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HIV/AIDS Patients' Medical and Psychosocial Needs in the Era of HAART: A Cross-sectional Study among HIV/AIDS Patients Receiving HAART in Yunnan, China

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Abstract

Background—Since the launch of China's Free Antiretroviral Therapy (ART) Program in 2002, more than 100,000 HIV/AIDS patients have been treated with highly active antiretroviral therapy (HAART). However, the current evaluation system for this program mainly focused on its medical outcomes. This study aims to evaluate the medical and psychosocial needs of HIV/AIDS patients after initiating HAART.

Methods—A cross-sectional study was conducted among 499 HIV/AIDS patients who were currently being treated with HAART in three designated hospitals in Luxi City, Yunnan Province. A questionnaire was used to collect information about participants' demographic characteristics, perceived HIV-related stigma, physician-patient relationship, quality of life, family functioning, etc. Patients' medical records in the National HIV Information System were linked with their questionnaire by their ART identification number.

Results—Patients on HAART who were infected with HIV through injection drug use and were current smokers typically had poorer physical health than other participants on HAART. Better financial status and better physician-patient relationship were associated with both physical and psychological well-being. Family awareness of the patient's HIV status was negatively associated with the patient's psychological well-being. Higher levels of perceived HIV-related stigma were associated with poorer psychological health and poorer family functioning.

Conclusion—This study emphasizes the importance of assuring a caring environment in China's AIDS treatment program and re-enforces the need to combat the stigma encountered with health providers and the public.

Keywords

HIV/AIDS; HAART; Patient's need

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Introduction

Since the first HIV case identified in 1981, great achievements have been made in the medical treatment of HIV/AIDS. Introduction of and advances in HAART have helped transform AIDS from a deadly illness to a treatable chronic disease (Powderly, 2002).

In 2002, China launched its first free ART pilot study in Henan Province (Dou et al., 2010; F. J. Zhang, Pan, Yu, Wen, & Zhao, 2005). One year later, China's National Free ART program was officially initiated in other high-prevalence counties through the China Comprehensive AIDS Response (China CARES) program (F. Zhang et al., 2007; F. J. Zhang et al., 2005). In 2004, the program was further expanded under the "Four Frees and One Care" policy, which included free antiretroviral drugs, free voluntary counseling and testing, free testing and drugs to prevent mother-to-child transmission, free schooling for AIDS orphans, and care and economic assistance to the households of people living with HIV/AIDS (Anonymous, 2004; Z. Wu, Sullivan, Wang, Rotheram-Borus, & Detels, 2007). By the end of 2011, over 140,000 HIV/AIDS patients had been treated nationwide.

As a potent medical intervention, HAART has demonstrated its effects on immunological and virological outcomes, not only in developed countries and in standardized clinical trials (Bartlett et al., 2006; Walmsley et al., 2002), but also in resource-limited countries (Hammond & Harry, 2008; Ivers, Kendrick, & Doucette, 2005). Similar findings have been reported in China as well (Qian & Vermund, 2008; F. Zhang et al., 2008).

As the accessibility of HAART is increasing and HIV mortality is decreasing, prolonging survival is no longer the only priority for HIV/AIDS patients (Panel on Antiretroviral Guidelines for Adults and Adolescents, 2011) and they tend to have much broader health needs just as other uninfected populations have. However, the current evaluation system for China's free ART program and most studies mainly focus on medical outcomes, such as the changes of CD4 cell count, viral load or mortality (Dou et al., 2010; Ma et al., 2010b; Qian & Vermund, 2008; F. Zhang et al., 2009; F. Zhang et al., 2008) rather than the health needs of patients.

Health is defined as a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity, and is seen by the public health community as a multidimensional concept that includes physical, mental, and social domains (WHO, 1948). Health-related quality of life has been widely used to assess the aspects that can be shown to affect health—either physical or mental (Gandek, Sinclair, Kosinski, & Ware, 2004; McHorney, 1999; Selim et al., 2009). Moreover, studies have reported that family could play a positive role in helping HIV/AIDS member deal with the disease and hence improve their health status (Kabore et al., 2010; Li et al., 2012; Li et al., 2006; Rotheram-Borus, Flannery, Rice, & Lester, 2005; Sun et al., 2009). This study was designed to evaluate the medical and psychosocial needs of HIV/AIDS patients on ART from the perspectives of quality of life and family functioning.

Methods

Study site

This study was conducted in Luxi City, the capital city of Dehong Prefecture, Yunnan Province. There were total five free ART sites in Luxi city and three of them were selected for study participant recruitment, which were Luxi People's Hospital, Luxi Center for Maternal and Child Health and Luxi City Zhefang Township Hospital. These three sites provide free ART services to more than 70% of all HIV/AIDS patients in the city.

Participant recruitment

The study was approved by the Institutional Review Board (IRB) at both the National Center for STD/AIDS Prevention and Control, Chinese Center for Disease Prevention and Control (NCAIDS, CCDC) and the University of California, Los Angeles (UCLA). Study participants were recruited between August 2010 and January 2011. During the recruitment period, all HIV/AIDS patients who came to the study sites for regular ART follow-up or other medical services were invited to participate. An information card with the title and contact information of this study was distributed to all potential participants at the end of their visit. For illiterate patients, study information was conveyed by research staff. If potential participants were interested in participation, they were screened for eligibility, which included: 1) being at least 18 years old; 2) currently receiving ART; 3) having no permanent or serious psychological problems that might affect communication and the accuracy of data collection; 4) had not participated in the study before; and 5) gave informed consent. A total of 512 questionnaires were administered, from which 13 duplicates (identified by ART identification number) were deleted, totaling 499 participants. The refusal rate was less than 5%.

Data collection

Data collection in this study involved both a pre-designed standard structured anonymous questionnaire and the patients' medical records in the National Free ART Information System, a nationwide database for all HIV/AIDS patients receiving ART in China (Ma et al., 2010a). The questionnaire was administered face-to-face by the principal investigator of the study and other trained interviewers in private rooms at the study sites, and usually lasted 40–50 minutes. To reduce desirability bias, the interviewers were recruited from Home of Red Ribbon, a patient-based non-governmental organization that provides counseling, education, and support services for HIV/AIDS patients at treatment sites. Interpreters or interviewers fluent in local dialects were also available. The questionnaire contained questions assessing patients' quality of life, family functioning, perceived stigma, physician-patient relationship, external support, etc. Participants received 10 RMB (approximately US \$1.50) plus reimbursement for their local transportation to their appointment after completing the questionnaire. All paper-based data were double-entered and compared using Epi Info v3.5 (USCDC) before data cleaning and analysis.

The National Free ART Information System was reviewed at the end of January 2011 after data collection in the field was completed. The medical records of study participants were identified using their ART identification numbers. Information collected included date of treatment initiation, route of transmission and CD4 cell counts (baseline and most recent).

Measurement

Several measurement scales were used in this study as outcome and/or predictor variables. The RAND 36-Item Short Form Health Survey (SF-36) ("Medical Outcomes Study,") was used to assess participants' quality of life. Bloom's (1985) family functioning measurement was modified and used to measure participants' family functioning (Li, Lin, Ji, Sun, & Rotheram-Borus, 2009). Physician-patient relationship was measured by a six-item scale which was partly adapted from the HIV Cost and Services Utilization Study (HCSUS; RAND) (HIVCostandServicesUtilizationStudy). Perceived HIV-related stigma scale was adopted from the studies of Herek & Capitanio (1993) and Apinundecha (2007) (Apinundecha, Laohasiriwong, Cameron, & Lim, 2007; Herek & Capitanio, 1993). Family/community support was assessed by an 18-item measurement scale containing four subscales: emotional/informational support, tangible support, affection support, and positive social interactions (Li, Liang, Ding, & Ji, 2011; Sherbourne & Stewart, 1991). More details about these scales were reported in table 1.

Data Analysis

Frequency distributions were used to summarize the participants' socio-demographic information which included gender, ethnicity, marital status, education level, financial status, transmission route, and whether their family knew their HIV status. To account for the potential influence of extreme values, continuous variables such as age, CD4 cell counts, and duration of ART were reported in median and interquartile range (IQR). Each participant's physical and mental component summaries of quality of life were computed with a web-based calculator ("SF-36® PCS, MCS and NBS Calculator,"). For other measurement scales, before obtaining the final score, all of the above scales were examined by Cronbach alpha and several items were dropped in order to increase their reliability (Table 1). Correlation matrices were compiled to check the interrelationships among variables of interest.

Multiple linear regression was used to analyze factors associated with quality of life (physical and mental component summaries) and family functioning. A model was built for each outcome variable independently. Before regression analysis, histograms of outcome variables were examined to verify the normality assumption. The form of the final regression models involved the considerations of subjective interests, prior knowledge and statistic analysis. A list of interested variables was first developed based on subjective interests and prior information. Simple linear regression was then conducted to explore the crude effects, as well as to select potential variables for the multiple linear regression model. Best subset selection was performed to select the best subset of predictors with maximum adjusted R-sq. Demographic information such as age, ethnicity, gender, marital status, and level of education were adjusted in all three models. Other variables used in the regression analysis included indicator variables for current tobacco and alcohol use, dummy variables for transmission route, whether their family knew their HIV status, ordinal variables of financial status (1=very poor, 2= poor, 3=about average, 4=good, 5=very good), most recent CD4 cell count (1=equal or less than 200, 2=201–350, 3=351–500, 4=501+), and duration of ART (in 6-month intervals). Continuous variables included physician-patient relationship, perceived side effects of HAART (scale of 0–10 for severity), family/community support, and perceived HIV-related stigma. Quality of life was used as a predictor variable for the family functioning model, while family function was used as a predictor of quality of life models. All data were analyzed using SAS 9.1.3 (SAS Institute, Cary, NC, USA).

Results

Demographic information is presented in Table 2. The median age of the study population was 35 years, IQR 29–41. Of the 499 participants, about 56% (281) were male, and the proportions of Han (the primary Chinese ethnicity) and minority were almost identical (50.1% and 49.9%, respectively). Over 70% of the study population was married or living with a partner. Close to 40% had an education level of primary school only, followed by middle school (31.5%) and illiterate (17.4%). Regarding financial status, 42% and 40% rated theirs as poor and about average, respectively. Only 18 participants reported that their financial status was good or very good. When asked whether their family knew their HIV status, 286 (57.4%) reported that some of their family members knew, 151 (30.3%), all knew, and 61 (12.3%), no one. Heterosexual contact was the most common route of transmission, and was reported by two-thirds of the study population, followed by injection drug use (24.9%), with other/unknown at 10.2%. Information from medical records indicated that median CD4 cell counts for baseline and most recent follow-up were 212 and 400 per microliter, respectively. Median duration of ART was 712 days (range: 0–2104 days).

Correlation analysis (Table 3) showed moderate correlation among the subscales of family/community support, with a Pearson correlation $r=0.46-0.61$. Those infected with HIV by injection drug use were observed to have moderate to mild correlation with current tobacco use ($r=0.49$, $p<0.0001$), poor financial status ($r=0.24$, $p<0.0001$), poor social interactions ($r=-0.25$, $p<0.0001$), poor physician-patient relationship ($r=-0.20$, $p<0.0001$), and severe side effects ($r=0.20$, $p<0.0001$). Most recent CD4 cell count was positively correlated with duration of treatment ($r=0.27$, $p<0.0001$) and social interactions ($r=0.20$, $p<0.0001$). No multicollinearity was observed among predictor variables.

Parameter estimates from linear regression for variables associated with quality of life (physical and mental component summaries) and family function are reported in Table 4. After adjusting for participants' demographic characteristics, their physical component summary was positively associated with current alcohol use ($b=1.78$, $p=0.0302$), better financial status ($b=1.77$, $p<0.0001$), higher recent CD4 cell count ($b=0.67$, $p=0.0331$), better physician-patient relationship ($b=0.66$, $p=0.0035$), and positive social interactions ($b=0.26$, $p=0.0010$). Current tobacco use ($b=-3.12$, $p=0.0025$), being infected through injection drug use ($b=-2.90$, $p=0.0023$), and having severe side effects ($b=-0.38$, $p=0.0006$) were found to be negatively associated with the physical component summary. For the mental component of quality of life, having better financial status ($b=2.92$, $p<0.0001$), better physician-patient relationship ($b=0.57$, $p=0.0280$), better family functioning ($b=0.49$, $p<0.0001$), and positive social interactions ($b=0.56$, $p<0.0001$) were found to have positive associations. Factors with negative associations included all family members knowing the participant's HIV status ($b=-2.52$, $p=0.0036$), severe side effects ($b=-0.50$, $p<0.0001$), more tangible support ($b=-0.28$, $p=0.0008$), and high levels of HIV-related stigma ($b_{stigma}=-0.31$, $p=0.0078$; $b_{shame}=-0.26$, $p=0.0010$). In the last model, family functioning was observed to be positively associated with family support ($b=0.13$, $p<0.0001$) and patient's mental component of quality of life ($b=0.08$, $p=0.0010$), and negatively associated with HIV-related stigma.

Discussion

With reduced mortality and improved longevity, quality of life has become an important goal of treatment (A. W. Wu, 2000). In addition to reducing HIV-associated morbidity and prolonging longevity, improving the quality of survival has been clearly stated as one of the primary goals of initiating antiretroviral therapy (Panel on Antiretroviral Guidelines for Adults and Adolescents, 2011). Although some studies have demonstrated the positive effects of ART on quality of life improvement in developed countries (Jelsma, Maclean, Hughes, Tinise, & Darder, 2005; Liu et al., 2006; Parsons, Braaten, Hall, & Robertson, 2006), such information is still limited in China.

The initial implementation and scale-up of China's Free ART Program focused on former blood and/or plasma donors partly because of their ease of management (F. Zhang et al., 2007). Although in some studies injection drug users were found to be less likely to receive HAART (Malta et al., 2009; McGowan et al., 2011; Tapp et al., 2011), conflicting findings had also been reported (Zala et al., 2008). A recent study conducted in China found that among those treated patients, IDUs were more likely to access to treatment early (Yi Wen, 2011). Findings from this study suggest that compared to the reference population (patients with sexual transmission), injection drug users on HAART tended to have poor physical health than other participants on HAART. This observation was possibly due to their high rate of HIV/hepatitis co-infection. Because of the shared transmission routes, HIV and hepatitis co-infection is very common among injection drug users (Buxton et al., 2010; He et al., 2011; Johnston, Saumtally, Corceal, Mahadoo, & Oodally, 2011; Marco, Saiz de la Hoya, & Garcia-Guerrero, 2012; Plitt et al., 2010; Zhou et al., 2011). Another factor that

might contribute to IDUs' poorer physical health might be tobacco use which was observed to be positively correlated with injection drug use and negatively associated with physical health. Finally, IDU associated suboptimal treatment adherence (Cescon et al., 2011; Moore et al., 2010; Nolan et al., 2011; Ortego et al., 2011) might lead to viral rebound and treatment failure, which would undermine their health status. Therefore, special attention should be given to IDU population from the aspects of HIV/HCV co-infection management, healthy life style promotion and adherence support.

The positive association between better physician-patient relationship and patients' health related quality of life has been reported in many domains of health including HIV/AIDS (Beach, Keruly, & Moore, 2006; Farin & Meder, 2010; Farin & Nagl, 2012; Preau et al., 2004; Shanafelt et al., 2009). However, it seems that this key component of patient care was not fully utilized in China. Although the national HIV/AIDS physician training program has been launched for over eight years, most of its training curriculum is focused on medical knowledge rather than communication skills and physician-patient relationships. The findings of this study might suggest a way in which the national training program could improve.

Amongst the factors that are negatively associated with HIV/AIDS patients' psychological well-being, awareness of the entire family of the patient's HIV status was observed to have the strongest association. Previous studies have demonstrated that family support generates multiple levels of positive impact on PLHA (Li et al., 2006). However, the findings reported here suggest that the family's awareness might not necessarily imply family support, and might be detrimental if the information is not conveyed properly. According to the current policy, health institutes and health workers are responsible for informing patients about their HIV status, and the patient is responsible for informing his/her partner within one month. If he/she does not, the health institute or health worker informs his/her partner without the patient's consent (Anonymous, 2006a, 2006b). Although this mandatory policy may protect the uninfected, it is a source of psychological pressure for the patient. From the perspective of family, having an HIV-positive member may make the family feel stigmatized and have a sense of failure. They may also feel that their future is compromised. Blame and bringing shame upon the family may also be perceived (Li et al., 2007). Therefore, to protect the interests of both the patient and the family, treatment and care program need to also work with the families of patients.

Perceived HIV-related stigma among PLHA has been well studied. The effects of HIV-related stigma on treatment were reported mainly from two aspects, a barrier to treatment access for untreated patients and an influence factor of treatment adherence for those treated (Duff, Kipp, Wild, Rubaale, & Okech-Ojony, 2010; Joglekar et al., 2011; Otieno et al., 2010; Portelli, Tenni, Kounnavong, & Chanthivilay, 2012; Sayles, Wong, Kinsler, Martins, & Cunningham, 2009; Sumari-de Boer, Sprangers, Prins, & Nieuwkerk, 2011; Theilgaard et al., 2011). In this study, HIV-related stigma was also found to have a negative influence on psychological health and family functioning among treated patients. Therefore, as a key component of care, medical care should play a more active role in reducing HIV-related stigma. Considering the positive effects of better physician-patient relationships, as previously discussed, it is important to adopt and apply anti-stigma interventions widely among healthcare providers in ART hospitals. Medical professionals, especially those working at ART facilities, should utilize their unique position to build a solid relationship of trust with their patients. Such a relationship serves as a platform for stigma reduction.

The limitation of this study was mainly related to its cross-sectional design. The findings reported herein only imply associations, not causation. Secondly, all the participants were recruited from HIV/AIDS patients actively receiving ART, so this study might suffer from

selection bias if these patients are different from those who had dropped out of treatment before the study. However, by recruiting all HIV/AIDS patients receiving ART without a minimal treatment duration requirement, we hope to have reduced the bias caused by selection. Thirdly, with only 500 participants, the findings might not be generalizable to other areas of China with different circumstances. Finally, interviewers were recruited from a PLHA based NGO with the hope to reduce social desirability bias. However, their roles of patient mentors at the treatment sites could introduce information bias. Nevertheless, in addition to medical indicators, this study provides another perspective for the current free ART program.

In conclusion, the findings of this study indicate that more effort would be made to build good physician-patient relationships and good communication skill, and more emphasis should be placed on counseling of families of HIV patients.

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Table 1

Measurement scales used in the study

Scale	Description
Quality of life (SF-36)	This 36-item measurement scale contains eight health concepts: physical function, physical pain, limitations due to emotional problems, emotional well-being, social functioning, energy/fatigue, and general health perceptions. These were further summarized as physical and mental components.
Family functioning	The original scale of family functioning measurement was a 75-item survey consisting of 15 subscales reflecting family relationships, system maintenance, and personal growth dimensions. In this study three subscales (family conflicts, family cohesion, and family sociability) were selected based on specific study interests and cultural appropriateness. For each item, participants were asked to rate how true each statement was for their own family on a 4-point Likert scale. The final score was the sum of the three subscales. A higher score indicates better family functioning.
Physician-patient relationship	This is a six-item scale which asks participants if they agreed, disagreed or were not sure about certain statements made about the attitudes or services of physicians. The sum of all the items was used as the final measurement. A higher score represents a better physician-patient relationship.
Perceived HIV-related stigma	This scale consists of 17 items, including 9 perceived stigma items and 8 internalized shame items. Participants were asked their degree of agreement with feelings that people sometimes have about living with HIV (strongly disagree, disagree, not sure, agree and strongly agree). For each subscale, the sum of its items was used as the final measurement. A higher score implied a higher degree of HIV-related stigma/shame.
Family/community support	Family/community support was assessed by an 18-item measurement scale containing four subscales: emotional/informational support, tangible support, affection support, and positive social interactions. Participants were asked how often certain forms of support were available to them if they needed it (never, rarely, some of the time, most of the time, and always). To better distinguish the sources of support, the four subscales were measured for both family and community.

Table 2

Cronbach Coefficient Alpha of Measurement Scales

Measurement	# of Question (Cronbach α)		Item removed
	Original	Modified	
Family functioning, cohesion	5 (0.74)	5 (0.74)	NA
Family functioning, conflict	5 (0.67)	4 (0.75)	Our family members hardly ever lose their tempers
Family function, sociability	5 (0.86)	4 (0.89)	Our family is full of life and good feelings
Patient-provider relationship	6 (0.77)	5 (0.79)	The health providers do not treat me well
Perceived stigma	8 (0.62)	7 (0.68)	I feel discriminated against by health workers
Internalized shame	9 (0.78)	8 (0.81)	If possible, I want to conceal my HIV status forever
Emotional/information support, from family	8 (0.91)	8 (0.91)	NA
Emotional/information support, from community	8 (0.92)	8 (0.92)	NA
Tangible support, from family	4 (0.95)	4 (0.95)	NA
Tangible support, from community	4 (0.93)	4 (0.93)	NA
Affection support, from family	3 (0.83)	2 (0.87)	Someone who hugs you
Affection support, from community	3 (0.88)	2 (0.91)	Someone who hugs you
Positive social interactions, from family	3 (0.85)	3 (0.85)	NA
Positive social interactions, from community	3 (0.89)	3 (0.89)	NA

Table 3

Demographic characteristic of study participants (n=499)

Variables	Number	%
Age		
Median (IQR)	35 (29, 41)	
Gender		
Male	281	56.3
Female	218	43.7
Ethnicity		
Han	250	50.1
Non-Han	249	49.9
Marital status		
Married or living together	359	71.9
Single or living alone	140	28.1
Education		
Illiterate	87	17.4
Primary school	196	39.3
Middle school	157	31.5
High school	40	8.0
College	19	3.8
Financial status		
Very good	2	0.4
Good	16	3.2
About average	199	39.9
Poor	206	41.3
Very poor	76	15.2
HIV status		
No one knows	61	12.3
Someone knows	286	57.4
Everyone knows	151	30.3
Transmission route		
Blood transfusion	1	0.2
Drug injection	124	24.9
Heterosexual	323	64.7
Other/unknown	51	10.2
Current regimen		
First-line	456	91.4
Second-line	43	8.6
Baseline CD4count (per μL)		
Median (IQR)	212 (115, 292)	
Most recent CD4 count (per μL)		
Median (IQR)	400 (273, 591)	

Variables	Number	%
Duration of ART (in days)		
Median (IQR; Range)	712 (303, 1105; 0–2104)	

Table 4

Correlation coefficients among different predictor variables

	Financial status	Injection drug use	Most recent CD4	Duration of ART	Current tobacco use	Current alcohol use	ART side effects	Physician-patient relationship	Emotional support	Social interactions	Tangible support	Perceived stigma
Injection drug use	-0.23729											
Most recent CD4	<.0001	-0.02292										
Duration of ART	0.01065	0.6254	0.27124									
Current tobacco use	0.8205	0.04225	<.0001	0.05436								
Current alcohol use	0.01416	0.3675	0.09757	0.2462	0.21687							
ART side effects	0.7627	0.49317	0.0373	0.09393	<.0001	-0.14070	-0.19128					
Physician-patient relationship	-0.08965	0.3660	0.8161	0.0448	0.04908	0.0017	0.11348	0.06354				
Emotional support	0.0453	<.0001	0.01092	0.2462	0.2748	0.0113	<.0001	0.15555	0.60808			
Social interactions	0.11539	-0.04055	0.01259	0.09393	0.00716	-0.02356	-0.15923	0.1615	<.0001	0.46109	-0.12551	0.28292
Tangible support	0.0099	0.3660	0.8161	0.0448	0.04908	0.0017	0.11348	0.15555	0.60808	0.9101	0.0054	<.0001
Perceived stigma	-0.06358	0.19833	0.01259	0.0448	0.04908	0.0017	0.11348	0.15555	0.60808	0.00512	-0.15044	<.0001
	0.1570	<.0001	0.7890	0.4967	0.2748	0.0113	<.0001	0.06354	0.1615	0.00512	0.0054	<.0001
	0.07183	-0.20281	-0.01139	-0.13016	-0.11879	0.11348	0.11348	0.06354	0.1615	0.00512	0.0054	<.0001
	0.1094	<.0001	0.8086	0.0054	0.0080	0.0113	<.0001	0.06354	0.1615	0.00512	0.0054	<.0001
	0.04568	-0.08627	0.04542	0.05763	0.00716	-0.02356	-0.15923	0.06354	0.1615	0.00512	0.0054	<.0001
	0.3139	0.0569	0.3392	0.2245	0.8747	0.6036	0.0004	0.15555	0.60808	0.00512	0.0054	<.0001
	0.12264	-0.24726	0.20394	0.02275	-0.19032	0.08873	0.0004	0.15555	0.60808	0.00512	0.0054	<.0001
	0.0067	<.0001	<.0001	0.6318	<.0001	0.0501	<.0001	0.0006	<.0001	0.46109	0.0054	<.0001
	0.08376	-0.09740	0.04640	0.09433	-0.02078	0.01492	-0.07030	0.08180	0.58131	0.9101	0.0054	<.0001
	0.0640	0.0311	0.3276	0.0460	0.6464	0.7419	0.1209	0.0707	<.0001	0.00512	0.0054	<.0001
	-0.03857	0.00282	0.10951	0.01160	-0.08077	0.06114	0.05012	0.08417	0.00682	0.00512	0.0054	<.0001
	0.3904	0.9500	0.0195	0.8048	0.0717	0.1731	0.2652	0.0608	0.8806	0.9101	0.0054	<.0001
	-0.14443	0.08909	-0.05581	-0.01635	-0.00870	-0.07964	0.09116	-0.01458	-0.12025	-0.05940	-0.15044	0.28292
	0.0012	0.0467	0.2343	0.7274	0.8463	0.0755	0.0422	0.7455	0.0078	0.1902	0.0008	<.0001

Table 5

Parameter estimates from linear regression

	Physical Component Summary (n=435)			Mental Component Summary (n=476)			Family Functioning (n=488)			
	Crude Estimate	p-value	Adjusted Estimate*	Crude Estimate	p-value	Adjusted Estimate*	Crude Estimate	p-value	Adjusted Estimate*	p-value
Financial status	2.40	<0.0001	1.77	4.08	<0.0001	2.92	0.50	0.0575	-0.22	0.3887
Transmission route										
Sexual	Ref.		Ref.	Ref.		Ref.	Ref.		Ref.	
IDU	-6.75	<0.0001	-2.90	-7.10	<0.0001	-2.02	-0.87	0.0710	-0.03	0.9557
Other/unknown	-0.99	0.3378	-1.42	-1.04	0.4639	-1.42	-0.18	0.7958	-0.55	0.3572
Most recent CD4 count	1.08	0.0011	0.67		0.0331					
Duration of ART (0.5y)	-0.08	0.5473	-0.03		0.7759					
Alcohol/tobacco use										
Current smoker	-4.49	<0.0001	-3.12		0.0025					
Current drinker	3.21	<0.0001	1.78		0.0302					
ART side effects	-0.70	<0.0001	-0.38	-1.04	<0.0001	-0.50				<0.0001
Physician-patient relationship	1.34	<0.0001	0.66	1.49	<0.0001	0.57				0.0280
Emotional support	0.02	0.5128	-0.10	0.30	<0.0001	0.10				0.0264
Positive social interactions	0.42	<0.0001	0.26	0.85	<0.0001	0.56				<0.0001
Tangible support				0.35	<0.0001	-0.28				0.0008
Family support							0.15	<0.0001	0.13	<0.0001
Internalized shame				-0.56	<0.0001	-0.26	-0.20	<0.0001	-0.10	0.0121
Perceived stigma				-0.47	0.0005	-0.31	-0.22	0.0004	-0.14	0.0218
Whether family knows										
HIV status										
Someone knows	Ref.		Ref.	Ref.		Ref.	Ref.		Ref.	
No one knows				-2.76	0.0455	-0.07	-0.29	0.6527	0.69	0.2510
Everyone knows				-5.71	<0.0001	-2.52	-0.33	0.4787	0.02	0.9691
Family Functioning				0.78	<0.0001	0.49				
Quality of Life										
MCS							0.17	<0.0001	0.08	0.0010
PCS							0.01	0.7245	-0.05	0.0809

* estimates after adjusting for age, gender, ethnicity, marital status and education level