

Nobre, N., Pereira, M., Roine, R. P., Sutinen, J., & Sintonen, H. (2016). Are the WHOQOL-HIV-Bref and 15D adequate measures to assess quality of life in patients living with HIV? *HIV Nursing*, 16(4), 104-112.

### Abstract

**Background:** The WHOQOL-HIV-Bref has been widely used in the assessment of quality of life (QoL) in HIV, but it has never been simultaneously evaluated with any generic health-related QoL (HRQoL) instrument. The aim of this study was to test the psychometric properties of the WHOQOL-HIV-Bref and compare it with the generic 15D HRQoL instrument in a sample of Finnish HIV-infected patients.

**Methods:** The sample comprised 382 participants, followed at the Infectious Disease clinic of Helsinki University Hospital. Participants completed the following self-reported questionnaires: WHOQOL-HIV-Bref and 15D.

**Results:** Both the Finnish version of the WHOQOL-HIV-Bref (Cronbach's alpha range: 0.67 to 0.86 across domains) and the 15D (Cronbach's alpha: 0.87) showed good reliability. A confirmatory factor analysis provided support for the original six-domain model. Construct validity of the WHOQOL-HIV-Bref was satisfactory for all domains (all  $r > 0.48$ ;  $p < 0.001$ ). Convergent validity of the WHOQOL-HIV-Bref with the 15D was good in relation to psychological health, but not equally satisfactory in relation to physical and physiological health. Neither the WHOQOL-HIV-Bref nor the 15D were able to discriminate between different CD4+ T-cell count subgroups.

**Conclusions:** These results offer support for the use of the WHOQOL-HIV-Bref and 15D as measures of QoL of HIV-infected patients in Finland. A novel finding was that the WHOQOL-HIV-Bref may assess primarily psychosocial aspects of health, but may not entirely address the domain of physical and physiological health. Its complementary use with the generic 15D HRQoL questionnaire may be valuable and economic, both on clinical and research settings.

**Keywords:** HIV; quality of life; WHOQOL-HIV-Bref; 15D; reliability; validity

## Introduction

The assessment of quality of life (QoL) in HIV infection has become an important focus of sociological, medical and psychological research. A number of instruments have been developed to capture the essence of the QoL of people living with HIV (PLWH), mostly in Western countries, however. In addition, the lack of a consensual definition of QoL, as well as of validated measures of cross-cultural nature, made it difficult to develop a satisfactory instrument for measuring the crucial aspects of QoL that could be concurrently applicable in different cultural settings. To unravel such limitation, the World Health Organization (WHO), through an international group (known as the WHOQOL Group) proposed a definition of QoL that could serve as a starting point to develop a thorough measure for assessing QoL. Accordingly, the WHOQOL Group defined QoL as “an individuals’ perception of their position in life in the context of the culture and value systems in which they live, and in relation to their goals, expectations, standards and concerns. It is a broad ranging concept affected in a complex way by the persons’ physical health, psychological state, level of independence, social relationships and their relationship to salient features of their environment” [1] (p. 28). According to the WHOQOL Group, this broad range definition intends to capture the individual’s subjective perception of their quality of life in the context of the physical, cultural, and social environment in which they live. In healthcare, this definition acknowledges the greater emphasis current being placed beyond the clinical aspects of illnesses and their treatments.

Based on this assumption, and in the context of the modular approach implemented by the WHO, a multidisciplinary and multicultural team (the WHOQOL-HIV Group) has specifically developed the WHOQOL-HIV (long version, 120 questions) and the WHOQOL-HIV-Bref (short version, 31 questions) to serve the assessment of QoL in PLWH. These instruments were developed in order to encompass a cross-cultural character and, therefore, to facilitate their use in cross-cultural comparisons [2]. The WHOQOL-HIV-Bref has been used in a wide range of cultural settings [3-11] and age groups [12], and proved to have acceptable psychometric properties.

Although widely used, the disease-specific WHOQOL-HIV-Bref has not been validated in Finland and compared with a generic health-related quality of life (HRQoL) instrument. The 15D is a fifteen-dimensional, standardised and self-reported instrument to measure HRQoL in a wide range of

cultural settings and medical conditions, and revealed sound psychometric proprieties [13-15]. This instrument has been developed to cover “the physical, psychological and social aspects of health” [15] (p. 330). Moreover, the 15D is a functional questionnaire in measuring the effectiveness of health care-related interventions [16,17] and HRQoL changes over time [18], and has been used successfully in several pharma-economic evaluations [15]. However, this questionnaire was only scarcely used in the HIV population [19]. Therefore, the aim of this study was to examine the psychometric properties of the WHOQOL-HIV-Bref and its association with the generic 15D among Finnish PLWH at different clinical stages of HIV infection.

## **Methods**

### **Participants and Procedures**

A sample of 550 HIV-infected individuals were consecutively recruited by convenience between June 2013 to October 2014, either during their outpatient visits to the Infectious Disease Clinic of the Helsinki University Hospital or during their visits to HIV/AIDS support groups (HIV Finland and The Finnish AIDS Council) or the Helsinki Deaconess Institute in the Helsinki metropolitan area. The general inclusion criteria were: age 18 years or older, diagnosis of HIV infection, and sufficient knowledge of Finnish language to be able to fill in the questionnaires provided. Prior to filling in the set of questionnaires, the participants were informed about the purpose of the study and provided an informed consent form. All the involved institutions provided their ethical approval.

Of the 550 participants initially recruited, 14 refused to participate in the study and 83 who accepted to participate never returned the set of questionnaires (completion rate = 82.4%). Sixty-six participants were further excluded from the study analyses because they were not born in Finland. Five participants were excluded because of missing values on all background variables. Therefore, the final sample comprised 382 patients. The participants' socio-demographic and HIV-related characteristics are presented in Table 1.

[Insert\_Table\_1]

### **Measures**

*WHOQOL-HIV-Bref.* The WHOQOL-HIV-Bref [20] is a self-reported questionnaire composed of 31 items that yields a multidimensional profile across six domains (factors): physical (four items), psychological (five items), level of dependence (four items), social relationships (four items), environment (eight items) and spirituality (four items). The first two items assess a general facet on overall QoL and health status, and the remaining 29 items represent specific facets or aspects of QoL (e.g., energy and fatigue, self-esteem, personal relationships – a description of the 29 specific facets is presented in Table 2). Each item is rated on a 5-point scale, and each scale point is specified with a number and a verbal descriptor. All domain scores are transformed to reflect a 0 to 100 scale (a higher score corresponds to a better QoL). There is no total score for the Bref. The Finnish version of the WHOQOL-HIV-Bref was translated in accordance with the World Health Organization (WHO) translation guidelines [21].

*15D.* The 15D is a questionnaire originally developed in Finland that can be used both as a profile instrument and a single-index score measure of HRQoL. It is a self-reported instrument composed of 15 dimensions (mobility, vision, hearing, breathing, sleeping, eating, speech, excretion, usual activities, mental function, discomfort and symptoms, depression, distress, vitality and sexual activity). Each dimension offers five different response options ranging from the most favourable condition to the least favourable condition. The valuation system is based on an application of the multi-attribute utility theory. The single index score (15D score), represents the overall HRQoL on a 0-1 scale (1 = full health, 0 = being dead). The dimension level values, reflecting the goodness of the levels relative to no problems on the dimension (= 1) and to being dead (= 0), are calculated from the health state descriptive system (questionnaire) by using a set of population-based preference or utility weights [13-15].

### **Data Analysis**

Data were analysed using the Statistical Package for Social Sciences (IBM SPSS, version 22) and the Analysis of Moment Structures (AMOS). Descriptive statistics were performed to explore the demographic and HIV-related characteristics of the sample, items' distribution, and floor and ceiling effects. A ceiling/floor effect was defined to exist, when a substantial proportion of observations obtains the upper/lower value on the scale of an item, domain, dimension or the instrument as a whole

(total score). According to Terwee et al. [22], if floor or ceiling effects are present, it is possible that extreme items are missing in the lower or upper end of the questionnaire, indicating limited content validity.

Internal consistency (a measure of the extent to which items in a questionnaire are correlated (homogeneous), thus measuring the same construct) of the instruments was assessed using Cronbach's  $\alpha$  coefficient. A coefficient  $> 0.7$  is regarded as acceptable [22]. To assess the construct validity (how well an instrument measures what it is intended to measure) of the WHOQOL-HIV-Bref, a confirmatory factor analysis (CFA) was performed to test whether the original six-domain solution fits our data sufficiently. Goodness of fit was verified by the following indices: comparative fit index (CFI), and root mean square error of approximation (RMSEA; 90% confidence interval [CI]). The models are considered to have a good fit when:  $CFI > 0.90$  and  $RMSEA < 0.08$  [23]. In addition, we examined the  $\chi^2$  statistic, which indicates whether or not the covariation pattern in the data can be explained by the postulated factor structure, and the ratio of  $\chi^2$  to degrees of freedom ( $\chi^2/df$ ), which decreases and approaches zero as the fit of the model improves. To explore how the instrument scores relate to each other, an exploratory factor analysis (EFA) was conducted with the 15D dimension level values and the WHOQOL-HIV-Bref domain scores as the set of variables observed. The factors were extracted by the principal component method, the number of factors was based on Eigenvalues  $> 1$ , and factors were rotated by the varimax method. The known-groups validity, i.e., whether the domains or dimensions of the instruments and the 15D score are able to discriminate between different CD4+ T-cell count subgroups, was tested by performing a multivariate analysis of variance (MANOVA). All tests were two-tailed with  $p$  values  $< 0.05$  as criterion of statistical significance.

## **Results**

### **Acceptability**

An overview of items' distributions of the WHOQOL-HIV-Bref is presented in Table 2. The missing values were lower than 1% for all items. Across domains, no floor and ceiling effects were observed. However, at the item level, ceiling effects were detected in 25 items. The skewness and kurtosis coefficients of most items were within the acceptable range of -1.00 to 1.00.

[Insert\_Table\_2]

The 15D dimensions' descriptive statistics and item-scale reliability analysis is presented in Table 3. No floor effects were observed; however, ceiling effects were observed on all dimensions. The mean 15D score was 0.89 ( $SD = 0.10$ ; range: 0.51-1.00). No floor effects were found; the percentage at ceiling (15D score = 1) was 8.7%.

[Insert\_Table\_3]

### **Internal Consistency**

Most of the domains of the WHOQOL-HIV-Bref reached the 0.70 level (see Table 2), indicating acceptable reliability. The exceptions were the Physical and Spirituality domains (both 0.67). The Cronbach's  $\alpha$  for the total instrument was 0.92. The internal consistency of the 15D was also satisfactory (Cronbach's  $\alpha = 0.87$ ).

### **Construct Validity**

The CFA at item level showed that the original six-domain solution did not fit the data sufficiently, although the model did not have significant error [ $\chi^2 = 1226.65$ ,  $df = 362$ ,  $p < 0.001$ ; CFI = 0.85; RMSEA = 0.079 (90% CI 0.07–0.08);  $\chi^2/df = 3.39$ ]. An examination of modification indices suggested a number of modifications in order to improve the initial model which did not meet our criteria for an acceptable fit. To improve fit, we allowed a minimal number of supplementary correlated error residuals; suggestions considered not to be plausible were not added. Adding error covariances between: Facet 4 (positive feelings) and Facet 24 (spirituality), Facet 19 (health and social care) and Facet 23 (transports), Facet 9 (mobility) and Facet 23 (transports), and Facet 53 (fear of the future) and 54 (death and dying) improved the model's fit significantly ( $\chi^2_{diff} = 291.86$ ,  $\Delta df = 4$ ,  $p < 0.001$ ). Apart from the  $\chi^2$  statistic, which is sensitive to the sample size, the other indices support the acceptability of the improved six-domain model [ $\chi^2 = 934.79$ ,  $df = 358$ ,  $p < 0.001$ ; CFI = 0.90; RMSEA = 0.07 (90% CI 0.06–0.07);  $\chi^2/df = 2.61$ ].

Coefficients of correlation of the WHOQOL-HIV-Bref domains showed that all domains were significantly correlated (range 0.48-0.79,  $p < 0.001$ ), which supports the construct validity of the

questionnaire. Additionally, each domain was significantly correlated with the general facet on QoL and health, with correlations varying between 0.54 (Spirituality) and 0.71 (Psychological).

The EFA, extracting Eigenvalues  $> 1$ , yielded a three-factor solution which cumulatively explained 55.4% of the variance (Table 4). The factor loadings of all the domains of WHOQOL-HIV-Bref were high on the first factor ( $> 0.70$ ). Regarding the 15D dimensions, nine showed highest loadings on the first factor (the dimensions of depression, distress, vitality, and sleeping showed the highest loadings). Concerning the other two factors, the highest loadings were on the dimensions of the 15D measuring various aspects of physical and physiological health.

An examination of the association between the two questionnaires indicated that all the domains of WHOQOL-HIV-Bref were positive and significantly correlated with the 15D dimensions ( $r$  range: 0.12-0.74), with the exception of the correlation between the Social relationships domain and the dimension Eating ( $r = 0.10, p = 0.054$ ), and the Spiritually domain and the dimensions Eating ( $r = 0.06, p = 0.220$ ) and Speech ( $r = 0.08, p = 0.128$ ).

[Insert\_Table\_4]

### **Known-groups Validity**

Known-groups validity of WHOQOL-HIV-Bref and 15D was conducted to see how well the questionnaires discriminated between the subgroups of patients in terms of CD4+ T-cell count. The WHOQOL-HIV-Bref domains and the general facet were not able to statistically discriminate between different CD4+ T-cell count subgroups (the most recent value) [Wilks'  $\lambda = 0.97; F(7, 367) = 0.72, p = 0.758, \eta_p^2 = 0.01$ ]. The same applied also to the 15D score,  $F(2, 368) = 0.97, p = 0.379, \eta_p^2 = 0.01$ .

### **Discussion**

This study outlines the psychometric testing of the Finnish version of the WHOQOL-HIV-Bref and of the 15D in the HIV population, being the first to do so. The results show that the WHOQOL-HIV-Bref is a valid cross-cultural instrument to measure the QoL of PLWH in Finland, and provide additional support for the original six-domain structure of it. Similarly, these findings show that the 15D is a reliable and valid generic instrument for measuring the HRQoL of PLWH.

In line with others studies conducted with the WHOQOL-HIV-Bref [9-11], no floor or ceiling effects were observed at the domain level. In addition, at the item level no floor effects were observed. However, and consistent with prior studies conducted in Taiwan [6], Portugal [12] and Thailand [8], a significant ceiling effect was found at the item level. Similarly, regarding the 15D, no floor effects, but significant ceiling effects were observed at the dimension level, but not in the 15D total score. Ceiling effects are population dependent [24]. It is therefore possible that these effects may reflect study sample differences. Considering the socioeconomic context of Finland, the observed ceiling effects may reflect the fact that the sample was reasonably healthy, as indicated by the predominance of asymptomatic (over 70%), being on antiretroviral therapy (96.3%), highly educated and mostly employed patients, factors consistently known to be associated with better QoL ratings [25]. Furthermore, as indicated by the mean scores of some specific items of the WHOQOL-HIV-Bref, these patients report good social support, feel socially integrated, have satisfactory financial resources for daily living, and have a good quality and accessible health care. These scores were higher than those earlier reported [6,12] and may therefore reflect socio-economic and health care differences between the countries in which the studies were conducted. The observed ceiling effects in both instruments may also reflect the absence of specific concerns of PLWH regarding the disease, as the participants of this study had high scores (indicating better QoL) on the specific items related to pain and discomfort, body image, negative feelings, dependence on medication or treatment, fear of the future, death and dying, and forgiveness. Overall, these results are consistent with a recent study conducted among older adults living with HIV in Finland [26] in which the participants expressed that they are living a good life as HIV-infected individuals.

In this Finnish sample, the WHOQOL-HIV-Bref and the 15D presented satisfactory reliability. The reliability values were similar to those reported in earlier WHOQOL-HIV-Bref validation studies [3,6,9,20] and 15D studies with other chronic medical conditions [27-29]. Regarding the WHOQOL-HIV-Bref, it was found that the Cronbach's alpha was greater than 0.70 for most domains, i.e., above the recommended threshold for acceptable reliability [22], with the exception of physical and spirituality domains, both with a Cronbach's alpha of 0.67. However, lower values of reliability on the physical [4-6,8] and particularly spirituality [3-6,8,9,11,12,20] domains



were also found in prior studies. Regarding the physical domain, the low reliability may be attributed to the content of this domain, and in particular to the item of sleep and rest. This item showed greatest variability of responses and the lowest mean score of the 29 specific items. This is consistent with the evidence suggesting an association between HIV and sleeping disturbances [30]. However, it may also be related to the evidence of poor sleeping patterns in Nordic countries and increased prevalence of insomnia in Finland compared to other European countries [31]. In relation to spirituality, the low reliability may be credited to the content of this domain (spirituality, death, guilt, future) and how the item about the meaning of life is interpreted in different cultures, as has also been suggested [8].

In support of prior validation studies [6,9,12,20], all domains of the Finnish version of the WHOQOL-HIV-Bref were significantly correlated between each other and the general facet on QoL and health. The observed correlations reinforce the notion of QoL as a multidimensional concept, as well as the ability of this questionnaire to assess the QoL of PLWH [32]. The evidence of the construct validity is also corroborated by the validation of the original six-domain structure [20] in the CFA. However, some modifications were needed to improve the model fit. Interestingly, some of the error covariances that were added were similar to those reported in the European Portuguese version [3], particularly the error covariances between the items assessing positive feelings and spirituality, health and social care and transports, and fear of the future and death and dying. This seems to suggest that these modifications are more systematic rather than random. Because, to our knowledge, no other studies examined the factor structure of the WHOQOL-HIV-Bref, additional studies are warranted to confirm the findings reported herein.

In support of the convergent validity of the WHOQOL-HIV-Bref, which considers that related construct's measures should be highly correlated, most domains were positive and significantly correlated with the dimensions of the HRQoL measured by the 15D (although certain exceptions were observed). However, as indicated by the three-factor solution yielded by the EFA, factor loadings of all the WHOQOL-HIV-Bref domains were high on the first factor ( $> 0.70$ ). Regarding the dimensions of the 15D, nine showed their highest loadings on the first factor (dimensions of depression, distress, vitality, and sleeping showing the highest loadings). For the other two factors, the highest loadings were on the 15D dimensions measuring aspects of physical and physiological health, whereas none of

the WHOQOL-HIV-Bref domains had a high loading on these factors. These findings suggest that the WHOQOL-HIV-Bref is particularly associated with the 15D in the area of psychological health, and that may not have sufficient discriminative validity for physical and physiological health.

Accordingly, the use of HIV-specific and generic questionnaires may be particularly valuable for a more comprehensive assessment of the QoL of PLWH.

Finally, regarding known-groups validity, which is demonstrated when a questionnaire can discriminate between two groups known to differ on a variable of interest, the results indicated that both the domains of the WHOQOL-HIV-Bref and the 15D score were not able to discriminate in a statistically significant manner between different CD4+ T-cell count subgroups. This result is contrary to that reported in the European Portuguese and Malay versions of the WHOQOL-HIV-Bref [3,10], but it is in line with other studies, however [6,12,33]. One reason for this finding in our sample may be the fact that 96% of the participants were on cART and only 3.5% of the participants in the current study were significantly immunosuppressed, having CD4+ T-cell count below 200 cells/mm<sup>3</sup>. In patient cohorts with good treatment response and high CD4+ T-cell count, the CD4+ T-cell count alone may not be a significant proxy of individuals' QoL.

Some limitations of the present study should be noted. This study focused on comparing the psychometric properties of the WHOQOL-HIV-Bref and the 15D cross-sectionally in a relatively healthy HIV-population. The test-retest reliability and responsiveness to change were not explored in this study. Further studies in HIV-populations using these instruments are warranted to address these quality criteria, as they are important when measuring changes in QoL over time, as well as of the effectiveness of possible treatment interventions.

This study contributes to the limited literature on the performance of the WHOQOL-HIV-Bref, and supports it as a valid instrument to assess the QoL of PLWH in Finland. As well, this study provides important evidence on the performance of the HRQoL questionnaire 15D among HIV-infected patients, particularly in relation to physical and physiological health dimensions. Given the fragile performance of the WHOQOL-HIV-Bref in the physical and physiological health domains, this questionnaire may benefit of a complementation with an instrument covering physical and physiological health more widely, such as covered by the 15D. Otherwise, our results reinforce the

cross-cultural nature of the WHOQOL-HIV-Bref, although some adaptations could probably improve its reflection of the QoL of PLWH in this era of greatly improved prognosis due to advanced medical treatment. Finally, these results also reinforce the cross-cultural nature of the WHOQOL-HIV-Bref as a valid instrument to be used in the assessment and comparison of QoL across cultures.

Because QoL is also a significant measure of health outcomes, QoL should be measured routinely and comprehensively at different stages of the infection to monitor disease progression and response to care. The complementary use of the WHOQOL-HIV-Bref with a generic measure (such as the 15D) may be particularly informative and cost-effective, both in research and nursing practice. Indeed, both questionnaires are brief and rapid to fill up (about five minutes per questionnaire) and easily interpreted. In addition, it is noteworthy that the profile of QoL generated by these questionnaires may allow a more thorough assessment of QoL and may be mainly useful in identifying which domains are most affected by direct or indirect challenges posed by HIV. Accordingly, nurses may use the results of the QoL assessment as guidelines to develop more comprehensive and holistic nursing interventions that can enhance the QoL of HIV-infected patients.

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Table 1  
*Sociodemographic and HIV-related characteristics of the sample*

	Mean	SD	Range
Age, years	48.31	10.57	20-76
Nadir CD4+ T-cell count	256.59	146.76	2-1050
Last CD4+ T-cell count	615.03	259.20	67-1579
Time since diagnosis, years	11.07	1.91	0-31
	<i>n</i>		%
<b>Gender</b>			
Male	305		80.7
Female	73		19.3
<b>Employment status</b>			
Employed	238		62.8
Student	11		2.9
Retired	84		22.2
Not currently working	46		12.1
<b>Education</b>			
No education	4		1.1
≤ 9 years	53		14.0
> 9 years	322		84.9
<b>Marital status</b>			
Single	150		39.5
Married/co-habiting/registered partnership	167		42.6
Separated/divorced	61		16.1
Widowed	7		1.8
<b>Mode of transmission</b>			
Men having sex with men	233		61.3
Heterosexual transmission	110		28.9
Intravenous drug use	25		6.6
Blood products	3		.8
Others	9		2.4
<b>Sexual orientation</b>			
Homosexual	218		57.5
Heterosexual	138		36.4
Bisexual	23		6.1
<b>HIV stage</b>			
Asymptomatic (CDC A <sup>a</sup> )	270		70.7
Symptomatic (CDC B <sup>a</sup> )	46		12.0
AIDS (CDC C <sup>a</sup> )	62		16.2
<b>CD4+ T-cell count<sup>a</sup></b>			
< 200 cells/mm <sup>3</sup>	13		3.5
201-499 cells/mm <sup>3</sup>	119		31.7
≥ 500 cells/mm <sup>3</sup>	243		64.8
<b>On cART</b>			
Yes	363		96.3
No	14		3.7

The *ns* of the background variables do not add up to 382 due to missing values



Table 2  
*Descriptive statistics and internal consistency of the WHOQOL-HIV-Bref*

Items	Missing (%)	Mean	SD	Floor (%)	Ceiling (%)	Skewness	Kurtosis	Cronbach's alpha
Domain 1 – Physical		75.77	17.01	0.3	8.4	-0.72	0.15	0.67
Pain and discomfort	0.8	4.32	1.00	2.1	60.7	-1.45	1.38	
Energy and fatigue	0.8	3.93	0.93	2.1	25.9	-1.05	1.10	
Sleep and rest	0.5	3.42	1.10	5.5	14.9	-0.47	-0.57	
Symptoms of PLWH <sup>a</sup>	0.8	4.45	0.79	0.3	60.7	-1.36	1.32	
Domain 2 – Psychological		70.68	17.91	0.3	3.9	-0.66	0.33	0.86
Positive feelings	0.8	3.75	0.87	0.8	20.4	-0.33	-0.23	
Cognitions	0.8	4.05	0.82	0.5	31.7	-0.70	0.39	
Self-esteem	0.5	3.73	0.90	1.3	18.1	-0.59	0.11	
Body image and appearance	0.8	3.96	0.96	2.4	30.9	-0.98	0.82	
Negative feelings	0.5	3.64	0.90	2.1	13.6	-0.67	0.33	
Domain 3 – Level of Independence		75.92	19.19	0.8	14.4	-0.90	0.70	0.77
Mobility	0.5	4.43	0.82	0.8	58.9	-1.69	2.97	
Activities of daily living	0.8	3.98	0.93	2.1	29.8	-1.02	1.05	
Dependence on medication or treatment	0.8	3.88	1.16	4.5	39.5	-0.81	-0.23	
Work capacity	0.5	3.85	1.06	3.1	31.4	-0.78	0.02	
Domain 4 – Social Relationships		68.11	17.99	0.3	3.1	-0.62	0.27	0.74
Personal relationships	0.5	3.78	0.96	2.6	21.5	-0.82	0.51	
Social support	0.5	3.91	0.90	1.0	28.0	-0.64	0.12	

Sexual activity	0.5	3.08	1.19	13.4	10.5	-0.26	-0.8	
Social inclusion <sup>a</sup>	0.8	4.12	0.72	0.5	29.1	-0.86	1.75	
Domain 5 – Environment		78.13	15.57	0.3	5.8	-1.04	1.43	0.83
Physical safety and security	0.8	4.23	0.85	1.0	44.5	-1.18	1.47	
Home environment	0.5	4.12	0.93	2.9	37.4	-1.41	2.29	
Financial resources	0.8	3.56	1.18	7.9	22.8	-0.65	-0.37	
Health and social care	0.5	4.29	0.87	2.1	48.4	-1.52	2.84	
New information or skills	0.8	4.25	0.74	0.5	39.3	-1.09	1.97	
Recreation and leisure	0.8	3.89	1.00	2.6	29.3	-0.89	0.37	
Physical environments	0.8	4.26	0.86	1.3	46.6	-1.29	1.85	
Transports	0.5	4.39	0.82	1.6	54.5	-1.77	3.97	
Domain 6 – Spirituality		74.10	17.26	0.8	6.3	-0.68	0.41	0.67
Spirituality, Religion, Personal beliefs	0.8	3.76	0.91	1.6	20.9	-0.56	0.13	
Forgiveness <sup>a</sup>	0.8	3.91	1.17	3.9	42.4	-0.79	-0.36	
Fear of the future <sup>a</sup>	0.8	3.91	0.92	1.0	30.6	-0.52	-0.19	
Death and dying <sup>a</sup>	0.8	4.23	0.85	1.0	48.4	-1.12	1.17	
Overall QoL		69.86	19.41	0.3	11.5	-0.55	0.21	0.75
General QoL	0.3	3.86	0.78	0.5	18.3	-0.61	0.61	
General health perception	0.3	3.73	0.95	1.3	19.9	-0.59	-0.13	

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

*Note.* *SD* = standard deviation. PLWH = People Living With HIV

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

Table 3

*Item analysis and response frequencies of the 15D*

	Mean (SD)	95% CI	Response frequencies (%)					Reliability analysis	
			1	2	3	4	5	Item-total correlation	Cronbach's alpha (if item deleted)
Mobility	1.15 (0.42)	1.11-1.19	87.4	9.7	2.6	-	-	0.45	0.862
Vision	1.25 (0.54)	1.19-1.30	79.3	17.6	2.1	1.0	-	0.39	0.863
Hearing	1.12 (0.38)	1.08-1.15	90.3	8.1	1.3	0.3	-	0.25	0.868
Breathing	1.32 (0.64)	1.26-1.39	74.7	20.8	2.1	2.4	-	0.50	0.858
Sleeping	1.97 (0.97)	1.87-2.07	35.8	42.6	12.1	7.9	1.6	0.51	0.857
Eating	1.03 (0.25)	1.00-1.05	97.9	1.8	-	-	0.3	0.24	0.868
Speech	1.06 (0.25)	1.03-1.08	94.5	5.3	0.3	-	-	0.27	0.868
Excretion	1.46 (0.61)	1.40-1.53	59.3	35.2	5.2	0.3	-	0.47	0.860
Usual activities	1.33 (0.62)	1.26-1.39	74.5	19.2	5.8	0.3	0.3	0.66	0.848
Mental function	1.33 (0.57)	1.27-1.39	71.3	25.0	2.9	0.8	-	0.56	0.856
Discomfort and symptoms	1.62 (0.79)	1.54-1.70	52.4	37.6	6.6	2.5	0.8	0.64	0.851
Depression	1.72 (0.83)	1.64-1.81	45.9	40.9	9.2	2.9	1.1	0.67	0.850
Distress	1.63 (0.77)	1.56-1.71	50.9	38.5	7.1	3.2	0.3	0.69	0.848
Vitality	1.73 (0.86)	1.64-1.81	46.4	40.4	8.4	3.4	1.3	0.74	0.845
Sexual activity	2.1 (1.11)	2.01-2.24	34.6	36.4	17.7	4.7	6.6	0.46	0.868

*Note.* *SD* = standard deviation. *CI* = Confidence Interval

Table 4

*Exploratory factor analysis of the WHOQOL-HIV-Bref domains and the dimensions of the 15D<sup>a</sup>*

	F1	F2	F3
Mobility (15D)	0.19	0.55	0.39
Vision (15D)	0.28	0.50	-0.04
Hearing (15D)	0.07	0.70	-0.23
Breathing (15D)	0.30	0.65	0.12
Sleeping (15D)	0.59	0.20	0.07
Eating (15D)	0.08	0.03	0.81
Speech (15D)	-0.03	0.48	0.28
Excretion (15D)	0.48	0.24	0.01
Usual activities (15D)	0.57	0.36	0.42
Mental function (15D)	0.42	0.38	0.28
Discomfort and symptoms (15D)	0.50	0.45	0.28
Depression (15D)	0.80	0.05	0.17
Distress (15D)	0.75	0.11	0.28
Vitality (15D)	0.75	0.19	0.30
Sexual activity (15D)	0.52	0.13	0.01
Physical (WHOQOL-HIV-Bref)	0.77	0.36	0.22
Psychological (WHOQOL-HIV-Bref)	0.89	0.12	0.11
Independence (WHOQOL-HIV-Bref)	0.73	0.35	0.30
Social relationships (WHOQOL-HIV-Bref)	0.72	0.15	-0.17
Environment (WHOQOL-HIV-Bref)	0.71	0.31	0.15
Spirituality (WHOQOL-HIV-Bref)	0.76	0.06	-0.12
Overall QoL (WHOQOL-HIV-Bref)	0.77	0.22	0.15

<sup>a</sup> Varimax-rotated factors