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Related Factors Associated with Quality of life Assessed Using a Chinese Version of the MOS-HIV Health Survey in People with HIV/AIDS in China

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Abstract

Objectives: To evaluate the Chinese version of the 35-item Medical Outcomes Study HIV Health Survey (MOS-HIV) in people living with HIV/AIDS (PLWHA) in mainland China and to study its relationship with socio-demographic characteristics and disease-related factors.

Methods: 222 PLWHA recruited from outpatient clinics in Hunan province completed measures of quality of life and related factors.

Results: Internal consistency of the overall score on the Chinese version of the MOS-HIV was high (α=0.95); internal consistency of the eight subscales was also high (α=0.79-0.91). Factor analysis of the MOS-HIV revealed a one-factor solution, accounting for 54.97% of the total variance. At linear regression analysis, all domains of quality of life (QOL) and Total Health Summary Score (THS) were correlated with KPS scores (r2 range 0.06-0.32), but only physical function and social function scores showed a significant correlation with CD4 cell count; the MOS-HIV however, did not distinguish between HIV disease stage. Using logistic regression analysis, KPS scores, as well as the variables of marriage, employment status, occupation before diagnosis, somebody to talk to, transmission modality of injection drug use and sex partner HIV positive showed statistically associated with a lower quality of life.

Conclusions: This study presents the first evidence for the reliability and validity of the Chinese version of MOS-HIV among PLWHA in mainland China. Lower scores of the MOS-HIV indicate that the QOL of the PLWHA in our study sample have been poor. This was irrespective of the stage of their disease and CD4 cell counts. This questionnaire has the potential to inform interventions aimed at enhancing and maintaining QOL of PLWHA.

Keywords: Chinese; Quality of life; HIV/AIDS; MOS-HIV health survey

Abbreviations: MOS-HIV: Medical Outcomes Study HIV Health Survey; PLWHA: People Living with HIV/AIDS; QOL: Quality of Life; WHO: The World Health Organization; THS: Total Health Summary Score; HAART: Highly Active Anti-retroviral Therapy; HRQL: Health Related Quality of Life; FAHI: Functional Assessment of HIV Infection; AIDS-HAQ: AIDS Health Assessment Questionnaire; HOPES: HIV Overview of Problems/ Evaluation; PHS: Physical Health Summary; MHS: Mental Health Summary; KPS: Karnofsky Performance Status Scores; SPSS: Statistical Package for Social Science

Introduction

Quality of Life (QOL) is a multidimensional construct generally used to refer to an overall sense of well-being [1,2]. The World Health Organization (WHO) defined QOL as "individuals' perceptions of their position in life in the context of the culture and value systems in which they live and in relation to their goals, standards, expectations and concerns" [3].

QOL has been traditionally studied in chronic diseases such as diabetes, cancer, schizophrenia and in patients who have undergone surgeries. More recently, the concept has been extended to HIV/AIDS since advances in treatments for HIV and AIDS-related illnesses (e.g., highly active anti-retroviral therapy, HAART) have significantly improved the health and life expectancies of PLWHA [4]. With these medical advancements, HIV/AIDS is becoming more and more conceptualized as a chronic illness rather than simply a terminal disease. When people with HIV progress in a normal or near-normal life span, QOL becomes an important issue [5]. This poses many challenges to health care providers, both in terms of treatment management and health outcomes [6]. However, the incurable and highly stigmatized nature of AIDS suggests that it is vital to pay attention to improving the QOL in PLWHA [7].

Given that PLWHA live longer lives, QOL must be an integral part of treatment effectiveness and outcome research in nursing care. In some instances, improvement in QOL may be the only short-term outcome of a study treatment a patient could experience. Moreover, QOL assessment is the only measure influenced by the patient's perspective rather than simply being evaluated by the researcher [8,9]. Several studies investigated QOL in relation to the effectiveness of treatments and programs, as well as factors predicting well-being in PLWHA [10-13]. Two distinct approaches to the measurement of HIV-related HRQL are the use of generic versus HIV-specific instruments. Generic instruments are those developed for use across different diseases, treatments and patient groups. Numerous HIV-specific HRQL instruments have emerged over the past decade in recognition of the unique challenges of living with HIV infection. These instruments evaluate the impact of HIV-related symptoms

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and their associated therapies [14-16]. Some examples include the Medical Outcomes Study—HIV Health Survey (MOS-HIV), HIV/AIDS—Targeted Quality of Life (HAT-QOL) Instrument, Functional Assessment of HIV Infection (FAHI) QOL Instrument, AIDS Health Assessment Questionnaire (AIDS-HAQ), and HOPES (HIV Overview of Problems/ Evaluation) [16].

As a specific QOL instrument for HIV/AIDS, the MOS-HIV is one of the most widely used instruments and is available in over 20 languages. The Chinese version was validated in Hong Kong, China [17-24]. Its validity and reliability have been extensively assessed and the scale has good psychometric properties [19,24,25]. It is also sensitive to clinically important symptoms or changes in symptoms as well as other disease-related factors [26,27]. In clinic centers, the completion of basic measures, such as patients' medical history, physical examination, and test procedures consumes a substantial amount of time and thus limits the time available to assess QOL. Compared to most existing instruments, which are lengthy and difficult to administer (always have to take 20 to 45 minutes to complete), MOS-HIV is short enough to be practical in most clinic settings and can be self-administered [25].

In China, QOL studies have focused mainly on cancer-related issues and very little information is known about QOL in HIV/AIDS patients [28]. Several researchers utilized generic instruments such as WHOQOL, SF-36 or GQOLI-74 to investigate the QOL in PLWHA [28-31]. However, there are few studies referring to HIV-specific QOL instruments in China. As QOL is influenced by one's value system and thus differs from one culture to another, the generalization of the findings from other countries to patient populations in China is not appropriate. There is an urgent need to conduct QOL studies among Chinese PLWHA. More traditional research included the efficacy of HAART other than the effect of symptoms, immunologic parameters, social and psychological factors on QOL, which was influenced by disease progressions and therapies. The recently published research indicates that QOL of PLWHA in mainland China is generally poor and had been ignored for a long time [29,32]. The goals of this study are 1) to assess the reliability and validity of the Chinese version of MOS-HIV among PLWHA in mainland China and 2) to study their relationship with socio-demographic characteristics and disease-related factors. China is currently facing a growing HIV/AIDS pandemic combined with prolonged life expectancies of PLWHA. These factors call for more research on the QOL of PLWHA in China [7,20]. This study has the potential to inform interventions aimed at enhancing and maintaining QOL among PLWHA.

Methods

Participants and procedures

From April to August 2008, individuals with HIV referred to outpatient clinics of three nationally designated HIV/AIDS special centers in Hunan (Hengyang Hospital of Infectious Disease, Changsha Hospital of Infectious Disease and Hongjiang AIDS Care Centre) were invited to participate in this study. People were eligible if they were at least 18 years of age, proficient in writing and reading mandarin, and voluntarily consented to take part in this study. Patients receiving HAARRT were asked to be followed-up every month and those attending CD4 cell count testing were followed-up at least every three months by the three nationally special centers. A total of 370 PLWHA attending outpatient clinics in these three centers were approached, and 245 decided to participate.

The researcher obtained permission to use the Chinese version of MOS-HIV from the author who translated it.

After the participants were recruited, the researcher and trained research assistants verbally explained the purpose of the study, risks and benefits, as well as the patients' rights to refuse to participate or withdraw from the project at any time. With informed consent and ensured privacy, participants filled out anonymously a self-report questionnaire package that included social and demographic characteristics, questions regarding the route of infection, and the MOS-HIV questionnaire. The researcher or the research assistants were available to answer any question participants may have had. Information from the medical chart was also obtained after granting the participant's consent. Medical information collected included disease-related information such as stage of disease, date of HIV/AIDS diagnosis, and CD4 cell count. Of those 245 respondents, 222 (90.61%) returned the completed questionnaires.

Ethics approval of this study was obtained from the Institutional Review Board of Yale University and Central South University before the study.

Measures

MOS-HIV

The MOS-HIV is a 35-item measure that includes 10 subscales (General Health, Physical Function, Role Function, Social Function, Cognitive Function, Pain, Mental Health, Energy/Fatigue, Health Distress, and Quality of Life). Of these 10 domains, eight were multi-items and two (Social Function and Quality of Life) consisted of a single item. There is another single item on Health Transition not part of any subscales. Total score on the MOS-HIV is obtained by adding the raw item scores of the respective scales and then transforming that score on a 0–100 point scale. Higher scores on the scale indicate higher levels of functioning and well-being [18]. Its validity and reliability have been extensively assessed and good psychometric properties have been documented [19,24,25]. The Chinese-language version of the MOS-HIV questionnaire has been used in a cross-sectional survey of 242 ethnic Chinese PLWHA in Hong Kong [24]. The psychometric properties were also very good. In both the original and Chinese version of the MOS-HIV, two summary scores (Physical Health Summary (PHS) and Mental Health Summary (MHS) scores) were generated from factor analysis of the 10 subscales [17]. However, in a multinational validation study, the German version generated only one factor. In addition, there is no factor analysis studies conducted on the validated Indian, Italian, and Spanish versions of the MOS-HIV. The Hong Kong translation of the MOS-HIV can also be used in mainland China as the language is the same [24]. A pilot study involving 20 PLWHA was conducted prior to the present study and showed no difficulties in using the Hong Kong version of the MOS-HIV in Hunan province of China.

Sociodemographic characteristics

We collected Sociodemographic Characteristics including age, gender, educational level, marital status, employment status, monthly income, occupation before HIV diagnosis, current living arrangement, whether they were parents and migrant workers, and disclosure of their seropositivity. Additional questions asked included satisfaction with sex life (Are you satisfied with you sex life during the past two weeks? Evaluated by five levels from definitely satisfied to definitely unsatisfied), did relationship conflicts with family affect your life? Evaluated by five levels from extremely to not at all. Numerical rating scale from 0(very poor) to 100(excellent) also used to evaluate overall quality of life.

Biological and clinical characteristics

Participants' immunovirological status was determined using HIV transmission modality (including years since first drug used and years since first injection drug used), time since first HIV and AIDS diagnosis, and the latest CD4 cell count. Disease stage (asymptomatic HIV, symptomatic HIV, and AIDS), and the Karnofsky Performance Status scores (KPS) were recorded at the visit during which the questionnaires were administered. A slightly modified version of the 1993 US CDC Classification system for HIV/AIDS case definition was adopted [33]. A KPS score of 80 (range: 0–100) indicates that the patient could carry on normal activity with effort, and he/she is likely to have some signs or symptoms of the disease. Co-infection with HCV was also recorded, as well as history of HIV/AIDS-related diseases (e.g., herpes zoster, skin rash, thrush, pulmonary tuberculosis, extrapulmonary tuberculosis, pneumocystis carinii pneumonia). Data concerning HAART included whether they received HAART and time since they started HHART. Numbers of routine clinic visits were also obtained from medical record.

Statistical Analysis

Data was analyzed using the Statistical Package for Social Science (SPSS) for Windows version 15.0. The internal structure of the MOS-HIV was assessed using Cronbach's α and exploratory factor analysis using principal components factoring for factor extraction [24] and Oblique rotation. Factor analyses were done separately for each of the eight scales with more than one item, and for the instrument as a whole. Because the scores of each subscale and THS were not normal, non-parametric Mann–Whitney U test and Kruskal–Wallis tests were performed.

Results

Descriptives

Socio-demographic characteristics of the respondents are shown in Table 1. Participants' age ranged between 20 and 65 years old (mean=37.17; SD=9.75), with a majority of males (73.9%). The majority of the sample had high school level of education or less (72.5%), were unemployed (76.1%), and had no fixed income or received financial assistance from government, family or friends (74.3%). As for occupation before being seropositive, 46.4% of all participants were classified as high risk populations (long-distance drivers, temporary workers and unemployed). 37.8% of them were migrant workers, 47.7% were single or separated, divorced or widowed and 23.4% of the total participants lived alone or with non-family members.

Clinical characteristics of respondents

Table 2 shows the Clinical characteristic of the respondents. The latest CD4 cell count ranged from 1/mm^3 to 1160/mm^3 and the mean is 232.4/mm^3. The majority of participants had CD4 cell count below 200/mm^3 (53.10%). Most participants have been infected with HIV by drug injections (68.9%). However, transmission modality differed by gender. 81.10% (133) of men have been infected by drug injections whereas 72.41% (42) of women were infected via sexual relations or other ways of transmission. This gender difference was also present in results of whether sex partner tested HIV positive: 44.83% (26) of partners of infected women were HIV positive, whereas this was true of only 10% of partners of infected men. Of all participants, 51.8% had KPS scores below 80. The mean months since the start of HAART was 11.40 (range 0.00-49.00) and since first HIV diagnosis was 17.36 (range 0.00-115.50), since first AIDS diagnosis was 9.54 (range 0.00-49.00). 62 respondents provided information about times of routine clinic visits. Of those, the mean was 6.45 (range 0.00-20.00). Of those who were infected with HIV from drug injection, mean years since first drug use was 12.48 (n=44, range 3.00-20.00) and the value to years since first injection drug use was 8.90 (n=35, range 0.50-16.50). As to HIV/AIDS-related diseases (e.g., herpes zoster, skin rash, thrush, pulmonary tuberculosis,

Characteristics		n=222(%)
Age	29 0r below	34 (15.3)
	30-39	115 (51.8)
	40-49	53 (23.9)
	50 or above	20 (9.0)
Gender	Male	164 (73.9)
	Female	58 (26.1)
Education level	Secondary school or below a	161 (72.5)
	High school	45 (20.3)
	College or above	16 (7.2)
Marital status	Single	60 (27.0)
	Currently married	86 (38.7)
	Others (e.g., separated, divorced, widowed)	46 (20.7)
	Cohabitation	30 (13.5)
whether they were parents	Yes	91 (41.0)
	No	131 (59.0)
Current living arrangement	Live alone	38 (17.1)
	Live with family members	170 (76.6)
	Live with relatives or non-family members	14 (6.3)
Employment status	Full time	24 (10.8)
	Part time	14 (6.3)
	Unemployed	169 (76.1)
	Others(e.g., retired, housewife)	15 (6.8)
Occupation before diagnosis	Staff member of public institutions b	78 (35.1)
	Private sector workers or businessman	27 (12.2)
	Peasants	14 (6.3)
	Long-distance drivers	16 (7.2)
	temporary workers	22 (9.9)
	unemployed	52 (23.4)
	Others(hairdressing workers, servers)	13 (5.9)
Monthly income	500 or below	17 (7.7)
	501-1000	16 (7.2)
	1001 or above	24 (10.8)
	have no fixed income	75 (33.8)
	drawing the minimum living allowance c	79 (35.6)
	Others(e.g., financial assistance from family or friends)	10 (4.5)
Migrant workers	Yes	84 (37.8)
	No	138 (62.2)
disclosure of their seropositivity	Spouses or partners only	19 (8.6)
	Parents only	17 (7.7)
	Close friends only	11 (5.0)
	Family members d	122 (55.0)
	Family members & 0thers(close friends, colleagues, employers)	40 (18.0)

a National nine-year compulsory education or less(about ≤Grade 11)
b These included executives(7, 3.2%), Professionals(14, 6.3%) and workers(57, 25.7%)
c the minimum living allowance in Hunan Province is about 200RMB
d These included siblings only(6, 2.7%), family members other than spouses or partners(6, 2.7%)

Table 1: Socio-demographic background characteristics of 222 respondents.

Characteristics		n=222	%
HIV transmission modality	injection drug use	149	67.1
	heterosexual contact with high risk partners	44	19.8
	heterosexual contact with spouse	24	10.8
	Others (e.g., blood product, unsterilized needles)	5	2.3
HIV disease stage	Symptomatic	69	31.1
	AIDS	153	68.9
The latest CD4 cell count	<100	58	26.1
	100-199	60	27.0
	200-499	83	37.4
	≥500	21	9.5
KPS	≥80	107	48.2
	<80	115	51.8
HAART	Yes	128	57.7
	No	94	42.3
Whether sex partners HIV positive	Yes	40	18.0
	No	147	66.2
	Uncertainty	35	15.8
HIV-HCV co-infection	Yes	71	32.0
	No	91	41.0
	Uncertainty	60	27.0

Table 2: Clinical characteristics of 222 respondents.

	No. of items	Cronbach's α	Mean	SD	% Floor a	%ceiling b	Range of Item-total Correlations c	Range of correlations between item and other scales d
General health	5	0.79	29.82	22.27	37.4	4.8	0.50-0.63	0.48-0.72
Physical function	6	0.82	52.53	28.67	30.8	25.4	0.51-0.78e	0.30-0.63
Role function	2	0.83	30.18	27.22	69.8	30.2	0.78	0.42-0.63
Social function	1	-	49.63	33.56	12.2	16.7	-	0.38-0.53
Cognitive function	4	0.80	52.21	23.68	8.7	12.9	0.60-0.73e	0.38-0.61
Pain	2	0.85	50.02	28.70	10.4	16.0	0.74	0.36-0.48
Mental health	5	0.79	45.51	22.90	14.3	9.9	0.50-0.65	0.40-0.69
Energy/Fatigue	4	0.81	35.59	22.37	22.5	3.8	0.50-0.70	0.44-0.64
Health distress	4	0.91	51.19	26.64	10.6	15.4	0.58-0.78	0.36-0.69

Higher scores indicate better health status.
a The percentages of respondents scored the minimum value of the scales (i.e. 0).
b The percentages of respondents scored the maximum value of the scales (i.e. 100).
c Correlations(correlated for overlap) between individual items and their respective. hypothesized scales (Pearson r).
d Correlations between individual items and scales other than their respective. hypothesized scales(Pearson r).
e Excluded the item which made Cronbach's α become bigger if item deleted. If these two items included, item-total correlations is 0.37-0.78 and 0.44-0.73.

Table 3: Internal consistency and some scale properties of Chinese.

extrapulmonary Tuberculosis, pneumocystis carinii pneumonia), the mean number was 0.96 (n=158, range 0.00-4.00).

The scale properties of the chinese MOS-HIV

The results as summarized in Table 3. The overall scale had the Cronbach's α of 0.95, this value for 8 multi-item MOS-HIV scales ranged from 0.79 (General Health and Mental Health) to 0.91(Health Distress). However, if the item "the kinds or amounts of vigorous activities you can do, like lifting heavy objects, running or participating in strenuous sports " deleted , the Cronbach's α of Physical Function increased from 0.82 to 0.84 and the least inter Item-total Correlations become bigger too. As to Cognitive Function, the same thing happened if the item "Did you have difficulty reasoning and solving problems, for example, making plans, making decisions, learning new things?" deleted, and Cronbach's α become bigger from 0.80 to 0.82. Concerned on the changes are not significantly and the overall Cronbach's α did not change significantly too, the two items still kept in our analysis. The mean scores of the subscales ranged from 29.82 (General Health) to 52.53 (Physical Function). Substantial floor effects were observed for Role Function and Physical Function. Generally, individual items correlated well with their own scale, and considerably less so with other scales. All item-total correlation coefficients were larger than or equal to 0.50. Inter-scale correlations were moderate to high; correlation coefficients ranged from 0.30 to 0.72. Health Transition was low to moderately correlated (r=0.23–0.41) with all scales.

Factor structure

The overall exploratory factor analysis of the instrument indicated that only one factor with eigenvalue greater than 1. The plot also identified one factor to be extracted (53.37% of the total variance). Using Oblique rotation, the factor loadings are presented in Table 4. The single factor summarized named Total Health Summary scores (THS). The factor structure in this study differentiates from

the original studies and many other studies, as well as the researches validated Chinese version in Hong Kong and Singapore Summary. In these studies, two summary scores (Physical Health Summary (PHS) and Mental However, the result similar to German version in a multinational validated study which only one factor was extracted named Health.

Of the 10 subscales, separated factor analyses were done to the 8 multi-item subscales. Only one factor with eigenvalue exceeding 1 was extracted for each of these 8 subscales. The factor loadings for the individual items of these 8 subscales ranged from 0.64 to 0.93 (Table 4), implying that these eight scales were unidimensional. The percent variance explained ranged from 53.92 to 87.11%.

Known group comparisons

Except for Physical Function and Social Function, the MOS-HIV scales were also not associated with CD4 cell count (Table 5). No significant associations were observed between the MOS-HIV scales and disease stage (Table 6). The scores of each subscale and THS were significantly higher ($p<0.0001$) for respondents with KPS≥80 as compared to respondents with KPS<80.

Bivariate correlation

The results of Spearman correlation of each subscale and THS values with general data (sociodemographic and clinical data) as summarized in Table 7. Correlations between each subscale of MOS-

	Overall factor analysis	Separate factor analysis		
	Factor loadings THS	Factor loadings range of items	Eigenvalue	% Total Variance explained
Mental health	0.768	0.70-0.81	2.70	53.92
Health distress	0.727	0.89-0.73	3.21	80.18
Quality of life	0.698	NA	NA	NA
Energy/Fatigue	0.859	0.76-0.86	2.56	63.91
General health	0.821	0.69-0.78	2.71	54.13
Cognitive function	0.739	0.64-0.87	2.52	62.99
Role function	0.762	0.92	1.71	85.38
Physical function	0.695	0.79-0.90	3.22	73.84
Social function	0.688	NA	NA	NA
Pain	0.629	0.93	1.74	87.11

Exploratory factor analysis, using principal component factoring for factor extraction (with Oblique rotation). NA: Not Appropriate; THS: Total Health Summary scores; Only a single principal factor with eigenvalue >1 was extracted in all separate factor analyses.

Table 4: Factor analysis of the MOS-HIV.

MOS-HIV	HIV disease stage		Pb	CD4 Count(cell/mm3)				Pa	KPS		Pb
	Symptomatic Mean (SD)	AIDS Mean (SD)		<100 Mean (SD)	100-199 Mean (SD)	200-499 Mean (SD)	≥500 Mean (SD)		≥80	<80	
GH	28.50 (20.12)	30.41 (23.21)	O.77	25.37 (21.39)	32.55 (25.64)	29.99 (11.94)	35.71 (22.58)	0.29	39.13 (23.16)	21.15 (17.48)	0.000
PF	54.71 (24.48)	51.54 (28.39)	0.44	42.70 (25.74)	57.31 (29.39)	53.879 (25.75)	60.00 (24.58)	0.01c	66.95 (23.32)	39.12 (23.54)	0.000
RF	26.81 (41.69)	31.70 (42.82)	0.39	57.31 (38.74)	35.83 (44.24)	30.729 (42.65)	57.38 (45.12)	0.24	50.00 (45.04)	11.74 (29.86)	0.000
SF	52.31 (31.40)	48.42 (34.28)	0.40	21.55 (34.46)	51.17 (34.79)	52.769 (31.90)	52.74 (29.66)	0.04 c	60.27 (31.79)	39.74 (32.24)	0.000
CF	52.47 (20.51)	52.09 (25.04)	0.92	39.82 (23.52)	50.71 (27.26)	49.98 (21.48)	48.19 (21.37)	0.36	58.74 (22.23)	46.13 (23.45)	0.000
P	45.43 (30.90)	52.09 (27.46)	0.96	55.08 (27.08)	54.25 (30.14)	46.66 (28.95)	42.42 (27.67)	0.54	57.94 (27.34)	42.65 (28.01)	0.000
MH	42.49 (19.18)	46.89 (23.21)	0.16	49.48 (24.33)	46.16 (21.69)	42.57 (18.31)	56.29 (22.09)	0.33	51.59 (20.85)	39.87 (21.79	0.000
EF	35.40 (20.15)	35.67 (23.36)	0.98	48.11 (22.81)	37.12 (25.12)	35.27 (20.64)	46.43 (18.53)	0.23	45.61 (21.90)	26.26 (18.49)	0.000
HD	35.67 (26.84)	52.1 (29.06)	0.47	31.98 (26.92)	51.95 (30.44)	46.96 (27.67)	42.86 (28.54)	0.29	58.53 (26.52)	44.38 (28.43)	0.000
QOL	38.41 (24.47)	44.40 (26.16)	0.16	54.65 (26.72)	42.08 (29.65)	42.68 (23.59)	49.26 (21.34)	0.80	50.40 (25.01)	35.22 (24.31)	0.000
HT	40.22 (27.19)	45.55 (32.08)	0.25	43.89 (34.27)	45.00 (32.27)	43.60 (32.48)	35.71 (28.10)	0.10	49.24(28.42)	38.91 (31.97)	0.000
TOTQoL	43.05 (18.24)	44.61 (19.96)	0.43	41.64 (17.71)	46.14 (22.39)	43.10 (18.38)	60.00 (18.61)	0.53	53.79 (18.92)	35.13 (15.12)	0.000

THS: Total Health Summary Scores.
aKruskal–Wallis test.
bMann-Whitney test.
cSignificantly lower than the Asymptomatic HIV patients($P<0.05$)
TOTQoL: overall quality of life ,evaluated by numerical rating scale from 0 (very poor) to 100 (excellent).

Table 5: Known group comparisons.

MOS-HIV	Self-perceived Change			Pa
	Worsened Mean(SD)	Remained the same Mean(SD)	Improved Mean(SD)	
General Health	20.46(17.91)	38.53 (23.35)	36.75 (22.45)	0.000
Physical Function	43.85(25.99)	61.12 (26.90)	58.31 (26.07)	0.000
Role Function	16.67(34.26)	39.13 (45.84)	41.45 (45.01)	0.000
Social Function	41.21(33.05)	56.73 (33.21)	56.31 (32.57)	0.003
Cognitive Function	43.89(22.89)	61.26 (20.49)	56.94 (22.82)	0.000
Pain	41.97(27.66)	59.35 (25.86)	54.21 (22.82)	0.001
Mental Health	38.14(21.99)	51.85 (19.97)	51.17 (20.89)	0.000
Energy/Fatigue	27.06(19.75)	43.50 (22.00)	41.74 (22.34)	0.000
Health Distress	44.71(27.29)	58.87 (28.06)	55.00 (28.61)	0.007
Quality of Life	32.32(24.81)	50.54 (22.04)	50.23 (23.99)	0.000
THS	32.94(15.86)	51.74 (19.27)	52.84 (18.58)	0.000

THS: Total Health Summary Scores.
aKruskal–Wallis test.

Table 6: Self-ratings of perceived change in health status.

MOS-HIV	QOL rating score	Satisfaction of sexual life	Relationship with family	Age	Education	Live alone or non-family members	unemployed	High risk occupation	HIV-HCV co-infection
GH	0.491**	0.285**	-0.284**	-0.135*		-	-0.240**	-	-0.217**
PF	0.330**	0.176**	-	-0.157*	0.163*	-	-0.213**	-	-
RF	0.353**	0.250**	-0.292**		0.170*	-	-0.247**	-0.192**	-0.175**
SF	0.403**	0.146**	-0.170*			-0.144*	-	-	-
CF	0.351**	0.240**	-0.289**	-0.187**		-0.140*	-0.239**	-0.165*	-
P	0.328**	0.251**	-0.416**	-0.200**	0.152*	-	-0.261**	-0.167*	-0.157*
MH	0.455**	0.300**	-0.315**		0.180**	-0.146*	-0.181**	-0.192**	-
E/F	0.401**	0.232**	-0.196**			-	-0.195**	-	-0.145*
HD	0.340**	0.258**	-0.369**			-	-0.177**	-0.150*	-0.161*
QOL	0.366**	0.352**	-0.292**			-	-0.269**	-0.173*	-
THS	0.520**	0.346**	-0.391**		0.148**	-0.155*	-0.275**	-0.182**	-0.182*

-: no significant correlation.
**P<0.01, *P<0.05.

Table 7: Correlation coefficients between MOS-HIV and general data.

	B	Exp(B)	95.0% C.I. for Exp(B)		Wald	Sig.
			Lower	Upper		
Single, separated, divorced or widowed	1.079	2.942	1.342	6.447	7.265	0.007
High risk occupation	0.766	2.151	1.030	4.490	4.161	0.041
KPS(<80)	0.644	1.905	1.405	2.083	17.205	0.000
Sex partner HIV positive	0.948	2.580	1.000	6.655	4.544	0.033

Dependent Variable: THS Below 30.25 (25th percentile)
Stepwise logistic regression
α, Entry=0.05 Removal=0.10

Table 8: Logistic regression analysis of general data on THS below 30 (25th percentile).

HIV and QOL rating score were weak to moderate. As to Satisfaction of sexual life the correlations were weak, except for subscale of Pain (moderate) the correlations with Relationship with family were weak too. Correlations between some subscales and age, education, live arrangement, employment, occupation before diagnosis and HIV-HCV co-infection were significantly but weak. There are some other variables weakly correlated with some subscales such as Injection drug use negative correlated with General Health(r=-0.197, p<0.01), Pain(r=-0.179, p<0.01), Quality of Life(r=-0.149, p<0.05).

Logistic regression

The stepwise logistic regression analysis, performed considering people with THS below 30.25(25th percentile) versus people with THS above this value, showed that four variables including KPS scores were statically associated with a lower quality of life results. Mean THS was 44.12 (SD 19.42), the 25th percentile is 30.25 and the 75th percentile is 58.43.

A simple linear regression was performed between each single QOL area and both KPS scores and CD4 cell count. All area values of QOL were significantly associated KPS scores (r2 range, 0.06-0.42, P=0.000), but only Physical Function and Social Function scores (r2=0.031, r=0.177, P=0.008) showed a significantly association with CD4 cell count. THS is also associated with KPS scores (r2=0.100, r=0.316, P=0.000) but not with CD4 cell count (Table 8).

Discussion

Since 2003, a new national prevention, treatment, and care program named “Four Frees and One Care” was provided nationwide in China. PLWHA who are rural residents or with financial difficulties living

in urban areas have been able to receive free voluntary counseling, testing and HAART in the nationally designated HIV/AIDS special centers [34]. With effective treatments and other supports from society, individuals with HIV/AIDS are concerned not only with a treatment's ability to prolong their life but also with the QOL they will have [25], and they are able to strive for more fulfilling and meaningful lives [14]. QOL measures are one means to provide valuable information about patients both in clinical trials and for cost-effectiveness analysis for HIV disease [11-14].

However, there are relatively few studies on QOL of PLWHA in mainland China. This might be because health care providers are usually concerned with the effect of HAART on well-being of patients but not necessarily on QOL [24,28,29]. To some extent, PLWHA themselves in China also neglect their QOL as they focus more on the risk of death from opportunistic infections. PLWHA do experience physiological symptoms, but they more frequently report psychological symptoms, especially related to the high levels of stigmatization and low economical status. The challenge for care providers is to build an aggressive care plan that not only control progression of disease but also meets physiological and social needs [35]. Studies on QOL should be conducted to increase awareness on the importance of improving QOL and to speed up holistic care process in China.

The target population for this study was the people who are living with HIV/AIDS from three designated HIV/AIDS three centers in Hunan Province. The three centers are the most representative centers in Hunan and responsible for the major clinic visits in Hunan province. HIV/AIDS epidemic in Hunan province is similar to that of the Chinese national trend, with drug use and sexual contact as the main routes of infection [36]. In Hunan, infections through these two routes account for 60.8% and16.4% of the total number of infections respectively, our results tune to the reported ratio. With Hunan Province being in the middle of the economic standing in the country, and with its major social and demographic characteristics representative of China, findings from Hunan will have important implications for the rest of the country.

Compared to the background information to the results of Lau et al., the primary differences were the employment and income. 26.3% of the study population in Lau's study unemployed; however, this value in our study is 76.1%. The same difference also presented among the results of income, those who have fixed income is 67.9% in Lau's study and 25.7% in our study. Unemployed and Lower social economic status have been mainly caused by the bad physical status and the stigma from society [37]. The stigmatization associated with HIV/AIDS has been referred to as a second epidemic because affects of stigma in HIV/AIDS were perceived by those infected as far greater than the severity of illness [38,39]. Patients with HIV/AIDS were less likely to have a stable job and income, and they could barely enjoy a normal family life and leisure activities. They were facing death and an uncertain financial future, compassionate possibly can combat stigma and potentially prevent avoidable exposure or infection.

QOL mean values observed in our study were remarkably lower than those reported by other results [8,17-25], as were floor and ceiling effects [8,24]. The scores of subscales ranged from 29.82 (General Health) to 52.53 (Physical Function), mean THS value was 44.12. Mean scores from other results usually above 50, Lau et al. reported mean scores of the subscales ranged from 53.18 to 81.08 [24]. Little ceiling effect was identified; conversely, a floor effect was observed for the Role Function and Physical Function.

The results suggest that the QOL of the PLWHA in our target population have been very bad, irrespective of their disease stage. There are many possible reasons that can explain this finding. First, 51.8% of participants had their KPS scores equal to or lower than 80. However, Lau et al. reported 94% of the respondents higher than 80 [24], this ratio even higher in the validated study of Italian version [8]. Second, of the total 222 participants, the majorities was males with Secondary school level or below of education, were aged between 30-39 years, were unemployed, had no fixed income or received financial assistance, some of them were migrant workers before diagnosis. All of these indicate that they are disadvantaged populations in our society, during the age when they are expected to be responsible for founding and raising a family. Third, the major HIV transmission modality was injection drug use (68.9%), and the majority is men 81.10% (133). Though in our study there are just some weak correlations between transmission modality and some subscales (General Health, Pain, Quality of Life), it is undoubted that drug addiction will deteriorate the QOL through reducing the adherence and increasing side effects of HAART [40,41], especially for those still indulge in, drug abuse will aggravate the stigma and then lack of economic, family and social support [41-45]. Though our study did not present how many people still indulge in drug abuse because of this question is too sensitive to collect, we do know from the staff members that most of them take drug repeatedly. Besides, as for women, 44.83% (26) of their partners were HIV positive and family support was unavailable. Those who get more supports from friends, family members, colleagues and neighbors often suffer less psychological pain and enjoy life better [45]. The correlation analysis in our study also supported that QOL values are associated with family relationships.

Our results demonstrated an acceptable reliability and validity of a Chinese version of the MOS-HIV Health Survey, a widely employed QOL instrument for PLWHA in mainland China. Such result has also been observed in various similar studies, including the Chinese validated researches in Hong Kong and Singapore [8,18-24]. Furthermore, correlation analysis also identified that QOL values moderate associated with scores of the numerical rating scale of overall QOL.

However, only one factor summarized from overall factor analysis, the result similar to German version in a multinational validated study which only one factor was extracted named Health [22]; however, it is different from most reported results including the original study and the Chinese validated researches in Hong Kong and Singapore [17,20,24]. There are no factor analysis reports in the validated studies of India, Italian and Spanish versions and factor structure is unavailable, in these studies, variables were analyzed with scores of each subscale and the total health score [19,26]. The differences between the results of most studies perhaps stem from the more advanced disease stage and extremely low QOL mean values. The overall QOL were too low to distinguish physical health and psychological health. Besides, as an index reflecting the physical function, psychological status, and social adaptability of patients, QOL reflects the multiple attribute of human being and these dimensions influence each other.

THS and each subscale were significantly associated with KPS status (≥80 vs. <80), results of our known group comparisons and regression analysis suggested that KPS score could be the most important factor associated with QOL values in people with advanced HIV and AIDS. In Lau's study, KPS more associated with PHS and these scales more related to PHS other than MHS and scales more related to MHS [24]. However, in the validated result of Italian version, no correlations between scale

values and KPS score was identified and the author consider that status is incomplete indicators of overall well-being in people with HIV and health status of people with HIV often wrongly identified by KPS status but QOL values strongly related to self-rated list of symptoms [26], It perhaps could be explained by the different disease stages, their study population with less advanced stages and would more sensitive to symptoms other than KPS status. The strong association between KPS score and QOL cannot be ignored, particularly in an outpatient clinic in which the number of patients with more advanced stages of HIV is high. We could get the assumption that the higher the level of KPS, the better QOL will be. Whether they could carry normal activity and take care of themselves are the important levels of measurement of QOL. Our data suggest that QOL instrument used for people with advanced HIV and AIDS should include KPS status.

It is note of in the simple linear regression analysis that QOL showed no relations with either disease stage of CD4 cell count (except for Physical Function and Social Function. Though compared to respondents in Lau's study (32% had CD4 count below 200) [24], our participants indicated with less CD4 cell counts (53.1% had CD4 count below), and the associations between QOL values and CD4 count are consistent. Such non-significant associations have been reported in considerable other similar validation studies [8,22]. Perhaps our participants with more advanced disease stages (35% were asymptomatic HIV compared to no symptomatic case), there were correlations between PHS and Pain scale with disease stages in Lau's study, which indicated better discrimination. As identified in our study, these two variables should not be taken as a rigid validation criterion for validation of MOS-HIV in the PLWHA in mainland China. However, there are few reports referred to correlations between QOL values and CD4 count in mainland China, just one result indicated that CD4 count positive correlated with some dimensions of SF-36 [31].

This study has some limitations. Firstly, the cross-sectional design does not allow examination of responsiveness of QOL scales to change over time. As in mainland China, tracking study to PLWHA is extremely difficult; especially those who infected with injecting drug use, this population seldom follow up regularly and family visits are also hard to do for they usually conceal their actual data and denied to participate in follow up study. However, it is extremely necessary to do longitudinal studies to identify predicting factors and to predict retrospective changes. Secondly, HIV disease stages just including symptomatic HIV and AIDS, perhaps it will influence the discrimination of MOS-HIV. However, those who infected did not to test until they present serious symptoms, so it is hard to recruit asymptomatic participants. Thirdly, it some differences were identified in the results of exploratory factor analyses. Compared to the original study and the validated studies of Chinese version in Hong Kong and Singapore, just one factor was extracted other than two, as analyzed above it may stem form extremely low QOL values. In our study, the response rate is 66.22%, and those who did not respond to study usually stay in worse conditions and their QOL even lower, this bias will influence our results, but it will happen in any cross-sectional study and could not avoid.

In conclusion, the results of the present study showed that interventions targeted to improve QOL of PLWHA in mainland China are urgently needed.

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