

Risk and protective factors in association with mental health problems among people living with HIV who were former plasma/blood donors in rural China

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A random sample of 271 people living with HIV (PLWH) who were former plasma/blood donors and a convenience sample of 67 HIV negative villagers were anonymously interviewed. Compared with the non-PLWH, PLWH reported higher prevalence of symptoms of depression (adjusted OR = 2.53, $p = 0.001$), anxiety (adjusted OR = 1.85, $p = 0.04$), and stress (adjusted OR = 1.77, $p = 0.06$). Of the PLWH respondents, 81.7% received Highly Active Antiretroviral Therapy (HAART); 32.1% of whom reported some side effects. Respectively 13.7%, 37.4%, and 38.4% PLWH perceived discrimination from their family members, relatives/friends, and neighbors. Absence of HAART, poor physical function, perceived discrimination from relatives and friends, and low level of resilience were associated with depression (stepwise regression; $\beta = -0.28-0.17$, R -square = 0.22), anxiety and stress (R -square = 0.32 and 0.16, respectively). The majority of respondents (70.1%) desired group intervention as a means for providing psychological support services. Relevant programs should both remove risk factors (e.g., absence of medical treatment, HIV-related discrimination) and promote protective factors (e.g., resilience). Support group is one of the potentially useful approaches to provide psychological support services.

Keywords: mental health; perceived discrimination; resilience; people living with HIV; former plasma/blood donors

Introduction

The prevalence of depression and anxiety among people living with HIV (PLWH) were respectively as high as 54.2 and 35.8% (Nogueira Campos, De Fatima Bonolo, & Crosland Guimaraes, 2006; Williams et al., 2005), which were higher than those of the general populations (Cruess et al., 2003). Mental health problems affect PLWH's treatments and medical conditions (Cruess et al., 2003), suicidal ideation (Carrico et al., 2007), HIV-related risk behaviors (Amirkhanian, Kelly, & McAuliffe, 2003), and quality of life (Tostes, Chalub, & Botega, 2004). The effectiveness of psychological intervention in reducing anxiety and depression among Chinese PLWH was only reported in one study (Fang, Jiang, & Dong, 2007b).

Risk factors for mental health problems among Chinese PLWH included low self-acceptance and poor social support (Chen et al., 2004; M. Zhang, Xu, Zhang, Wang, & Zhang, 2007), stress related to HIV/AIDS (J. Wang, Lin, Wu, & Qu, 2005), negative life events (Chen et al., 2004), and perceived discrimination (Fang, Jiang, & Dong, 2007a). Resilience, a protective factor, is defined as effective

coping and adaptation when one experiences loss, hardship, or adversity (Tugade & Fredrickson, 2004). Resilient people reported fewer depressive symptoms than others in response to major stressors (Fredrickson, Tugade, Waugh, & Larkin, 2003; Tugade & Fredrickson, 2004). Resilience may serve as a moderator between risk factors and mental health outcomes (Ong, Bergeman, Bisconti, & Wallace, 2006). The concept has been applied to different populations (Bonanno, Moskowitz, Papa, & Folkman, 2005; Werner, 1989) but not to the PLWH population.

Furthermore, cost-effective interventions can be designed using the resilience concept (Luthar, Cicchetti, & Becker, 2000). Through counseling, demonstration, role play, experiential learning, and other techniques (Fergus & Zimmerman, 2005; Mallmann, 2003), some components of resilience (e.g., problem-solving skills, communication ability, independence, self-esteem, emotional control) are largely amendable (Benard, 2004). Such interventions can be implemented by professionals and non-professionals (Worsley, 2006).

By the end of October 2007, 19.3% of all confirmed HIV/AIDS cases in China were former

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plasma/blood donors (FPBDs) (State Council AIDS Working Committee Office and UN Theme Group on AIDS in China, 2007). In Henan Province, the HIV prevalence among the FPBDs living in some villages ranged from 17 to 69% (K. Wang, Xu, Qu, Li, & Yang, 2005; W. Zhang, Hu, Xi, Zhang, & Duan, 2006; Zheng et al., 2000). A FPBDs census identified 25,036 HIV positive cases living in 51,187 villages (*25,036 HIV carriers in China's Henan, Survey, September 14, 2004*). FPBD-PLWH in China face high prevalence of depression and anxiety (Jin et al., 2006; Sun, 2006; J. Wang, Lin, Wu, & Qu, 2005), substantial HIV-related stigma and discrimination, and serious financial and medication problems (Cao, Sullivan, Xu, & Wu, 2006). Many FPBD-PLWH perceived themselves as being deliberately isolated by their neighbors and refrained from utilizing medical care services (Cao et al., 2006).

This study compared the levels of depression, anxiety, and stress between FPBD-PLWH and a sample of HIV negative villagers. Risk and protective factors in association with mental health status were identified. The hypotheses that perceived discrimination is a risk factor whereas resilience is a protective factor of mental health and the interaction effects between resilience and other risk factors were examined. Desirability related to different types of psychological support services and different types of psychological support providers was also investigated.

Methods

The study site

The study was conducted in a rural county in central China, which has 528 villages (population size = 1.3 million) with an average annual personal income lower than 2000 RMB (about 260 US\$). In 2005, the national CDC identified 6663 HIV positive cases (>90% were FPBDs) in this county (personal communication with the director of the local Family Planning Services Office).

Participants

Eligible participants included HIV positive FPBDs who were 18 years of age and above. The prevalence of HIV transmission via sexual activities was unknown. In this study, seven of the 22 "high-prevalent" villages with HIV prevalence >10% (HIV prevalence of the seven villages ranged from 12 to 15%) were randomly selected. A registry listing all PLWH (over 2000) living in these villages was used as the sampling frame and random propor-

tionate sampling (according to the number of PLWH) was conducted. A total of 271 PLWH participated in the study (response rate = 83.3%) during July through December 2006. A convenience sample of 67 HIV negative villagers (age ≥ 18 years) were recruited from the same villages.

A total of 12 interviewers, who were staff members of the local Family Planning Services Office, were trained in a 1.5-day session. A pilot study was conducted. After obtaining written informed consent from the participants, anonymous face-to-face interviews were conducted in a private setting. Participants were reimbursed 20 RMB (about 3 US\$) for their time. Data confidentiality was strictly observed. Quality control and field supervision were exercised by one of the authors (Lv). Ethics approval was obtained from the Chinese University of Hong Kong.

Measurements

Information was collected on respondents' socio-demographic characteristics and HIV-related information (see Table 1). Perceived discrimination from the participant's family members, relatives and friends, and neighbors was assessed by three questions.

The Depression, Anxiety, and Stress Scales (DASS-21)

The Depression, Anxiety, and Stress Scales (DASS-21) consists of 21 items and three subscales (measuring depression, anxiety, and stress; Cronbach's $\alpha = 0.87-0.94$). Its depression and anxiety subscales were correlated significantly with the Beck Depression Inventory and Beck Anxiety Inventory (Lovibond & Lovibond, 1995). The Chinese version showed good psychometric properties and replicated the three-factor structure of the original instrument (Taouk, Lovibond, & Laube, 2001). In this study, the three subscales had Cronbach's α values ranging from 0.80 to 0.83.

Physical Function Subscale of the Medical Outcomes Study HIV Health Survey (MOS-HIV)

Physical Function Subscale of the Medical Outcomes Study HIV Health Survey (MOS-HIV) consists of 6 items (Cronbach's $\alpha = 0.83-0.89$) and correlated significantly with some subscales of the MOS-HIV (Wu, Revicki, Jacobson, & Malitz, 1997). The Chinese version demonstrated good internal reliability (Cronbach's $\alpha = 0.84$) and correlated significantly with the WHOQOL-BREF and the Profile of Mood States (Lau, Tsui, Patrick, Rita, &

Molassiotis, 2006). Some minor modifications were made in this study and cultural adaptation had been conducted in similar studies (Mast et al., 2004). Cronbach's α of Physical Function Subscale was 0.84 in this study.

Connor-Davidson Resilience Scale (CD-RISC)

Connor-Davidson Resilience Scale (CD-RISC) consists of 25 items and assesses resilience (e.g., "tend to bounce back after illness or hardship") (Connor & Davidson, 2003). The Cronbach's α of the CD-RISC was 0.89 and test-retest reliability was 0.87; it correlated significantly with hardiness and social support (Connor & Davidson, 2003). The Chinese version demonstrated good internal reliability (Cronbach's $\alpha = 0.91$) and was associated with self-esteem, life satisfaction, and personality factors of the NEO Five-Factor Inventory (Yu & Zhang, 2007). In this study, its Cronbach's α was 0.91.

Respondents were asked about whether they desire particular types of psychological support services (hotline, face-to-face consultation, and group intervention; multiple answers were allowed), as well as to choose which type of people is most preferred to provide psychological support (trained psychologists, doctors, staff of local Family Planning Services Office, volunteers monitoring the adherence to Highly Active Antiretroviral Therapy (HAART), and family members and friends; only one choice was allowed).

Statistical analyses

Chi-square test and *t*-test were used to compare between-group differences. Multiple logistic regression models were used to compare DASS-21's item responses between the HIV-positive and the HIV-negative groups, adjusting for socio-demographic variables that showed statistically significant between-group differences (using the ENTER option). Bivariate Pearson and Spearman correlation coefficients were presented; those independent variables with significant bivariate correlations were used as candidate variables for stepwise multiple linear regression to predict the DASS-21 subscale scores. The significance of the main and interaction effects between resilience and the studied independent variables in predicting the DASS-21 subscale scores were tested, using the ENTER option of linear regression models (Baron & Kenny, 1986). SPSS 14.0 for Windows was used for data analyses and $p < 0.05$ was considered as statistically significant.

Results

Background characteristics of the respondents and comparing prevalence of mental health problems between people living with HIV (PLWH) and HIV negative respondents

It is noted that 77.5% PLWH did not attend secondary school and 40.2% of them had annual family income less than 1000 RMB (around 130 US\$) and 76.7% had ≥ 2 children (see Table 1) while HIV-negative respondents tended to be females with higher annual family income and having less children, as compared to their PLWH counterparts (Table 1).

Of the PLWH participants, 57.9% had donated plasma/blood for 10–100 times and 15.5% > 100 times, and 70.7% of the respondents had known about their HIV status for three to five years. More than 18% (18.3%) had not received HAART and 32.1% of those receiving HAART reported some side effects. A total of 58.7% of respondents reported at least one symptom (e.g., fever, nausea) in the past month. More than half respondents (58.7%) had HIV positive spouses (some of whom had died of HIV/AIDS) and 41.3% had at least one relative who died of HIV/AIDS. Perception of perceived discrimination from family members, relatives/friends, and neighbors was 13.7%, 37.4% and 38.4%, respectively.

Significant adjusted odds ratios comparing HIV-positive and HIV-negative respondents were detected for most of the individual item responses of the DASS-21 (Table 2). A higher percentage of PLWH, as compared to the non-PLWH, reported at least one depression-related symptom(s) (adjusted OR = 2.53, $p = 0.001$), at least one anxiety-related symptom(s) (adjusted OR = 1.85, $p = 0.04$) or at least one stress-related symptom(s) (adjusted OR = 1.77, $p = 0.06$) (Table 2).

Associations between the independent variables and the DASS-21 subscale scores among people living with HIV (PLWH)

The bivariate correlation coefficients are summarized in Table 3. Most of the HIV-related variables were not significantly associated with depression, anxiety, or stress (Table 3). Among PLWH, the results of the stepwise multiple linear regression models showed that absence of HAART (reference = those receiving HAART with no side effect), poorer physical function, perceived discrimination from relatives and friends, and lower resilience were independently associated with higher depression subscale score (Model I, R -square = 0.22, Table 4). Similar predictors were identified for anxiety and stress subscale scores (see Model II and III of Table 4).

Table 1. Background characteristics of the respondents.

	HIV positive respondents <i>n</i> = 271	HIV negative respondents <i>n</i> = 67	<i>p</i>
Socio-demographic characteristics			
Gender			
Male	127 (46.9)	14 (20.9)	<0.001
Female	144 (53.1)	53 (79.1)	
Age (years)			
≤40	114 (42.1)	31 (46.3)	0.40
40–50	87 (32.1)	24 (35.8)	
>50	70 (25.8)	12 (17.9)	
Education level			
Illiterate	58 (21.4)	10 (14.9)	0.45
Elementary school	152 (56.1)	39 (58.2)	
Middle school or higher education	61 (22.5)	18 (26.9)	
Marital status			
Married	243 (89.7)	64 (95.5)	0.14
Single/separated/divorced/widowed	28 (10.3)	3 (4.5)	
Annual family income (RMB ^a)			
≤1000	109 (40.2)	4 (6.0)	<0.001
1000–3000	113 (41.7)	37 (55.2)	
>3000	49 (18.1)	26 (38.8)	
Number of children			
0	13 (4.8)	5 (7.5)	0.03
1	50 (18.5)	16 (23.9)	
2	145 (53.5)	41 (61.2)	
≥3	63 (23.2)	5 (7.5)	
HIV-related information			
Number of donation			
≤10	72 (26.6)	NA	NA
10–100	157 (57.9)		
>100	42 (15.5)		
Number of years since HIV diagnosis			
<3	37 (13.7)	NA	NA
3–5	191 (70.7)		
>5	42 (15.6)		
HAART ^b and whether side effect mentioned			
No treatment	49 (18.3)	NA	NA
Treatment with no side effect	133 (49.6)		
Treatment with side effect	86 (32.1)		
Presence of symptoms in the past month ^c			
No	112 (41.3)	NA	NA
Yes (at least one symptom)	159 (58.7)		
HIV status of the spouse			
Negative/unknown	112 (41.3)	NA	NA
Positive/died of HIV/AIDS	159 (58.7)		
Number of relatives died of HIV/AIDS ^d			
0	159 (58.7)	NA	NA
1	86 (31.7)		
≥2	26 (9.6)		

^a1US\$ = 7.7RMB.^bHAART = Highly Active Antiretroviral Therapy.^cSymptoms in the past month include fever, fatigue, sleep disorder, headache, cough, diarrhea, and nausea etc..^dTypes of relatives include spouse, parents, grandparents, siblings, aunt and uncle, nephew and niece. Sixteen respondents reported death of spouse; three reported death of parents; 68 reported death of siblings; and the rest reported deaths of grandparents, aunt or uncle, and nephew or niece. NA, not applicable.

Table 2. Comparing item responses (percent of a considerable degree/very much) and mean scores of Depression Anxiety Stress Scales in the past week between HIV positive and HIV negative respondents.

	HIV positive	HIV negative	OR _a (95% CI) ^a	<i>p</i>
	respondents <i>n</i> = 271	respondents <i>n</i> = 67		
	<i>n</i> (%)	<i>n</i> (%)		
Depression subscale (DASS-21)				
Couldn't experience positive feeling	99 (36.5)	7 (10.4)	4.74 (2.01, 11.20)	<0.001
Difficult to work up initiative	99 (36.5)	14 (20.9)	1.87 (0.94, 3.71)	0.08
Had nothing to look forward to	74 (27.3)	6 (9.0)	3.53 (1.40, 8.86)	0.01
Felt down-hearted and blue	116 (42.8)	6 (9.0)	7.70 (3.09, 19.18)	<0.001
Unable to become enthusiastic	95 (35.1)	12 (17.9)	2.18 (1.06, 4.46)	0.03
Not worth much as a person	74 (27.3)	8 (11.9)	2.81 (1.22, 6.47)	0.02
Life was meaningless	93 (34.3)	9 (13.4)	3.31 (1.51, 7.27)	0.001
Had at least one symptom	182 (67.2)	30 (44.8)	2.53 (1.39, 4.60)	0.001
Mean (SD)	16.46 (9.31)	9.85 (7.21)	NA	<0.001 ^b
Anxiety subscale (DASS-21)				
Dryness of mouth	112 (41.3)	7 (10.4)	4.75 (2.03, 11.14)	<0.001
Breathing difficulty	39 (14.4)	1 (1.5)	9.11 (1.18, 70.14)	0.03
Trembling	27 (10.0)	4 (6.0)	2.01 (0.63, 6.40)	0.24
Worried about panic situations	55 (20.3)	21 (31.3)	0.53 (0.28, 1.04)	0.07
Felt close to panic	73 (26.9)	6 (9.0)	3.32 (1.31, 8.39)	0.01
Aware of the action of my heart	64 (23.6)	5 (7.5)	3.68 (1.36, 10.00)	0.01
Scared for no good reason	62 (22.9)	2 (3.0)	9.07 (2.09, 39.46)	0.001
Had at least one symptom	168 (62.0)	28 (41.8)	1.85 (1.02, 3.34)	0.04
Mean (SD)	13.20 (7.62)	8.60 (6.60)	NA	<0.001 ^b
Stress subscale (DASS-21)				
Hard to wind down	57 (21.0)	12 (17.9)	1.01 (0.48, 2.15)	0.97
Over-react to situations	56 (20.7)	9 (13.4)	1.49 (0.65, 3.40)	0.35
Using nervous energy	83 (30.6)	3 (4.5)	8.65 (2.55, 29.34)	0.001
Getting agitated	64 (23.6)	4 (6.0)	4.26 (1.43, 12.71)	0.01
Difficult to relax	93 (34.3)	3 (4.5)	9.31 (2.77, 31.32)	<0.001
Intolerant kept from getting on	53 (19.6)	11 (16.4)	1.26 (0.58, 2.73)	0.56
Touchy	86 (31.7)	6 (9.0)	4.88 (1.95, 12.20)	0.001
Had at least one symptom	174 (64.2)	32 (47.8)	1.77 (0.98, 3.20)	0.06
Mean (SD)	15.24 (7.69)	9.40 (5.75)	NA	<0.001 ^b

^aOdds ratio comparing HIV positive respondents versus HIV negative respondents (reference), adjusting for gender, annual family income, and number of children.

^bThe mean scores were compared by using *t*-test.

NA, not applicable.

Resilience did not moderate the associations between the studied factors (i.e. HIV-related variables, physical function, perceived discrimination) and depression, anxiety, or stress. Data were not tabulated.

Services and providers of psychological support

Of all PLWH respondents, 27.3% desired hotlines; 43.5% chose face-to-face counseling; 70.1% desired group intervention as the mode(s) of receiving psychological support. A total of 11.8% of the respondents desired staff of the local Family Planning Services Office, 18.9% desired trained psychologists,

19.6% desired family members and friends, 20.3% desired doctors, and 21.8% desired volunteers monitoring adherence to HAART to be providers of the psychological support services.

Discussion

This is one of the few studies reporting mental health problems among PLWH in rural China and in particular, among FPBD-PLWH. This study used random cluster sampling method to collect data from the PLWH whereas most of the other studies used convenience sample (Jin et al., 2006; Nogueira Campos et al., 2006).

Table 3. Bivariate correlation coefficients between independent variables and DASS-21 subscales (among HIV positive respondents).

	Depression Subscale		Anxiety Subscale		Stress Subscale	
	<i>r</i> ^a	<i>p</i>	<i>r</i> ^a	<i>p</i>	<i>r</i> ^a	<i>p</i>
Socio-demographic characteristics						
Gender	0.05	0.45	0.09	0.13	0.02	0.79
Age	0.03	0.59	0.05	0.43	0.05	0.42
Education level	-0.12	0.04	-0.13	0.03	-0.05	0.45
Married versus single/separated/divorced/widowed	0.01	0.90	0.02	0.80	0.03	0.59
Annually family income	-0.20	<0.001	-0.26	<0.001	-0.21	<0.001
Number of children	-0.04	0.49	-0.11	0.08	-0.09	0.16
HIV-related variables						
Number of donation	0.01	0.86	0.08	0.22	0.07	0.28
Number of years since HIV diagnosis	0.01	0.97	0.09	0.16	0.07	0.23
Not receiving HAART (versus HAART with no side effect) (<i>n</i> = 185)	0.14	0.05	-0.04	0.59	0.01	0.86
Received HAART with side effect (versus with no side effect) (<i>n</i> = 219)	0.13	0.05	0.19	0.001	0.06	0.39
Having symptoms in the past month	0.03	0.67	0.05	0.45	0.05	0.38
Spouse was HIV positive	0.03	0.62	-0.04	0.54	-0.01	0.94
Had relatives died of HIV/AIDS	0.05	0.40	0.02	0.77	0.04	0.47
Physical condition						
Physical Function Subscale of Medical Outcomes Study HIV Health Survey	-0.33	<0.001	-0.49	<0.001	-0.33	<0.001
Risk factor						
Perceived discrimination from:						
Family members	0.19	<0.001	0.22	<0.001	0.19	<0.001
Relatives and friends	0.18	<0.001	0.21	<0.001	0.20	<0.001
Neighbors in the village	0.14	0.02	0.20	<0.001	0.17	0.01
Protective factor						
Connor-Davidson Resilience Scale	-0.37	<0.001	-0.32	<0.001	-0.26	<0.001

^aSpearman correlation was used for ordinal and binary independent variables. Pearson correlation was used for continuous independent variables.

The values with *p* < 0.05 are presented with boldface.

In this study, PLWH were more likely than non-PLWH to have suffered from mental health problems. A meta-analysis reported that the prevalence of depression among PLWH was two times higher than that among non-PLWH (Ciesla & Roberts, 2001). According to the cut-off scores recommended by Lovibond and Lovibond (1995), respectively 32.1 and 30.6% of the studied PLWH would be diagnosed as being moderately and severely/extremely depressed; respectively 29.9 and 38.4% as moderately and severely/extremely anxious; respectively 18.5 and 11.4% as being as moderately and severely/extremely stressful. Using Nieuwenhuijsen and his colleagues' cut-off points (Nieuwenhuijsen, de Boer, Verbeek, Blonk, & van Dijk, 2003), respectively 71.2 and 84.9% PLWH would be diagnosed as having depression and anxiety problems. Despite the high prevalence of mental health problems, psychological/

psychiatric counseling services are virtually non-existent in rural China.

This study reports that absence of HAART was associated with depression and side effects of treatment was associated with anxiety, which is supported by previous results (Judd et al., 2000; Rabkin, Ferrando, Lin, Sewell, & McElhiney, 2000). The local government has been providing free HAART to all PLWH with CD4 < 200 (China's State Council, 2006). Respondents not using HAART might have CD4 > 200. However, other HIV-related variables (e.g., presence of symptoms, HIV positive status of spouse, and death of relatives) were not associated with the studied mental health problems. Some studies reported that symptoms rather than HIV status of the spouse was associated with PLWH's depression and anxiety (Chandra, Ravi, Desai, & Subbakrishna, 1998). A qualitative study reported

Table 4. Multiple regression models predicting DASS-21 subscale scores (among HIV positive respondents).

	Model I Depression	Model II Anxiety	Model III Stress
	Subscale	Subscale	Subscale
	Beta (se)	Beta (se)	Beta (se)
Annually family income (≤ 1000 = reference)			
1000–3000	NS	−0.11 (0.56)*	NS
> 3000	NS	−0.15 (0.43)**	−0.14 (0.48)*
HAART and whether side effect mentioned (HAART treatment with no side effect = reference)			
No HAART	0.12 (0.69)*	NS	
HAART with side effect	NS	0.13 (0.44)*	
Physical function subscale	−0.23 (0.10)***	−0.37 (0.08)***	−0.24 (0.08)***
Perceived discrimination from family members	0.17 (0.74)***	0.15 (0.56)***	NS
Perceived discrimination from relatives and friends	NS	NS	0.17 (0.45)***
Connor-Davidson resilience scale	−0.28 (0.02)***	−0.19 (0.02)***	−0.17 (0.02)***
Adjusted R^2	0.22	0.32	0.16

Note: Beta obtained from stepwise multiple linear regression, using bivariately significant variables as candidate variables (summarized in Table 3, $p < 0.05$). The variables used for adjustment were not listed in the table, including educational level, and perceived discrimination from the neighbors in the village. SE, standard error. NS, non-significant. * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$.

that PLWH in South Africa accepted the death of their significant others as a part of their life, and they tried to reframe the bereavement in a positive way (Demmer, 2007).

Despite their FPBD status, the studied PLWH perceived considerably high levels of discrimination from their significant others. Discrimination toward PLWH in rural China may hence not be confined to those who contracted HIV via injecting drug use or sexual behaviors. In this case, morality should not be an issue. Misconceptions about mode of transmission and fear for transmission via daily contacts with PLWH may be the sources of discrimination in rural China (Qian et al., 2007). Very few intervention programs were launched in rural China to rectify misconceptions and to foster acceptance toward PLWH.

This is the first report addressing the protective effect of the resilience trait on mental health among PLWH. In this study, resilience was a protective factor of mental health after adjusting for other relevant factors and the effect was stronger than that of perceived discrimination. Resilience can be strengthened via interventions (Luthar & Suchman, 2000). Resilience is an initiation of the intrinsic strength (e.g., problem-solving skills, self-esteem, hope, emotional control) and can be achieved in the scarcity of external resources (Barbarin, 1999). It is hence important for PLWH living in underdeveloped areas (such as rural China) to become resilient, as sophisticated psychological services are not widely

available in these areas. The concept of positive psychology has been underdeveloped in PLWH research.

Of the five published reports addressing interaction between resilience and risk factors predicting mental health, three reported significant interaction effects (Campbell-Sills, Cohan, & Stein, 2006; Ong et al., 2006; Rossi, Bisconti, & Bergeman, 2007) while two reported non-significant interaction effects (Aroian & Norris, 2000; Hjemdal, Aune, Reinfjell, Stiles, & Friberg, 2007). The interactions were non-significant in our study. It was commented that the interactions between resilience and risk factors have small effect sizes, as compared to the much larger effect sizes of the robust main effects (Luthar et al., 2000). Promotion of resilience, in the absence of significant moderating effects, is therefore still important.

There is a strong demand for psychological support services among PLWH in developing countries (Collins, Holman, Freeman, & Patel, 2006). Such services are virtually non-existent in rural China (Fang, Jiang, & Dong, 2007b; Jin et al., 2006). In this study, it is seen that PLWH desired a support group approach, as the majority of the respondents desired “attending activities with other PLWH” as a mode of receiving psychological support. Concerning providers of psychological support, trained psychologists were chosen by only 20% PLWH, whereas the figures for volunteers and family members/friends were respectively 23 and 21%. The participants seem to

be more comfortable with people they are familiar with, rather than with those who are professionally trained. Those who seek formal clinical psychological services might be stigmatized as “mentally ill” in traditional and undeveloped areas whereas group interventions may be seen as social or recreational in nature. It should be noted that PLWH living in underdeveloped rural areas may not be familiar with western psychological services. The train-the-trainer approach and capacity building of local non-medical workers to provide psychological support to the PLWH in rural China should be explored.

The present study has some limitations. Firstly, this study does not report prevalence of mental health problems because the Chinese version of DASS-21 does not have validated cut-off points. Second, the local HIV negative respondents were not randomly sampled. Third, the cross-sectional design could not draw causal conclusions with respect to the associations between the studied factors and mental health.

In summary, the potentially high prevalence of depression, anxiety, and stress suggests that there is a salient need for prevention and treatment of mental health problems among PLWH who were FPBDs living in the affected rural areas in China. Reduction of discrimination and promotion of resilience are two potentially effective approaches. Psychological support services need to be culturally sensitive to the PLWH in rural China.

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