

# Behavioral Intention to Initiate Antiretroviral Therapy (ART) Among Chinese HIV-Infected Men Who Have Sex With Men Having High CD4 Count in the Era of “Treatment for All”

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## Abstract

China has updated its national guideline recommending antiretroviral therapy (ART) to all people living with HIV (PLWH) since 2016. This study was to investigate the prevalence of behavioral intention to initiate ART among HIV-infected men who have sex with men (MSM) with CD4 levels  $>350$  cells/mm<sup>3</sup>, who had just become eligible to receive free ART in China. A cross-sectional survey was conducted among 262 eligible HIV-infected MSM who had never received ART. The theory of planned behavior (TPB) was used to guide the variable selection. The prevalence of behavioral intention to initiate ART was 69.9%. After adjusting for significant background variables, all five constructs of TPB were significantly associated with behavioral intention to initiate ART. These significant constructs were: positive attitudes (adjusted odds ratios, AOR: 1.14; 95% CI [1.06, 1.24]) and negative attitudes (AOR: 0.89; 95% CI [0.82, 0.97]) toward immediate ART initiation; perceived their significant others would support them to initiate ART immediately (perceived subjective norm; AOR: 1.14; 95% CI [1.03, 1.25]); perceived high proportion of PLWH having similar CD4 cell levels were on ART (perceived descriptive norm; AOR: 2.22, 95% CI [1.16, 4.24]); and being confident in initiating ART immediately (perceived behavioral control; AOR: 1.21; 95% CI [1.04, 1.39]). Prevalence of behavioral intention to initiate ART was high among this group of MSM. Effective health promotion is needed to translate behavioral intention into related action. TPB may be a useful framework for developing future health promotion increasing ART coverage in this group.

## Keywords

behavioral intention, antiretroviral therapy, HIV-infected men who have sex with men, China

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Evidence reports that when an individual is virally suppressed by antiretroviral therapy (ART), his or her risk of HIV transmission will be greatly reduced. This new concept is known as Treatment as Prevention (TasP; Baeten et al., 2012). A large-scale randomized clinical trial (RCT) reported that initiation of ART among people living with HIV (PLWH) at higher CD4 levels ( $>350$  cells/mm<sup>3</sup>) with good adherence could significantly reduce the risk of HIV transmission by 96% (Cohen et al., 2011). Modeling results suggested

that an increase in ART coverage could reduce HIV incidence at the population level (Eaton et al., 2014; Tanser, Barnighausen, Grapsa, Zaidi, & Newell, 2013). New evidence demonstrates that as compared to ART initiation when CD4 levels dropped to 350 cells/mm<sup>3</sup>, early ART initiation at higher CD4 levels (above 500 cells/mm<sup>3</sup>) would have significant clinical benefit (e.g., reduce risk of serious AIDS-related events by 72% and serious non-AIDS events by 39%; INSIGHT START Study Group et al., 2015).



Based on such new evidence, the 90-90-90 target was set and advocated by the Joint United Nations Programme on HIV/AIDS (UNAIDS, 2014). It targets having 90% of PLWH knowing about their HIV status, 90% of diagnosed PLWH receiving ART, and 90% of PLWH on ART having viral suppression. The target sheds light of hope, as its achievement by 2020 would put the global HIV epidemic under control by 2030 (UNAIDS, 2014). The World Health Organization (WHO) soon reacted by creating two guidelines, which recommended provision of ART to PLWH with CD4 levels  $\leq 500$  cells/mm<sup>3</sup> (2014) and then to all PLWH regardless of their CD4 levels (2015) (WHO, 2015). Moreover, WHO (2017) recommended rapid ART initiation (i.e., within 7 days from the day of HIV diagnosis) to all PLWH following a confirmed HIV diagnosis and ART initiation on the same day to people who are ready to start (WHO, 2017). In response to the changes of WHO guidelines, the Chinese National ART Guidelines were also updated twice. In May 2014, the guideline stated that "Irrespective of WHO stage of HIV infection, ART is recommended to all PLWH with CD4 count  $\leq 500$  cells/mm<sup>3</sup>." The guideline started recommending free ART to all PLWH regardless of their CD4 level since June 2016 (National Health and Family Planning Commission of China, 2014, 2016).

The implementation of the new National ART guideline is the key to achieving the 90-90-90 target in China. The HIV epidemic among MSM is alarming. In some Chinese cities (e.g., Chongqing and Guiyang), the HIV prevalence among MSM has exceeded 20% and has increased by more than 10% over the last decade (Li et al., 2014; Wei et al., 2005; Y. Zhang et al., 2012). The overall HIV prevalence was 9.9% (Qin et al., 2016), while the overall HIV incidence was as high as 5.6 per 100 person-year among MSM in China (W. Zhang et al., 2016). However, in China, only 67% of PLWH received ART in 2015 (Wu, 2016). HIV-infected MSM reported lower ART use than other HIV-infected groups (Rodger

et al., 2014). HIV-infected MSM with higher CD4 levels might be less motivated to receive ART, as international and national data consistently reported that higher CD4 level was associated with lower ART initiation (Koenig et al., 2016; Q. Zhang et al., 2015). HIV-infected MSM with CD4 levels  $>350$  cells/mm<sup>3</sup> in China had just become eligible to receive free ART after the National ART guideline was updated. It is important to understand their behavioral intention to initiate ART as well as the barriers and facilitators involved in order to develop effective health promotion. However, no study investigated this topic among this group.

Behavioral change theories are useful in guiding the development of interventions for a particular health behavior (Michie & Prestwich, 2010; Painter, Borba, Hynes, Mays, & Glanz, 2008). The theory of planned behavior (TPB; Ajzen, 1985; 1991) is one of the most commonly used theories to explain a health behavior. It postulates that in order to form an intention to adopt a health behavior (e.g., initiate ART), one would first evaluate the behavior (positive and negative attitudes), consider whether their significant others would support such behavior (subjective norm), assess how many of their peers have done so (descriptive norm), and appraise how much control they have over the behavior (perceived behavioral control) (Ajzen, 1991).

In order to fill the knowledge gap, a cross-sectional study was conducted among HIV-infected MSM with CD4 levels of  $>350$  cells/mm<sup>3</sup> who have never received ART in China. The prevalence of behavioral intention to initiate ART in the next 6 months and associated factors were investigated. Potential associated factors included background characteristics (socio-demographics, disease-related characteristics, and sexual behaviors since diagnosis) and perceptions based on the TPB (positive attitudes, negative attitudes, perceived subjective norm, perceived descriptive norm, and perceived behavioral control).

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## Methods

### Participants

A cross-sectional study was conducted from February to November 2016. Participants were recruited from three nongovernmental organizations (NGOs) and one Center for Disease Control and Prevention (CDC) that were providing follow-up services to HIV-infected MSM in four different cities in mainland China (Chengdu, Hangzhou, Fuzhou, and Shenyang). Inclusion criteria were: (a) men aged  $\geq 18$  years old, (b) self-reported having anal intercourse with at least one man in the lifetime, (c) received confirmatory HIV diagnosis, (d) with CD4 levels  $>350$  cells/mm<sup>3</sup> since diagnosis to the time of survey, and (e) have never received ART before. Special groups who were eligible for free ART disregarding the change of the national ART guideline made in 2014 or 2016 (i.e., marriage with a woman, having a regular female sex partner at the time of diagnosis, or having advanced symptoms of HIV stage III/IV or AIDS defining conditions classified by WHO since diagnosis) were excluded.

### Data Collection

In Chengdu, Hangzhou, and Fuzhou, NGOs are the major providers of direct HIV-related services to HIV-infected MSM, as routine tasks of HIV prevention and PLWH care have been transferred from government agencies to these NGOs (Kelly et al., 2006; Yan et al., 2014). For example, the collaborative NGO in Chengdu provides treatment-supporting services to over 1,000 HIV-infected MSM residing in Chengdu, which accounted for about 80% of all reported HIV-infected MSM in this city. The situation in Shenyang is different, as Shenyang CDC is the major service provider for HIV-infected MSM. Three NGOs (in Chengdu, Hangzhou, and Fuzhou) and one CDC (in Shenyang) facilitated the data collection. Trained staff of the collaborative NGOs/CDC contacted all HIV-infected MSM listed in their service records, briefed them about the study, and screened their eligibility. Eligible participants were invited to join the study, assured making refusals would not affect their rights to use any other services, and that they could quit at any time without being questioned. Interested participants were invited to visit the collaborative NGOs/CDC for an anonymous face-to-face interview. Out of 269 eligible participants being invited, 262 provided written informed consent and completed the interview. Participants received monetary compensation of 80 RMB (11 USD) for their time spent after completing the interview. Ethics approval was obtained from the Survey and Behavioral Research Ethics Committee of the Chinese University of Hong Kong.

### Measurements

**Background characteristics.** Participants were asked about their socio-demographics (e.g., age, education level, marital status, monthly personal income), disease-related characteristics (e.g., duration since HIV diagnosis), and sexual behaviors since HIV diagnosis (e.g., anal intercourse with regular and nonregular male sex partners). Regular male sex partners (RP) were defined as those who were in a stable relationship that did not involve transactional sex, while nonregular male sex partners (NRP) were defined as men who were not RP where transactional sex was not involved.

**Behavioral intention to initiate ART in the next 6 months.** Participants were asked whether they were willing to initiate ART in the next 6 months (response categories: 1 = *definitely not*, 2 = *probably not*, 3 = *neutral*, 4 = *probably will*, 5 = *definitely will*). Responses were then dichotomized. Behavioral intention was defined as *probably will* or *definitely will*, while without behavioral intention was defined as *neutral*, *probably not*, or *definitely not*.

**Perceptions related to immediate ART initiation based on TPB.** Four scales were constructed based on TPB: (a) the 6-item Positive Attitudes Scale (e.g., “Immediate ART initiation would effectively reduce your risk of transmitting HIV to others”); (b) the 5-item Negative Attitudes Scale (e.g., “You would be discriminated by health professionals when obtaining ART”); (c) the 5-item Subjective Norm Scale (e.g., “Your regular male sex partner [e.g., boyfriend] will support you to initiate ART immediately”); and (d) the 3-item Perceived Behavioral Control Scale (e.g., “Whether to initiate ART immediately is completely under your control”) (Responses categories: 1 = *strongly disagree*, 5 = *strongly agree*). Cronbach’s  $\alpha$  of these four scales ranged from 0.70 to 0.87.

In addition, descriptive norm related to ART initiation was measured by a single item: “To your knowledge, what’s the proportion of PLWH who have similar CD4 levels as you (i.e.,  $>350$  cells/mm<sup>3</sup>) were on ART?” (Response categories: 1 = *none*, 2 = *less than half*, 3 = *half*, 4 = *more than half*, 5 = *almost everyone*).

### Statistical Analysis

Using behavioral intention to initiate ART in the next 6 months as the dependent variable, univariate odds ratio (OR<sub>u</sub>) for the associations between background variables and the dependent variable were estimated. Those background variables with  $p < .10$  were adjusted for in the subsequent logistic regression analysis involving cognitive variables and the dependent variable, adjusted odds ratios (AOR), and respective 95% CI were derived. IBM

SPSS statistics 21 was used to conduct the analysis, with  $p$  value  $<.05$  taken as statistically significant.

## Results

### Background Characteristics

The majority of the participants were 18–30 years old (173/262, 66.0%), attained college degree or above (155/262, 59.2%), were currently single (218/262, 83.2%), had a monthly income higher than 3000 RMB (USD 435; 171/262, 65.3%), and identified themselves as homosexuals (213/262, 81.3%). Regarding disease-related characteristics, 43.9% (115/262) had been diagnosed for more than 1 year and 34.0% (89/262) self-reported having some AIDS-related symptoms. Since HIV diagnosis, 42.0% (110/262) and 55.0% (144/262) had had anal intercourse with RP and NRP, respectively (Table 1).

### Behavioral Intention to Initiate ART and Perceptions Related to Immediate ART Based on TPB

The prevalence of behavioral intention to initiate ART in the next 6 months was 69.9%. Individual item responses and means ( $SD$ ) for the scales related to perceptions of immediate ART initiation are presented in Table 2.

### Factors Associated With Behavioral Intention to Initiate ART in the Next 6 Months

In the univariate analysis, four background variables were significantly associated with behavioral intention to initiate ART in the next 6 months. Those having CD4 levels  $>500$  cells/mm<sup>3</sup> in their last test (ORu: 0.51; 95% CI [0.30, 0.88];  $p = .015$ ;  $R^2 = 0.0317$ ), longer duration of HIV diagnosis (2–6 months: ORu: 0.32; 95% CI [0.10, 0.99];  $p = .048$ ; 7–12 months: ORu: 0.16; 95% CI [0.05, 0.50];  $p = .001$ ;  $>12$  months: ORu: 0.13; 95% CI [0.05, 0.35];  $p < .001$ ; reference group:  $\leq 1$  month;  $R^2 = 0.1189$ ), and had had anal intercourse with RP (ORu: 0.52; 95% CI [0.31, 0.89];  $p = .017$ ;  $R^2 = 0.0308$ ) and NRP (ORu: 0.38; 95% CI [0.22, 0.67];  $p = .001$ ;  $R^2 = 0.0629$ ) since diagnosis had lower intention to initiate ART in the next 6 months (Table 3).

In the bivariate analysis, all five constructs of TPB were significantly associated with behavioral intention, which include: (a) the Positive Attitude Scale (ORu: 1.14; 95% CI [1.06, 1.23];  $p < .0001$ ;  $R^2 = 0.0716$ ), (b) the Negative Attitude Scale (ORu: 0.91; 95% CI [0.84, 0.98];  $p = .010$ ;  $R^2 = 0.0364$ ), (c) the Subjective Norm Scale (ORu: 1.19; 95% CI [1.09, 1.31];  $p < .0001$ ;  $R^2 = 0.0820$ ), (d) the Perceived Behavioral Control Scale (ORu: 1.20;

**Table 1.** Background Characteristics of HIV-Infected MSM ( $n = 262$ ).

	<i>n</i>	%
<b>Socio-demographic factors</b>		
Age group		
18–30	173	66.0
$>30$	89	34.0
Highest education level attained		
Junior high or lower	39	14.9
Senior high school (or equivalent)	68	26.0
College or above	155	59.2
Marital status		
Currently single	218	83.2
Cohabited with men	44	16.8
Monthly personal income (RMB)		
$<3000$	91	34.7
$\geq 3000$	171	65.3
Self-identified sexual orientation		
Bisexual/uncertain	49	18.7
Homosexual	213	81.3
<b>Disease characteristics</b>		
CD4 counts during last test		
351–500	162	61.8
$>500$	100	38.2
Time since HIV diagnosis (months)		
$\leq 1$	58	22.1
2–6	48	18.3
7–12	41	15.6
$>12$	115	43.9
Self-reported having AIDS-related symptoms <sup>a</sup>		
No	173	66.0
Yes	89	34.0
<b>Sexual behaviors since HIV diagnosis</b>		
Had had anal intercourse with regular male sexual partner (RP)		
No	152	58.0
Yes	110	42.0
Had had anal intercourse with nonregular male sex partner (NRP)		
No	118	45.0
Yes	144	55.0

Note. <sup>a</sup>AIDS-related symptoms may include fever, headache, body rash, sore throat, swollen lymph nodes, weight loss, diarrhea, muscle pain, etc.

95% CI [1.05, 1.38];  $p = .007$ ;  $R^2 = 0.0383$ ), and (e) MSM who perceived that more than half/ almost all PLWH with similar CD4 levels were on ART (ORu: 2.52; 95% CI [1.38, 4.60];  $p = .001$ , reference group: None/less than half/half;  $R^2 = 0.0520$ ; Table 4).

Adjusted for these four background variables, all five constructs of TPB remained significantly associated with the dependent variable in the expected direction. They were: (a) the Positive Attitude Scale (AOR: 1.14;

**Table 2.** Perceptions Related to Immediate ART Initiation (IART) Based on the Theory of Planned Behavior (TPB) ( $n = 262$ ).

	%	Mean (SD)
<b>Positive attitudes toward IART</b> (% agree/strongly agree)		
IART would effectively improve your immune function	72.2	
IART would effectively slow your disease progression	71.7	
IART would effectively reduce your risk of death	66.8	
IART would effectively reduce your risk of having chronic disease (e.g., cardiovascular disease, hyperlipidemia, and diabetes)	44.6	
IART would effectively reduce your risk of transmitting HIV to others	63.4	
IART would effectively reduce your psychological burden	42.0	
<i>Positive Attitude Scale</i>		18.7 (3.8)
<b>Negative attitudes toward IART</b> (% agree/strongly agree)		
IART would cause severe side effects	53.8	
IART would cause inconvenience to your daily life	41.3	
You would be discriminated by health professionals when obtaining ART	13.7	
You worry that others may know you are PLWH if you are using ART	29.4	
IART would develop drug resistance	35.9	
<i>Negative Attitude Scale</i>		15.2 (3.7)
<b>Subjective norm related to IART</b> (% agree/strongly agree)		
Your regular male sex partner (e.g., boyfriend) would support you to initiate ART immediately	62.6	
Your family members would support you to initiate ART immediately	71.7	
Your HIV-infected friends would support you to initiate ART immediately	65.6	
Your significant others would support you to initiate ART immediately	67.9	
Health professionals would support you to initiate ART immediately	72.5	
<i>Subjective Norm Scale</i>		19.3(3.2)
<b>Perceived behavioral control related to IART</b> (% agree/strongly agree)		
Whether to initiate ART immediately or not is completely under your control	72.2	
You are confident that you can initiate ART immediately if you want to	74.1	
You are confident to initiate ART immediately if it has some side-effects	69.4	
<i>Perceived Behavioral Control Scale</i>		11.6 (2.0)
<b>Descriptive norm related to IART</b>		
To your knowledge, what's the proportion of PLWH having similar CD4 level as you are on ART?		
None	3.8	
Less than half	16.0	
Half	43.5	
More than half	29.4	
Almost everyone	7.3	
<b>Behavioral intention to initiate ART in the next 6 months</b>		
Willing to initiate ART in the next 6 months		
No (Definitely not/probably not/neutral)	30.1	
Yes (Probably will/definitely will)	69.9	

95% CI [1.06, 1.24];  $p = .001$ ;  $R^2 = 0.2271$ ), (b) the Negative Attitude Scale (AOR: 0.89; 95% CI [0.82, 0.97];  $p = .009$ ;  $R^2 = 0.2050$ ), (c) the Subjective Norm Scale (AOR: 1.14; 95% CI [1.03, 1.25];  $p = .008$ ;  $R^2 = 0.2037$ ), (d) the Perceived Behavioral Control Scale (AOR: 1.21; 95% CI [1.04, 1.39];  $p = .012$ ;  $R^2 = 0.1978$ ), and (e) MSM who perceived that more than half/almost all PLWH with similar CD4 levels were on ART (AOR: 2.22; 95% CI [1.16, 4.24];  $p = .016$ ; reference group: None/less than half/half;  $R^2 = 0.1949$ ; Table 4).

## Discussion

Prevalence of behavioral intention to initiate ART was high among the sampled HIV-infected MSM (69.9%). A meta-analysis identified only 43% to 62% of those with a behavioral intention would translate it into related action (McEachana, Conner, Taylor, & Lawton, 2011). Therefore, without effective health promotion, the ART coverage among this group of HIV-infected MSM may remain low. As compared to those with CD4 levels 351–500 cells/mm<sup>3</sup>, the prevalence of behavioral intention was significantly lower among those with CD4 levels

**Table 3.** Associations Between Background Variables and Behavioral Intention to Initiate ART in the Next 6 Months (*n* = 262)

	Row %	ORu (95% CI)	<i>p</i> value	<i>R</i> <sup>2</sup>
<b>Socio-demographic factors</b>				
Age group				
18–30	70.5	1		
>30	68.5	0.91 [0.52, 1.59]	.74	0.0006
Highest education level attained				
Junior high or lower	71.8	1		
Senior high school (or equivalent)	70.6	0.94 [0.40, 2.25]	.90	
College or above	69.8	0.88 [0.40, 1.90]	.74	0.0007
Marital status				
Currently single	70.6	1		
Cohabited with men	65.9	0.80 [0.40, 1.60]	.53	0.0021
Monthly personal income (RMB)				
<3000	68.1	1		
≥3000	70.8	1.13 [0.65, 1.96]	.66	0.0010
Self-identified sexual orientation				
Bisexual/uncertain	68.5	1		
Homosexual	75.5	1.42 [0.69, 2.89]	.34	0.0051
<b>Disease-related characteristics</b>				
CD4 count during last test				
351–500	75.3	1		
>500	61.0	<b>0.51 [0.30, 0.88]</b>	<b>.015</b>	<b>0.0317</b>
Time since HIV diagnosis (months)				
≤1	91.4	1		
2–6	77.1	<b>0.32 [0.10, 0.99]</b>	<b>.048</b>	
7–12	63.4	<b>0.16 [0.05, 0.50]</b>	<b>.001</b>	
>12	58.3	<b>0.13 [0.05, 0.35]</b>	<b>&lt;.001</b>	<b>0.1189</b>
Self-reported AIDS-related symptoms				
No	69.7	1		
Yes	69.9	1.01 [0.58, 1.77]	.96	0.0000
<b>Sexual behaviors since HIV diagnosis</b>				
Had had anal intercourse with regular male sexual partner				
No	75.7	1		
Yes	61.8	<b>0.52 [0.31, 0.89]</b>	<b>.017</b>	<b>0.0308</b>
Had had anal intercourse with nonregular male sexual partner				
No	80.5	1		
Yes	61.1	<b>0.38 [0.22, 0.67]</b>	<b>.001</b>	<b>0.0629</b>

Note. ORu = univariate odds ratios; CI = confidence interval.

Bold font signified the variables that significantly associated with the outcome and with *p* value < .05.

**Table 4.** Factors Associated With Behavioral Intention to Initiate ART in the Next 6 Months (*n* = 262).

Items	ORu (95% CI)	<i>p</i> value	<i>R</i> <sup>2</sup>	AOR (95% CI)	<i>p</i> value	<i>R</i> <sup>2</sup>
Positive Attitudes Scale (mean, SD)	<b>1.14 [1.06, 1.23]</b>	<b>&lt;.0001</b>	<b>0.0716</b>	<b>1.14 [1.06, 1.24]</b>	<b>.001</b>	<b>0.2271</b>
Negative Attitudes Scale (mean, SD)	<b>0.91 [0.84, 0.98]</b>	<b>.010</b>	<b>0.0364</b>	<b>0.89 [0.82, 0.97]</b>	<b>.009</b>	<b>0.2050</b>
Subjective Norms Scale (mean, SD)	<b>1.19 [1.09, 1.31]</b>	<b>&lt;.0001</b>	<b>0.0820</b>	<b>1.14 [1.03, 1.25]</b>	<b>.008</b>	<b>0.2037</b>
Perceived Behavioral Control Scale (mean, SD)	<b>1.20 [1.05, 1.38]</b>	<b>.007</b>	<b>0.0383</b>	<b>1.21 [1.04, 1.39]</b>	<b>.012</b>	<b>0.1978</b>
Descriptive norm related to immediate ART initiation ( <i>N</i> , %)						
To your knowledge, what's the proportion of PLWH who have similar CD4 levels as you were on ART?						
Nobody/less than half/half	1			1		
More than half/almost all	<b>2.52 [1.38, 4.60]</b>	<b>.001</b>	<b>0.0520</b>	<b>2.22 [1.16, 4.24]</b>	<b>.016</b>	<b>0.1949</b>

ORu = univariate odds ratios; AOR = adjusted odds ratios.

Odds ratios adjusted by significant background variables in univariate analysis listed in Table 3.

>500 cells/mm<sup>3</sup> (61.0% vs. 75.3%). They might have better health status and hence have lower motivation to receive ART. Evidences obtained from RCTs reported that initiating ART when CD4 level is above 500 cells/mm<sup>3</sup> would have significant higher clinical benefits (Danel et al., 2015; INSIGHT START Study Group et al., 2015). Such information needs to be disseminated to this group of HIV-infected MSM in future health promotion campaigns. The majority of the participants were sexually active, as about 42.0% and 55.0% had had anal intercourse with either RP or NRP since diagnosis. Sexually active HIV-infected MSM reported significantly lower intention to initiate ART. Since previous studies reported high prevalence of condomless anal intercourse in this group (Wang et al., 2017), their risk of HIV transmission is high. Therefore, attention should be given to sexually active HIV-infected MSM in future campaigns promoting ART initiation. Immediate ART initiation should be considered by policy makers and service providers in China, as HIV-infected MSM who received confirmatory diagnosis within 1 month reported highest prevalence behavioral intention to initiate ART. Such an approach could reduce loss to care before ART starts and improve clinical outcomes (WHO, 2017).

The results suggested that TPB is a potential useful framework for designing future programs promoting ART initiation, as all its constructs were significantly associated with behavioral intention to initiate ART and the associations were in the expected direction. About 70% of them had some positive attitudes toward immediate ART initiation (i.e., it would improve their immune function, slow disease progression, and reduce risk of death and HIV transmission). Few of them perceived immediate ART initiation could reduce risk of chronic diseases (44.6%) or psychological burden (42.0%). About 30% to 50% of them had concerns related to immediate ART initiation (i.e., severe side effects, would cause inconvenience, psychological stress, drug resistance, and expose their HIV serostatus to others). It is important to strengthen positive attitudes and remove negative attitudes toward immediate ART initiation, as both constructs were significantly associated with behavioral intention to initiate ART. Health communication messages should emphasize immediate ART initiation is effective in improving clinical outcomes and reducing risk of transmission. Information about the safety of immediate ART initiation (e.g., severe side effects are rare, common mild side effects [e.g., diarrhea and rash] can be easily managed, and lower chance of developing drug resistance as compared to delayed ART initiation) should also be disseminated to this group of HIV-infected MSM

(Fogel et al., 2016). In contrast to commonly used health communication messages that present factual information in favor of a particular behavior, narrative messages use storytelling and testimonials to describe experiences and the consequences of behavior. Narratives have been increasingly recognized and used as a tool for health promotion. It has been suggested that narratives are more effective in conveying risk information than factual information (Rothman & Kiviniemi, 1999). A meta-analysis of 22 studies reported that narrative messages were more effective than factual information in changing attitudes (Reinhart & Feeley, 2007). It is expected that narratives from their peers would be useful in influencing attitudes toward immediate ART initiation among HIV-infected MSM, as most of them tend to have a very close circle of friends and a strong attachment to each other (O'Donnell et al., 2002). It is therefore expected they would find their peers' experiences particularly valuable.

About two-third of them perceived their significant others would support them to initiate ART immediately. Such perception was associated with higher behavioral intention to initiate ART. It is therefore important to encourage HIV-infected MSM to discuss immediate ART initiation with their significant others to reduce potential misunderstandings and to obtain support regarding ART initiation. Perception that more PLWH with similar CD4 levels were on ART was positively associated with behavioral intention to initiate ART. New social norms about the ART initiation need to be built. The diffusion of innovation theory—which states that according to the length of innovation-decision process, people can be divided into innovators, early majority (early adopters), late majority, and the laggards (late adopters)—is applicable to this case (Rogers, 2003). Future health promotion should identify a group of innovators (i.e., HIV-infected MSM who initiated ART when CD4 counts >350 cells/mm<sup>3</sup>). These innovators can introduce immediate ART initiation to the MSM community. Innovators' positive experience would draw the attention of the early adopters, who would in turn serve as role models for the late adopters. Testimonials from innovators and early adopters are potentially useful to establish a new social norm. It is, therefore, important to publicize such testimonials widely through social media and websites and reinforce the fact that most of the HIV-infected MSM with high CD4 counts are already on ART. Enhancing perceived behavioral control related to immediate ART initiation is another useful strategy. Clear goal setting may help them to overcome difficulties to initiate treatment and enhance their perceived control over ART initiation.

This study has the strengths of being theory-based and having a high participation rate. The collaborative NGOs/CDC has been providing supporting services for the participants in this study. Good relationship and mutual trust has been established between the staff of these organizations and the participants. As a result, the participants were likely to support the work of these organizations by participating in the survey. The high participation rate can reduce potential selection bias. This study also has some limitations. First of all, the participants were recruited by nonprobabilistic sampling, in the absence of sample frames. The results might not be representative of all HIV-infected MSM with CD4 levels  $>350$  cells/mm<sup>3</sup> in China. Caution should be made when generalizing the results to other Chinese cities. Secondly, number and information of ineligible participants or those who refused to participate in the study were not recorded. Third, face-to-face interview was conducted in this study. Reporting bias may be caused by social desirability when answering questions regarding behavioral intention to initiate ART and sexual risk behaviors. Moreover, the items/scales were constructed for this study, as no validated item/scale was available. Lastly, this was a cross-sectional study and could not establish causality.

## Conclusion

Prevalence of behavioral intention to initiate ART was high among HIV-infected MSM with CD4 counts  $>350$  cells/mm<sup>3</sup>. Effective health promotion is needed to translate behavioral intention into action. More attention should be given to HIV-infected MSM with CD4 level  $>500$  cells/mm<sup>3</sup> and those who are sexually active. Rapid ART initiation should be considered to reduce loss to care. Future health promotions modifying perceptions related to immediate ART initiation based on the TPB may be effective in increasing ART coverage in this group.

## Declaration of Conflicting Interests

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