

## Title Page

Disclosure of maternal HIV infection to children among Chinese women with HIV:  
the application of the Theory of Planned Behavior and the role of various norms

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Abstract

Maternal HIV disclosure to children has numerous benefits for both mothers and children. However, the prevalence of maternal HIV disclosure to children remains low in many countries. The present study examined factors associated with intention to disclose maternal HIV status to children among Chinese HIV+ women who haven't disclosed their HIV status to their child. Factors from the Theory of Planned Behavior and various norms (injunctive, descriptive, and moral norm) were examined. Findings from 179 HIV+ women revealed that only 16.8% intended to disclose their HIV status to their child in the future. Adjusted for significant background variables, all factors from the TPB and various norms (i.e. attitude, injunctive norm, descriptive norm, moral norm, perceived behavioral control) were associated with intention to disclose HIV status (AOR ranged from **3.22**, **15.85**). Stepwise logistic regression showed that attitude (ORm=**6.96**) and injunctive norm (ORm=**6.81**) were associated with intention to disclose HIV status. Interventions to promote maternal HIV disclosure were warranted to promote attitude, perceived behavioral control, and various norms associated with HIV disclosure.

Keywords: maternal HIV; disclosure; children; intention; Theory of Planned Behavior

Introduction

According to the Ministry of Health and the World Health Organisation (WHO), there were 780,000 individuals living with HIV in 2011, and 28.6% of them were female (Ministry of Health People's Republic of China, Joint United Nations Programme on HIV/AIDS, & World Health Organization, 2011). Most of the HIV+ women are in their reproductive age and many of them have children. With the advancement in medication treatment, many HIV+ mothers can live a healthy life and play an increasing important role in the care of their children. On the other hand, disclosure of maternal HIV status to children has become a potential challenge to most of the mothers and also an important public health concern across the globe (Hawk, 2007; Li, de Wit, Qiao, & Sherr, 2015).  
Maternal disclosure of HIV to children: A significant public health issue

Disclosure of HIV status is an important part of the process of living with HIV and is crucial to continuum of HIV care. Self-disclosure is a process that involves self-initiated telling of previously concealed and potentially stigmatizing information to one or more **people** with the intention **to improve** one's sense of psychological well-being and/or maintaining relationship (Derlega, Metts, Petronio, & Margulis, 1993). The WHO recommends that children of school age should be informed the HIV status of their parents, and younger children should be informed incrementally to accommodate their cognitive skills and emotional maturity (World Health Organization, 2011). Maternal HIV disclosure to children has numerous benefits for both mothers and children (Krauss, Letteney, De Baets, Baggaley, & Okero, 2013), including children's involvement in assisting mother with her illness (Donaldson F. Conserve et al., 2014), more **maternal** support (Murphy, Roberts, & Hoffman, 2006), emotional relief and improvement in mental health of the mother (D. F. Conserve & King, 2014), improvement in parent-child relationship, (Debra A. Murphy, 2008; Tenzek, Herrman, May, Feiner, & Allen, 2013; Vallerand, Hough, Pittiglio, & Marvicsin, 2005), more open and honest communication between parent and child (Debra A. Murphy, 2008; Vallerand et al., 2005), facilitation of future planning for the child (Rotheram-Borus, Draimin, Reid, & Murphy, 1997), and improvement in child's mental and social well-being (Hawk, 2007; Murphy et al., 2006). A recent intervention that aimed to promote maternal disclosure of HIV to young children **resulted in decreased** psychological distress **of the mother** and parenting stress, **improved** parent-child relationship, and **reduced** child emotional and behavioral problems (Rochat, Arteché, Stein, Mitchell, & Bland, 2015). **Thus, identifying** factors **related** to disclosure of HIV status **is** an important public health goal **which** provide **insights in** strategies for HIV care.

Despite the numerous benefits associated with maternal HIV disclosure, many HIV+ mothers have not disclosed their HIV status to their children. Studies have shown that many HIV+ mothers expressed uneasiness in initiating the disclosure conversation (Mandalazi, Bandawe, & Umar, 2014) and struggled with when and how to disclose their HIV status to their children (D. A. Murphy, 2008; Qiao, Li, & Stanton, 2013). Review studies have shown that the disclosure rates ranged from only 20% to 67% in the U.S., and 11% to 50% in other countries (Corona et al., 2006; Murphy et al., 2006; Palin et al., 2009; Qiao et al., 2013). One study among children whose parents are HIV+ in China showed that only a small portion of them (39%) learned maternal HIV infection from their mother (Zhao et al., 2015).

Factors and theories associated with self-disclosure of HIV status

It has been suggested that **one decided to disclose maternal HIV status** when the pros of disclosure outweighs the cons (Delaney, Serovich, & Lim, 2008). In particular, the Consequence Theory suggests that disease progression influences disclosure through perceived psychological, social, and material consequences or outcomes of informing others (Serovich, 2001, 2008). Previous studies have documented various factors associated with maternal HIV disclosure, including child's age (Armistead, Tannenbaum, Forehand, Morse, & Morse, 2001; Corona et al., 2006; Vallerand et al., 2005), gender (Armistead et al., 2001), level of maturity (Delaney et al., 2008; Vreeman, Gramelspacher, Gisore, Scanlon, & Nyandiko, 2013), mother's age and HIV status (Serovich, 2001), social isolation (Corona et al., 2006), and fear of stigma (Ostrom, Serovich, Lim, & Mason, 2006). **In particular, HIV is a highly stigmatized condition in China, participants may be concerned about the possible stigma and discrimination, or other negative reactions that their child may experience once they are informed of their mother's HIV status and thus are reluctant to disclose. In addition, health care professionals play an important role in assisting patients in planning and conducting HIV status disclosure. In China, there is a lack of proper policy and training for health care professionals in supporting individuals with HIV in performing the disclosure, which was evidenced by studies showing that some health care professionals disclosed the patients' HIV status to their family members or close friends before the patient in China (Chen et al., 2007; Nie, Walker, Qiao, Li, & Tucker, 2015).**

Studies that investigated the reasons for and against maternal disclosure revealed that the most common reason for disclosure was the belief that disclosure was the "right

thing to do" and the need to make arrangements for children's future, while the most common reason for non-disclosure was maternal concern about discussing death and dying with children (Pilowsky, Sohler, & Susser, 2000).

The utility of Theory of Planned Behavior in explaining maternal HIV disclosure

Despite the plethora of studies in examining the reasons and factors of maternal disclosure of HIV, it has been criticized that very few studies have studied the topic by employing a behavior change theory. Behavior change theories are useful in guiding the selection of factors and **developing** interventions associated with a particular health behavior (Michie & Prestwich, 2010; Painter, Borba, Hynes, Mays, & Glanz, 2008). Among the behavior change theories, the Theory of Planned Behavior (TPB) (Ajzen, 1985, 1991) has been one of the most **commonly** used theories for explaining a health behavior. The TPB suggests that **intention** to engage in a behavior **was** the most proximal determinant of a behavior. Three cognitive components, namely, attitude towards the behavior, subjective norm, and perceived behavioral control, are important in explaining behavioral intention and consequently the behavior. In particular, attitude is the person's overall positive or negative evaluation of a particular behavior whereas subjective norm refers to the individual's perceptions of social pressure to perform the behavior. Perceived behavioral is the perception of personal control over the performance of behavior and is believed to be important **in explaining** behaviors which individuals have incomplete control.

The TPB has been widely applied into a variety of health behaviors, such as condom use (Molla, Astrom, & Berhane, 2007), physical activity (Hagger et al., 2007; Hagger, Chatzisarantis, & Biddle, 2002), cervical cancer screening (Roncancio et al., 2015), adherence to medication treatment (Rich, Brandes, Mullan, & Hagger, 2015), smoking (Alanazi, Lee, Dos Santos, Job, & Bahjri, 2017), use of social networking websites (Pelling & White, 2009), intention to use HIV counselling **and** testing (Abamecha, Godesso, & Girma, 2013; Kakoko, Åstrøm, Lugoe, & Lie, 2006), adherence to HIV medication (Vissman et al., 2011), and help-seeking behaviors for mental health problems (Mo & Mak, 2009). A meta-analysis of the TPB (Armitage & Conner, 2001) **further** supported the effectiveness of the theory, which accounted for 39% and 27% of the variance in intention and behavior respectively. The TPB has also been applied to **understanding the** intention to disclose sexual **orientation** among sexual minority (Mak, Ng, Mo, & Chong, 2010), and intention **of caregivers** to disclose **to HIV+ children of their status** (Jemmott et al., 2014). One study examined the

intentions to **non-disclosure** of HIV status among **HIV+** women based on the TPB, but it measured HIV disclosure in general without specifying any disclosure target (Mucheto et al., 2011). From our understanding, no studies to date have explained maternal HIV disclosure to child among HIV+ mothers using TPB.

The inclusion of different types of norms

Although the TPB has been successful in predicting various health behaviors, its adequacy has been receiving considerable **challenges**. In a meta-analysis of 185 studies that investigated the TPB, Armitage (Armitage & Conner, 2001) found that subjective norm was generally a weaker construct and called for a need for expansion of the normative component. The TPB has also been criticized for neglecting moral considerations, especially in behaviors that might be relevant to moral concerns (Manstead, 2000). Studies have therefore investigated the different types of norms and proposed that it would be useful to distinguish between descriptive, injunctive, and moral norms (Kallgren, Reno, & Cialdini, 2000). Injunctive norm is similar to subjective norm and refers to the beliefs about what others think one should do. Descriptive norm refers to the perception on what is the most common actions that are exhibited in a group. Moral norm is regarded as an individual's perception of the moral correctness or incorrectness **in** performing a behavior. A number of studies on TPB have found that the different types of norms were found to **independently** predict intentions across various behaviors (Borsari & Carey, 2003; Conner & Armitage, 1998; Ravis & Sheeran, 2003). Moral concerns may predominantly **be** relevant in the context of HIV disclosure, in which individuals with HIV who perceive they have a particular responsibility **to protect** their family **may** be more likely to disclose. It is therefore conjectured that the inclusion of different types of norms might improve the predicability of the model in predicting HIV disclosure.

The present study

The present study identified the factors associated with **the** intention to disclose maternal HIV status to child among HIV+ mothers by applying the TPB. The role of different types of norms, namely, descriptive norm, injunctive norm, and moral norm were also investigated. It is hypothesized that more positive attitude towards disclosure and higher levels of descriptive norm, injunctive norm, moral norm and perceived behavioral control would be associated with intention to disclose maternal HIV status to the child.

Methods

## Participant recruitment

Participants were recruited from eight antenatal care (ANC) clinics in three cities (four in Dehong, two in Qinzhou and two in Hezhou) **which were** located in Yunnan and Guangxi Province, China, during November 2015 to May 2016. Chinese women who were: 1) aged  $\geq 18$  years and 2) received confirmatory **HIV+** diagnosis were invited to the study.

All HIV+ women attending the eight ANC clinics during the study period were invited to participate in the study. A clinician screened **and invited eligible** participants to join the study in a consultation room. The study purposes were **introduced**, participants were assured that refusals would not affect their right to use any services and they could quit any time without being questioned. A total of 593 eligible HIV+ women were approached, 546 (91.2%) provided written informed consent and completed an anonymous **structured** face-to-face interview **with the research assistants. Participants received a non-monetary incentive which was worth of RMB20 (~USD2.5) to compensate the time they spent on the study.** Ethics approval was obtained from the institutional Ethics Committee.

Taking reference with the WHO recommendation that children of school age would be the appropriate target **to be** informed with their parents' HIV status, the current subsample consisted of HIV+ women who had at least one child **whose age was** over 5 years old, and had not disclosed to her oldest child. The use of 5 years old as a cut-off **line has** been used in other studies of HIV disclosure (Ostrom et al., 2006). **Adult children are included in this study as the literature has suggested that the attitudes for maternal intention to disclose and positive results from maternal disclosure are similar for adult children and younger children (Mkwanazi, Rochat, Imrie, & Bland, 2012; Qiao et al., 2013).** A total of 367 participants were excluded from the study. **Among those, 34.4% were excluded because they do not have a child; 25.9% were excluded because their child were younger than the age of 5; 39.7% were excluded as they have disclosed their HIV status to their oldest child. Among those who have disclosed their HIV status to their oldest child, 82.2% has disclosed to all of their children; 0.7% of mother has disclosed to some of their children only; 17.0% of the mothers has disclosed their HIV status to their oldest child while their other children were informed of their HIV status by other means (e.g. by other family members).** A total of 179 participants **fulfilled** the criteria and were thus included in the data **analyses.**

## Measures

Socio-demographic variables, such as age, ethnicity, education level, marital status, monthly family income, and number and age of children were obtained. Medical characteristics, such as duration of HIV diagnosis, mode of transmission, disease stage, and whether **they were** currently on antiretroviral treatment, were also obtained. They were also asked to provide information on the HIV status of their spouse, whether their partner was aware of their HIV status, and self-perceived health status.

Factors associated with the TPB were designed **by the research team** based on the **TPB questionnaire construction guideline (Fishbein & Ajzen, 2010)**. **As there is no validated TPB questionnaire available in the literature, it is a common practice to construct behavior-specific items for each study based on this guideline (Dai, Wombacher, Matig, & Harrington, 2018; Gantt, 2001; Sasson & Mesch, 2016)**. **The items were piloted among 6 HIV+ women before finalized (two from each city)**. For participants who had more than one child, they were asked to answer all the items with respect to their oldest child as an indexed person. A total of 15 items were set according to six constructs of TPB, which included perceived attitudes towards HIV disclosure (4 items, e.g. **“Disclosing my HIV status to my child is useful”**, Cronbach’s  $\alpha = 0.95$ ), injunctive norm (3 items, e.g. **“Those people who are important to me think that I should disclose my HIV status to my child”**, Cronbach’s  $\alpha = 0.98$ ), descriptive norm (3 items, e.g. **“Most of the HIV+ mothers have disclosed their HIV status to their child”**, Cronbach’s  $\alpha = 0.96$ ), moral norm (2 items, **“I have the moral responsibility to disclose my HIV status to my child”**, Cronbach’s  $\alpha = 0.93$ ), perceived behavioral control (2 items, **“I can decide whether to disclose my HIV status to my child or not”**, Cronbach’s  $\alpha = 0.59$ ), and intention to disclose (1 item, **“How likely would you disclose your HIV status to the child in the future”**). For the first 5 constructs, items were measured on a 5-point Likert scale from 1 = strongly disagree to 5 = strongly agree, with higher score indicating a higher degree of endorsement to the respective construct. For intention to disclose, participants were asked to rate their likelihood of disclosing their HIV status to their child in the future on a 5-point Likert Scale from 1 = highly unlikely to 5 = highly likely. Participants who had a score of 4 or above were classified as having the intention to disclose HIV to their child in the future.

## Data Analysis

Descriptive statistics were presented. Univariate logistic regressions were first conducted to examine the association between background **and TPB variables and**

intention to disclose **respectively**, and **the** resulting univariate odds ratios (OR<sub>u</sub>) were presented. Multivariate logistic regression models were then fit for each of the TPB variables on intention to disclose, adjusted for background variables that were significant at the  $p < .10$ . Resulting adjusted odds ratios (AOR) and 95% CI were reported. Finally, those TPB factors that were significant in the adjusted analyses were used as candidates for multivariate stepwise logistic regression analyses. The multivariate odds ratios (OR<sub>m</sub>) and respective 95% confidence intervals (CI) were derived; a set of significant independent variables was hence selected by that model. All data analyses were performed using SPSS version 20.

## Results

### Background characteristics of participants

More than half of the participants (57.5%) were between 31 to 40 years old, and about a quarter of them (26.3%) **was** 41 years old or above. Nearly half (46.4%) of the participants had primary school level of education or below and similar proportion (43.6%) had a monthly family income of RMB 1,000 (~**USD 149**) or below. One-third (36.3%) perceived their health as good or very good. Two-third of them (64.7%) had more than one child older than 5 years old, and half of them (50.3%) reported that their oldest child was between 5 to 10 years old. Nearly all of the participants (94.9%) reported that their partner were aware of their HIV status, about two-third of them (59.8%) reported that their partner was also HIV+.

In terms of medical characteristics, about two-third of the participants (64.8%) have been diagnosed with HIV for more than 5 years. Majority of them (72.1%) were infected through sexual contact. Half of them (49.7%) were in the asymptomatic stage and majority of them (82.1%) were currently on antiretroviral treatment (Table 1).

### Descriptive statistics of the TPB variables and the various types of norms

The descriptive statistics of the TPB variables and the various types of norms are presented in Table 2. Overall, less than half of the participants (40.3% to 52.5%) **had a** positive **attitude** towards TPB disclosure. Only about one third of participants endorsed the items on injunctive (37.5% to 39.7%) and descriptive norm (33.0% to 36.4%). About half of them (48.6% to 53%) agreed that they had the moral obligation to disclose HIV status. Respectively 67.1% and 53.1% agreed that they could decide whether to disclose their HIV status and that they could disclose their HIV status if they tried to. Only 16.8% of the participants reported that they intend to disclose their HIV status to their oldest child in the future.

Univariate association between background variables and intention to disclose HIV

The results of the univariate analysis showed that among all the background variables, **having a** monthly household income of RMB1,001-2,000 (~USD149-298; (OR=0.39, 95% CI=0.14, **1.04**) **higher age of the first-born child (OR=0.94, 95% CI=0.88,1.00)**, partner awareness of the participants' HIV **status** (OR=0.25, 95% CI=0.05) were **marginally** associated with lower intention to disclose HIV at  $p<0.10$  level. On the other hand, being infected **with** HIV from selling blood (OR=2.47, 95% CI=0.98, 6.20) was **marginally** associated with **higher** intention to disclose HIV at  $p<0.10$  level. These variables were adjusted for in the subsequent analyses (**Table 3**). Association between TPB variables, different types of norms, and intention to disclose

Results from univariate analyses showed that all variables of the TPB and the different types of norms, namely attitude towards HIV disclosure (OR=5.62, 95% CI=2.48, 12.74), injunctive norm (OR=5.35, 95% CI=2.52, 11.35), descriptive norm (OR=2.09, 95% CI=1.25, 3.52), moral norm (OR=1.77, 95% CI=1.01, 3.11) and perceived behavioral control (OR=3.33, 95% CI=1.48, 7.50) were significantly associated with intention to disclose HIV **status**. These variables remained significant after adjusting for significant background variables (ORs=**3.22 to 15.85**). Stepwise analyses showed that attitude towards HIV disclosure (OR=**6.96**, 95% CI=**1.83,26.43**) and injunctive norm (OR=**6.81**, 95% CI=**1.77,26.22**) were significantly associated with intention to disclose HIV (**Table 4**).

#### Discussion

Promoting maternal HIV disclosure to child is a particularly critical component of HIV care. From our understanding, most of the studies on maternal HIV disclosures to date were conducted in non-Chinese context and very few of them were theory-based. The present study aims to fill up this important gap by examining the various factors that predict intention to disclose maternal HIV status to their child among HIV+ mothers who have not disclosed based on the TPB. It is expected that **the** findings would be useful in helping HIV+ women **overcome** the barriers of disclosure and in promoting disclosure of HIV status to their children, which **have** important implications in improving health of both the mothers and children.

It is **very** important to note that the intention to disclose HIV status was very low in this sample. In the present study, less than one-fifth (16.8%) of participants revealed that they intended to disclose their HIV status to their child. Findings of the present

study call for an urgent need to provide support to individuals with HIV in **disclosing** HIV status

The present study examined the factors associated with intention to disclose HIV status to their child among HIV+ mothers using the TPB. Results demonstrated the utility of the TPB in predicting maternal HIV disclosure. First, holding a positive attitude towards HIV disclosure was a significant factor associated with intention to disclose HIV status. Attitude was the most important **predictive** factor among all the **examined** variables. Findings were consistent with previous studies that individuals with more positive attitudes towards disclosure **were** more likely to disclose, and individuals who had less favorable attitudes **toward** disclosure were more likely to delay HIV disclosure (Hawk, 2007; Li et al., 2015). Results suggested that positive attitudes **toward** HIV disclosure should be promoted, **with** the inculcation of positive beliefs and demonstration of positive outcomes associated with HIV disclosure.

**Furthermore, the** present study also confirmed that intention to disclose HIV status was influenced by the perception of whether HIV disclosure is under their control. Previous research has suggested that a person's perception of control has a particularly significant effect on behavior when volitional control is not high and when the person's perception of control is accurate (Montano & Kasprzyk, 2002). Given that HIV disclosure is fairly non-volitional, it is conceivable that perceived behavioral control would be a significant factor to HIV disclosure intention.

Recently, the sufficiency of the TPB **in explaining intention of health behaviors** has been discussed and **expansion of different types of norms under subjective norms were proposed to the theory** (Conner & Armitage, 1998). Corroborating with the previous **study**, the present study showed that descriptive norm, injunctive norm, and moral norms were all significant **predictive** factors to intention to disclose HIV **status**. The findings that descriptive and injunctive norms were significant factors to HIV disclosure intention were consistent with previous studies, which reported the positive influence of significant others on **the** intention to disclose. It has been suggested that intention is more subject to be influenced by significant others when a behavior is not well incorporated into one's repertoire (Baumann, Brown, Fontana, & Cameron, 1993). Furthermore, a lack of personal experience would lead individual to rely more on views of significant others in **performing** a behavior (Baumann et al., 1993). Therefore, participants who had no prior experiences in disclosing HIV **status** would value the views of others in **disclosing HIV status**.

The significant role of descriptive and injunctive norm on intention to disclose is found to be particularly interesting in the Chinese context in which normative values are respected. It has long been documented that Chinese culture values interpersonal relatedness, harmony with others, consideration of **oneself** in terms of family and community relationships, and obedience to authority (Oyserman, Coon, & Kemmelmeier, 2002). Hence, the intention to disclose is likely to increase when others believe that this should be done. Findings **were** consistent with previous study which documented the significant role of subjective norm in the Chinese context (Mo & Mak, 2009).

Previous studies have shown that moral norms exert an important influence on behaviors with a strong moral or ethical **standard** (Manstead, 2000; van Kesteren, Hospers, van Empelen, Breukelen, & Kok, 2007). HIV disclosure has a strong moral or ethical consideration as it affects both the infected individuals as well as their family members. It might be possible that mothers who perceive a higher level of moral norm might be more likely to endorse the feeling of moral obligation to do good **for** their child, and therefore are more likely to disclose their HIV status to their child in the future. Indeed, studies among HIV+ individuals have found that participants cited altruism as their reasons to disclose HIV status (Rutledge, 2009). Results of the present study confirmed this assertion and extended previous research by providing support that the consideration of different types of norms might be a useful approach in understanding HIV disclosure.

#### Implications for practice

This present study offers significant implications for healthcare professionals to promote HIV disclosure among HIV+ women in clinical practice. They are in a vital position not only to support and assist HIV+ clients in their HIV disclosure decisions, but also to promote the well-being of **the** entire family as a unit of care. However, research **has** indicated that most of the health care professionals **did** not have sufficient knowledge on factors and situations that might influence the decision of disclosing one's HIV+ status, which resulted in inadequate communication with clients (Bairan et al., 2007; Simoni et al., 2015). Further education is necessary to maximize the effects of intervention to enhance maternal HIV disclosure to their children.

Findings from our studies suggest some ways to further facilitate the effectiveness of intervention in promoting disclosure of HIV status to children. First, the **significante** association between attitudes and intention to disclose suggest that

interventions should foster a positive perception of HIV disclosure. **Health care professionals could promote more favorable attitudes towards disclosure through providing accurate knowledge on the efficacy and positive consequences of disclosure to the infected individual and the family, as well as highlighting the positive values of the behavior.**

**Second**, the significant role of descriptive and injunctive norms suggests that more efforts should be placed on the influence of individual's significant others when promoting HIV disclosure. Health care professionals should encourage HIV+ women to discuss their HIV disclosure and concerns with family members or other HIV+ mothers who have had the similar experience. This would not only strengthen their group norms but also enable them to receive increased support regarding HIV disclosure. This is evidenced by previous studies which show that supports from family and others (i.e., other HIV+ mothers) could bring significant benefits in myriad ways (Blasini et al., 2004; Rotheram-Borus et al., 2010; Wiener, Mellins, Marhefka, & Battles, 2007). Furthermore, the significant association between moral norms and intention to disclose also highlights the need for health care professionals to emphasize the moral obligations of mothers to disclose their HIV status as a means to promote better health of their child and family.

Finally, interventions are needed to enhance perception of personal control over disclosure. It was proposed that perception of personal control is influenced by both improving self-efficacy and controllability, which can be enhanced by various techniques such as social modeling, mastery experience, and social persuasion (Bandura, 1986).

In sum, a successful intervention should facilitate one's decision to disclose as well as to take care of children's well-being after being disclosed. Future intervention may consider including behavioral change model as a framework when designing and delivering family nursing intervention to promote HIV status disclosure among HIV+ mother.

#### Limitations

There were several limitations of the study that should be noted. First of all, the study was cross-sectional in nature and thus causality could not be assumed. However, it should be noted that the hypothesized relationship between the variables in the current study makes theoretical sense. Second, there may be a self-selected bias that those who agreed to take part in the interview might present a more positive attitude towards HIV

disclosure. Third, the use of face-to-face structured interview might also result in social desirability bias, therefore the prevalence of intention to disclose HIV status and their associated factors might be over-estimated. Fourth, only HIV disclosure intention was investigated in the study as it would deem inappropriate to examine the association between TPB variables and past HIV disclosure behavior in a cross-sectional study. As indicated in the literature, a gap between intention and behavior might exist (Armitage & Conner, 2001). Longitudinal studies are warranted to elucidate the relationship between TPB variables and HIV disclosure behavior. Finally, the sample was collected in the cities which were relatively rural with lower level of income. Therefore, findings of the study might not be generalizable to all HIV+ women in China.

### Conclusion

The present study is the first attempt in exploring factors associated with intention to disclose maternal HIV among HIV+ mothers based on the TPB and various norms. Overall, findings support the application of the TPB in HIV disclosure intention among HIV+ mothers in the Chinese context and also highlight the importance of examining descriptive, injunctive, and moral norms. Findings have important implications for the design of interventions aiming at promoting HIV disclosure. Such interventions should target attitude, descriptive and injunctive norms, moral responsibility, and perceived behavioral control related to disclosure.

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### Declaration of Conflicting Interests

The Authors declare that there is no conflict of interest

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Table 1 Background characteristics of participants (Participants with at least one child > 5 years old and haven't disclosed to the oldest child, N=179)

	N (%)
<b>Socio-demographic Variables</b>	
Age	
30 or below	29 (16.2)
31-40	103 (57.5)
41-50	37 (20.7)
51-60	8 (4.5)
61 or above	2 (1.1)
Ethnicity	
Han	148 (83.1)
Others	31 (17.3)
Highest educational level attained	
No education	19 (10.6)
Primary	64 (35.8)
Junior secondary	86 (48.0)
Senior secondary	8 (4.5)
University or above	2 (1.1)
Marital status	
Single	4 (2.2)
Married	143 (80.3)
Cohabiting	11 (6.2)
Divorce	4 (2.2)
Widowed	16 (9.0)

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Monthly household income (in RMB)

Below 1,000	78 (43.6)
1,001-2,000	59 (32.9)
2,001-3,000	36 (20.2)
3,001- or above	6 (3.3)

Perceived health status

Very poor/ poor	13 (7.3)
Fair	101 (56.4)
Good / very good	65 (36.3)

Number of children

1	65 (36.3)
2	77 (43.0)
3	26 (14.5)
4 or above	11 (6.2)

Age of the oldest child

5 to 10 years old	90 (50.3)
11 to 20 years old	61 (34.1)
21 years old or above	28 (15.6)

Gender of the oldest child

Male	81 (45.3)
Female	98 (54.7)

Partner awareness of the participants' HIV status

Yes	170 (94.9)
No	7 (3.9)
Don't know / don't have a partner	2 (1.1)

HIV status of partner

Positive	107 (59.8)
Negative	63 (35.2)
Don't know / don't have a partner	9 (5.0)

**Diseases-related characteristics**

Time since HIV diagnosis

Less than 5 years	63 (35.2)
6-10 years	80 (44.7)
11 years or above	36 (20.1)

Mode of transmission

Sex	129 (72.1)
Injecting drug use	2 (1.1)
Selling blood	33 (18.4)
Don't know/ don't wish to answer	15 (8.4)

Disease stage

Asymptomatic	89 (49.7)
Symptomatic	7 (3.9)
AIDS	47 (26.3)
Don't know	36 (20.1)

On antiretroviral treatment

Yes	147 (82.1)
No	32 (17.9)

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Table 2 Descriptive statistics of the TPB constructs and different types of norms  
(Participants with at least one child > 5 years old and haven't disclosed to the oldest  
child, N=179)

	N (%)*/ Mean(SD)
<b>Attitude</b>	
Disclosing my HIV status to my child is useful	94 (52.5)
Disclosing my HIV status to my child is necessary	92 (51.4)
Disclosing my HIV status to my child is wise	72 (40.3)
Disclosing my HIV status to my child is positive	72 (40.3)
Mean score of the attitude scale	3.20 (0.96)
<b>Injunctive norm</b>	
Those people who are important to me think that I should disclose my HIV status to me child	70 (39.1)
Those people who are important to me agree that I should disclose my HIV status to me child	67 (37.5)
Those people who are important to me think disclose my HIV status to me child is appropriate	71 (39.7)
Mean score of the injunctive norm scale	3.00 (0.97)
<b>Descriptive norm</b>	
Most of the HIV+ mothers have disclosed their HIV status to their child	65 (36.4)
It is common for HIV+ mothers to disclose their HIV status to their child	64 (35.8)
I expect that most of the HIV+ mothers I know have disclosed their HIV status to their child	59 (33.0)
Mean score of the descriptive norm scale	2.98 (0.90)

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Moral norm

I have the moral responsibility to disclose my HIV status to my child 95 (53.0)

Not disclosing my HIV status to my child deviates the moral norm 87 (48.6)

Mean score of the moral norm scale 3.31 (0.84)

Perceived behavioral control

I can decide whether to disclose my HIV status to my child or not 120 (67.1)

If I try to, I am sure I can disclose my HIV status to my child 95 (53.1)

Mean score of the perceived behavioral control scale 3.46 (0.68)

Intention to disclose HIV status

How likely would you disclose your HIV status to the child in the future 30 (16.8)

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\*Those who answered agree/**strongly agree** in the respective item

Table 3 Association between background variables and intention to disclose HIV status to the oldest child (Participants with at least one child > 5 years old and haven't disclosed to the oldest child, N=179)

	Row%	OR <sub>u</sub> (95% CI)
<b>Socio-demographic Variables</b>		
Age	-	<b>0.97(0.92,1.02)</b>
Ethnicity		
Han	18.2	1.0
Others	<b>10.0</b>	<b>0.50(0.14, 1.76)</b>
Highest educational level attained		
Primary or below	19.3	1.0
Secondary and above	14.6	0.72(0.33,1.57)
Marital status		
Currently single	4.2	1.0
Married/cohabited with men	18.8	5.34(0.69,41.14)
Monthly household income (RMB)		
Below 1,000	23.1	1.0
1,001-2,000	10.3	0.39(0.14,1.04) †
2,001 or above	14.3	0.56(0.20,1.53)
Perceived health status		
Very poor/poor	30.8	1.0
Fair	12.9	0.33(0.09,1.24)
Good/very good	20.0	0.56(0.15,2.12)
Number of children	-	<b>0.90(0.57,1.42)</b>
Age of the oldest child	-	<b>0.94(0.88,1.00) †</b>
Gender of the oldest child		
Male	15.2	1.0
Female	18.9	1.31(0.59,2.91)
Partner awareness of the participant's HIV status		
No	42.9	1.0
Yes	15.9	0.25(0.05,1.19) †
Don't know / don't have a partner	0.0	NA
HIV status of partner		
Negative	12.7	1.0
Positive	18.7	1.58(0.65,3.84)
Don't know / don't have a partner	22.2	1.96(0.35,11.17)
<b>Diseases-related characteristics</b>		

Time since HIV diagnosis	-	<b>1.00(0.88,1.12)</b>
Mode of HIV infection		
Sex	13.2	1.0
Selling blood	27.3	2.47(0.98,6.20) †
Injecting drug use	50.0	6.59(0.39,110.35)
Don't know / don't wish to answer	20.0	1.65(0.42,6.44)
Disease stage		
Asymptomatic	16.9	1.0
Symptomatic	14.3	0.82(0.09,7.34)
AIDS	17.0	1.01(0.40,2.60)
Don't know	17.6	1.06(0.37,3.00)
On antiretroviral treatment		
No	<b>25.0</b>	1.00
Yes	14.3	<b>0.50(0.16,1.52)</b>

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† p<.10

Table 4 Association between TPB variables and different types of norms on the intention to disclose HIV status to the oldest child (Participants with at least one child > 5 years old and haven't disclosed to the oldest child, N=179)

	ORu (95% C.I.)	AOR (95% C.I.)	ORm (95% C.I.)
Attitude	5.62 (2.48, 12.74)***	<b>15.85 (4.72,53.21)***</b>	<b>6.96 (1.83,26.43)**</b>
Injunctive norm	5.35 (2.52, 11.35)***	<b>15.04 (4.43,51.05)***</b>	<b>6.81 (1.77,26.22)**</b>
Descriptive norm	2.09 (1.25, 3.52)**	<b>3.99 (1.92,8.30)***</b>	N.S.
Moral norm	1.77 (1.01, 3.11)*	<b>3.22 (1.49,6.96)**</b>	N.S.
Perceived behavioral control	3.33 (1.48, 7.50)**	<b>7.00 (2.29,21.35)**</b>	N.S.

AOR = Adjusted odds ratio adjusted for monthly family income, age of the oldest child, **partner awareness of the participant's HIV status**, and **mode** of HIV infection

N.S. = not selected by the stepwise analysis

\*\*p<.01, \*\*\*p<.001



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