

This is a post-peer-review, pre-copyedit version of an article published in *Quality of Life Research*.  
The final authenticated version is available online at: <http://dx.doi.org/10.1007/s11136-014-0707-7>

Pereira, M., Martins, A., Alves, S., & Canavarro, M. C. (2014). Assessing quality of life in middle-aged and older adults with HIV: Psychometric testing of the WHOQOL-HIV-Bref. *Quality of Life Research*, 23(9), 2473-2479. doi:10.1007/s11136-014-0707-7

## ABSTRACT

**Purpose:** The aim of this study was to test the psychometric properties of the WHOQOL-HIV-Bref in a sample of HIV-infected patients aged 50 years and older.

**Methods:** The sample consisted of 185 patients, recruited in the main departments of infectious diseases of 10 Portuguese hospitals. In addition to the WHOQOL-HIV-Bref, patients also completed the Brief Symptom Inventory, a self-report questionnaire for measuring psychopathological symptoms.

**Results:** The European Portuguese version of WHOQOL-HIV-Bref showed acceptable reliability (Cronbach's alpha range: 0.65 to 0.86 across domains). Confirmatory factor analysis corroborated the original six-domain structure. Convergent validity with depressive and psychopathological symptoms was satisfactory for all domains. Overall QoL, Physical and Independence domains discriminated well subjects considering the HIV stage. None of the domains were significantly different according to CD4+ T-cell count subgroups.

**Conclusions:** These results offer promising support for the use of the WHOQOL-HIV-Bref as a measure of QoL among HIV-infected patients aged 50 years and older. Its brevity and multidimensionality allow a more practical and comprehensive assessment of QoL, both on clinical and research settings.

**Keywords:** HIV infection; Middle-aged and older adults; Quality of life; Reliability; Validity

## **ABBREVIATIONS**

BSI – Brief Symptom Inventory

CFA – Confirmatory factor analysis

CFI – Comparative fit index

HIV – Human Immunodeficiency Virus

QoL – Quality of life

RMSEA – Root mean square error of approximation

WHO – World Health Organization

WHOQOL-HIV-Bref – World Health Organization Quality of Life in HIV infection, abbreviated version

## INTRODUCTION

Although HIV infection has been historically considered a disease of young adults [1], epidemiological evidence confirms that adults aged 50 years and older constitute now an ever-growing proportion of HIV/AIDS cases worldwide [2, 3]. Thus, with the changing patterns in HIV epidemiology and ageing of the HIV population, the issue of quality of life (QoL) assessment in older ages has become increasingly important.

Based on a generic measure of QoL (the WHOQOL-100), developed within an international project initiated by the World Health Organization (WHO) [4], a modular approach implemented by the WHO led to the development of the WHOQOL-HIV. This questionnaire comprises 120 items assessing overall QoL, general health perception, 24 specific facets derived from the generic instrument, as well as five specific facets of the HIV module [5-7]. An abbreviated version of this instrument was also developed [8]. All questionnaires were developed according to internationally agreed protocols [4, 5]. This methodology was thoroughly followed in the development of the European Portuguese versions and has been reported elsewhere [9-11].

The WHOQOL-HIV-Bref has been studied in an international sample [8], as well as in diverse countries [9, 12-15], but not specifically in individuals aged 50 years and older. As the instrument's psychometric properties in this population are still unknown, the aim of this study was to assess the psychometric properties of the WHOQOL-HIV-Bref in a sample of Portuguese middle-aged and older adults with HIV.

## METHODS

### Participants and procedures

This cross-sectional study was part of a larger project about the QoL and mental health of Portuguese HIV-infected patients. The recruitment procedures are presented in more detail elsewhere [16]. The sample was recruited by convenience between September 2007 and July 2008, and comprised 185 HIV-infected patients aged 50 years and older contacting the main departments of infectious diseases of 10 Portuguese hospitals. Patients were invited to participate in the study while attending the medical consultation with their infectious disease specialist. Trained researchers

(psychologists) were available to provide assistance in completing questionnaires to those who needed it. The participants' sociodemographic and HIV-related characteristics are displayed in Table 1.

All participants were informed of the purpose of the study and those who accepted to participate provided us a written informed consent. Ethical approval to conduct the study was obtained from the Ethics Committees of all institutions involved.

[INSERT\_TABLE\_1]

## Measures

The WHOQOL-HIV-Bref is a 31-item self-reported questionnaire that yields a multidimensional profile across six domains (Physical, Psychological, Independence, Social Relationships, Environment, and Spirituality) and 29 specific facets. One additional facet (two items) pertains to global QoL and general health. The instrument was organized by response scale (capacity, frequency, intensity or satisfaction), and items were rated on a five-point scale. Each scale point was specified with a number and a verbal descriptor.

The Brief Symptom Inventory (BSI) [17], a 53-item self-reporting inventory of psychological distress [Cronbach's  $\alpha$  from 0.70 (Paranoid ideation) to 0.88 (Depression)] was used to assess convergent validity.

Sociodemographic and HIV-related characteristics were obtained by self-report, and the latter were confirmed from medical records. As adopted by most of the available research in this area, and as categorised by the United States National Institute of Aging [18], middle-aged and older adults were defined as those aged 50 years or older.

## Data analysis

Data were analysed using the Statistical Package for Social Sciences (IBM SPSS 20.0). Analysis of Moment Structures (AMOS) was used to perform a Confirmatory Factor Analysis (CFA). Descriptive statistics were first calculated in order to explore the sample's characteristics, the item's descriptive statistics, and floor and ceiling effects. Goodness of fit was verified by the following indices:  $\chi^2$  statistic, comparative fit index (CFI), and root mean square error of approximation (RMSEA). Models are considered to have a good fit when:  $CFI > 0.90$  and  $RMSEA < 0.08$  [19]. Internal consistency was assessed using Cronbach's alpha. To assess known-groups validity, a

multivariate analysis of variance (MANOVA) was undertaken in order to determine differences in WHOQOL-HIV-Bref domains according to HIV stage and CD4 count. Spearman's rho and Pearson's correlations were computed to determine the construct and convergent validities. All tests were two-tailed with  $p < 0.05$  indicating statistical significance.

## RESULTS

An overview of items' distribution is presented in Table 2. The missing values were lower than 2% for all items. Across domains, no floor and ceiling effects were observed. However, ceiling effects were detected in 10 items. The skewness and kurtosis coefficients of most items were within the acceptable range of -1.00 to 1.00. With the exception of Spirituality, the Cronbach's alpha of all domains exceeded 0.70.

[INSERT\_TABLE\_2]

The CFA revealed that the original six-domain structure of the WHOQOL-HIV-Bref fit the data very well [ $\chi^2 = 117.23$ ,  $df = 62$ ,  $p < 0.001$ ; CFI = 0.97; RMSEA = 0.07 (90% CI 0.05–0.09)].

Correlation coefficients of WHOQOL-HIV-Bref domains indicated that all domains were significantly correlated ( $r$  range: 0.42-0.78;  $p < 0.001$ ). Furthermore, each domain was significantly correlated with the general facet ( $r$  range: 0.42-0.68). The construct validity was also demonstrated by the significant correlations found between the WHOQOL-HIV-Bref domains and a self-evaluated health status item ( $r_s$  range: 0.34-0.54;  $p < 0.001$ ). All WHOQOL-HIV-Bref domains and Overall QoL correlated significantly with the psychopathological dimensions of the BSI (Table 3).

[INSERT\_TABLE\_3]

Known-groups validity was conducted to examine how well the questionnaire discriminated among asymptomatic and symptomatic/AIDS patients, as well as CD4 count subgroups. A significant multivariate effect was found for HIV stage [Wilks'  $\lambda = 0.89$ ;  $F(7, 168) = 3.11$ ,  $p = 0.004$ ,  $\eta_p^2 = 0.012$ ]. Follow-up tests showed that symptomatic/AIDS patients reported lower scores on Physical and Independence domains, as well as in Overall QoL. Regarding CD4 count, the multivariate effect was significant [Wilks'  $\lambda = 0.85$ ;  $F(7, 155) = 8.11$ ,  $p = 0.028$ ,  $\eta_p^2 = 0.079$ ], however, subsequent analysis indicated that none of the univariate tests were statistically significant (Table 4).

[INSERT\_TABLE\_4]

## DISCUSSION

This is the first study assessing the psychometric properties of the WHOQOL-HIV-Bref for use in middle-aged and older adults with HIV. The results support the acceptability, reliability and validity of the European Portuguese version of the WHOQOL-HIV-Bref. Supporting its cross-cultural perspective, the WHOQOL-HIV-Bref may be a valid tool for the assessment of QoL of middle-aged and older individuals with HIV, particularly because in these specific groups, studies may need more practical and easier to apply measures for assessing QoL.

The WHOQOL-HIV-Bref presented satisfactory reliability. Cronbach's alpha was above 0.70 for most domains, exceeding the recommended alpha for established instruments [20]. This is comparable to the reliabilities reported in the field test [8], in Taiwan [13], Vietnam [14] and Malaysia [15]. The exception was the Spirituality, which dropped below the minimum standard (0.65). This lower reliability could be attributed to its size (four items), and/or the items' content (spirituality, death, guilt, future). However, lower reliabilities in this domain have been also found cross-culturally [8, 13, 14].

At item level, although no floor effects were found, the existence of ceiling effects above the accepted threshold of 15% [21] should be noted. Similar effects in these items have been previously reported [13]. In line with prior validation studies [14, 15], no floor and ceiling effects were observed on QoL domains. As ceiling effects are population dependent [22], the observed effects in individual items may be related to the fact that our sample comprised a relatively larger number of middle-aged participants rather than the elderly. The fact that the sample was reasonably healthy, as indicated by the proportion of asymptomatic patients, may also have led to better QoL ratings.

The evidence of the construct and convergent validities was also provided. The first is supported by the significant correlations between all domains, as well as the confirmation of the original six-domain structure [8]. Evidence for convergent validity is supported by significant correlations with the general facet of QoL and the self-reported perception of general health. This pattern of associations was also demonstrated in other validation studies [13, 15], and the strength of the associations was comparable to the reported in those studies. It was further observed that all domains were significantly and negatively correlated with psychopathological symptoms. This

association calls attention to the importance that mental health has on QoL and is consistent with findings suggesting that higher emotional distress may have a central role in patient's QoL [16, 23], including in older ages [24].

The WHOQOL-HIV-Bref domains were significantly different across HIV stage but not CD4 count subgroups. This is consistent with findings showing that an advanced disease stage is related to lower levels of QoL [8, 15], particularly in the domains related to Physical and Independence QoL [25]. Although few studies report specific associations between biological markers and QoL, the results have been conflicting. In line with other studies [12, 13], we were also unable to find significant differences between CD4 count subgroups. As CD4 count not always relates to how well patients are feeling, it is possible that some patients can have high CD4 counts and more HIV-related complications than others with low CD4 counts. Thus, similar to their younger counterparts, being symptomatic or having AIDS may have a greater impact in their perception of QoL. Further studies are needed to clarify this association.

Potential limitations imposed by the sample, the sampling strategy and the study design should be acknowledged. All participants were recruited from health settings and accordingly, were actively engaged in health care. The cross-sectional design impedes a suitable assessment of questionnaire sensitivity to change. Furthermore, ceiling effects were detected in several items. However, as minimal effects were observed on domains, we believe these effects do not compromise the validity of the WHOQOL-HIV-Bref or limit its usefulness to detect changes in QoL. Finally, the sample comprised a relevant proportion of middle-aged patients rather than the elderly. Thus, we cannot exclude the possibility that our findings simply reflect cohort effects, and that they could be different if our sample was less heterogeneous and composed by adults aged 65 years and older, as conventionally defined by the WHO. Despite these limitations, this study contributes to the narrow literature on the WHOQOL-HIV-Bref performance.

In conclusion, the profile of QoL generated by the WHOQOL-HIV-Bref may allow a more comprehensive assessment of QoL and may be more useful in identifying which domains are most affected by direct or indirect challenges posed by ageing and/or HIV. Given its shortness, in research settings, the WHOQOL-HIV-Bref may be more practical than the 120-item version for use in large

epidemiological surveys, in studies with several assessment times, and particularly in studies with older patients, that may have increased difficulties in completing the longer version.



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Table 1  
Sociodemographic and HIV-related characteristics of the sample ( $N = 185$ )

	Mean (SD; range)
Age, years	57.84 (6.79; 50-81)
Education, years	7.03 (4.48; 4-17)
CD4+ T-cell count	433.06 (275.65; 5-1,234)
Time since diagnosis, years	6.34 (5.20; 0-24)
	<i>n</i> (%)
Gender	
Male	120 (64.9)
Female	65 (35.1)
Employment status	
Employed	76 (41.1)
Not currently working	109 (58.9)
Marital status	
Single	28 (15.1)
Married/co-habiting	94 (50.8)
Separated/divorced	45 (24.3)
Widowed	18 (9.7)
Mode of transmission <sup>a</sup>	
Sexual intercourse with man	70 (38.0)
Sexual intercourse with woman	80 (43.5)
Intravenous drug use	15 (8.2)
Blood products	13 (7.1)
Others	6 (3.3)
HIV stage	
Asymptomatic	119 (64.7)
Symptomatic	30 (16.3)
AIDS	27 (14.7)
Unknown	8 (4.3)
CD4+ T-cell count <sup>b</sup>	
< 200 cells/mm <sup>3</sup>	34 (18.4)
201-499 cells/mm <sup>3</sup>	72 (38.9)
> 500 cells/mm <sup>3</sup>	57 (30.8)
Unknown	22 (11.9)
Self-reported health status <sup>a,c</sup>	
Very poor	9 (5.1)
Poor	35 (19.9)
Neither good nor poor	60 (34.1)
Good	67 (38.1)
Very good	5 (2.8)

<sup>a</sup> The *ns* of these variables do not add up to 185 due to missing values

<sup>b</sup> CD4+ T-cell count, based on clinically meaningful cut-off points, was stratified into three groups: < 200 cells/mm<sup>3</sup>, 201-499 cells/mm<sup>3</sup>, and > 500 cells/mm<sup>3</sup>

<sup>c</sup> As an overall indicator of morbidity, self-reported health status was assessed by the question: "How would you rate your health?"

Table 2  
Descriptive statistics and internal consistency of the WHOQOL-HIV-Bref ( $N = 185$ )

Items	Missing (%)	Mean	SD	Floor (%)	Ceiling (%)	Skewness	Kurtosis	Cronbach's alpha
<i>Domain 1 – Physical</i>		59.24	21.91	0.5	2.7	-0.12	-0.76	0.74
Pain and discomfort	0.5	3.70	1.24	3.8	37.3	-0.44	-1.04	
Energy and fatigue	0.5	3.20	0.94	2.2	9.2	0.10	-0.41	
Sleep and rest	0.5	3.09	1.15	8.6	8.6	-0.18	-1.01	
Symptoms of PLWHAs <sup>a</sup>	0	3.49	1.33	3.8	34.1	-0.16	-1.48	
<i>Domain 2 – Psychological</i>		57.83	19.17	1.1	0.5	-0.18	-0.21	0.81
Positive feelings	0	3.65	1.01	2.7	17.8	-0.67	-0.08	
Cognitions	0.5	3.28	0.93	1.6	7.6	-0.14	-0.62	
Self-esteem	0.5	3.30	1.05	4.9	11.4	-0.29	-0.58	
Body image and appearance	0	3.38	1.04	3.2	15.1	-0.17	-0.58	
Negative feelings	0	2.95	1.06	9.2	8.1	0.04	-0.42	
<i>Domain 3 – Level of Independence</i>		60.78	22.85	0.5	4.3	-0.29	-0.72	0.86
Mobility	0.5	3.59	0.99	2.2	18.9	-0.37	-0.35	
Activities of daily living	0.5	3.49	1.26	3.2	9.7	-0.24	-1.25	
Dependence on medication or treatment	0.5	3.35	1.00	4.3	39.2	-0.36	-0.57	
Work capacity	1.6	3.29	1.06	5.4	10.8	-0.34	-0.57	
<i>Domain 4 – Social Relationships</i>		58.38	20.48	1.1	2.2	-0.30	-0.42	0.82
Personal relationships	0.5	3.45	0.99	2.2	12.4	-0.36	-0.53	
Social support	0.5	3.46	1.02	4.3	13.0	-0.53	-0.20	

Sexual activity	1.1	2.83	1.03	11.9	3.2	-0.13	-0.66	
Social inclusion <sup>a</sup>	0	3.60	1.01	4.3	17.8	-0.62	0.20	
<i>Domain 5 – Environment</i>		56.14	15.41	1.1	0.5	-0.18	0.15	0.81
Physical safety and security	0.5	3.30	0.92	3.2	7.6	-0.28	-0.07	
Home environment	0	3.53	1.02	4.9	14.1	-0.68	0.08	
Financial resources	0	2.64	0.92	12.4	2.7	0.01	0.03	
Health and social care	0	3.58	0.98	3.8	12.4	-0.81	0.30	
New information or skills	0.5	3.17	0.91	2.2	6.5	0.01	-0.39	
Recreation and leisure	0	2.86	1.03	9.7	4.3	-0.01	-0.65	
Physical environments	0.5	3.38	0.80	2.2	4.3	-0.54	0.52	
Transport	0	3.51	0.94	3.8	9.7	-0.74	0.37	
<i>Domain 6 – Spirituality</i>		57.49	22.48	4.3	3.8	0.20	-0.99	0.65
Spirituality, Religion, Personal beliefs	0.5	3.47	1.06	5.9	14.6	-0.59	-0.13	
Forgiveness <sup>a</sup>	0	3.61	1.30	6.5	38.4	-0.37	-1.07	
Fear of the future <sup>a</sup>	1.1	2.90	1.30	11.9	18.9	0.38	-1.02	
Death and dying <sup>a</sup>	0.5	3.22	1.44	11.9	29.7	-0.03	-1.46	
<i>Overall QoL</i>		51.57	21.69	2.2	2.2	-0.23	-0.40	0.77
General QoL	0.5	3.15	0.90	3.8	3.8	-0.30	-0.29	
General health perception	0.5	2.97	1.02	7.6	2.7	-0.22	-0.89	

<sup>a</sup> Items of the HIV Module

*SD* standard deviation, *PLWHA* People Living With HIV/AIDS

Floor (%): percentage of respondents at the lowest scale rating; Ceiling (%): percentage of respondents at the highest scale rating

Table 3

Correlations between the WHOQOL-HIV-Bref domains and the psychopathological dimensions of the BSI ( $N = 185$ )

Domains	Psychopathological symptoms								
	Somatization	Obsessions- Compulsions	Interpersonal Sensitivity	Depression	Anxiety	Hostility	Phobic Anxiety	Paranoid Ideation	Psychoticism
Physical	-0.63	-0.58	-0.47	-0.55	-0.57	-0.49	-0.49	-0.40	-0.53
Psychological	-0.54	-0.64	-0.56	-0.68	-0.60	-0.50	-0.52	-0.43	-0.64
Independence	-0.53	-0.57	-0.42	-0.50	-0.52	-0.47	-0.48	-0.31	-0.50
Social relationships	-0.48	-0.55	-0.51	-0.58	-0.55	-0.48	-0.50	-0.35	-0.55
Environment	-0.51	-0.54	-0.49	-0.55	-0.51	-0.45	-0.50	-0.42	-0.54
Spirituality	-0.44	-0.44	-0.47	-0.50	-0.46	-0.41	-0.40	-0.34	-0.42
Overall QoL	-0.52	-0.53	-0.40	-0.50	-0.47	-0.37	-0.37	-0.38	-0.49

All Pearson's correlations are significant at  $P < 0.001$  (two-tailed)

Table 4

Known-groups validity: Comparison of WHOQOL-HIV-Bref domains for subgroups of patients by HIV stage and CD4+ T-cell count

	Physical		Psychological		Independence		Social relationships		Environment		Spirituality		Overall QoL	
	Mean (SD)	<i>F</i>	Mean (SD)	<i>F</i>	Mean (SD)	<i>F</i>	Mean (SD)	<i>F</i>	Mean (SD)	<i>F</i>	Mean (SD)	<i>F</i>	Mean (SD)	<i>F</i>
HIV stage ( <i>n</i> = 176)		4.57*		0.87		10.33**		0.17		0.49		0.00		5.90*
Asymptomatic	61.46 (21.25)		58.16 (19.50)		64.20 (21.27)		58.41 (20.10)		56.33 (14.83)		57.00 (22.90)		53.60 (21.60)	
Symptomatic/AIDS	53.98 (22.73)		55.30 (18.09)		52.70 (24.05)		57.02 (21.65)		54.59 (16.47)		56.85 (21.24)		45.39 (19.57)	
CD4 T-cell count ( <i>n</i> = 163)		2.84		0.50		2.79		0.27		1.22		1.85		0.32
< 200 cells/mm <sup>3</sup>	52.76 (20.54)		54.77 (20.45)		53.31 (23.37)		56.44 (20.90)		54.57 (15.31)		55.51 (20.69)		49.63 (23.53)	
201-499 cells/mm <sup>3</sup>	62.89 (22.26)		58.40 (18.11)		62.64 (23.30)		58.95 (19.95)		57.68 (14.87)		60.66 (21.82)		51.74 (20.16)	
> 500 cells/mm <sup>3</sup>	58.11 (18.93)		56.16 (18.14)		63.96 (19.32)		56.69 (20.28)		53.73 (14.89)		53.40 (22.84)		53.34 (21.46)	

*SD* standard deviation

All scores were transformed to reflect a 0 to 100 scale, with higher scores corresponding to a better quality of life

Group comparisons using multivariate analysis of variance (MANOVA)

\*  $P < 0.05$ ; \*\*  $P < 0.01$