondents were asked whether they had participated in the same study before; and if so, they were excluded from the study. A total of 529 male IDU were recruited to the cross-sectional study during April to September 2008. Among these 529 IDU, 456 reported to be sexually active in the last 6 months (particularly, 318 reported having had sex with at least a regular sex partner (RP), 116 with a non-regular sex partner (NRP), and 129 with a female sex worker (FSW)).

Those male IDU respondents not having sex with a RP, NRP, or FSW in the last 6 months were asked a set of questions related to life satisfaction, sexual functions,

etc. instead of their sexual behaviors (because they had none) as in the case for those sexually active respondents. This was to make the interview time to be more or less the same among all IDU respondents. Otherwise, some may intentionally report that they have no sexual activity at all in order to minimize the time engaged in the interview. Data obtained on this part however, were <u>not</u> presented here because they are not the purposes of the study.

3.2.2. Longitudinal (pilot) study

Among those 456 sexually active male IDU joining the baseline cross-sectional study, all were invited to join a longitudinal part one month later. Of them 124[1] were successfully contacted by telephones and answered the brief one-month questionnaire during May to November 2008.

3.3. Recruitment of study participants and data collection

Respondents were recruited from the community in two cities in China: Dazhou city in the Sichuan province and Hengyang city in the Hunan province. Sichuan and Hunan respectively rank the sixth and eighth in the total number of HIV reported cases in China. Dazhou, with a population of about 6.5 million, is situated in the northeast part of Sichuan Province and has an area of 16,600 square kilometers. From 1996 to October 2005, the city reported 982 HIV positive cases [98]. By the end of April, 2009, a total of 2,004 HIV cases were reported. It ranks second in the total number of reported HIV cases in the Sichuan province.

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[1] The number of follow-up cases is relatively low. A full-scale longitudinal study, which requires much more resources, was not planned at the very beginning. The 2008 Sichuan earthquake also had some impacts on the follow-up rate.

Another study site, Hengyang, with a population of nearly 7.3 million, is situated in the middle south part of Hunan Province and has an area of 15,310 square kilometers. From 1992 to 2004, the city reported 486 HIV positive cases [99] and 2,093 cases were reported by end June 2007. It has the highest number of reported HIV cases in the Hunan province. In both study sites, IDU together with heterosexual transmission account for the majority of HIV infections. In both cities, available HIV prevention services include MMT, SEP, and HIV voluntary counseling testing services, etc..

IDU form a 'hidden' population and no sampling frame exists for them [100]. In this study, multiple means of recruitment were used to recruit study respondents in both study sites. These include via snowball sampling, outreach by CDC staff, via peer educators of SEP or users of other HIV services (MMT, VCT, etc.) of local CDC. A team of experienced interviewers who are staff of CDC administered the interview in a face-to-face manner. Training was offered to the team of interviewers who also have experiences in other studies such as the China-UK HIV/AIDS Prevention and Care Project [64, 65, 101, 102].

Prospective respondents were firstly briefed about the study purpose and background. They were then invited to participate in the study. With written informed consent, the interview commenced. Respondents were not asked to sign on the consent form. The interviewers pledged that they had clearly explained the study details to the respondents and signed on the consent form in front of the respondents. A modest compensation fee of RMB20 to 30 was offered to respondents upon

successful completion of the interview. The procedures have been used in other similar studies [64, 65]. An anonymous structured questionnaire was designed to collect data for the study purposes. It took on average 10 to 12 minutes to complete. Ethics approval has been obtained from the Research Survey Ethics Committee of the Chinese University of Hong Kong.

Upon completion of the interview, all respondents were invited to join a longitudinal part of the study to complete a brief telephone interview (about 5 to 8 minutes) one month later. No monetary compensation would be offered for this part. Those who agreed to join the study were asked to leave a contact telephone number and a nickname/fake name (for anonymity reason) for follow-up.

Before commencement of the main study since April 2008, several site visits have been paid to the two study sites (Dazhou, Sichuan: October 2006 and January 2008; Hengyang, Hunan: December 2007). In October 2006, besides visiting some MMT and SEP, and drug rehabilitation centers in Dazhou, I interviewed four male IDU (two were MMT users, one was SEP enrollees, and one was referred via snowballing) with the help of a brief semi-structured questionnaire. During the conversation, how these male IDU viewed their HIV risks were explored to confirm some preliminary research ideas. Information collected was used to design the main questionnaire. Pilot studies were then carried out in both study sites respectively during December 2007 through January 2008 to further refine the measurements and survey operations.

3.4. Measures

Unless specified otherwise, items were self-constructed with references made to similar studies.

3.4.1. Cross-sectional study (Baseline)

3.4.1.1. Background characteristics
<u>Socio-demographic characteristics</u>

Age, education level, current marital status, monthly personal income, ethnicity, and locality of origin (local or non-local of the survey site) of the respondents were collected.

<u>HIV-related knowledge</u>

Two items were measured to assess HIV-related knowledge of the respondents. In particular, respondents were asked "`1). whether a person infected with HIV could be determined by his/her appearance?" and "2). whether or not HIV could be detected once after the infection took place?"). Response categories include "yes", "no", and "not certain". A variable counting the number of appropriate responses given to these 2 items was formed (giving 2 appropriate responses vs. else).

<u>Knowing someone who is HIV positive</u>

Respondents were asked about the number of HIV-infected persons with whom

they were acquainted. Responses categories included "none", "one", "two to five", "six to 15", "more than 15", and "not certain". Responses were dichotomized into "five or less/not certain" and "more than five".

History of STD

Respondents were asked if they have ever contracted STD. Response categories included "currently infected with STD", "ever contracted STD", and "never". Responses of this item were presented in two categories ("ever" vs. "never'; none were currently infecting with STD).

Utilization of HIV/STD-related prevention services

Respondents were asked if they had ever been tested for HIV antibody; and if so, when the last HIV antibody test took place. Respondents were also asked if they had participated in Methadone Maintenance Treatment (MMT) or Syringe Exchange Program (SEP) in the last 6 months prior to the survey. Further, they were asked if they had received other 3 types of HIV/STD prevention services in the last 6 months, including receiving free condoms, STD checkup or treatment, and HIV/STD education materials (e.g., pamphlets). A variable counting the number of these latter 3 services was formed. Response options to these questions included "yes" and "no".

3.4.1.2. Drug use practices

Respondents were asked about their duration of drug injection (less than 6

months/6 months to less than 2 years/2 years to less than 5 years/5 years to less than 10 years/more than 10 years), frequency of drug injection (number of times per day/week/month), type(s) of drug used in the last 6 months, and quit drug attempts ("no" and "yes"; and if so, number of attempts made).

3.4.1.3. Injecting risk behaviors

Respondents were asked if they had injected with others' used syringes (receptive syringe-sharing), lent or sold used syringes to others (distributive syringe-sharing), or shared other paraphernalia (e.g., cookers, cotton, rinse water) with others for drug injection in the last 6 months prior to the survey. Two variables were created. One specifically related to sharing of syringes and indicated whether respondents had either receptive- or distributive syringe-sharing behaviors (yes/no). Another one was about whether respondents had engaged in any one of the aforementioned three sharing behaviors (yes/no).

3.4.1.4. Sex partnerships

Respondents were asked whether they had regular sex partner (RP), non-regular sex partner (NRP), or female sex worker (FSW) with whom they had had sex in the last 6 months (the number of each type of partner is recorded). **RP** is defined as those female sex partners 'who are one's spouse or girlfriend, the respondent knows her quite well', has a relatively stable or long-time relationship, and has the intention to develop a stable relationship with her'. **NRP** is defined as those female sex partners who are non-spouse, or who are not girlfriends or FSW, the respondent does not

know her deeply, has a relatively casual sexual relationship with her that did not involve the exchange of money/drug. **FSW** refers to those female partners where the sexual relationship involves the exchange of money or drugs. There is no universal consensus on the definition of various types of sex partners.

The number of female sex partners in the last 6 months was counted. Respondents were categorized as being "exclusive monogamous (having a single female sex partner)" or having "multiple partners" in the last 6 months.

<u>Partner-specific questions were asked to those with the respective partners</u>

Unlike many other previous studies, questions that made explicit reference to a partner type (i.e. partner-specific) were asked only to those who reported actually having had sexual encounters with the particular partner type in the last 6 months. That is, those who reported having had sex solely with RP but not other partner types were asked only the set of questions specifically referring to RP. Those who reported having had sex with both RP and FSW were asked two sets of similar but partner-specific questions. Unless specified otherwise, this applies to all partner-specific questions described below.

Such data collection method might limit the possibility of making meaningful within-individual comparisons across partner types due to small sample size. It however, avoids soliciting responses to unreal situations from those who do not have any actual experience with a particular sex partner type of concern. Results obtained from those hypothetical questions could be of limited use or has no real practicality.

<u>Order of the three partner-specific sets of questions</u>

To minimize potential confusion between NRP and FSW, the sequence of the three sets of partner-specific questions appearing on the questionnaire were arranged as follows: RP set first, followed by FSW set, and then NRP set. Results presented however, were organized in the order from RP set, to NRP set, and then FSW set.

3.4.1.5. Sexual risk behaviors

Among those respondents who reported having had sex with RP, NRP or FSW in the last 6 months, they were asked about the frequency of condom use with the respective type of sex partner(s) in the last 6 months. Response categories include "always used", "used most of the time", "used a little of the time", and "never used". These three condom use variables were dichotomized into "consistent use (i.e. always used)" and "inconsistent use (including the remaining three response categories)". Another indicator variable of overall condom use with any female sex partners was formed (inconsistent use vs. consistent use with all partners).

3.4.1.5. HAPA variables

HAPA variables examined here include: 1) risk perception, 2) outcome expectancies, 3) self efficacy, and 4) behavioral intention.

<u>HIV risk perceptions</u>

In this study, there are three kinds of HIV risk perceptions: (i) global risk perception, (ii) self-directed conditional sexual/injecting risk perceptions, and (iii) others-directed conditional sexual/injecting risk perceptions. By 'self-directed', it refers to the path of HIV acquisition oneself; and 'others-directed' refers to the path of HIV transmission to others. Details are described below one by one.

(i) Global risk perception

A single item, "How likely do you think you will get infected with HIV?" was used. Response categories were on a 5-point scale ranging from "no chance at all" to "sure chance". The variable was dichotomized into "no/little/about half" chance and "high or sure" chance.

(ii) Self-directed conditional sexual/injecting risk perceptions

Three items, each referring to a particular female partner type, were used to measure self-directed conditional <u>sexual</u> risk perception. In particular, respondents were asked: "How likely do you think that your RP will transmit HIV to you via unprotected sex with her?". Two other similar questions with respect to NRP and FSW were asked. Response categories were on a 5-point scale ranging from "no chance at all" to "sure chance". These variables were dichotomized to "no/little/about half" chance and "high or sure" chance.

Another item was used to measure self-directed conditional <u>injecting</u> risk perception. In particular, respondents were asked: "How likely do you think that you will contract HIV via sharing syringes with others for drug injection?". Response categories were on a 5-point scale ranging from "no chance at all" to "sure chance". The variables was dichotomized into "no/little/about half" chance and "high or sure" chance.

(iii) Others-directed conditional sexual/injecting risk perceptions

Three items, each referring to a particular female partner type, were used to measure others-directed conditional <u>sexual</u> risk perception. In particular, respondents were asked: "How likely do you think that you will transmit HIV to your RP via unprotected sex with her?". Two other similar questions with respect to NRP and FSW were asked. Response categories were on a 5-point scale ranging from "no chance at all" to "sure chance". These variables were dichotomized to "no/little/about half" chance and "high or sure" chance.

Another item was used to measure others-directed conditional <u>injecting</u> risk perception. In particular, respondents were asked: "How likely do you think that you will transmit HIV to others u via sharing syringes with others for drug injection?". Response categories were on a 5-point scale ranging from "no chance at all" to "sure chance". The variables was dichotomized into "no/little/about half" chance and "high or sure" chance.

Outcome expectancies

Positive and negative outcome expectancies were measured. There were two sets of questions, with one set related to condom use and another set related to syringe-sharing.

(i) Condom use positive outcome expectancies

A single item was used to measure the construct: "Condom use can protect you from HIV infection". Respondents were asked to indicate their agreement or disagreement with the statement on a 5-point scale, from (1) strongly disagree to (5) strongly agree. The variables was dichotomized into "disagree/strongly disagree/undecided" and "agree/strongly".

(ii) Condom use negative outcome expectancies

Four items were used to measure the construct: "(1) Condom use lessens your sexual pleasure; (2) Condom use makes you feel uncomfortable; (3) Condom use ruins your mood or atmosphere of sex; and (4) Condom use makes your sex partners think that you do not trust her". Respondents were asked to indicate their agreement or disagreement with the statement on a 5-point scale, from (1) strongly disagree to (5) strongly agree. Factor analysis of these items identified one single factor, with an explained variance of 63.1%. The internal consistency (Cronbach's alpha) was found to be 0.78. A composite scale score was constructed by deriving a mean from the sum total of these four items.

(iii) Positive outcome expectancies for not sharing syringes

A single item was used to measure the construct: "Not sharing syringes with others can protect you from HIV infection". Respondents were asked to indicate their agreement or disagreement with the statement on a 5-point scale, from (1) strongly disagree to (5) strongly agree. The variables was dichotomized into "disagree/strongly disagree/undecided" and "agree/strongly".

(iv) Negative outcome expectances for not sharing syringes

A single item was used to measure the construct: "Not sharing syringes while not having a new one, the drug addicted symptoms would make you feel very bad". Respondents were asked to indicate their agreement or disagreement with the statement on a 5-point scale, from (1) strongly disagree to (5) strongly agree. The variables was dichotomized into "disagree/strongly disagree/undecided" and "agree/strongly".

Self efficacy

(i)   Condom use self efficacy

Five items were used to measure the construct: (1) You are confident to use condoms every time when having sex with FSW; (2) You are confident to use condoms every time when having sex with NRP; (3) You are confident to use

condoms every time when having sex with RP; (4) You believe you can insist always using condom, even though this is not easy to do so; and (5) You can surely use condoms every time if you want to. Respondents were asked to indicate their agreement or disagreement with the statement on a 5-point scale, from (1) strongly disagree to (5) strongly agree. Factor analysis of these items identified one single factor, with an explained variance of 47.4%. The internal consistency (Cronbach's alpha) was found to be 0.72. A composite scale score was constructed by deriving a mean from the sum total of these five items.

(ii) Self efficacy for not sharing syringes

A single item was used to measure the construct: "You can surely refuse sharing needles with others if you want to". Respondents were asked to indicate their agreement or disagreement with the statement on a 5-point scale, from (1) strongly disagree to (5) strongly agree. The variables was dichotomized into "disagree/strongly disagree/undecided" and "agree/strongly".

Behavioral intentions

(i)   Condom use behavioral intention

Three items, each referring to a particular female partner type, were used to measure respondents' intention to use condoms consistently during sexual intercourse in the next 6 months. In particular, respondents were asked: "In the coming 6 months, how likely do you think that you will use condom everytime when having sex with RP?". Two other similar questions with respect to NRP and FSW

were asked. Response categories were on a 5-point scale ranging from "no chance at all" to "sure chance". These variables were dichotomized into "no/little/about half" chance and "high or sure" chance.

(ii)   Behavioral intention for not sharing syringes

Another item was used to measure respondents' intention not to share syringes with others for drug injection in the next 6 months. In particular, respondents were asked: "In the coming 6 months, how likely do you think that you will share syringes with others (receptive and/or distributive sharing) for drug injection?". Response categories were on a 5-point scale ranging from no chance at all" to "sure chance". The variable was dichotomized into "no chance at all" versus "some chance (including little/about half/high/sure chance)".

3.4.2. Longitudinal study

Respondents were telephone followed after one month, and asked that whether they had shared syringes with others in the last month and that whether they had had sex with a female sex partner in the last month, and if so, the type of sex partners and respective frequency of condom use.

3.5. Statistical analyses

Details on statistical analyses are presented in subsequent respective Chapters. In general, frequency distributions of the studied variables are tabulated. Chi-square tests were performed to examine any group differences in the studied variables.

Logistics regression analyses were performed to examine factors in association with the outcome measures of interest. Univariate and multivariate odds ratio (OR) and respective 95% confidence interval (CI) were presented where appropriate. For multi-item measures, their reliability coefficients were checked and reported and factor analysis was also performed where appropriate. All statistical analyses were performed using SPSS for Window 15.0 and a p-value <0.05 was taken as statistically significant.

Chapter 4 Background characteristics of the respondents

4.1. Background

Few studies have compared if male IDU who are sexually active or inactive would differ in terms of background characteristics and drug-using behaviors. Recent evidence suggests that male IDU engage in high level of sexual risk behaviors [2, 51, 63]. Further, those practicing high risk injecting behaviors were found to be more likely to be engaging in high risk sexual behaviors [65, 68].

4.2. Objectives

This Chapter firstly describes and compares the background characteristics (including socio-demographics, utilization of HIV/STD-related prevention services, drug use practices, and injecting risk behaviors) between sexually active and inactive male IDU. Their overall level of perceived risk of contracting HIV will also be examined and compared. Second, it presents the prevalence of three types of sex partners, the prevalence of sexual risk behaviors, and the prevalence of overlapping injecting and sexual risk behaviors among sexually active male IDU. This part is descriptive in nature.

4.3. Measures

The sexual active status of the respondents was assessed by asking whether or not they had had sex with regular sex partners (RP), non-regular sex partners (NRP),

or female sex worker partners (FSW) in the last 6 months. Other measures examined in this Chapter included: 1). background characteristics (e.g., socio-demographics, HIV-related knowledge, knowing some who are HIV positive, self-reported STD infection), 2). utilization of HIV/STD-related prevention services (e.g., HIV antibody testing, MMT, SEP), 3). drug use practices (e.g., length of drug injection, daily frequency of drug injection), and 4). injecting risk behaviors (e.g., receptive and distributive syringe sharing), and 5). risk perception of HIV infection ("How likely do you think that you will contract HIV?").

4.4. Statistical analysis

Frequency distributions of the studied variables are tabulated by the sexually active status. Univariate odds ratios (ORu) and respective 95% confidence intervals were derived to examine the associations between the studied variables and sexually active status. A stepwise multivariate logistic regression model, using univariately significant factors as candidate variables, was then fit to identify differences between sexually active and inactive male IDU. A p-value <0.05 was considered as statistically significant.

4.5. Results

4.5.1. Prevalence of sexually active male IDU

Of all 529 male IDU joining the study, 456 (or 86.2%) reported having had sex with at least one female (RP, NRP, or FSW) in the last 6-month period preceding the survey. They were classified as being "**sexually active**" in the subsequent parts of the

thesis; the rest (n=73) of the respondents were classified as being "**sexually inactive**".

4.5.2. Characteristics of sexually active and inactive male IDU

4.5.2.1. Background characteristics

All respondents were of Han ethnicity (Table 4.1). As compared to sexually inactive male IDU, sexually active respondents were less likely than others to be 31 years old or above (71.3% vs. 83.6%, ORu=0.49), having no income at all (32.2% vs. 58.9%, ORu=0.33), being recruited from Hengyang (16.9% vs. 26.9%, ORu=0.52) and knowing more than five HIV positive persons (16.2% vs. 31.5%, ORu=0.42); sexually active male IDU were more likely than others to be currently married (32.9% vs. 11.0%, ORu=3.98) and to give appropriate responses to HIV-related knowledge items (54.8% vs. 41.1%, ORu=1.74).

Table 4.1 Background characteristics of sexually active and inactive male IDU

	All	Sexual Status		
		Inactive	Active	
	(n=529)	(n=73)	(n=456)	Univariate OR
	Col%	Col%	Col%	(95%CI)
Age group‡				
18-30	27.0	16.4	28.7	1.00
31 and over	73.0	83.6	71.3	**0.49(0.29,0.94)****
Education level				
Junior high or below	72.8	76.7	72.1	1.00
Senior high or above	27.2	23.3	27.9	1.27(0.71,2.27)
Current marital status				
Currently not married	70.1	89.0	67.1	1.00
Currently married	29.9	11.0	32.9	**3.98(1.86,8.52)*****
Personal monthly income				
Some income/did not disclose	64.1	41.1	67.8	1.00
No income at all	35.9	58.9	32.2	**0.33(0.20,0.55)*****
Study site				
Dazhou city (in Sichuan)	81.1	73.1	83.1	1.00
Hengyang city (in Hunan)	18.9	26.9	16.9	**0.52(0.30,0.91)***
Residence of origin				

Local	93.6	98.6	92.8	1.00
Non-local	6.4	1.4	7.2	5.62(0.76,41.72)
Number of appropriate responses given to the two HIV knowledge items†				
<2 appropriate responses	47.1	58.9	45.2	1.00
2 appropriate responses	52.9	41.1	54.8	**1.74(1.05,2.87)***
Know someone who is HIV positive				
None to five/not certain	81.7	68.5	83.8	1.00
More than five	18.3	31.5	16.2	**0.42(0.24,0.73)****
Ever contracted an STD ξ				
Never	69.3	68.5	69.4	1.00
Ever	30.7	31.5	30.6	0.96(0.56,1.63)

‡Respectively, mean age (SD) for all respondents, sexually active and inactive male IDU are 34.7 (6.04), 34.47 (6.11), and 36.25 (5.42). Significant differences between the latter two groups were observed (p<0.05, student's t-test).

†The 2 HIV-related knowledge items include: "Whether a person infected with HIV could be determined by his/her appearance?", and "whether or not HIV could be detected once after the infection took place?". Response categories included "yes", "no", and "not certain". For both questions, the answer "no" was considered as appropriate response.

ξNone of the respondents were currently infecting with STD.

*p<0.05;**p<0.01;***p<0.001.

4.5.2.2. Utilization of HIV/STD prevention services

Of all respondents, about 28% received an HIV antibody test in the last 6 months (72.8% had ever done so in their lifetime; data not tabulated); 72.6% and 28.9% respectively had ever used MMT or participated in SEP in the last 6 months; close to 81% received some other forms of HIV/STD-related prevention services (Table 4.2). No statistically significant between-group differences in service utilization were observed between sexually active and inactive male IDU (Table 4.2), except that sexually active male IDU were more likely than the inactive ones to have participated in SEP in the last 6 months (30.7% vs. 17.8%, ORu=2.05).

Table 4.2 Utilization of HIV/STD-related prevention services among sexually active and inactive male IDU

In the last 6 months,	All (n=529) Col%	Sexual Status		Univariate OR (95%CI)
		Inactive (n=73) Col%	Active (n=456) Col%	
Received an HIV antibody test				
No	71.7	75.0	71.2	1.00
Yes	28.3	25.0	28.8	1.21(0.69,2.15)
Received MMT				
No	27.4	34.2	26.3	1.00
Yes	72.6	65.8	73.7	1.46(0.86,2.47)

Participated in SEP				
No	71.1	82.2	69.3	1.00
Yes	28.9	17.8	30.7	**2.05(1.09,3.85)***
Received other HIV/STD prevention services (e.g., free condoms, STD checkup/treatment, education pamphlets)				
No	19.1	19.2	19.1	1.00
Yes	80.9	80.8	80.9	1.01(0.54,1.89)

*p<0.05;**p<0.01;***p<0.001.

4.5.2.3. Drug use practices

It can be seen from Table 4.3 that among all respondents, 25.5% had been injecting drugs for 10 years or more, close to 70% were injecting at least once a day, and 37.4% had been using multiple types of drug; all respondents reported injecting heroin in the last 6 months (data not tabulated). Around 60% had made more than one attempt to quit drug use. Sexually active male IDU were significantly less likely than sexually inactive ones to have injected drugs for more than 10 years (23.9% vs. 35.6%, ORu=0.57). No statistically significant between-group differences in the other three aforementioned variables were observed.

Table 4.3 Drug use practices among sexually active and inactive male IDU

	All	Sexual Status		
		Inactive	Active	
	(n=529)	(n=73)	(n=456)	Univariate OR
	Col%	Col%	Col%	(95%CI)
Length of drug injection				
Less than 10 years	74.5	64.4	76.1	1.00
More than 10 years	25.5	35.6	23.9	**0.57(0.34,0.96)***
Frequency of drug injection[#]				
Less than once a day	30.8	28.8	31.1	1.00
At least once a day	69.2	71.2	68.9	0.89(0.52,1.54)
Use of multiple drugs				
No, heroin only	62.6	60.3	62.9	1.00
Yes, multiple drugs	37.4	39.7	37.1	0.89(0.54,1.48)
Ever quit drug use				
Once or none	40.3	38.4	40.6	1.00
More than once	59.7	61.6	59.4	0.91(0.55,1.51)

*p<0.05;**p<0.01;***p<0.001.

4.5.2.4. Risk behaviors related to injecting drug use

Of all respondents, 8.5% had injected with others' used syringes (receptive sharing), 7.6% had lent or sold used syringes to others (distributive sharing), and 16.1% reported having shared paraphernalia with others during drug injection (Table 4.4). Overall, 19.3% engaged in at least one of the aforementioned three injection equipment sharing behaviors in the last 6 months; and 10.8% had shared syringes with others (i.e. either distributive and/or receptive sharing). No statistically significant between-group differences in these injecting risk behaviors were observed between sexually active and inactive male IDU (Table 4.4).

Table 4.4 Injecting risk behaviors among sexually active and inactive male IDU

In the last 6 months,	All (n=529) Col%	Sexual Status		Univariate OR (95%CI)
		Inactive (n=73) Col%	Active (n=456) Col%	
Injected with others' used syringes (receptive syringe sharing)				
No	91.5	91.8	91.4	1.00
Yes	8.5	8.2	8.6	1.04(0.43,2.56)
Lent or sold one's used syringes to others (distributive syringe sharing)				
No	92.4	95.9	91.9	1.00
Yes	7.6	4.1	8.1	2.06(0.62,6.87)
Shared paraphernalia with others during drug injection				
No	83.9	83.6	84.0	1.00
Yes	16.1	16.4	16.0	0.97(0.50,1.89)
Receptive or distributive syringe sharing				
No	89.2	91.8	88.8	1.00
Yes	10.8	8.2	11.2	1.41 (0.58, 3.41)
Any one of the above 3 sharing behaviors				
No	80.7	82.2	80.5	1.00
Yes	19.3	17.8	19.5	1.12(0.59,2.13)

*p<0.05;**p<0.01;***p<0.001.

4.5.3. Global risk perception of HIV infection

Of all 529 male IDU respondents, 11.9% thought that they were having high or

sure chance of contracting HIV; the percentage perceiving 'no chance (at all)' was 21.0%. Among sexually active and inactive male IDU respectively, 12.5% and 8.2% perceived high/sure chance of contracting HIV; 20.6% and 23.3% perceived 'no chance (at all)'. From Table 4.5, it can be seen that sexually active status was not associated with risk perception of HIV infection.

Table 4.5 Risk perception of HIV infection among sexually active and inactive male IDU

| | All
(n=529)
Col% | Sexual Status | | |
		Inactive (n=73) Col%	Active (n=456) Col%	Univariate OR (95%CI)
Risk perception of HIV infection§				
No chance at all	21.0	23.3	20.6	1.00
Little/about half chance	67.1	68.5	66.9	1.10(0.61,2.00)
High/sure chance	11.9	8.2	12.5	1.72(0.64,4.61)

§ Question item: "How likely do you think that you will contract HIV?"

4.5.4. A multivariate model distinguishing sexually active and inactive male IDU

A stepwise multivariate logistic regression model was fit to distinguish between sexually active and inactive male IDU. All of the 8 unvariately significant factors listed in Tables 4.1 to 4.5 were used as candidate variables (including age, current marital status, personal income, study site, HIV-related knowledge, knowing someone who is HIV positive, participation in SEP, and length of drug injection).

The results of the stepwise multivariate analysis showed that being currently married (ORm = 3.65, 95% CI: 1.69-7.90, p<0.01) were more likely than others to be sexually active, whereas having no income at all (ORm = 0.37, 95% CI: 0.22-0.62, p<0.001), and knowing more than five people who are HIV positive (ORm = 0.47, 95% CI: 0.27-0.84, p<0.05) were less likely than others to be sexually active (data not tabulated).

4.5.5. Prevalence of types of sex partner and respective condom use behaviors among sexually active IDU

4.5.5.1. Prevalence of different types of female sex partner

It can be seen from Table 4.6 that among the 456 sexually active male IDU, the prevalence of having had sex with at least one RP, NRP, or FSW were respectively 69.7% (n=318), 25.4% (n=116), and 28.3% (n=129). About 36.2% of them reported having had more than one female sex partners in the last 6 months.

Table 4.6   Prevalence of different types of sex partners (in the last 6 months)

In the last 6 months,	Among sexually active male IDU (n=456) Col%
Having had sex with regular sex partner(s) (RP)	
No	30.3
Yes	69.7
Having had sex with non-regular sex partner(s) (NRP)	
No	74.6
Yes	25.4
Having had sex with female sex worker(s) (FSW)	
No	71.7
Yes	28.3
Multiple sex partnership	
Exclusive monogamy (having only 1 sex partner in number)	63.8
Multiple partners	36.2

4.5.5.2. Prevalence of inconsistent condom use

Overall, inconsistent condom use with any female sex partner(s) in the last 6 months was reported by 82.5% (376/456) among the sexually active male IDU (Table 4.7). Amongst those having the respective type(s) of female sex partner, the prevalence of inconsistent condom use was 87.7% (279/318) with RP, 82.8% (96/116) with NRP, and 62.8% (81/129) with FSW (Table 4.7).

Table 4.7 Prevalence of inconsistent condom use in the last 6 months

| | % Inconsistent condom use | | | |
| | with RP | with NRP | with FSW | with any sex female partner |
	%	%	%	%
i). Among sexually active respondents (n=456)	61.2	21.1	17.8	82.5
ii). Among those with the respective type of sex partners (n$_{RP}$=318; n$_{NRP}$=116; n$_{FSW}$=129)	87.7	82.8	62.8	na

RP: regular sex partner; NRP: non-regular sex partner; FSW: female sex worker.   na: not applicable.

4.5.6. Prevalence of overlapping injecting and sexual risk behaviors

Of the 456 sexually active male IDU, 17.5% (n=80) engaged in both injecting risk behaviors (i.e. at least one of the 3 injection equipment sharing behaviors) and sexual risk behaviors (i.e. unprotected sex with any female sex partners) in the last 6 months. From Table 4.8, it can be seen that those who had shared injecting equipments were about 2 times more likely than others to have engaged in unprotected sex in the last 6 months.

Table 4.8   Overlapping injecting and sexual risk behaviors in the last 6 months

| | Having unprotected sex with any female sex partners[#] | | |
	No (n=80) Col%	Yes (n=376) Col%	Univariate OR (95%CI)
Any one of the 3 injecting risk behaviors[#]			
No (n=376)	88.8	78.7	1.00
Yes (n=89)	11.3	21.3	2.13 (1.02;4.45)*

[#] In the last 6 months.   *p<0.05;**p<0.01;***p<0.001.

4.6. Summary and discussion of the key findings

1).   The majority (86.2%) of the male IDU respondents were sexually active, which is consistent with previous studies [2, 64, 65]. This refutes the claim that IDU are sexually inactive at all. Male IDU hence also play an important role in the sexually-driven part of the HIV epidemic. High level of sexual risk behaviors (e.g., unprotected sex,

multiple sex partners, and commercial sex) was observed among our group of sexually active male IDU. This is consistent with findings of previous studies [2, 51, 63, 65]. Prevention efforts are warranted. Though overall level of injecting risk behaviors (<20%) was relatively low, overlapping injecting and sexual risk behaviors is quite substantial (17.5%). There remains a non-negligible potential 'bridging' effect for HIV transmission across different populations. Corroborating with previous findings of clustered HIV risky behaviors among IDU [65], those sharing injection equipments were more likely than others to be not using condoms.

2). Male IDU who are sexually active and inactive had similar drug use practices such as daily frequency of drug injection. The two groups also engaged in comparable level of injecting risk behaviors, including both receptive and distributive syringe sharing. Overall, our respondents however, reported a relatively lower level of injecting risk behaviors (<20%) than other similar studies [64, 65]. However, such findings corroborates with recent behavioral surveillance data obtained from the study site (personal communication with CDC of Dazhou city).

3). Male IDU who were sexually active and inactive did not differ in their level of HIV risk perception. Having sex per se was not associated with HIV risk perception among our male IDU respondents. The respondents seem to be quite realistic about their risk of HIV infection. Some studies reported that 50% or more of the IDU respondents did not perceive any chance of contracting HIV [80, 103] but only 21% of the male IDU in this study had a similar perception. Many of them hence do acknowledge their own risk of HIV infection. Meanwhile, only around 12% perceived a high/sure chance of contracting HIV. This might be due to their relatively low level of injecting risk behaviors (about 20%).

Chapter 5 Associations between background characteristics and HIV-related behaviors

5.1. Background

Many research studies reported associations between background variables and prior HIV-related risk/preventive behaviors (e.g. consistent condom use in the last 6 months) and behavioral intentions (consistent condom use and avoidance of syringe sharing). These variables are potential confounders of the associations between risk perception and HIV-related behaviors and behavioral intentions, which are the foci of our investigation. Significant variables identified in this Chapter were hence adjusted for in data analysis to be performed in subsequent chapters.

5.2. Objectives

This Chapter is primarily descriptive in purpose. The prevalence of some HIV-related preventive or risk behaviors was presented. The associations between the six behavioral outcomes (prior behaviors related to condom use and syringe sharing in the last 6 months and behavioral intentions for consistent condom use and avoidance of syringe sharing) and a number of studied background characteristics of the sexually active male IDU respondents were investigated.

5.3. Measures

Six behavioral measures were used as the dependent variables, including those related to condom use with any female sex partner in the last 6 months, syringe

sharing in the last 6 months, behavioral intention for consistent condom use with RP, NRP and FSW in the coming 6 months and behavioral intention for avoiding syringe sharing in the coming 6 months. Independent variables used in this Chapter included: 1). background characteristics (e.g., socio-demographics, HIV-related knowledge, knowing some who are HIV positive, self-reported STD infection), 2). utilization of HIV/STD-related prevention services (e.g., HIV antibody testing, MMT, SEP), 3). drug use practices (e.g., length of drug injection, daily frequency of drug injection), and 4). injecting risk behaviors (e.g., receptive and distributive syringe sharing).

5.4. Statistical Analysis

Frequency distributions of the studied variables are tabulated. Univariate odds ratio (ORu) and respective 95% confidence interval were derived to investigate the associations between the studied background characteristics and each of the six behavioral outcomes of concern. A stepwise multivariate logistic regression model, using univariately significant factors as candidate variables, was then fit to identify characteristics in association with the behavioral outcomes. A p-value <0.05 was considered as statistically significant.

5.5. Results

5.5.1. Prevalence of prior condom use and syringe-sharing behaviors (last 6 months) and behavioral intention to use condoms or to share syringes for drug use

Amongst the 429 participants, less than 1/5 (17.5%) reported consistent condom

use with any female sexual partners. The majority (89.2%) of the participants had no experience of sharing syringes with others (data not tabulated). Amongst those who had RR (N=318), about one third (32.1%) reported that they intended (highly likely or very certain) to use condoms every-time with RP; around half of them (49.1%) intended to use condoms every time with NRP in the coming six months around two thirds of them (63.6%) showed a similar behavioral intention to use condom consistently with FSW (Table 5.1). The vast majority (79.8%) of the respondents intended to avoid sharing syringes with others for drug injection in the coming six months (Table 5.2).

Table 5.1 Behavioral intention for consistent condom use with the three types of sex partner

In the next 6 months, …	High/sure chance Row %	No to half chance Row %
a). Regular sex partner (RP) (n=318) "How likely do you think that you will use condoms everytime with RP?"	32.1	67.9
b). Non-regular sex partner (NRP) (n=116) "How likely do you think that you will use condoms everytime with NRP?"	49.1	50.9
c). Female sex workers (FSW) (n=129) "How likely do you think that you will use condoms everytime with FSW?"	63.6	36.4

Table 5.2 Behavioral intention to avoid sharing syringes with others for drug injection

	No chance Row %	Little to sure chance Row %
"How likely do you think that you will share syringes with others for drug injection?"	79.8	20.2

5.5.2. Background characteristics in association with prior consistent condom use and not sharing syringes during drug injection in the last 6 months

Three factors (HIV-related knowledge, utilization of HIV/STD prevention services, and having RP and/or NRP being IDU) were significantly associated with consistent

condom use in both the univariate and multivariate analysis. Length of drug injection was significant in the univariate but not in the adjusted analysis (Table 5.3).

Table 5.3 Associations between background factors and prior consistent condom use (n=456) ◊

	Used condoms every-time with female sex partners in the last 6 months		
	Row%	ORu (95%CI)	ORm (95%CI)
Background characteristics & service use			
Number of appropriate responses given to the two knowledge items†			
<2 appropriate responses	10.2	1.00	1.00
2 appropriate responses	23.6	**2.72(1.59,4.66)***	**2.13(1.22,3.71)**
Utilization of HIV/STD prevention services#∏			
4 types or fewer	14.2	1.00	1.00
>4 types	31.5	**2.78(1.03,4.75)***	**2.28(1.31,3.96)**
Drug use practices & sex partnership			
Length of drug injection			
Less than 10 years	19.9	1.00	ns
More than 10 years	10.1	**0.45(0.23,0.89)***	
Having RP and/or NRP being IDU#			
No / not certain/no RP and NRP	20.3	1.00	1.00
Yes	6.5	**0.27(0.12,0.65)**	**0.35(0.14,0.84)***

#†The 2 HIV-related knowledge items include: "Whether a person infected with HIV could be determined by his/her appearance?", and "whether or not HIV could be detected once after the infection took place?".
∏ Include "HIV antibody test", "MMT", "SEP", "receiving free condoms", "STD checkup/treatment", and "receiving HIV education materials".
ORu: Univariate odds ratio.
ORm: Odds ratios obtained from stepwise logistic regression analysis using univariately significant variables as candidate variables.
*p<0.05; **p<0.01; ***p<0.001. ns: multivariately not significant. --- univariately significant.
◊: The factors examined in the univariate analysis included background characteristics (age, education, marital status, monthly income, study site and residence of origin), HIV/STD related factors (HIV/STD knowledge, knowing someone who is HIV positive, ever contracting STD and utilization of HIV/STD services), drug use practice (duration and frequency of drug injection, usage of multiple drugs and numbers of attempts to quit drug use) and sexual behavioral factors (number of sex partners and having IDU sex partners). Only the statistically significant variables were presented in the table.

Four factors (knowing someone who is HIV positive, STD infection, utilization of HIV/STD prevention services, and multiple sex partners) were significantly associated with abstinence from sharing syringes in the last 6 months, in both the univariate and multivariate analysis. Current marital status was significant only in the univariate analysis but become non-significant in the multivariate analysis (Table 5.4).

Table 5.4 Background characteristics in association with prior experience of not syringe-sharing in the last 6 months (n=456) $^{\lozenge}$

	Did not share syringes with others[#]		
	Row%	ORu (95%CI)	ORm (95%CI)
Background characteristics & service use			
Current marital status			
Currently not married	86.3	1.00	ns
Currently married	94.0	**2.49(1.18,5.27)***	
Known someone who is HIV+			
None to five/not certain	91.4	1.00	1.00
More than five	75.7	**0.29(0.16,0.56)***	**0.29(0.15,0.57)***
Ever contracted an STD			
Never	92.4	1.00	1.00
Ever	80.6	**0.34(0.19,0.62)***	**0.43(0.23,0.80)**
Utilization of HIV/STD prevention services[#]∏			
4 types or fewer	87.2	1.00	1.00
>4 types	95.5	**3.12(1.09,8.91)***	**3.10(1.05,9.16)***
Drug use practices & sex partnership			
Number of sex partners[#]			
Exclusive monogamy	93.1	1.00	1.00
Multiple number of sex partners	81.2	**0.32(0.18,0.58)***	**0.36(0.19,0.67)**

[#] In the last 6 months.   †The 2 HIV-related knowledge items include: "Whether a person infected with HIV could be determined by his/her appearance?", and "whether or not HIV could be detected once after the infection took place?".
∏ Include "HIV antibody test", "MMT", "SEP", "receiving free condoms", "STD checkup/treatment", and "receiving HIV education materials".
ORu: Univariate odds ratio.
ORm: Odds ratios obtained from stepwise logistic regression analysis using univariately significant variables as candidate variables.
*p<0.05; **p<0.01; ***p<0.001.   ns: multivariately not significant. --- univariately significant.
$\lozenge$: The factors examined in the univariate analysis included background characteristics (age, education, marital status, monthly income, study site and residence of origin), HIV/STD related factors (HIV/STD knowledge, knowing someone who is HIV positive, ever contracting STD and utilization of HIV/STD services), drug use practice (duration and frequency of drug injection, usage of multiple drugs and numbers of attempts to quit drug use) and sexual behavioral factors (number of sex partners and having IDU sex partners). Only the statistically significant variables were presented in the table.

5.5.3. Background characteristics in association with behavioral intentions for consistent condom use and avoidance of syringe sharing in the coming 6 months

Utilization of more than four types of HIV/STD prevention services was significantly associated with the behavioral intention for consistent condom use with RP in both the univariate and multivariate analysis. Knowing someone who was HIV positive, having more than 10 years of drug injection history and addiction to multiple drugs were statistically significant in the univariate analysis but not in the multivariate analysis (Table 5.5).

Table 5.5 Background characteristics in association with behavioral intentions for consistent condom use with different types of sex partner and avoidance of syringe sharing in the coming 6 months (n=318) [◊]

	% Behavioral intention to use condoms every-time (high/sure chance) with RP in the next 6 months		
	Row%	ORu (95%CI)	ORm (95%CI)
<u>Background characteristics & service use</u>			
Study site			
Dazhou city (in Sichuan)	36.2	1.00	1.00
Hengyang city (in Hunan)	14.8	**0.31(0.14,0.65)****	**0.35 (0.16, 0.76)****
Known someone who is HIV+			
None to five/not certain	35.2	1.00	ns
More than five	15.7	**0.34(0.16,0.76)****	
Utilization of HIV/STD prevention services[#][∏]			
4 types or fewer	25.8	1.00	1.00
>4 types	56.1	**3.67 (2.09,6.44)*****	**3.36 (1.90,5.94)*****
<u>Drug use practices & sex partnership</u>			
Length of drug injection			
Less than 10 years	35.6	1.00	ns
More than 10 years	22.4	**0.52(0.29,0.93)***	
Use of multiple drugs[#]			
No, heroin only	36.6	1.00	ns
Yes, multiple drugs	25.0	**0.58(0.35,0.95)***	

[#] In the last 6 months.   [†]The 2 HIV-related knowledge items include: "Whether a person infected with HIV could be determined by his/her appearance?", and "whether or not HIV could be detected once after the infection took place?".
[∏] Include "HIV antibody test", "MMT", "SEP", "receiving free condoms", "STD checkup/treatment", and "receiving HIV education materials".
ORu: Univariate odds ratio.
ORm: Odds ratios obtained from stepwise logistic regression analysis using univariately significant variables as candidate variables.
*p<0.05; **p<0.01; ***p<0.001.   ns: multivariately not significant. --- univariately significant.
◊: The factors examined in the univariate analysis included background characteristics (age, education, marital status, monthly income, study site and residence of origin), HIV/STD related factors (HIV/STD knowledge, knowing someone who is HIV positive, ever contracting STD and utilization of HIV/STD services), drug use practice (duration and frequency of drug injection, usage of multiple drugs and numbers of attempts to quit drug use) and sexual behavioral factors (number of sex partners and having IDU sex partners). Only the statistically significant variables were presented in the table.

Multiple previous attempts to quit drug use was the only factor significantly associated with behavioral intention for consistent condom use with NRP in the next six months (ORu=.44; data not tabulated). In the univariate analysis, none of the studied factors was significantly associated with the behavioral intention for consistent condom use with FSW in the univariate analysis (data not tabulated).

Three variables (utilization of more than four types of HIV/STD prevention services, having multiple sex partners and being Dazhou residence) were associated with the behavioral intention to avoid syringe sharing in both the univariate and the multivariate analysis (Table 5.6).

Table 5.6 Background characteristics in association with behavioral intention for not sharing syringes with others in the next 6 months (n=456)

	% Behavioral intention for not sharing syringes with others in the next 6 months (no chance)		
	Row%	ORu (95%CI)	ORm (95%CI)
Background characteristics & service use			
Study site			
Dazhou city (in Sichuan)	82.0	1.00	1.00
Hengyang city (in Hunan)	69.6	0.50(0.29,0.87)*	0.54 (0.31,0.95)*
Utilization of HIV/STD prevention services[#]∏			
4 types or fewer	76.8	1.00	1.00
>4 types	92.1	3.53 (1.57,7.93)**	3.36 (1.49,7.61)**
Drug use practices & sex partnership			
Exclusive monogamy	83.5	1.00	1.00
Multiple number of sex partners	73.3	0.54(0.34,0.86)*	0.53 (0.33,0.86)**

[#] In the last 6 months.　†The 2 HIV-related knowledge items include: "Whether a person infected with HIV could be determined by his/her appearance?", and "whether or not HIV could be detected once after the infection took place?".
∏ Include "HIV antibody test", "MMT", "SEP", "receiving free condoms", "STD checkup/treatment", and "receiving HIV education materials".
ORu: Univariate odds ratio.
ORm: Odds ratios obtained from stepwise logistic regression analysis using univariately significant variables as candidate variables.
*p<0.05; **p<0.01; ***p<0.001.　ns: multivariately not significant. --- univariately significant.
◊: The factors examined in the univariate analysis included background characteristics (age, education, marital status, monthly income, study site and residence of origin), HIV/STD related factors (HIV/STD knowledge, knowing someone who is HIV positive, ever contracting STD and utilization of HIV/STD services), drug use practice (duration and frequency of drug injection, usage of multiple drugs and numbers of attempts to quit drug use) and sexual behavioral factors (number of sex partners and having IDU sex partners). Only the statistically significant variables were presented in the table.

5.6. Summary and discussion of key findings

1) Amongst the study participants, only less than 1/5 reported consistent condom use with female sexual partners in the last 6 months. The low prevalence of condom use reported in this study is supported by previous studies [2, 51, 63, 65]. It once again confirmed the important role played by male IDU in the sexually-driven part of the HIV epidemic. Though the overall level of syringe sharing behaviors (about 10%) was relatively low, the number might be under-reported due to social desirability bias. These numbers suggested a non-negligible potential 'bridging' effect for HIV transmission from sexually active IDU to other drug users and their sexual partners. To curb the HIV epidemic in China, it is urgent to develop prevention programs to adjust both sexual and injecting risk behaviors of male IDU.

2) HIV knowledge was associated with both prior condom use behavior and future behavioral intention for consistent condom use with RP. Although it is widely

accepted that knowledge level of AIDS may not be a sufficient predictor of safe sexual behavior practices[104], reduce the misconceptions and provision of accurate knowledge about HIV would be the necessary first step to influence the attitude and beliefs of susceptibility and ultimately bring about behavioral change.

3) Utilization of HIV/STD services was shown to be correlated with both prior preventive behaviors (e.g. consistent condom use and not sharing syringes) and future intentions for consistent condom use and avoidance of syringe sharing, after the potential confounders were being controlled for. Such finding was consistent with Booth and colleagues' 1999 study which demonstrated that drug abusers who received services reported significantly fewer HIV-related risks than those who did not received services[105]. Such an association is speculated to be bilateral. On one hand, utilization of HIV/STD related services (e.g. mental health counseling, medical care) might have potential impact on the putative risk behaviors associated with HIV infection and possibly influence the course of new infections [105]; it is also possible that lower risk individuals were more likely to use health-related services than those who were higher risk or whose drug abuse was more debilitating. Given the nature of cross-sectional design, we could not differentiate the two effects.

Chapter 6 Associations between unconditional and conditional HIV-related risk perceptions and behavioral intention and behaviors

6.1. Background

6.1.1. Relationship between HIV-related risk perceptions and behaviors – the motivational hypothesis

Risk perception is central to HIV-related research and interventions. In the context of HIV, risk perception refers to an individual's subjective assessment of the likelihood of HIV infection [30]. Many HIV intervention programs, implicitly or explicitly, attempt to increase the level of risk perception for HIV infection among individuals [13, 14]. Risk perception is also a core element in a number of prevailing health behavior theories [8], including the Health Action Process Approach (HAPA) [9, 10], the Health Belief Model (HBM) [11, 12], the Protection Motivation Theory (PMT) [106, 107], and the AIDS Risk Reduction Model [108]. A common underlying assumption of these theories is that a heightened level of HIV-related risk perception would motivate an individual to avoid relevant risk behaviors or to adopt relevant preventive behaviors. These health behavioral theories hence prescribe a negative association between risk perception and risk behaviors, or a positive association between risk perception and preventive behaviors. This underlying assumption is known as the motivational hypothesis [25, 109]. The motivational hypothesis has been supported by a number of research on cancer screening [110-112], influenza vaccination [113], but inconsistent findings have also been reported.

6.1.2. Mixed findings for the relationship between HIV risk perceptions and risk

behaviors

Empirical findings concerning the relationship between HIV-related risk perceptions and behaviors have been mixed and inconclusive [24-26]. In some cross-sectional studies, a negative association was found between HIV risk perception and inconsistent condom use and syringe-sharing [114], supporting the motivational hypothesis, whilst opposite findings of positive associations or null associations have also been reported in other studies [51, 81, 82, 115]. Similar mixed findings were reported in a number of longitudinal studies. In some studies, a heightened level of HIV-related risk perception at the baseline predicted a lower prevalence of syringe-sharing behaviors at the follow-up studies. In other studies, positive associations were reported [116-118].

6.1.3. Plausible explanations for the mixed findings – an overview of the key methodological issues

Some researchers identified a number of conceptual and measurement limitations inherent in the literature investigating the relationship between HIV-related risk perceptions and behaviors e.g., [25, 26]. Three key issues exist. First, there are often misinterpretations concerning cross-sectional associations between risk perception and behaviors. The temporal order hinders meaningful causal relationship to be established from cross-sectional data. Second, many researchers used unconditional global measures which does not take specific types of risk behaviors into account when assessing the level of HIV-related risk perception. An example of the this unconditional, or behavioral non-specific, global measure is: "How likely do you think is your chance of getting infected with HIV?" [24, 25]. Third,

one's risk perceptions on certain risk behaviors might vary according to the nature of the partners involved in the behaviors. For instance, steady partners are often perceived to be 'safe' [119]. However, many researchers assessed risk perceptions affiliated with risk behaviors that are partner non-specific [30].

Thus far, only a few empirical studies have addressed these three methodological issues explicitly [29, 30, 109]. More often, more than one of these inherent conceptual and measurement limitations was found in the existing literature [120]. This further complicates the interpretation of the motivational role of HIV risk perception on modifying risk behaviors. The three methodological issues are further elaborated below.

6.1.3.1. Misinterpretations of cross-sectional associations between HIV risk perceptions and risk behaviors

Many researchers fail to recognize that risk perception can both be an outcome resulting from practicing a particular risk behavior and a predictor of subsequent risk behaviors[24,28,121]. The aforementioned motivational hypothesis requires risk perception to be a cause but not a result of behaviors. However, the practice of a risk behavior or relevant behavioral changes could causally alter the perception of risk. Hence, the temporal order between risk perception and behaviors should be taken into consideration and extreme care needs to be exercised when interpreting the results of relevant cross-sectional studies.

Previous studies in the literature have not paid enough attention to this

important temporal order between risk perception and behaviors. In cross-sectional studies, risk perception and risk behaviors were often being assessed in the same survey. The reported associations are often based on current risk perception (e.g., "How likely to you think that you would contract HIV?") but prior behaviors (e.g., use or non-use of condoms in the last sexual encounter). The temporal requirement of the motivational hypothesis is therefore violated [25, 28]. In this case, one would currently perceive a high HIV risk if he/she had or has been practicing risk behaviors in the past (prior to the survey). Instead of being motivational (i.e. the level of perceived HIV risk affects the level of risk behaviors in the past), the case is reflective in nature (i.e. the level of perceived HIV risk is determined by the level of risk behaviors that took place in the past). This reflective mechanism of risk perception therefore expects a positive association between HIV risk perception and prior risk behaviors or vice versa for prior preventive behaviors [25, 28, 109]. This argument that current risk perceptions are reflections of prior behaviors is sometimes known as the accuracy hypothesis [28, 109].

It is hence not difficult to understand why some researchers, who have not taken seriously the temporal issues into account in cross-sectional studies 'misinterpreted' positive or null associations between current HIV risk perception and prior risk behaviors, which occurred in the past, as a failure to support the motivational hypothesis.

6.1.3.2 Use of unconditional global measures of risk perception

A single item similar to the one "How likely do you think is your chance of

getting infected with HIV?" is often used in previous studies to assess HIV-related risk perception [24, 25]. This measure has sometimes been referred to as a global HIV risk perception measure [26, 30]. In general, a global measure is believed to solicit an individual's overall level of perceived HIV risk. It is unconditional in the sense that it does not specify the risk associated with a particular type of risk behavior (e.g. syringe sharing or unprotected sex). In the mind of an individual, the time frame of this unconditional risk perception measure may refer to either prior or future behaviors (e.g., intending to change a behavior). In cross-sectional studies using prior behaviors as outcome variables, an unconditional global risk perception measure therefore provides no clues to disentangle the aforementioned issues concerning the temporal order between risk perception and prior behaviors. It is argued that such unconditional global measures of risk perception are often reflective of prior behaviors, instead of being motivational in nature [25, 28, 109].

Methodological issues exist in cross-sectional studies even when behavioral intentions, rather than prior behavors, are used as outcome variables. People may intend to adopt preventive behaviors as a result of their perceived risk (motivational hypothesis). Others may lower their level of risk perception as a result of the behavioral intention to adopt proventive behaviors (accuracy hypothesis). It is therefore necessary to search for other types of risk perception measures. It is argued that conditional measures on risk perception are required for a closer xamination of the motivational hypothesis [113, 121, 122].

Some researchers believed that the global measures of risk perception fail to condition the risk perception on the presence or absence of particular risk behaviors

[29], [113]. A conditional measure therefore assesses the perceived likelihood or risk, given the presence or absence of a clearly defined risk behaviors such as unprotected sex or syringe sharing [123]. An example of a conditional measure is: "How likely do you think is your chance of contracting HIV, if you do not use condoms during sexual intercourse?" Risk perceptions condition on type of risk behavior is particularly relevant to individuals practicing multiple risk behaviors, such as sexually active male IDU. However, only a few studies have employed conditional measures to assess HIV risk perception for groups facing multiple types of risk for HIV transmission.

6.1.3.3. Use of partner non-specific measures to assess risk perception and risk behaviors

When some particular types of risk behaviors are of concern, the source of risk (e.g., different types of sex partner) matters. Some researchers assessed risk behaviors (e.g. inconsistent condom use) without making reference to the type of sex partners (e.g. RP, NRP and FSW). It is argued that global risk perception measures have not paid adequate attention to the source of the risk [26]. Abundant evidence shows that prevalence of inconsistent condom use varies according to the specific type of sex partners [65], [124]. Different partner types may have different characteristics which are going to affect the perception of the HIV-related risk. Steady partners are often perceived to be 'safe' [119]. Some researchers hence suggest the use of partner-specific measure [30]. In the context of sexual behaviors, partner-specific measures are particularly relevant.

6.2. Objectives

In this Chapter, the first group of analyses investigated the levels of various types of HIV-related risk perception and behavioral intentions:

1.   To investigate the level of risk perceptions, using unconditional global measures on risk perception for the chance of contracting HIV.

2.   To investigate the level of risk perceptions for contracting HIV, conditioned on sexual risk and partner type (behavior-and-partner-specific risk perceptions).

3.   To investigate the level of risk perception, conditioned on syringe sharing behavior.

4.   To investigate the level of conditional behavior-and-partner-specific behavioral intention for consistent condom use in the next 6 months (with RP, NRP and FSW).

5.   To investigate the level of behavioral intention for avoiding syringe sharing in the coming 6 months.

The second group of analyses investigated the associations between unconditional risk perceptions and prior HIV-related behaviors:

1.   To investigate the association between prior consistent condom use with any female (every-time) in the last 6 months and global risk perception on contracting HIV.

2.   To investigate the association between prior syringe sharing behavior in the last 6 months and global risk perception on contracting HIV.

The third group of analysis investigated the associations between global/conditioned risk perceptions and behavioral intentions for consistent condom use and avoidance of syringe sharing in the coming 6 months:

1.   To investigate the associations between behavior-and-partner-specific risk perception for contracting HIV (via unprotected sex with RP, NRP and FSW) and partner-specific behavioral intention for consistent condom use in the coming 6 months (with RP, NRP and FSW).

2.   To investigate the associations between unconditional global risk perception, risk perception conditioned on syringe sharing and behavioral intention for avoiding syringe sharing in the coming 6 months.

It is hypothesized that in general, associations involving unconditional global measures of risk perceptions and prior behaviors or behavioral intentions would be reflective in nature (i.e. practice or intention to practice risk behaviors increased unconditional global risk perception for the chance of contracting HIV), whereas associations involving conditional risk perceptions (conditional on behavior and/or partner type) would be motivational in nature (i.e. higher conditional risk perceptions result in higher level of behavioral intention to avoid the risk behavior).

6.3. Measures

6.3.1. Measures of HIV-related risk perceptions

1. A single item on unconditional global HIV risk perception ("How likely do you

think that you would contract HIV?") was used; the variable was dichotomized into "no/little/about half" chance (0) and "high or sure" chance (1).

2. Three partner-specific and behavior-specific conditional sexual risk perceptions were used. The question item for RP is: "How likely do you think that your RP will transmit HIV to you via unprotected sex with her?"). Two similar questions with respect to NRP and FSW respectively were asked. These variables were dichotomized to "no/little/about half" chance (0) and "high or sure" chance (1).

3. One behavior-specific conditional risk perception on injecting drug use was used ("How likely do you think that you will contract HIV via syringe-sharing with others for drug injection?").

6.3.2. Measures of HIV-related behaviors (sexual intercourse and injecting drug use)

1. Prior condom use behaviors were assessed. Respondents were asked about their frequency of condom use with RP, NRP, or FSW in the last 6 months. Response categories include "always used", "used most of the time", "used a little of the time", and "never used". An indicator variable for overall inconsistent condom use with any female sex partners was also formed (yes = (1) versus no= 0).

2. Partner-specific behavioral intentions on consistent condom use were assessed. Three items, each referring to a particular type of female partner (RP, NRP and FSW), were used to assess respondents' behavioral intention to use condoms consistently

during sexual intercourse with the particular type of sex partner in the coming 6 months. Respondents were asked: "In the coming 6 months, how likely do you think you would use condoms every-time when having sex with your RP?" Two similar questions were asked, making references to NRP and FSW. Response categories were on a 5-point scale ranging from "no chance at all" to "sure chance". These variables were dichotomized into "no/little/about half chance" to use condoms every-time (1) and "high or sure" chance to use condoms every-time (0).

3. Respondents were also asked whether they had had shared syringe with others in the last 6 months (prior behavior).

4. Respondents were asked whether they intended to share syringes with others in the coming 6 months (behavior-specific behavioral intention - "How likely do you think that you will share syringes with others in the next 6 months?"). Due to the length of the questionnaire, questions on partner-and-behavior-specific behavioral intentions (intend to share with sex partner, friends or strangers) for syringe sharing were not asked.

6.4. Statistical analysis

Frequency distributions of the studied variables (HIV-related risk perceptions and prior behaviors and behavioral intentions) are tabulated. Logistic regression analyses were performed to derive univariate odds ratio and respective 95% confidence interval for the associations between specific types of HIV risk perception and specific types of HIV-related behavior or behavioral intention.

Adjusted OR (adjusting for background factors that were significantly associated with the behavioral measures of interest) were then derived by using multiple logistic regression models. Associations between the aforementioned behaviors and background characteristics were presented in the last Chapter. In particular, background characteristics examined included: 1) background characteristics (e.g., socio-demographics, HIV-related knowledge, knowing some who are HIV positive, self-reported STD infection), 2) utilization of HIV/STD-related prevention services (e.g., HIV antibody testing, MMT, SEP), and 3) drug use practices (e.g., length of drug injection, daily frequency of drug injection). A p-value <0.05 was considered as statistically significant.

6.5. Results

6.5.1. Global and partner-behavior-specific HIV risk perceptions related to sexual intercourse

Of all 456 male IDU respondents, 12.5% perceived unconditional high risk (sure or very high chance) of contracting HIV, according to the global measure for HIV-related risk perception (How likely do you think you would contract HIV?). Of the 456 IDU respondents, 318 (69.7%) had had sex with at least a RP, 116 (25.4%) with a NRP, and 129 (28.3%) with a FSW in the last 6 months. These three types of sexual partnership are not mutually exclusive. Among the respondents, 10.4% of those having RP, 33.6% of those with NRP and 53.7% with those with FSW perceived a high risk of contracting HIV if they were not using condoms with the corresponding type of female sex partner (partner-and-behavior-specific risk perceptions). Data are not tabulated.

Of the respondents, 67.9% of those with RP, 50.9% of those with NRP and 36.4% of those with FSW indicated that they had a low level of behavioral intention (no to half chance) to use condoms consistently in the coming 6 months with the corresponding type of female sex partner (behavior-and-partner-specific behavioral intention on consistent condom use; see Table 6.1).

Table 6.1 Behavioral intention for consistent condom use with the three types of sex partner

In the next 6 months, ...	High/sure chance Row %	No to half chance Row %
a). Regular sex partner (RP) (n=318)		
"How likely do you think that you will use condoms every-time with RP?"	32.1	67.9
b). Non-regular sex partner (NRP) (n=116)		
"How likely do you think that you will use condoms every-time with NRP?"	49.1	50.9
c). Female sex workers (FSW) (n=129)		
"How likely do you think that you will use condoms every-time with FSW?"	63.6	36.4

6.5.2. Associations between global risk perceptions and prior sexual behaviors (unconditioned on type of sex partners)

Of all respondents, 82.5% had had inconsistent condom use with at least one type of female sex partners (prior behavior unconditioned on type of sex partner). A statistically non-significant association between the unconditional global measure of risk perception and prior condom use behavior (unconditioned on type of sex partners) was observed (Table 6.2).

Table 6.2 Associations between unconditional global HIV risk perception and prior inconsistent condom use with any female sex partner (unconditioned on partner type)

	High level of unconditional global risk perception (High/sure chance of contracting HIV)		
	Row%	ORu (95% CI)	AOR (95%CI)
Inconsistent condom use with any female sex partner in the last 6 months			
No, condoms always used	13.8	1.00	1.00
Yes, inconsistent use	12.2	0.87 (0.43,1.77)	1.10^1 (0.52, 2.31)

ORu: Univariate Odds Ratio. AOR: Adjusted Odds Ratio.
1. Odds ratio adjusted for the three univariately significant background factors (HIV-related knowledge, utilization of HIV/STD-related services, and having an IDU sex partner).
*p<0.05;**p<0.01;***p<0.001.
na: not applicable

6.5.3. Associations between partner-specific conditional sexual risk perceptions and partner-specific condom use behavioral intentions for consistent condom use

In the univariate analysis, the three partner-specific conditional sexual risk perceptions significantly predicted the corresponding partner-specific behavioral intention for consistent condom use. Those who perceived high risk of contracting HIV (conditioned on unprotected sex with their RP) were less likely than others to have a low level of behavioral intention for consistent condom use with RP (42.4% versus 70.9%; univariate OR = 0.16; Table 6.3). A higher level of risk perception was hence associated with a lower level of behavioral intention for not practicing preventive behaviors, which is in agreement with the motivational hypothesis. The corresponding univariate OR for NRP an FSW were 0.16 (30.8% versus 61%) and 0.28 (17.6% versus 51.4%; Table 6.3) respectively.

Adjusting for the two background factors (study site and utilization of HIV/STD-related services) that were significantly associated with behavioral

intention for consistent condom use with RP (see Chapter 9), the adjusted OR became 0.27 (95%CI: 0.13, 0.59; p<0.001; data not tabulated). None of the background factors was significantly associated with behavioral intention for consistent condom use with NRP and FSW. Hence, no adjustment was performed for these two associations.

Table 6.3 Associations between conditional behavior-and-partner-specific sexual risk perceptions and partner-specific condom use behavioral intentions

	Low level of intention to use condom consistently in the next 6 months (no/low/half chance) (partner-specific behavioral intention)					
	With RP[1] (n=318)		With NRP (n=116)		With FSW (n=129)	
	Row%	ORu (95% CI)	Row%	ORu (95% CI)	Row%	ORu (95% CI)
Conditional perception on sexual intercourse (behavior-partner-specific) [a]						
Low	70.9	1.00	61.0	1.00	57.4	1.00
High	42.4	**0.30 (0.14,0.63)****	30.8	**0.28 (0.13,0.65)****	17.6	**0.16 (0.07,0.36)*****

a. There were three questions, each referring to a particular type of sex partner (RP, NRP, and FSW respectively). The question asked for RP was: "How likely do you think that your RP will transmit HIV to you via unprotected sex with her? Two other similar questions were asked with respect to NRP and FSW respectively.
*p<0.05;**p<0.01;***p<0.001.

6.5.4. Associations between prior syringe sharing behavior and global unconditional risk perceptions

Of all respondents, 71.9% perceived a high risk of contracting HIV via sharing syringes with others (risk perception conditioned on behaviors but not relationship with sharer – "How likely do you think that you would contract HIV via sharing syringes with others for drug injection?"). Data were not tabulated

Of all respondents, 11.2% shared syringes with others during injecting drug use in the last 6 months (prior injecting behavior). It is seen that both before and after

adjusting for significant background variables (see footnote of Table 6.4), prior syringe sharing behavior in the last 6 months was associated a lower level of global risk perception for contracting HIV (ORu = .2 and AOR=.21). It is seen that 35.3% of the syringe sharers perceived a high level of unconditional global risk perception for contracting HIV but only 9.6% of the non-sharers held such a risk perception. It seems to support the 'accuracy hypothesis' – that global risk perception was reflective of the risk behavior.

Table 6.4 Associations between unconditional HIV risk perception and prior injecting drug use behaviors

	High/sure chance of contracting HIV (Unconditional global risk perception)		
	Row%	ORu (95% CI)	AOR (95%CI)
Sharing syringes with others in the last 6 months			
Yes	35.3	1.00	1.00
No, never shared	9.6	0.20 (0.10, 0.38)***	0.21[1] (0.10,0.45)***

ORu: Univariate Odds Ratio.   AOR: Adjusted Odds Ratio.
1. Odds ratio adjusted for the four univariately significant factors identified in Table 13.
*p<0.05;**p<0.01;***p<0.001.   na: not applicable

6.5.5. Associations between global and conditional injecting risk perceptions and syringe-sharing behavioral intentions

Over 70% of the respondents intended to avoid sharing needles with others in the future 6 months. The results obtained from the univariate analysis are very similar to those of the adjusted studies. It can be seen both the global risk perception measure (ORu=0.37; 95% CI=0.20, 0.67) and the risk perception measure conditioned on syringe sharing (ORu=2.02; 95% CI=1.25, 3.26) significantly predicted the behavioral intention for not sharing syringes with others in the next 6 months. Both types of risk perception measure, being global or conditional, remained statistically significant after adjusting for relevant significant background correlates (Table 6.5).

The directions of the two associations were however, opposite to each other. The association involving the global risk perception for contracting HIV seems to be reflective in nature (behavioral intention for not practicing risk behaviors results in a lower level of global risk perception). The association between the risk perception for contracting HIV, conditioned on syringe sharing, however, seems to be motivational in nature – a higher level of perceived conditional risk for contracting HIV via syringe sharing result in behavioral intention for not practicing risk behaviors (sharing syringes).

Table 6.5 Predicting behavioral intentions for abstinence from sharing syringes with others in the next six months by using global risk perception and risk perception conditioned on syringe sharing for contracting HIV

	Behavioral intention for not sharing syringes (no chance) with others in the next 6 months (n=456)		
	Row%	ORu (95% CI)	AOR[1] (95% CI)
Global risk perception for contracting HIV			
No	82.2	1.00	1.00
High/sure chance	63.2	**0.37 (0.20,0.67)****	**0.34 (0.18,0.65)****
Risk perception conditioned on syringe sharing			
No	71.1	1.00	1.00
Yes	83.2	**2.02 (1.25,3.26)****	**1.80 (1.10,2.95)***

1. Logistic regression models adjusted for the three significant factors (study site, utilization of HIV/STD prevention services, and multiple sex partnership) identified in Table 5.6 were fitted for both global risk perception and conditional risk perception respectively.

    i). In the adjusted model using 'global risk perception' as a predictor, study site (adjusted odds ratio (AOR)=0.55; 95% confidence interval (CI)=0.31,0.87), utilization of HIV/STD prevention services (AOR=3.79; 95%CI=1.65,9.70), and multiple sex partnership (AOR=0.60; 95%CI=0.37,0.97) remained significant.

    ii). In the adjusted model using 'conditional injecting risk perception' as a predictor, study site (AOR=0.56; 95%CI=0.32,0.99), utilization of HIV/STD prevention services (AOR=3.08; 95%CI=1.35,7.00), and multiple sex partnership (AOR=0.53; 95%CI=0.33,0.85) remained significant.

*p<0.05;**p<0.01;***p<0.001.

6.6. Summary and discussion of the key findings

1) The majority (close to 88%) of the sampled IDU were not sharing syringes with others. This is understandable as the study site had a long history of harm reduction interventions. It is one of the first sites for launching methadone maintenance and needle exchange programs which can be dated back to 2003-05. Such low prevalence of syringe sharing is confirmed by the local behavioral surveillance data (personal communication). However, only about ¾ of the respondents intended to avoid sharing syringes totally in the future 6 months. About 1/4 of the respondents may therefore, still intend to share syringes with others – prevention efforts against HIV transmission via syringe sharing is still required.

2) The prevalence of sexual risk was however, a different story. The majority of the sampled IDU had had female sex partners in the last 6 months – two-thirds of them had had RP and about ¼ were having NRP and even FSW partners. The majority (over 80%) of those male IDU who were sexually active had had unprotected sex with at least one female sex partner in the last 6 months! In terms of behavioral intention, only around 30% of those with RP expected themselves to have a high chance of using condoms consistently with RP in the future 6 months and around 50-60% of those with NRP or FSW had similar intention for consistent condom use with NRP or with FSW. Therefore, our data shows that sexual risk amongst male IDU is an important, and probably under-emphasized, public health problem. Whilst relevant harm reduction interventions may have reduced the risk of syringe sharing substantially, such improvements have not been evident for prevention of sexual transmissions of HIV. In fact, it may be a neglect aspect of HIV prevention among

male IDU, as past literature have pointed out that harm reduction programs in China are rather compartmentalized – risk reduction for IDU-related behaviors are not aligned with risk reduction for sex-related behaviors. Integrated services are hence greatly warranted.

3) Different types of HIV-related risk perception measures solicited different levels of perceived risk. A very high proportion of the respondents (71.9%) perceived high risk (high/sure chance) of contracting HIV via syringe-sharing, whereas only respectively 10.4%, 33.6% and 52.7% of those with RP, NRP and FSW perceived high risk of contracting HIV via unprotected sex with these 3 corresponding types of female sex partners. In comparison with the case of RP, perceived risk attributed to unprotected sex with NRP and FSW are relatively high, though being lower than that of syringe sharing with others. The risk of contracting HIV via unprotected sex with RP is quite low (around 10%) and might have been under-estimated. It is known that many regular female sex partners of male IDU are also IDU and even FSW, who may share needles with others or have unprotected sex wit sex work clients, and are hence vulnerable to HIV transmission.

4) Conditional risk perceptions for contracting HIV via unprotected sex with RP, NRP and FSW were significantly associated with behavioral intention for consistent condom use with the corresponding types of female sex partners. There are hence potentials for changing the risk perceptions about the high risk of contracting HIV via sexual intercourse with different types of sex partners. As mentioned, this is especially true for the case of risk perception concerning RP. Amongst those with RP and perceived a low level of risk for HIV transmission via unprotected sex with RP,

around 70% reported a low level of behavioral intention for consistent condom use with RP. It is important to increase the behavioral intention to use condoms with RP among these male IDU – modification of risk perception provides a potential means to achieve this ends.

5) The level of unconditional global risk perception, i.e. perceived likelihood of contracting HIV without making reference to different types of behavior and partner, was modest (12.5%). This low level of global risk perception is understandable as the majority of the respondents reported not having sharing syringes with others in the last month, though the majority of them had had a female sex partner in the last 6 months. As the risk of HIV transmission, according to our respondents were mainly due to needle sharing.

our findings corroborate with researchers' suggestions that partner-specific measures should be used where appropriate and possible [30]. Otherwise, the perception-behavior link might be under-estimated. The results highlight and confirm the importance of the choice of risk perception measure in assessing HIV risk perception [29]

6) A significant negative association was found between global risk perception and not sharing syringes in the last 6 months. This also corroborates with the findings of some previous studies [81-83]. This result supports the argument that a global risk measure is reflective in nature and supports the accuracy hypothesis [28] - those who did not share syringes with others for drug injection perceived a lower level of risk for contracting HIV. In many cross-sectional studies such a negative association was reported and was often being misinterpreted as a causal relationship that a lower

level of perceived HIV risk would result in a lower likelihood to practice preventive behaviors.

7) No significant association was found between unconditional global risk perception and consistent condom use in the previous 6 months (prior behaviors). This result is in line with the findings of previous studies that IDU did not link their HIV risk with sexual behaviors [16]. This might be due to the fact that IDU often do not associate their global HIV-related risk to sexual behaviors. They regarded that most of the risk may be due to syringe sharing, as seen from the findings that risk perception conditional on syringe sharing was much higher than those conditional on unprotected sex. As discussed, continuous intervention efforts to raise the awareness of IDU about their sexual risk are warranted.

8) The motivational hypothesis that a higher level of conditional risk perception would predict a higher likelihood of reporting behavioral intention for adopting preventive behaviors (in our case, consistent condom use and avoidance of syringe sharing) was supported by our data. Similar significant associations were observed across all three types of sex partner and also in the case of syringe sharing.

9) In contrast, the motivational hypothesis for a positive association between global risk perception and the aforementioned types of behavioral intentions was not supported. No association was found between unconditional global risk perception and behavioral intention for consistent condom use. Plausible explanations were discussed. A negative association was observed between global risk perception and behavioral intention for avoiding syringe sharing, which supports the alternate

accuracy hypothesis. It is speculated that respondents who did not intend to avoid syringe sharing perceived that they are likely to share syringes with others, and given the high risk associated with syringe sharing, they expect themselves to have a high level of global overall risk perception for contracting HIV. This explanation is reflective in nature.

9) A recent meta-analysis on studies investigating the risk perception-behavior relationship (e.g. vaccination research) concluded that risk perception remains an important component in health behavior theories [113]. Future studies may involve a different study population such as MSM or FSW.

Chapter 7 Using others-directed HIV-related risk perceptions to predict behavioral intentions for consistent condom use and avoidance of syringe sharing

7.1. Background

Theoretically, the concern of transmitting HIV to others, like one's concern of contracting HIV, could motivate the adoption of preventive behaviors [125]. Some researchers hence advocate incorporating the concern for preventing others from HIV infection into existing HIV-related prevention programs, as current prevention messages primarily focus on protecting oneself from HIV acquisition [126, 127].

Studies on HIV risk perception for HIV transmission (vs. acquisition) to others were primarily conducted among HIV positive individuals[125, 128, 129]. In a previous study of HIV positive IDU [125], about 33% stated that preventing others from being infected with HIV is one of the main perceived benefits of not sharing syringes with others, though 56% of them pointed out that prevention against re-infection is the main benefit of not sharing syringes with others. These findings show that the concepts of self-protection and protecting others co-exist within the same individual. Other studies reporting higher consistent condom use among HIV discordant than concordant relationships suggest a sign of altruism [130].

Very few studies have been conducted to investigate whether risk perception for transmitting HIV to others (other-directed risk perception) could promote preventive behaviors or avoid risk behaviors among high risk individuals who are not known to

be HIV positive. The research question is highly relevant. High risk groups such as IDU practicing high risk behaviors are constantly facing the risk of contracting HIV, as well as the risk of transmitting the virus to others. There is a dearth of data for this research topic and new studies are greatly warranted. This chapter attempts to address this information gap.

7.2. Objectives

This Chapter aims at investigating whether perception on the risk of transmitting HIV to others (others-directed risk perceptions) would predict behavioral intention for consistent condom use with different types of sex partner and avoidance of syringe sharing among sexually active male Chinese IDU. It was hypothesized that a higher level of others-directed risk perception of HIV transmission would predict a higher likelihood of the aforementioned types of behavioral intentions.

7.3. Measures

7.3.1. Dependent variables

1. The three variables on partner-specific behavioral intentions for consistent condom use were used as dependent variables. The question item for regular sex partners (RP) is: How likely do you think that you will use condom everytime with RP in the next 6 months?"). Two similar questions with respect to non-regular sex partners (NRP) and female sex workers (FSW) respectively were asked. The three partner-specific

condom use behavioral intention outcome variables were dichotomized into "high/sure chance" vs. "no/low/half chance".

2. The variable on behavioral intention on avoiding syringe sharing was used as another dependent variable ("How likely do you think that you will share syringes with others in the next 6 months?"). The variable was dichotomized into "no chance" versus "low/half/high chance".

7.3.2. Predictor variables

Measures of conditional sexual and injecting risk perceptions were used as independent variables. They were termed as "others-directed" conditional risk perceptions because they are related to risk perception for transmitting HIV to others.

1. There are three partner-specific others-directed conditional sexual risk perceptions used in this Chapter. The question item for RP is: "How likely do you think that you would transmit HIV to your RP via unprotected sex with her?"). Two similar questions with respect to NRP and FSW respectively were asked. The three others-directed partner-specific risk perception variables which were conditioned on unprotected sex, as well as the variable on unconditional global risk perception, were dichotomized into "high/sure chance" versus "no/low/half chance".

2. A variable on others-directed risk perception conditioned on syringe sharing was also used for data analysis ("How likely do you think that others will contract HIV via syringe-sharing with you for drug injection?"). The risk perception variable conditioned on syringe sharing was dichotomized into "high/sure chance" versus

"no/low/half chance".

7.4. Statistical analyses

Significant background variables in association with these behavioral intention outcome variables were identified in Chapter 5 and were adjusted for in the statistical analysis. The analysis on whether others-directed risk perceptions predict behavioral intentions was performed in the two steps. First, separate logistic regression models using respective other-directed conditional risk perception as predictor variables were fit to predict respective behavioral intention outcome variables (Tables 7.2 and 7.3). Univariate odds ratio (OR) and respective 95% confidence interval (CI) were derived. Second, if background correlates of the respective four behavior intentions were statistically significant, the previous step was repeated to adjust for these correlates.

7.5. Results

7.5.1. The level of others-directed partner-specific conditional sexual risk perceptions

From Table 7.1, it is seen that of those having RP, 11.9% of the respondents perceived high/sure chance of transmitting HIV to their RP via unprotected sex. Corresponding figures with respect to NRP and FSW were respectively 26.7% and 32.6%.

Table 7.1 Others-directed partner-specific conditional sexual risk perceptions

	High/sure chance	No to half chance
	Row %	Row %
1). Among those having RP (n=318)	11.9	88.1
2). Among those having NRP (n=116)	26.7	73.3
3). Among those having FSW (n=129)	32.6	67.4

7.5.2. Associations between others-directed partner-specific conditional sexual risk perceptions and behavioral intentions for consistent condom use with different types of sex partners

The results of the univariate analysis showed that all three others-directed conditional sexual risk perceptions predicted respective partner-specific behavioral intentions for consistent condom use. In the case of NRP and FSW, no background variables were significantly associated with the aforementioned behavioral intention for consistent condom use; no statistical adjustment was hence made. Two background variables (study site and utilization of HIV/STD prevention services were however, significantly associated with behavioral intention for consistent condom use with RP (see Chapter 5). Adjusting for these variables (data not tabulated), the variable on other-directed risk perception remained statistically significant (AOR=2.95 and 95% CI= 1.43=6.08).

Table 7.2 Predicting partner-specific condom use behavioral intentions for consistent condom use by others-directed partner-specific conditional sexual risk perceptions

	Behavioral intention for consistent condom use in the next 6 months, (high/sure chance to use condom every-time)					
	With RP (n=318)		With NRP (n=116)		With FSW (n=129)	
	Row%	ORu (95% CI)	Row%	ORu (95% CI)	Row%	ORu (95% CI)
Others-directed partner-specific conditional sexual risk perception [a]						
No	29.6	1.00	41.2	1.00	54.4	1.00
Yes	50.0	**2.37 (1.20,4.71)***	71.0	**3.49 (1.44,8.48)****	83.3	**4.26 (1.71,10.62)****

a. There were three questions, each referring to a particular type of sex partner (RP, NRP, and FSW respectively). The question asked for RP was: "How likely do you think that you will transmit HIV to your RP via unprotected sex with her? Two other similar questions were asked with respect to NRP and FSW respectively.

7.5.3. Associations between global and conditional injecting risk perceptions and behavioral intention for avoiding sharing syringes

Amongst the 456 sexually active male IDU, 45% thought perceived high or sure chance of transmitting HIV to others via syringe-sharing. (Data not tabulated). It can be seen from Table 7.3 that others-directed conditional injecting risk perception significantly predicted behavioral intention for avoiding syringe sharing. The variable however became statistically non-significant after adjusting for other background correlates.

Table 7.3 Predicting syringe-sharing behavioral intentions by global and conditional risk perceptions respectively

	Behavioral intention for avoiding syringe sharing in the next 6 months (no chance to share syringes with others) (n=456)		
	Row%	ORu (95% CI)	AOR[1] (95% CI)
Perceived risk conditioned on syringe sharing [a]			
No	78.5	1.00	1.00
Yes	81.5	1.21 (0.76,1.92)**	1.08 (0.67,1.74)

a. The question asked was : "How likely do you think that you will transmit HIV to others via syringe-sharing with you for drug injection?"
1. A logistic regression models adjusted for the three significant factors (study site, utilization of HIV/STD prevention services, and multiple sex partnership) identified in Chapter 5 was fitted.
*p<0.05;**p<0.01;***p<0.001.

7.6. Summary and discussion of key findings

1) This chapter represents one of the few attempts to investigate other-directed risk perception in a high-risk population which is not known to be HIV positive. One of the important findings of this chapter is that others-directed conditional risk perceptions were associated with behavioral intention for consistent condom use

across the three types of sex partners. The AORs are relatively strong in magnitude. The results have important implications that future behavioral interventions targeting male IDU should also focus on raising awareness and concern of the high risk of transmitting HIV to others, and such program may increase the frequency of condom use with different types of sex partners.

2) It is interesting to note that the respondents perceived a higher chance of transmitting HIV to FSW than to other types of female sex partners. Amongst the three types of female sex partner, the rate of condom use among FSW was the highest. In addition, the magnitude of association between others-directed risk perception and behavioral intention for consistent drug use was found to be the highest for sexual behavior with FSW, followed by NSP. Qualitative research is warranted to gain further understanding on these new findings.

3) The association between others-directed risk perception concerning the chance of transmitting HIV to others via syringe sharing and behavioral intention to avoid syringe sharing became statistically non-significant after adjusting for background variables. It is speculated that male IDU care less about transmitting HIV to other IDU via syringe sharing, as the risk is bilateral. The male IDU themselves are simultaneously undergoing the risk of getting infected whilst worrying about the risk of transmitting the virus to other IDU. Risk perceptions conditioned on syringe sharing was very high. It might therefore be 'a fair game' if someone got HIV from the male IDU via syringe sharing. The perceived risk of being infected by female sex partners was however, much lower than that via syringe sharing. As the male IDU himself had dual risk of contracting HIV via sex and injecting drug use, some of

them might feel that the risk gradient between himself and his female sex partner not being even and would hence feel better by reducing the risk of transmitting HIV to his female sex partners. These interpretations are speculative and need to be proved by new evidence.

Chapter 8 Using conditional risk perception to predict behavioral intention for consistent condom use within the HAPA Model

8.1. Background

There is a strong concern about the risk of HIV transmission from male IDU to their non-IDU sex partners via sexual intercourse [53, 131]. Amongst IDU, interventions aiming at reduction of sexual risk behaviors have been less successful than those aiming at reduction of high risk injecting drug use behaviors [76, 78-80]. A better understanding of the factors affecting decisions on condom use among male IDU, including conditional partner-specific risk perception, is therefore urgently warranted to facilitate design of relevant effective programs. It is also important to test the significance of the refined measures of conditional risk perception in predicting behavioral intention in a theory-based context.

In this Chapter, HAPA [9, 10] is chosen as the theoretical framework to understand behavioral intention for consistent condom use among male IDU. The health behavioral model has been applied successfully to explain a variety of health-related behaviors, including testicular self-examination, food hygiene, dietary behaviors, alcohol use, dental flossing, physical activity [88-93, 132]. A study comparing the utility of prevailing social-cognitive health behavior theories, including HAPA, Health Belief Model [11], Theory of Planned Behavior [94], etc.) concluded that HAPA has the best performance and the highest predictive utility [95]. It also has an explicit link between risk perception and behavioral intention, which forms the core research question of this thesis. The detail background about the HAPA and the rationale for

using it as the conceptual framework was explained in a previous chapter. To the best of our knowledge, no study has applied HAPA to understand condom use behaviors of male Chinese IDU.

In brief, the HAPA model suggests that behavioral changes involve both pre-intentional and post-intentional phases. In the pre-intention phase, risk perception, outcome expectancies (pros and cons of behavioral outcomes), and self-efficacy (confidence in one's capability to perform a behavior) are the three key determinants for the formulation of behavioral intention. In the post-intentional phase, behavioral intention, together with other post-intentional factors such as action and coping planning, transforms intention into actual enacted behavior. The present study only focused only on the pre-intentional phase, as behavioral intentions were used as our main outcome variables.

8.2. Objectives

It is already known from the previous chapter that conditional risk perceptions were predictive of behavioral intention for consistent condom use and avoidance of syringe sharing. In this Chapter, we examined hierarchically the additional utility of adding other constructs of the HAPA model (i.e. outcome expectancy and self-efficacy) to the refined conditional risk perception measures, in predicting behavioral intention for condom use with different type of sex partners (RP, NRP, FSW) and behavioral intention for avoidance of syringe sharing among male Chinese IDU.

8.3 Measures

8.3.1. Dependent variables

There are three dependent variables on partner-specific behavioral intentions for consistent condom use with RP, NRP and FSW and one dependent variable on behavioral intention to avoid syringe sharing in the next 6 months.

8.3.2. Predictor variables

Background variables mentioned in Chapter 5 was used in this Chapter.

A set of variables were used to predict behavioral intention for consistent condom use. They were derived from the three constructs of the HAPA model, including:

1. Partner-specific risk perceptions conditional on unprotected sex (see Chapter 6)

2. Positive outcome expectancies affiliated with condom use: "Condom use can protect you from HIV infection". Respondents were asked to indicate their agreement or disagreement with the statement on a 5-point scale, from (1) strongly disagree to (5) strongly agree. The variables was dichotomized into "disagree or strongly disagree or undecided" and "agree/strongly".

3. Four items were used to measure negative outcome expectancies affiliated with condom use: 'condom use lessens your sexual pleasure', 'condom use makes you

feel uncomfortable', 'condom use ruins your mood or atmosphere of sex' and 'condom use makes your sex partners think that you do not trust her'. Respondents were asked to indicate their agreement or disagreement with the statement on a 5-point scale, from (1) strongly disagree to (5) strongly agree. Factor analysis of these items identified one single factor, with an explained variance of 63.1%. The internal consistency (Cronbach's alpha) was found to be 0.78. A composite scale score was constructed by deriving a mean from the sum total of these four items.

4. Five items were used to assess condom use self efficacy: 'you are confident to use condoms every-time when having sex with FSW', 'you are confident to use condoms every-time when having sex with NRP', 'you are confident to use condoms every-time when having sex with RP', 'you believe you can insist always using condom, even though this is not easy to do so' and 'you can surely use condoms every-time if you want to'. Respondents were asked to indicate their agreement or disagreement with the statement on a 5-point scale, from strongly disagree (1) to strongly agree (5). Factor analysis of these items identified one single factor, with an explained variance of 47.4%. The internal consistency (Cronbach's alpha) was found to be 0.72. A composite scale score was constructed by deriving a mean from the sum total of these five items.

A third set of HAPA-based independent variables was used to predict behavioral intention for avoiding syringe use:

1. Conditional injecting risk perception ("How likely do you think that you will contract HIV via syringe-sharing with others for drug injection?").

2. A single item was used to measure non-sharing syringe positive outcome expectancies: "Not sharing syringes with others can protect you from HIV infection". Respondents were asked to indicate their agreement or disagreement with the statement on a 5-point scale, from (1) strongly disagree to (5) strongly agree. The variables was dichotomized into "disagree/strongly disagree/undecided" and "agree/strongly".

3. A single item was used to measure the construct of negative outcome expectancies: "Not sharing syringes while not having a new one, the drug addicted symptoms would make you feel very bad". Respondents were asked to indicate their agreement or disagreement with the statement on a 5-point scale, from (1) strongly disagree to (5) strongly agree. The variables was dichotomized into "disagree/strongly disagree/undecided" and "agree/strongly".

4. A single item was used to measure the construct of self-efficacy: "You can surely refuse sharing needles with others if you want to". Respondents were asked to indicate their agreement or disagreement with the statement on a 5-point scale, from (1) strongly disagree to (5) strongly agree. The variables was dichotomized into "disagree/strongly disagree/undecided" and "agree/strongly".

8.4. Statistical analyses

The associations between background factors and the outcome variables were reported in Chapter 5. Those factors which were statistically significant were

adjusted for in subsequent analyses. Hierarchical models were fit for each of the dependent variables. Model 1 investigated the association between conditional risk perception and behavioral intention for consistent condom use, after adjusting for relevant significant background factors; such models are the same as that reported in Chapter 6. Model 2 is obtained by fitting stepwise logistic regression models using the block containing two other HAPA candidate variables (i.e. outcome expectancies and self efficacy), after entering all Model 1 variables.

8.5. Results

8.5.1. Descriptions of the HAPA variables by groups with different types of sex partner

It is seen that whilst the level of positive outcome expectancies was high, the levels of negative outcome expectancy and self-efficacy were not too high (Table 8.1)

Table 8.1 HAPA variables by groups with different types of sex partner (RP, NRP, and FSW)

	RP (n=318) %/ Mean(SD)	NRP (n=116) %/ Mean(SD)	FSW (n=129) %/ Mean(SD)
Conditional sexual risk perception			
How likely do you think that RP/NRP/FSW would <u>transmit HIV to you via unprotected sex</u>?			
No/little/about half chance	89.6	66.4	47.3
High/sure chance	10.4	33.6	52.7
Condom use outcome expectancies			
i). **Positive** Outcome Expectancies (% strongly agree/agree)			
Condom use could protect you from HIV infection	85.5	89.7	81.4

ii). **Negative** Outcome Expectancies

Individual item responses (% strongly agree/agree)

Condom use lessens your sexual pleasure	53.1	56.9	52.9
Condom use makes you feel uncomfortable	53.8	59.4	55.8
Condom use ruins your mood or atmosphere of sex	50.6	54.3	53.5
Condom use makes your sex partners think that you do not trust her	38.7	37.0	45.0

Scale score#

Condom use negative Outcome Expectancies (1-5)	3.08(0.80)	3.14(0.79)	3.15(0.73)

Condom use self efficacy

Individual item responses (% strongly agree/agree)

You are confident to use condoms every-time if having sex with FSW	60.7	56.9	41.1
You are confident to use condoms every-time if having sex with NRP	50.9	50.9	42.6
You are confident to use condoms every-time if having sex with RP	32.4	40.5	35.7
You believe you can insist always using condom, even though this is not easy to do so	54.0	56.0	50.4
You can surely use condoms every-time if you want to	66.9	64.6	55.0

Scale score#

Condom use self efficacy (1-5)	3.18(0.66)	3.17(0.75)	3.04(0.73)

Condom use behavioral intention

In the next 6 months, how likely do you think that you will use condoms everytime when having sex with RP/NRP/FSW?

No/little/about half chance	67.9	50.9	36.4
High/sure chance	32.1	49.1	63.6

1. The internal consistency (Cronbach's alpha) of the condom use negative outcome expectancies was 0.78, 0.80, and 0.70 respectively for the group with RP, NRP, and FSW. The percentage of variance explained as obtained from factor analysis was 62.9%, 65.3% and 58.3% respectively for the three partner types.
2. The internal consistency (Cronbach's alpha) of the self efficacy was 0.68, 0.75, and 0.77 respectively for the group with RP, NRP, and FSW. The percentage of variance explained as obtained from factor analysis was 44.4%, 50.0%, and 52.3% respectively for the three partner types.

8.5.2. Predicting behavioral intention for consistent condom use with RP (n=318)

Background factors predicting intention for consistent condom use with RP were reported in Chapter 5; two factors were found statistically significant in the multivariate analysis (study site and number of service used). These two factors were adjusted for in the subsequent hierarchical analyses. All constructs of the HAPA,

except for positive outcome expectancies, were significant in the univariate analysis in predicting the aforementioned type of behavioral intention for consistent condom use with RP. It is seen from Model 1 that the refined conditional risk perception measure was significantly associated with the behavioral intention variable (Table 8.2). After adjusting for the two background variable and the conditional risk perception variable, two other HAPA-based variables (negative outcome expectancies and self-efficacy) were significant and hence had additional utility besides conditional risk perception, in predicting the behavioral intention on consistent condom use with RP (see Table 8.2)

Table 8.2 Predicting behavioral intention for consistent condom use with **RP** in the coming 6 months (n=318)

	% High/ sure chance Row% / Mean(SD)	ORu (95%CI)	Model 1 AOR[1] (95%CI)	Model 2 AOR[2] (95%CI)
I. Basic HAPA variables				
1). Conditional sexual risk perception How likely do you think you will contract HIV from RP via unprotected sex with her?				
No/little/half chance	29.1	1.00	1.00	1.00
High/sure chance	57.6	**3.30** **(1.58,6.90)****	**3.64** **(1.69, 7.87)*****	**4.22** **(1.81,0.85)****
2). Condom use outcome expectancies Condom use positive outcome expectancies ("Condom use can protect you from HIV infection")				
Strongly disagree/disagree/not certain	41.3	1.00	na	ns
Strongly agree/agree	30.5	0.62 (0.33,1.19)		
Condom use negative outcome expectancies	2.74(0.72)	**0.43** **(0.31,0.59)*****	na	**0.46** **(0.33,0.66)*****
3). Condom use self efficacy				
Condom use self efficacy	3.40(0.52)	**2.28** **(1.53,3.40)*****	na	**2.24** **(1.41,3.57)****

ORu: Univariate odds ratio.   *p<0.05; **p<0.01; ***p<0.001.   ns: not significant.   na: not applicable.
Model 1: ENTER = risk perception adjusting for 2 multivariately significant background factors;
Model 2: Step 1: ENTER = risk perception + 2 multivariately significant factors;
    Step 2: Step 1 + Stepwise (outcome expectancies and self efficacy)

8.5.3 Predicting behavioral intention for consistent condom use with NRP (n=116)

In Chapter 5, no background factors were significantly associated with behavioral intention for consistent condom use with NRP. Adjustment was hence not necessary. All of the HAPA variables, except the one on positive outcome expectancies, were significant in the univariate analysis. Model 2 shows that in addition to the conditional risk perception measure, the negative outcome expectancies variable was significant in predicting the relevant type of behavioral intention (see Table 8.3).

Table 8.3 Predicting behavioral intention for consistent condom use with NRP in the coming 6 months (n=116)

	% High/sure chance Row% / Mean(SD)	ORu (95%CI)	Model 1 AOR[1] (95%CI)	Model 2 AOR[2] (95%CI)
I. Basic HAPA variables				
1). Conditional sexual risk perception How likely do you think you will contract HIV from NRP via unprotected sex with her?				
No/little/half chance	39.0	1.00	1.00	1.00
High/sure chance	69.2	3.53 (1.55,8.00)**	3.53 (1.55,8.00)**	3.25 (1.33,7.95)*
2). Condom use outcome expectancies Condom use positive outcome expectancies ("Condom use can protect you from HIV infection")				
Strongly disagree/disagree/not certain	58.3	1.00	na	ns
Strongly agree/agree	48.1	0.66 (0.20,2.22)		
Condom use negative outcome expectancies	2.79(0.74)	0.29 (0.17,0.50)***	na	0.30 (0.17,0.53)***
3). Condom use self efficacy				
Condom use self efficacy	3.31(0.73)	1.71 (1.02,2.86)*	na	ns

ORu: Univariate odds ratio. *p<0.05; **p<0.01; ***p<0.001. ns: not significant. na: not applicable.
Model 1: ENTER = risk perception;
Model 2: Step 1: ENTER = risk perception; Step 2: Step 1 + Stepwise (outcome expectancies and self efficacy)

8.5.4 Predicting behavioral intention for consistent condom use with FSW

In Chapter 5, none of the background factors were significantly associated with behavioral intention for consistent condom use with FSW. Similar to the previous two types of sex partners' cases, all HAPA variables, except the one on positive expectancies, were significantly associated with the behavioral intention variable in the univariate analysis (Table 8.4). In Model 2, both the conditional risk perception variable and the variable on self-efficacy predicted behavioral intention for consistent condom use with FSW (see Table 8.4).

Table 8.4 Predicting behavioral intention for consistent condom use with FSW in the coming 6 months (n=129)

	% High/sure chance Row% / Mean(SD)	ORu (95%CI)	Model 1 AOR[1] (95%CI)	Model 2 AOR[2] (95%CI)
I. Basic HAPA variables				
1). Conditional sexual risk perception How likely do you think you will contract HIV from NRP via unprotected sex with her?				
No/little/half chance	42.6	1.00	1.00	1.00
High/sure chance	82.4	**6.28 (2.81,14.04)*****	**6.28 (2.81,14.04)*****	**7.06 (2.88,17.28)*****
2). Condom use outcome expectancies Condom use positive outcome expectancies ("Condom use can protect you from HIV infection")				
Strongly disagree/disagree/not certain	62.5	1.00	na	ns
Strongly agree/agree	63.6	1.06 (0.42,2.65)		
Condom use negative outcome expectancies	2.99(0.72)	**0.43 (0.25,0.74)****	na	ns
3). Condom use self efficacy				
Condom use self efficacy	3.25(0.63)	**3.50 (1.94,6.29)*****	na	**3.81 (1.99,7.31)*****

ORu: Univariate odds ratio.   *p<0.05; **p<0.01; ***p<0.001.   ns: not significant.   na: not applicable.
Model 1: ENTER = risk perception
Model 2: Step 1: ENTER = risk perception; Step 2: Step 1 + Stepwise = outcome expectancies and self efficacy

8.5.5 Prediction of behavioral intention for avoiding syringe sharing

Table 8.5 Behavioral intention for avoiding syringe sharing

	No chance Row %	Little to sure chance Row %
"How likely do you think that you will share syringes with others for drug injection?"	79.8	20.2

Of all respondents, 79.8% showed a behavorial intention for avoiding syringe sharing (no chance to share syringe with others for drug injection in the coming 6 months). All the HAPA variables, except the one on positive outcome expectancy were significantly associated with the behavioral intention variable in the univariate analysis (Table 8.6). Model 1 shows that the conditional risk perception variable and the self-efficacy variable had independent predictive effect onto the dependent variable (behavioral intention for avoiding syringe sharing).

Table 8.6 Using the HAPA model to predict behavioral intention for avoiding syringe sharing in the coming 6 months (no chance for sharing)

	% No intention to share syringes Row% / Mean(SD)	ORu (95%CI)	Model 1 AOR[1](95%CI)
I. Basic HAPA variables			
1). Conditional injection risk perception			
How likely do you think that <u>you will contract HIV via syringe-sharing</u>?			
No/little/half chance	71.1	1.00	1.00
High/sure chance	83.2	2.02 (1.25,3.26)**	1.69 (1.01,2.81)*
2). Positive outcome expectancies			
Non-sharing of syringe positive outcome expectancies ("Not sharing syringes with others can protect you from HIV infection")			
Strongly disagree/disagree/not certain	78.5	1.00	ns
Strongly agree/agree	80.3	1.12 (0.59,2.12)	
Non-sharing of syringes negative outcome expectancies ("Not sharing syringes while not having a new one, the drug addicted symptoms would make you feel very bad")			
Strongly disagree/disagree/not certain	84.3	1.00	ns
Strongly agree/agree	75.8	0.59 (0.37,0.94)*	
3). Self efficacy			
Non-sharing of syringes self efficacy ("You can surely refuse sharing needles with others if you want to")			
Strongly disagree/disagree/not certain	69.2	1.00	1.00
Strongly agree/agree	82.0	2.03 (1.17,3.50)*	3.76 (1.98,7.14)***

ORu: Univariate odds ratio. *p<0.05; **p<0.01; ***p<0.001. na: not applicable; ns: not significant
Model 2: Model I (enter)+ stepwise (expectancy + self-efficacy)

8.6. Summary and discussion of key findings

1) This study is one of the first few studies to using HIV risk perception under the HAPA framework to understand behavioral intention on consistent condom use among male IDU. The results show that risk perception was a robust motivating factor predicting behavioral intention for consistent condom use across different types of sex partner (i.e. a higher level of conditional risk perception was predictive of a higher level of behavioral intention for consistent condom use) and behavioral

intention for avoiding syringe sharing. Conditional risk perception and HAPA-based variables such as self-efficacy had independent effects on behavioral intention. It is therefore established that conditional risk perceptions are strong determinants of behavioral intentions for HIV-related behaviors.

2) All three key constructs of the HAPA (risk perception, outcome expectancies, and self efficacy) were univariately significant in predicting behavioral intention for consistent condom use. The pre-intention phase of the HAPA model is hence in general, applicable to this study population, though variations across the three types of sex partners (RP, NRP, and FSW) have been observed - stronger support for was observed for the RP group whereas weaker support was observed for the NRP and FSW groups.

3) Consistent with other studies, self-efficacy related to condom use was significant in predicting behavioral intention for consistent condom use with FSW and with RP, though not with NRP. Self efficacy is also a strong predictor of avoidance to syringe sharing among male IDU. Intervention programs such as MMT or NEP should also empower their users to build up the confidence that they could protect themselves, besides of providing the methadone substitute treatment or a clear syringe.

4) It is seen that positive expectancies were not significant in all the models tested in this chapters, whereas negative expectancies were significant most of the univariate analyses and in some of the multivariate analyses. Male IDU therefore do not intend to practice preventive behaviors (consistent condom use and avoid syringe sharing) to get possible experience, but such as are done to avoid negative consquences. This

observation is a reasonable on, as the except for avoiding negative consequences, consistent condom use and avoidance of syringe sharing do not apparently brings in lots of advantage. HIV prevention should therefore emphasize the negative consequences on inconsistent condom use or syringe sharing. Cautions should be made to interpret these results, as positive outcome expectancies were only measured by a single item and may not be sensitive enough to capture associations with other variables.

Chapter 9 To bridge the gap between behavioral intentions and actual behaviors

9.1. Background

Though behavioral intention may be one of the strongest predictor of actual behaviors, whether or not behavioral intentions would actually be transformed into actual risk or preventive behaviors remains an important empirical research question. This is important in different ways. First, it allows behavioral intention to be used as a solid outcome variable in cross-sectional studies with a good predictive power for future behaviors, hence addressing the methodological limitation of the retrospective nature in cross-sectional studies. Second, it contributes to the validation of many health behavioral theories such as Theory of Planned Behaviors and HAPA. Third, it guides health promoters in their program design which can aim at changing behavioral intention as the first step of intervention. Very few studies have addressed the issue as longitudinal studies involving vulnerable and mobile groups, such as male IDU, are difficult to conduct. To bridge the intention-behavior knowledge gap, a small-scale longitudinal part of the study was implemented.

9.2. Objectives

This Chapter explored whether behavioral intentions with regard to consistent condom use and syringe sharing could longitudinally predict corresponding actual sexual and injecting behaviors within a 1-month follow-up period. Of all 456 respondents, 131 were followed up one month after completion of the cross-sectional

study. The response rate was not high and this longitudinal study can only be seen as a pilot study.

9.3. Statistical analyses

Baseline characteristics (socio-demographics, syringe-sharing and unprotected sex behaviors) among those being followed up or being loss to follow up were compared using chi-square test. For each of the two outcome variables (condom use with RP, NRP, and FSW, and syringe-sharing behaviors), univariate odds ratios (ORu) were derived for all HAPA variables (including intention, risk perception, outcome expectancies, and self efficacy). A hierarchical model adjusting for behavioral intention was fitted using all HAPA variables in the second step (stepwise approach). As behavioral intention is postulated by the HAPA to be a mediator between other social cognitive factors and the actual behavioral outcome, the variable on behavioral intention was entered first. Due to small sample size for those with a NRP (n=21) and those with a FSW partners (n=16), models were not fit for these the groups of participants with NRP or FSW. Analyses were conducted on those with RP (n=80) and drug injection (n=122) at both the baseline and at the follow up.

9.4. Results

9.4.1. Comparing baseline data of those being followed up or being loss-to-follow-up

Results are summarized in Table 9.1. Those who were successfully followed-up were more likely to be currently married and having unprotected sex at the baseline.

No significant differences were observed in age, education level, personal income, study site, local of residence, and syringe-sharing behaviors.

Table 9.1 Comparison of **baseline characteristics** between those followed-up (n=131) and lost to follow-up (n=325)

	Lost to follow-up (n=325) % (n)	Follow-up (n=131) % (n)	χ² test p-value
Socio-demographics			
Age group‡			
18-30	28.6 (93)	29.0 (38)	0.93
31 and over	71.4 (232)	71.0 (93)	
Education level			
Junior high or below	72.0 (234)	72.5 (95)	0.91
Senior high or above	28.0 (91)	27.5 (36)	
Current marital status			
Currently not married	69.8 (227)	60.3 (79)	**<0.05**
Currently married	30.2 (98)	39.7 (52)	
Personal monthly income			
Some income/did not disclose	68.9 (224)	64.9 (85)	0.40
No income at all	31.1 (101)	35.1 (46)	
Study site			
Dazhou city (in Sichuan)	81.8 (266)	84.7 (111)	0.46
Hengyang city (in Hunan)	18.2 (59)	15.3 (20)	
Residence of origin			
Local	92.3 (300)	93.9 (123)	0.55
Non-local	7.7 (25)	6.1 (8)	
HIV-related risk behaviors#			
Receptive or distributive syringe-sharing			
No	89.5 (291)	87.0 (114)	0.44
Yes	10.5 (34)	13.0 (17)	
Unprotected sex with any female sex partner(s)			
No	20.0 (65)	11.5 (15)	**0.03**
Yes	80.0 (260)	88.5 (116)	

†The 2 HIV-related knowledge items include: "Whether a person infected with HIV could be determined by his/her appearance?", and "whether or not HIV could be detected once after the infection took place?".
∏ Include "HIV antibody test", "MMT", "SEP", "receiving free condoms", "STD checkup/treatment", and "receiving HIV education materials".
In the last 6 months.

9.4.2. Predicting actual behaviors practiced during the 1-month follow up period

Among those with RP (n=80), 11.3% of them used condoms consistently during the follow-up period; among those who were injecting drug users, 94.3% had not shared syringes during the follow-up period. Behavioral intention for consistent

condom use and avoidance of syringe sharing were both strong predictors of actual behaviors practiced during the 1-month follow-up period. In both cases, behavioral intention was the only significant factor in the multivariate analysis (Table 9.2 and 9.3)

Table 9.2 Predicting condom use with RP within the 1-month follow-up period (n=80)

Baseline variables	Often or always used a condom in the last month Row%	ORu (95%CI)	AOR (95%CI)
1). Behavioral intention to use condom every time with RP			
No/low/half chance	3.0	1.00	1.00
High/sure chance	50.0	32.00 (5.54,184.98)***	32.00 (5.54,184.98)***
2). Conditional sexual risk perception How likely do you think you will contract HIV from RP via unprotected sex with her?			
No/little/half chance	8.3	1.00	ns
High/sure chance	33.3	5.42 (1.07,27.33)*	
3). Outcome expectancies Condom use positive outcome expectancies ("Condom use can protect you from HIV infection")			
Strongly disagree/disagree/not certain	0.0	/	/
Strongly agree/agree	12.5		
Condom use negative outcome expectancies	3.14 (7.19)	ns	ns
4). Self efficacy			
Condom use self efficacy	3.64 (0.67)	5.13 (1.18,22.2)*	ns

ORu: univariate odds ratio.
AOR: Odds ratio adjusted for behavioral intention and with the inclusion of all HAPA variables (stepwise).

Table 9.3 Predicting syringe-sharing within the 1-month follow-up period (n=122)

Baseline variables	Had not shared syringes with others in the last month Row%	ORu (95%CI)	AOR(95%CI)
1). Behavioral intention to share syringes with others			
Some chance	75.0	1.00	1.00
No chance	98.0	16.67 (2.96,93.76)**	16.67 (2.96,93.76)**
2). Conditional injection risk perception			
How likely do you think that <u>you will contract HIV via syringe-sharing</u>?			
No/little/half chance	97.3	ns	ns
High/sure chance	92.9		
3). Outcome expectancies			
Non-sharing of syringe positive outcome expectancies ("Not sharing syringes with others can protect you from HIV infection")			
Strongly disagree/disagree/not certain	100.0	/	/
Strongly agree/agree	94.0		
Non-sharing of syringes negative outcome expectancies ("Not sharing syringes while not having a new one, the drug addicted symptoms would make you feel very bad")			
Strongly disagree/disagree/not certain	96.4	ns	ns
Strongly agree/agree	92.5		

ORu: univariate odds ratio.
AOR: Odds ratio adjusted for behavioral intention and with the inclusion of all HAPA variables (stepwise).

9.5. Summary and discussion of key findings

1) The results of this Chapter suggested that behavioral intention was strongly predictive of actual behaviors practiced during the 1-month follow up period. It is therefore meaningful for future research to use behavioral intention as a measuring proxy for future behaviors. The finding also has implication for behavioral interventions as such programs should be designed to influence behavioral intention prior to change of the actual behavior.

2) Though some pre-intentional factors (risk perception, outcome expectancies, and

self efficacy) were univariately significant in predicting actual consistent condom use with RP, such effects were fully mediated by the behavioral intention variable, which was controlled for in the first step of the hierarchical modeling process. The finding confirmed that intentions account for most of the variance in behavior and contributed to the validation of TPB and HAPA model specification that behavioral intention is the immediate antecedent of behaviors[9, 10, 94].

3) The longitudinal part of study however, has several limitations. First of all, the sample sizes were small so the study could only be considered as a pilot study. Second, the follow-up rate was rather low. Nonetheless, the participants who were lost to follow-up were in general comparable to the followed up cohort in terms of most social demographic characteristics and HIV-related risk behaviors, except for the fact that those who were successfully followed-up were more likely to be married and having unprotected sex at the baseline. Interpretations should however, be made with extreme caution. Future scaled-up studies are thus warranted to further investigate the inter-relationship of behavioral intention and actual behaviors.

Chapter 10 Summary and discussion

10.1. Limitations of the study

The study has several limitations. First, the results on the associations between various types of risk perception and HIV-related behaviors or behavioral intentions were based on data obtained from a cross-sectional survey. An attempt was made to build in a longitudinal component to validate relationship between behavioral intention and actual behavior adopted within a 1-month follow-up period. Very few studies on this mobile male IDU population were longitudinal in nature. However, the longitudinal study has a small sample size, and the number of loss to follow up was substantial. It is therefore only a pilot study in nature and large-scale longitudinal studies need to be conducted in the future to confirm the observations obtained in this exploratory study.

The sample design was based on snowball sampling and may introduce selection biases. The direction of the bias with respect to the associations between different types of risk perceptions and risk behaviors or behavioral intention was however, unclear. Recent advances using respondent-driven sampling have been applied to sample IDU, though few of such studies targeting IDU were conducted in China. Such a sampling strategy requires resources that are beyond our capacity. Most of the studies on male IDU in China, however, are using sampling designs which are similar to ours. Though the overall sample size of this study is relatively large, the sample size for respondents reporting sex partnership with female sex workers and non-regular sex partners are relatively small.

The prevalence of syringe-sharing among our study respondents was lower than other previous similar studies. It may be due to the extensive intervention efforts in the study sites, reporting bias, or other unknown reasons. The author cross-checked about this observation with the local CDC, finding out that the data on syringe sharing were consistent with those obtained by their annual behavioral surveillance data,

Only male IDU were included in this study, and study findings one may be able to generalize our findings to female IDU. It is known that many female IDU are also FSW; their risk perception and the relationship between risk perceptions and subsequent behavioral intention or risk/preventive behaviors may hence be very different from those of the male IDU. Whilst our results are specific to the male IDU population, the issues and discussions raised by this study with respect to conditional (behavior and partner specific) or global risk perceptions and their associations with behaviors and intentions are also general concerns for other populations and other types of health behaviors. This study therefore has shed some insights on the formulation of similar studies for other groups with high HIV vulnerability, or even for other types of prevention and risk behaviors.

One important limitation is that most of the measures used in this study were self-constructed, though references have been made to previous similar studies. Few studies compared these measures. Limited by the length of the questionnaire and the need to ask about both risk perceptions and behaviors or behavioral intention for both sexual and injecting drug use behaviors, most of the risk perception measures were

single-item indicators, rather than scales of established psychometric properties. Future study focusing on specific types of perceptions and behaviors may begin constructing and validating new conditional risk perception scales. Such efforts contribute to the development of risk perceptions research.

Conceptually, the full HAPA model had not been tested in this study. Instead, only the part of behavioral intention (pre-intentional) was used in this study. This part of the study design matches with the main purpose of this study - inspecting the associations between risk perceptions and behavioral intention. As both risk perceptions and behavioral intention are constructs of the HAPA, the theory was hence used as a conceptual framework to place the variables of risk perception and behavioral intention into a boarder context. This is also one of the few studies applying HAPA to investigate HIV-related behaviors and may be the first one for HIV-related injecting drug use behaviors. Our results therefore also expand the application of HAPA. Future studies along this direction are warranted.

10.2. Summary and discussion of key findings

The key findings are summarized and discussed in point forms:

1) Sexual behaviors are very common among male IDU. Some researchers claimed that such is not the case as drug use may prohibit sexual drive. Our results show that such perceptions are not correct. Moreover, prevalence of unprotected sex was high among those male IDU who were sexually active and relatively low proportions of them reported behavioral intention for consistent condom use. The

concern that male IDU would serve as a bridge population transmitting HIV to female populations hence cannot be dismissed.

2) The aforementioned observations on sexual risk behaviors are in contrast to the low prevalence of syringe sharing and the relatively high level of behavioral intention to avoid sharing syringes. It is argued that first, male IDU neglect the risk of sexual transmission, as they might feel that the risk of HIV transmission via sex is much lower than that via syringe sharing; second, whilst harm reduction services targeting male IDU in China may have been effective, such interventions had not taken risk reduction of sexual transmissions of HIV into account and integrated services are required.

3) The overall or global risk perception in this group is rather low (around 10% felt susceptible for contracting HIV), though risk perceptions conditioned on syringe sharing is very high and risk perceptions conditioned on different types of sex partners vary and are in between the global risk perception and that conditioned on syringe sharing.

4) Global risk perception was not significantly associated with prior sexual risk behaviors, reinforcing the observation and argument that sexual risk may have been under-emphasized. Global risk perception was however, associated with prior syringe sharing behaviors, supporting the accuracy hypothesis that is reflective in nature (prior risk behaviors increased the level of risk perceptions).

5) When behavior-and-partner-specific risk perceptions were used instead of global measures and behavioral intention for consistent condom use and behavioral

intention for avoiding syringe sharing was used instead of prior behaviors, different results were however obtained. Such conditional risk perceptions were consistently and strongly associated with behavioral intentions to avoid both sex-related and drug-related risk behaviors. Instead of supporting the aforementioned accuracy hypothesis, the results supported the motivational hypothesis – that a higher level of conditional risk perceptions motivates individuals to avoid risk behaviors. Researchers are reminded that the choice of different types of risk perceptions measures have direct impacts on the results to be obtained.

6) The results have encouraging implications on HIV prevention services – it is important to inform male IDU about the high risk involved in drug-related and sex-related behaviors and that may potentially lead to behavioral changes favoring HIV prevention. With the harm reduction programs in place, the former message about the risk involved in syringe sharing has gone through, but possibly not the message about sexual risk as such risk are seen to be rather low, especially when regular partners are involved. As many of the RP of male IDU are also IDU, the sense of security may have been inflated.

7) One particular way to increase condom use and to decrease the likelihood of syringe sharing is to expand the concept of risk perceptions to include other-directed risk perceptions – the concern of infecting others instead of being infected by others. This is one of the first studies investigating other-directed risk in non-HIV-positive vulnerable groups. Possibly out of altruism, significant associations were reported between conditional others-directed risk perceptions

and different types of behavioral intentions for consistent condom use. Such risk perception was however not associated with behavioral intention for avoidance of syringe sharing. It is postulated that male IDU are less sympathetic to fellow IDU as they themselves might undergo high risk of contracting HIV via syringe sharing. These findings hence point to a new direction of HIV prevention strategies. More research in this new area are warranted.

8) This is one of the few studies comparing the relationships between risk perceptions and avoidance of risk behaviors by looking at different combinations of conditional and unconditioned risk perceptions, as well as different types of risk behaviors, including those that are sex-related and drug-related. Besides the aforementioned service implications, the results hence offer important insight to resolve the puzzle of inconsistent findings in the risk perception literature. Risk perception has been a central construct of many important health behavioral theories and will continue to be on the centre of the stage. We confirm that the risk perception construct is useful.

9) It is also suggested that substantial development on measurement of conditional risk perception is greatly warranted and may make a huge difference to the development of health behavior theories. This study is only a starting point, as it is acknowledged that the measures of this study had not been fully validated and may be crude in nature.

10) The results in general supports the HAPA model, though the work hereby is only pilot in nature and our data only deals with the pre-intentional phase of the

HAPA model. Both risk perceptions and behavioral intentions are central parts of the HAPA, which links this study to further theoretical developments. Encouraging results are reported that conditional risk perceptions remained statistically significant in the presence of other HAPA-based variables such as self-efficacy and negative outcome expectancies, across different scenarios involving types of sex partners and risk behaviors. It is interesting to see that positive outcome expectancies, unlike the rest of the HAPA-based model, did not seem to affect behavioral intention. This study also contributes to development of the HAPA model, as it is the first time in the literature that this relatively new model was applied to study IDU-related behaviors. Other contributions come from the measurement perspective, that modelers should consider using conditional risk perception measures instead of global measures.

11) Another important finding is the strong associations between behavioral intention and actual future behaviors, according to our small scale and exploratory longitudinal study. The results on one hand backs up other findings and that it is meaningful to study behavioral intention. Methodologically, the results points at an important research direction of using behavioral intention, instead of prior risk behaviors taking place in the past, as outcomes for HIV-related research. Currently, over 90% of such risk studies are cross-sectional in nature, and possibly over 90% of these cross-sectional studies employed retrospective prior behaviors as end points. Behavioral intention can be easily assessed in cross-sectional studies, and it has a strong potential to replace prior risk behaviors to serve as new endpoints, which are strongly predictive of future behaviors. With some formative research to strengthen the observed relationships reported

in this study, it is expected that more HIV-related research will follow our research direction.

12) There are some indications that HIV-related knowledge and participation in HIV-related services were associated with lower levels of both prior risk behaviors and behavioral intentions. As well self-efficacies and negative outcome expectancies were also significant in some of the analyses. These elements may be considered in formulation of HIV prevention programs targeting male IDU in China.

13) Risk perception is an important research topic for HIV prevention. Though our findings are obtained from male IDU, they should have more general implications for other vulnerable groups. The HIV incidence and prevalence have been very high and increasing among men who have sex with men (MSM) in different parts of China. Their risk perceptions and impacts on their HIV-related behaviors have both theoretical and practical implications and it is suggested that future studies should be conducted in the near future. One particular interesting implication of our findings on the MSM group is that many of the MSM in China are bisexual and have female sex partners, such as spouse or girlfriends. Without disclosing their MSM identity to these female sex partners, the condom use rate is usually very low. Our findings on others-directed risk perception are therefore highly relevant to this case. Out of altruism, many MSM when perceiving a high chance of passing HIV to their female spouse, may modify their high risk behaviors. Further studies are therefore warranted.

13) Finally, the implications on theory development and refinement of risk perception measures of this study, though cannot be generalized to other forms of health behaviors at this stage, the potential is there as health behavioral theories are general and are not limited to application in particular types of health behaviors such as condom use or syringe sharing.

In sum, this study have a few novel elements and contributes to both service and theory development. Many parts of this study remain preliminary in nature and future studies are much required.

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Appendix - Questionnarie (Chinese)

男性健康行为调查

调查地区： □₁达县　　　□₂通川　　　□₃大竹　　　□₄其它(请注明) _____

招募方式： □₁滚雪球　　□₂其它(请注明) _____

关键人物： □₁针具交换员(_____区；号码/称呼： _____)　　□₂其它(请注明)_____

调查场所： □₁疾控中心　　□₂针具交换中心　　□₃美沙酮中心　　□₄其它(请注明)_____

调查员编码： _____　调查员(签字) _____　　督导员编码： _____　督导员(签字) _____

调查时间：　　年　　月　　日　　　　结果代码：□₁完成　　□₂部份完成(原因) _____

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1. 民族：　　　□₁汉族　　□₂其它 (请注明： ____族)

2. 你是那里人？　□₁达县　　□₂通川　　□₃大竹　　□₄其它 (请注明： _____)

3. 出生年月日: 19□□□年 □□月□□日

4. 文化程度： □₁未上过学　　□₂小学　　□₃初中　　□₄高中/中专　　□₅大专或以上

5. 目前婚姻状况： □₁未婚　　□₂同居　　□₃已婚/再婚　　□₄离异/分居/丧偶　　□₅其它

6. 你每个月的收入大约是多少：
   □₁没有收入　□₂1-500 元　□₃501-1000 元　□₄ 1001-2,000 元　□₅ 2,000 元以上　□₆不愿透露(不读出)

7.		可以	不可以	不确定/不知道 (不读出)
a).	艾滋病感染者可不可以从外表看得出来？	□₁	□₂	□₃
b).	刚刚感染了艾滋病病毒，可不可以立即检测到出来？	□₁	□₂	□₃
c).	一个外表看来健康的人，可不可以传染艾滋病给其它人？	□₁	□₂	□₃

8. 我现在会说一些关于使用安全套的*好处*和*坏处*，和各种会让人没有使用安全套的原因，请表示你对这些说法的同意或者不同意的程度。

		非常不同意	不同意	没有意见	同意	非常同意
a).	*使用安全套，会减低你性交的乐趣*	□₁	□₂	□₃	□₄	□₅
b).	*使用安全套，令你感觉不舒服*	□₁	□₂	□₃	□₄	□₅
c).	*使用安全套，会破坏你性交的情绪、气氛*	□₁	□₂	□₃	□₄	□₅
d).	*使用安全套，性伴会认为你保护她避免感染艾滋病*	□₁	□₂	□₃	□₄	□₅
e).	你没有信心向新的性伴提出使用安全套	□₁	□₂	□₃	□₄	□₅
f).	假如与<u>小姐</u>性交，你有把握每次使用安全套	□₁	□₂	□₃	□₄	□₅
g).	假如与<u>非固定</u>女性伴性交，你有把握每次使用安全套	□₁	□₂	□₃	□₄	□₅
h).	假如与<u>固定</u>女性伴性交，你有把握每次使用安全套	□₁	□₂	□₃	□₄	□₅
i).	*使用安全套，性伴会认为你不信任她*	□₁	□₂	□₃	□₄	□₅
j).	*使用安全套，可以有效预防你感染艾滋病*	□₁	□₂	□₃	□₄	□₅
k).	你相信自己能坚持每次使用安全套，虽然这可能并不容易做到	□₁	□₂	□₃	□₄	□₅
l).	只要你想的话，你能够每次性交时使用安全套	□₁	□₂	□₃	□₄	□₅

9. 你认为自己有多大机会会感染艾滋病？ (读出选项)
   □₁完全没有机会　　□₂相当小机会　　□₃一半一半　　□₄相当大机会　　□₅一定会

固定的女性性伴

-指配偶或者女朋友、你对她有一定的认识、跟她的关系是比较稳定长久或有跟她建立稳定关系的想法

→ **10.** 最近 6 个月，你有多少位<u>固定</u>女性性伴<i>(指配偶或者女朋友、你对她有一定的认识、跟她的关系是比较稳定长久)</i>?
- □₁ 没有→跳至第 **11** 题
- □₂ 1 位
- □₃ 多于 1 位[#]

注: [#]*若有<u>多于</u>1 位固定女性伴，请以你<u>最近 一</u>次有性行为的那一位固定性伴的情况回答下面题目。*

10.1. 未来 6 个月跟这位<u>固定</u>女性伴性交时，你有多大机会会<u>每次</u>使用安全套? _(读出选项)
- □₁完全没有机会　　□₂相当小机会　　□₃一半一半　　□₄相当大机会　　□₅一定会

艾滋病	10.2a). *如果不用安全套 跟这位<u>固定</u>女性伴性交，有多大机会 这位<u>固定</u>女性伴会 把 艾滋病 传给你?*	10.2b). *如果不用安全套 跟这位<u>固定</u>女性伴性交，有多大机会 你会把 艾滋病 传给 这位<u>固定</u>女性伴?*
	□₁完全没有机会 □₂相当小机会 □₃一半一半 □₄相当大机会 □₅一定会	□₁完全没有机会 □₂相当小机会 □₃一半一半 □₄相当大机会 □₅一定会 □₆*她已感染艾滋病(不读出)*

10.3a. 最近 6 个月，你与这位<u>固定</u>女性伴性交时，有多常使用安全套?
- □₁从不_(6 个月内没有)→跳至 **10.4**　　□₂有些时候　　　□₃多数时候　　　□₄每次→跳至 **10.4**

10.3b. 你最近一次与这位<u>固定</u>女性伴性交时，是否使用安全套?
- □₁没有使用　　　　□₂使用

10.4 你这位<u>固定</u>女性伴有没有注射吸毒?
- □₁现在有　　□₂她曾吸毒但 6 个月内没有　　　□₃从不　　□₄不知道

小姐 (商业性女性性伴)
- 指纯粹以金钱或者毒品换取性的关系

➔ **11.** 最近 **6** 个月，你找过多少位 <u>小姐</u> *(指以金钱或者毒品换取性)*?

☐₁ 没有 ➔ 跳至第 **12** 题

☐₂ 1 位

☐₃ 2 位

☐₄ 3–5 位

☐₅ 6–20 位

☐₆ 多过 20 位

11.1. 未来 **6** 个月跟 <u>小姐</u> 性交时，你有多大机会会 <u>每次</u> 使用安全套? *(读出选项)*

☐₁ 完全没有机会　　☐₂ 相当小机会　　☐₃ 一半一半　　☐₄ 相当大机会　　☐₅ 一定会

	11.2a). *如果不用安全套* *跟<u>小姐</u>性交，有多大机会* **小姐会 把 艾滋病 传给你?**	11.2b). *如果不用安全套* *跟<u>小姐</u>性交，有多大机会* **你会把 艾滋病 传给 <u>小姐</u>?**
艾滋病	☐₁ 完全没有机会 ☐₂ 相当小机会 ☐₃ 一半一半 ☐₄ 相当大机会 ☐₅ 一定会	☐₁ 完全没有机会 ☐₂ 相当小机会 ☐₃ 一半一半 ☐₄ 相当大机会 ☐₅ 一定会

11.3a. 最近 **6** 个月，你与 <u>小姐</u> 性交时，有多常使用安全套?

☐₁ 从不₍₆个月内没有₎ ➔ 跳至 **11.4**　　☐₂ 有些时候　　☐₃ 多数时候　　☐₄ 每次 ➔ 跳至 **11.4**

11.3b. 你最近一次与 <u>小姐</u> 性交时，是否使用安全套?

☐₁ 没有使用　　　☐₂ 使用

11.4 你认为 <u>小姐</u> 都注射吸毒吗? *(读出选项)*

☐₁ 没有吸毒的　　☐₂ 小部份有吸毒　　☐₃ 大部份有吸毒　　☐₄ 不知道

非固定的女性性伴

- 指非配偶/女朋友、非小姐，你对她认识不深，跟她的性关系比较随便、没有涉及金钱/毒品交易

12. 最近 6 个月，你有多少位<u>非固定</u>女性性伴*(指非配偶/女朋友、非小姐，你对她认识不深，跟她的性关系比较随便、没有涉及金钱交易)*?

    □₁没有➜跳至第 **13** 题

    □₂1 位

    □₃2 位

    □₄3–5 位

    □₅多过 5 位

12.1. 未来 6 个月跟<u>非固定</u>女性伴性交时，你有多大机会会<u>每次</u>使用安全套? *(读出选项)*
    □₁完全没有机会   □₂相当小机会   □₃一半一半   □₄相当大机会   □₅一定会

	12.2a). 如果不用安全套 跟<u>非固定</u>女性伴性交，有多大机会 <u>非固定</u>女性伴会 把 艾滋病 传给你?	*12.2b). 如果不用安全套 跟<u>非固定</u>女性伴性交，有多大机会 你会把 艾滋病 传给 <u>非固定</u>女性伴?*
艾滋病	□₁完全没有机会 □₂相当小机会 □₃一半一半 □₄相当大机会 □₅一定会	□₁完全没有机会 □₂相当小机会 □₃一半一半 □₄相当大机会 □₅一定会 □₆*她已感染艾滋病(不读出)*

12.3a. 最近 6 个月，你与<u>非固定</u>女性伴性交时，有多常使用安全套?
    □₁从不*(6个月内没有)*➜跳至 **12.4**   □₂有些时候   □₃多数时候   □₄每次➜跳至 **12.4**

12.3b. 你最近一次与<u>非固定</u>女性伴性交时，是否使用安全套?
    □₁没有使用   □₂使用

12.4. 你的<u>非固定</u>女性伴有没有注射吸毒?
    □₁没有   □₂有   □₃不知道

13. 最近 6 个月，你有没有用过以下的服务？

a).接受美沙酮维持治疗？　　　　　　　　□₁没有　□₂有(吃多久了: □₁少于 1 个月　□₂1-3 个月　□₃多于 3 个月)

b).参加针具交换计划？　　　　　　　　　□₁没有　□₂有

c).收过免费派发的安全套？　　　　　　　□₁没有　□₂有

d).做性病检查或治疗？　　　　　　　　　□₁没有　□₂有 (□₁自费　□₂免费)

e).收过预防艾滋病/性病教育材料(小册子、折页)？　□₁没有　□₂有

14. 未来 6 个月，你有多大机会会与他人共用注射器？[注:共用指「借用别人用过的」或「将自己用过的给予他人用」]

　　□₁完全没有机会　　□₂相当小机会　　□₃一半一半　　□₄相当大机会　　□₅一定会

15. 我现在会说一些关于跟他人共用注射器的*好处*和*坏处*，和各种让人共用注射器的原因，请表示你对这些说法的同意或者不同意的程度。

		非常不同意	不同意	没有意见	同意	非常同意
a).	不跟他人共用注射器而又没有新注射器的话，起毒瘾时你会非常辛苦	□₁	□₂	□₃	□₄	□₅
b).	你并没有信心在任何情况下都可以避免跟他人共用注射器	□₁	□₂	□₃	□₄	□₅
c).	不跟他人共用注射器，可以有效预防你感染艾滋病	□₁	□₂	□₃	□₄	□₅
d).	只要你想的话，你能够完全拒绝与他人共用注射器	□₁	□₂	□₃	□₄	□₅

16a. *如果你跟他人共用注射器，你认为有多大机会你会因此而感染艾滋病*? (读出选项)

　　□₁完全没有机会　　□₂相当小机会　　□₃一半一半　　□₄相当大机会　　□₅一定会

16b. *如果你跟他人共用注射器，你认为有多大机会你会因此而把艾滋病传给他人*? (读出选项)

　　□₁完全没有机会　　□₂相当小机会　　□₃一半一半　　□₄相当大机会　　□₅一定会

17a. 你注射吸毒多长时间？　□₁少于 6 个月　□₂6 个月–2 年内　□₃2–5 年内　□₄5–10 年内　□₅10 年以上

17b. 最近 6 个月，你平均多久注射一次毒品？　□₁每天___次　　□₂每星期___次　　□₃每月___次

　　(按调查对象的答案，在合适处填写)

17c. 最近 6 个月，你用过什么毒品: (可多选，尽量追问)

　　□₁海洛因　□₂安定　　□₃异丙秦　　□₄K 粉　　□₅冰　　□₆大麻　　□₇其它(请注明_____)

最近 6 个月，……		从不(6个月内没有)	有些时候	多数时候	每次
17d.	*最近 6 个月*，你有多常跟别人共用吸毒用炊具、小药瓶、容器、药棉、滤布和涮水等？	□₁	□₂	□₃	□₄
17e.	*最近 6 个月*，你有多常将自己用过的注射器给予或售予别人？	□₁	□₂	□₃	□₄
17f.	*最近 6 个月*，你多常使用别人用过的注射器？	□₁→跳至 18	□₂	□₃	□₄→跳至 18

17g. 最近一次注射毒品，你有没有使用别人用过的注射器？　　□₁没有　　　□₂有

18. 你曾否戒毒？　□₁没有　　　□₂有→共戒毒___次

19. 你有没有做过艾滋病病毒检测？　　□₁没有→跳至第 2 题　　　　□₂有→共检测过___次

20. 你上一次是什么时候做艾滋病检测的？　　_____年___月 (请尽量想想)

21. 你曾否感染性病 (不包括艾滋病)？　　□₁现在感染　　　□₂曾经感染　　　□₃从不

———问卷完，谢谢您的参与———