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Assessing quality of life in older people: psychometric properties of the WHOQOL-BREF

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Abstract The World Health Organization has developed a brief generic questionnaire to assess quality of life, the WHOQOL-BREF. It has been studied in diverse groups, but not specifically in older people. The purpose of this study was to analyze the psychometric properties of the French version of the WHOQOL-BREF questionnaire in healthy older people and to compare the mean profiles of participants with the mean profile obtained in the international validation study of the WHOQOL-BREF. Of the total sample of 262 Swiss French speaking older participants, 122 completed a retest after 2 weeks. The WHOQOL-BREF items demonstrated high test–retest reliability and validity. The WHOQOL-BREF items were differentially related to physical and mental health measures (SF-12 components, morbidity, and depression), thereby demonstrating convergent and discriminant validity. Compared to the international validation sample of the WHOQOL-BREF, participants of the present study reported higher QOL on 22 of the 26 items. A comparison of item profiles between male and female participants revealed gender differences for two items only (social support and negative feelings). We conclude that the psychometric properties of the WHOQOL-BREF items in older adults are good. To consider the 24 specific facets that are assessed by the WHOQOL-BREF appropriately, we recommend using item profiles on the individual and the sample level.

Keywords Older adults · Quality of life · Questionnaire · Reliability · Validity

Introduction

With the ageing of the world's population, the question of quality of life (QOL) in old age becomes an increasingly important issue. In approaches focusing on the subjective evaluation of living conditions, QOL has been defined as “individuals' perception of their position in life in the context of the culture and value system in which they live and in relation to their goals, expectations, standards and concerns” (WHOQOL Group 1995, p. 1405). QOL can be conceived of as a multi-dimensional concept, referring to the subjective evaluation of different life domains, including cognitive functioning and well being (von Steinbüchel et al. 2005). From a European perspective, comparative research on the similarities and differences in the QOL of older people living in different countries is needed for advance ageing research and to inform policy makers (Walker 2005). An important methodological issue in this respect concerns the availability of comparable scales with good psychometric properties to measure QOL in old age.

Initiated by the World Health Organization (WHO), the international WHOQOL project has developed a generic instrument, the WHOQOL-100 (WHOQOL Group 1998), which is available in over 20 languages. Its 100 items measure general QOL and general health as well as 24 specific QOL facets (e.g., pain, positive feelings, social support, transport) that can be organized into four broad QOL domains (physical, psychological, social, and environmental). As a short version of this instrument, the WHOQOL-BREF (Skevington et al. 2004) was developed. It contains one general QOL and one health item, as well as 24 specific items—one item from each of the 24 facets of the WHOQOL-100. To parallel the general structure of the WHOQOL-100 and to make scoring easier, the WHOQOL-BREF items are typically combined to form the four domain scores

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“Physical”, “Psychological”, “Social relationships”, and “Environment”. However, results from studies using this questionnaire in different patient groups (e.g., Fang et al. 2002; Ohaeri et al. 2004; Taylor et al. 2004; Trompenaars et al. 2005) revealed problems with the proposed four-factor model, as some of the specific items were only poorly represented by the relevant factor. That is, reducing the 24 items to four domain scores might lead to a loss of relevant information. Nonetheless, the WHOQOL BREF questionnaire can be considered as a standard economical instrument to measure QOL in different populations and countries, because the WHOQOL project’s approach to simultaneously develop the instrument in different cultures ensured comprehensive coverage of pertinent QOL facets.

The WHOQOL-BREF questionnaire has been studied in an international, age-heterogeneous sample (Skevington et al. 2004), as well as in diverse patient groups in various countries (e.g., Fang et al. 2002; Herrman et al. 2002; Hsiung et al. 2005; Jang et al. 2004; Leplège et al. 2000; Min et al. 2002; Noerholm et al. 2004; O’Carroll et al. 2000; Ohaeri et al. 2004; Taylor et al. 2004; Trompenaars et al. 2005), but not specifically in the populations of older people. Although the international validation sample of the WHOQOL-BREF (Skevington et al. 2004) included individuals aged 12–97 years, results pertaining to the subgroup of older adults (aged 60 and above) were not reported. Hence, the instrument’s psychometric properties assessed in older people are unknown. Therefore, the purpose of the present research was to examine the psychometric properties of the WHOQOL-BREF in Swiss French-speaking healthy older people. Information on the reliability and validity of the instrument’s items in a sample of healthy older people might be of particular interest because it could be compared in future studies with results obtained in populations of older people with cognitive impairments.

More specifically, our aim was to analyze the WHOQOL-BREF items’ test–retest stability and factorial validity, as well as their convergent and discriminant validity in respect of measures of subjective physical and mental health. Across an interval of 2 weeks during which healthy older people’s life circumstances should be relatively constant (as compared to, e.g., health-related QOL measurement before and after medical treatment), we expected participants’ QOL evaluations to be rather stable. As an indication of factorial validity, we wanted to test whether the proposed four-factor model (Skevington et al. 2004) holds in a population of healthy older people. However, based on the fact that the WHOQOL-BREF questionnaire includes one item from each of the 24 specific facets contained in the WHOQOL-100, we assumed that more than four factors might be necessary to appropriately account for the items’ interrelations. As an indication of convergent and discriminant validity, the WHOQOL-BREF items should demonstrate differential relations with subjective health status measures. That is, items assessing physical aspects of QOL should be closely related to physical

health status, whereas items assessing psychological aspects of QOL should be closely related to mental health and depression.

To be able to judge absolute levels of healthy older people’s QOL evaluations with regard to some kind of standard, we additionally compared the item mean profiles of male and female participants with the mean profile collected in the international validation study of the WHOQOL-BREF (Skevington et al. 2004), which combines data from 23 countries across gender and age groups.

Method

Procedure

An external agency (Bureau Genevois d’Adresses) selected the first 2,800 Swiss nationals from the alphabetical register of the whole population living in the Canton of Geneva, ensuring equal numbers from age-groups 60–70, 71–80 and 80–90 of both sexes (from around 62,500 Swiss people of this age categories). These individuals were contacted by mail. About 500 non-responders received a second invitation after 9 months, which allowed additional recruitment, however, with lower success. From the total of 958 persons returning a response in a pre-stamped envelope, 363 were affirmative. Each person willing to participate in a study on QOL of older people was contacted by phone. French fluency and morbidity status were assessed (the latter using a checklist of 27 frequent medical conditions in older adults according to the American Geriatrics Society, 2002). Individuals not fluent in French or in such a bad health status that would hinder their participation in the study were discouraged from participating. Some people also declined to participate after they received a full explanation of the study protocol. Cognitive functioning was assessed using an adapted version of the Telephone interview for cognitive status (TICS, Brandt et al. 1988). Individuals with cognitive impairment (TICS score < 30, where the maximum was a score of 55) were not included in the study. The cut off of 30 was estimated based on the relationship between the TICS-M (maximum score of 39) and the MMSE described by de Jager et al. (2003) in order to exclude participants with a MMSE score below 24. In total, from the 300 eligible individuals who received the study documentation, 262 older people completed the self-report questionnaire, and a retest questionnaire was filled in by 122 older people from the 127 first responders who received the retest material after a 2-week interval (according to a protocol target of 100 retests).

Participants

Out of the final sample of 262 older people, 59% were female. Mean age was 73.4 years ($SD = 7.6$,

range = 60–90). Individuals were distributed fairly evenly across the three age groups of 60–69 years (37%), 70–79 years (37%), and 80 and above (27%). With regard to education level, 7% indicated primary school, 13% secondary school, 39% a trade or technical certificate, 15% a college degree, and 24% a university degree. 43% of participants were married, 4% partnered, 16% separated, 25% widowed, and 10% single. The distribution of marital status is close to being representative of the Geneva population aged 65 and over (52% married, 13% separated, 28% widowed and 8% single; *Etat de Genève 2004*). Almost all participants (94%) were living at home (about half of them supported by family members). The majority of participants (85%) considered themselves to be healthy.

Measures

QOL

The WHOQOL-BREF (Skevington et al. 2004) is an abbreviated 26-item version of the WHOQOL-100 (WHOQOL Group 1995, 1998). It contains one general QOL item, one general health item, and 24 specific items—one item from each of the 24 QOL facets of the WHOQOL-100. The 24 specific items cover four broad domains: physical, psychological, social, and environmental. The items are answered on five-point scales, which assess the intensity, capacity, frequency, and evaluation of QOL facets with respect to the last two weeks. Negatively keyed items are reversely scored, so that higher values indicate better QOL.

Self-reported morbidity

During the telephone interview, morbidity was assessed with a 27-item checklist, which contains frequent medical conditions in older adults according to the American Geriatrics Society (2002) covering ten domains (cardiovascular, musculoskeletal, neurological, respiratory, gastrointestinal, endocrine, oncological, renal, psychosomatic, and sensory). Participants reported whether or not they suffered from each of the 27 medical conditions (yes/no). As a broad measure of self-reported morbidity, we computed a global score for each participant indicating the total number of medical conditions (possible value range 0–27).

Subjective health status

To measure the subjective health status, we used the SF-12 (Ware et al. 1996) in the standard version (referring to the last 4 weeks), which assesses a physical and a mental component. To obtain the physical and mental component scores, standard, norm-based scoring procedures for the SF-12 were used (Ware et al. 1996). The range of the component scores is 0–100, with 0 indicating the least

favourable and 100 the most favourable health status. In the present study, Cronbach's alpha was 0.84 for the physical component and 0.76 for the mental component.

Depression

Depression was measured by the geriatric depression scale (Yesavage et al. 1983). Participants indicate whether they experienced 30 depressive symptoms during the last week using a dichotomous response format (yes/no). To obtain a depression score for each participant, the number of depressive symptoms across all items is calculated. The value range is 0–30, with higher values indicating more depressive symptoms. Cronbach's alpha was 0.86 in the present study.

Methods of data analysis

Test–retest correlations were analyzed for each item. To account for their ordinal character, we computed polychoric correlations using the program Mplus (Muthén and Muthén 2004). To test whether the proposed four-factor model holds in our sample, we applied confirmatory factor analysis for ordinal variables (Muthén and Muthén 2004). We specified a model with four latent variables. The physical, psychological, social, and environmental factors were measured by seven, six, three, and eight items, respectively. No double loadings or correlated error variables were allowed. The WLSMV (mean- and variance-adjusted weighted least square) estimator was used. Model fit was assessed by the chi-square test, the root mean square error of approximation (RMSEA), and the comparative fit index (CFI).

To analyze convergent validity with respect to morbidity, SF-12 components, and depression, we used stepwise multiple regression analyses. This allowed to determine which of the WHOQOL-BREF items were the best predictors and to control the problem of multicollinearity.

Results

Sample characteristics in respect of self-reported morbidity, subjective health status, and depression can be found in Table 1. On an average, participants reported suffering from five medical conditions. The mean SF-12

Table 1 Sample characteristics with respect to self-reported morbidity, subjective health status, and depression

Measure	Min.	Max.	M	Md	SD
Self-reported morbidity	0	14	4.84	5	2.97
SF-12 physical component	17.24	61.42	45.52	47.93	9.74
SF-12 mental component	21.19	64.11	51.30	53.82	9.11
Depression	0	29	7.19	6	5.65

M mean, *Md* median, *SD* standard deviation

physical component score was about half the standard deviation below the mean of 50 of the U.S. norm sample (Ware et al. 1996), and the mean SF-12 mental component score was near this population mean. Mean depression was rather low, with 74% of the participants scoring equal to or below 10—a value range that is typically considered as indicating the absence of depression (Yesavage et al. 1983). That is, on average, participants reported good mental health and some constraints in their physical health. Older age was low to moderately related to worse subjective physical health ($r = 0.13$, $P < 0.05$, for morbidity, and $r = -0.23$, $P < 0.001$, for SF-12 physical component), while age was unrelated to mental health ($r = 0.02$, ns , for SF-12 Mental Component, and $r = 0.08$, ns , for depression).

Descriptive statistics for the WHOQOL-BREF items are shown in Table 2. The rate of missing values was low, except for the “sex life” item (15% missing). This rate was somewhat higher than in the international validation study of the WHOQOL-BREF (Skevington et al. 2004), where 6% of data were missing for “sex life”. The item means demonstrated that the participants reported rather high QOL. The test–retest correlations

ranged from 0.64 (positive feelings) to 0.92 (general QOL), and the mean (r -to-Fisher Z transformed) test–retest correlation was 0.81. That is, item-level reports of QOL were very stable across 2 weeks.

Next, we analyzed whether age was associated with QOL ratings. On a Bonferoni-corrected alpha-level of 0.002, only one item (“mobility”, $r = -0.32$, $P < 0.001$) was significantly correlated with age, indicating that older participants were less satisfied with their ability to get around. Thus, in the subsequent analyses, we did not differentiate between different age groups.

Table 3 shows the results of the confirmatory factor analysis. The four-factor model did not fit the data well (see Note to Table 3). The pattern of standardized loadings demonstrated items with high loadings for each domain, however, also some items with only low to moderate loadings (under 0.60). Items not well captured by the respective factor were sleep and medication for the physical domain, negative feelings, self-esteem, and meaningful life for the psychological domain, sex life for the social domain, and home environment and physical environment for the environmental domain. Consequently, the communalities of these items were very low. The four factors correlated highly. The correlations ranged between $r = 0.50$, $P < 0.01$ (physical–social) and $r = 0.76$, $P < 0.01$ (psychological–social). Taken together, this means that on the item level, each specific QOL facet was measured reliably and the instrument as a whole assesses more than four factors. In the subsequent analyses, we therefore used the item-level information.

The items’ convergent and discriminant validity were analyzed with respect to self-reported morbidity, SF-12 components, and depression using stepwise multiple regression analyses. Table 4 shows the results of these analyses. Only those items that contributed significantly to the prediction are depicted. The explained variance ranged between 0.38 (morbidity) and 0.64 (SF-12 physical component), meaning that the multiple correlation between the WHOQOL-BREF items and the criterion variables ranged between 0.62 and 0.80. Most important, for physical health (morbidity, SF-12 physical component), the best predictors were WHOQOL-BREF items stemming from the physical domain, whereas for mental health (SF-12 mental component, depression), the best predictors were WHOQOL-BREF items from the psychological domain. This pattern supports the WHOQOL-BREF items’ convergent and discriminant validity.

Finally, we compared participants’ item means with the means obtained in the WHOQOL-BREF international validation study ($N = 11,830$), which comprised men and women of all age groups (Skevington et al. 2004). As shown in Fig. 1, our sample of Swiss older people reported higher QOL than the validation sample on 22 items, $t_s(12,090) > 3.55$, $P < 0.001$, d between 0.22 (sleep) and 0.98 (health services). They reported lower satisfaction with sex life, $t(12,090) = -4.39$,

Table 2 Descriptive statistics and test–retest correlations of WHOQOL-BREF items

Item	Missing (%)	M	Md	SD	$r_{\text{test-retest}}^a$
General QOL	0.4	4.13	4.00	0.66	0.92
General health	0	3.76	4.00	0.83	0.78
Physical					
Pain (r)	0.4	4.10	4.00	1.03	0.82
Energy	0.8	4.01	4.00	0.76	0.85
Sleep	1.5	3.72	4.00	1.05	0.84
Medication (r)	1.1	3.83	4.00	1.19	0.78
Mobility	1.9	4.31	5.00	0.87	0.89
Activities of daily living	0.8	3.95	4.00	0.88	0.74
Working capacity	0.8	3.85	4.00	0.92	0.72
Psychological					
Positive feelings	1.5	3.92	4.00	0.77	0.64
Negative feelings (r)	1.1	4.18	4.00	0.67	0.85
Self-esteem	2.7	3.46	3.00	0.65	0.79
Concentration	0.8	3.90	4.00	0.91	0.84
Body image	0	4.13	4.00	0.96	0.84
Meaningful life	1.9	3.48	4.00	1.33	0.75
Social relationships					
Personal relations	1.1	4.06	4.00	0.75	0.79
Sex life	15.3	3.00	3.00	1.10	0.90
Social support	3.1	3.98	4.00	0.83	0.74
Environment					
Finances	1.1	3.93	4.00	1.05	0.85
Information	1.1	4.35	4.00	0.77	0.78
Leisure	0.4	4.13	4.00	1.08	0.79
Home environment	0.8	4.44	5.00	0.75	0.88
Health services	1.5	4.54	5.00	0.78	0.79
Physical safety	0.8	4.12	4.00	0.90	0.67
Physical environment	0.4	3.95	4.00	1.08	0.67
Transport	1.5	4.34	4.00	0.78	0.87

$N = 262$. Possible range of items: 1–5

M mean, Md median, SD standard deviation, r Polychoric correlation, (r) reversely scored

^a n between 93 and 121

Table 3 Confirmatory factor analysis of self-ratings: Standardized loadings and communalities

Item	Physical	Psychological	Social	Environmental	h^2
Pain (<i>r</i>)	0.66				0.43
Energy	0.81				0.66
Sleep	0.50				0.25
Medication (<i>r</i>)	0.44				0.20
Mobility	0.63				0.40
Activities of daily living	0.91				0.82
Working capacity	0.94				0.88
Positive feelings		0.68			0.46
Negative feelings (<i>r</i>)		0.54			0.30
Self-esteem		0.34			0.11
Concentration		0.58			0.34
Body image		0.70			0.49
Meaningful life		0.26			0.07
Personal relations			0.86		0.73
Sex life			0.46		0.21
Social support			0.78		0.60
Finances				0.61	0.37
Information				0.72	0.52
Leisure				0.73	0.53
Home environment				0.56	0.31
Health services				0.70	0.50
Physical safety				0.65	0.42
Physical environment				0.57	0.33
Transport				0.62	0.38

$N = 192$. h^2 communality. (*r*) reversely scored. Model fit information: $\chi^2 = 187.54$, $df = 77$, $P < 0.001$; Root mean square error of approximation (RMSEA) = 0.09; comparative fit index (CFI) = 0.92

Table 4 Stepwise multiple regression analyses predicting self-reported morbidity, Subjective health status, and depression by WHOQOL-BREF Items

Criterion variable	R^2	Beta weight
Predictor variable		
Self-reported morbidity	0.38	
Pain (<i>r</i>)		-0.29**
Medication (<i>r</i>)		-0.27**
Negative feelings (<i>r</i>)		-0.20**
Leisure		-0.19**
SF-12 physical component	0.64	
Pain (<i>r</i>)		0.33**
Mobility		0.24**
General health		0.17**
Activities of daily living		0.16**
Leisure		0.14*
Medication (<i>r</i>)		0.12*
Physical safety		-0.11*
SF-12 mental component	0.46	
Negative feelings (<i>r</i>)		0.36**
Body image		0.20**
Working capacity		0.16*
Concentration		0.14*
Medication (<i>r</i>)		0.12*
Self-esteem		0.12*
Depression	0.59	
Negative feelings (<i>r</i>)		-0.24**
Body image		-0.19**
Concentration		-0.18*
Self-esteem		-0.15*
General health		-0.14*
Medication (<i>r</i>)		-0.14*
Leisure		-0.14*
Positive feelings		-0.13*

** $P < 0.01$, * $P < 0.05$

$P < 0.001$, $d = 0.27$, and there were no mean differences for medication, meaningful life, and self-esteem, $t_s(12,090) = 2.2$, -1.44 , and -0.87 , respectively,

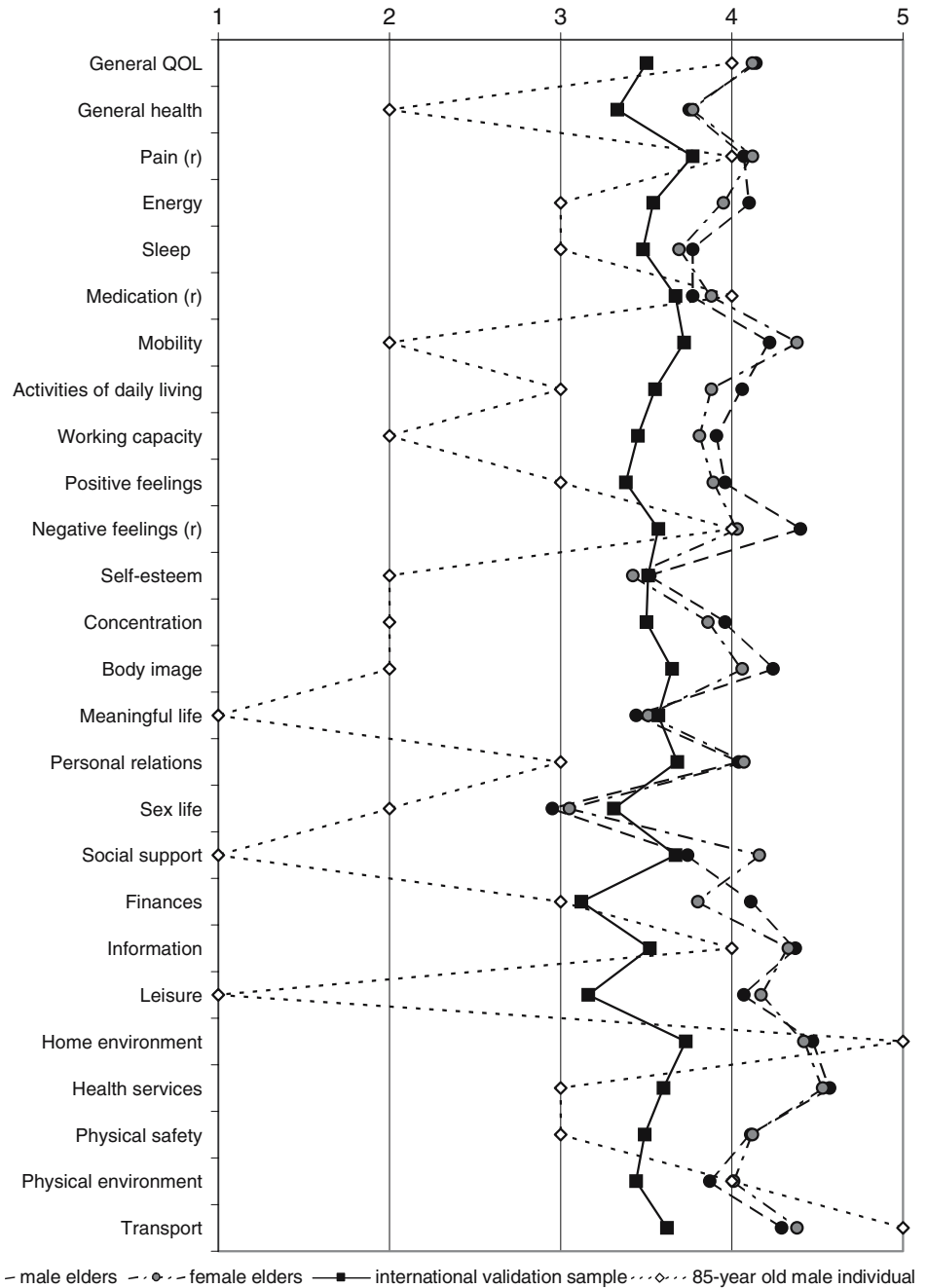
$P > 0.05$. Male and female participants in our sample differed on two items only: women reported higher satisfaction with social support, $t(252) = 4.17$, $P < 0.001$, $d = 0.53$, and more negative feelings, $t(257) = 4.53$, $P < 0.001$, $d = 0.57$. That item level comparisons revealed interesting QOL similarities and differences, which cut across broad QOL domains, is also illustrated by the profile of one selected participant (see Fig. 1). His QOL ratings differed substantially within the four WHOQOL-BREF domains.

Discussion

Our results demonstrate that QOL in older people can be measured reliably with the WHOQOL-BREF items. The high test-retest correlations can be considered as a lower bound for reliability, because the instable part reflects both unreliability and change. That is, reliability is somewhat underestimated by these correlations. Additionally, the WHOQOL-BREF items' differential relations with physical and mental health measures demonstrated convergent and discriminant validity.

Our results also showed that the instrument's four-factor structure that has been demonstrated in the international, age-heterogeneous validation sample (Skevington et al. 2004) was not fully confirmed in our sample of older adults. Although many items showed high loadings, several items were only poorly represented by the relevant factor. This may be partly due to age-specific influences on some items. In old age, for instance, individual differences in satisfaction with one's sex life do not necessarily correspond to individual differences in satisfaction with one's personal relations. Our factor-analytic results are in line with other appli-

Fig. 1 WHOQOL-BREF item means for Swiss French-speaking male and female older people, the international validation sample (Skevington et al. 2004), and a selected 85 year old male participant. (*r*) reverse scored item



cations of the WHOQOL-BREF in special subgroups, for example in patients with HIV infection (Fang et al. 2002), patients with arthritis (Taylor et al. 2004), and psychiatric outpatients (Ohaeri et al. 2004; Trompenaars et al. 2005). To understand these structural differences, one has to keep in mind that each of the WHOQOL-BREF's 24 specific items represents one facet of the original WHOQOL-100 instrument. This means that in fact the WHOQOL-BREF comprises 24 different QOL facets. The four-factor structure found in the original validation sample (Skevington et al. 2004) represents a kind of second-order structure, which depends on the correlations among the 24 primary dimensions.

However, it is unlikely that the correlations between the 24 primary dimensions are the same for all specific subgroups. Instead, it seems plausible to find strong differences between subgroups. If one considers the subgroup of older people and the subgroup of patients with HIV infection, for example, it is very likely that the item "sex life" is quite differentially related to the other 23 items. Moreover, it can be expected that the relation between body image and meaningful life might be different for younger and older individuals, and so on. There are many ways in which the associations between the 24 QOL facets might differ between subgroups. It is important to note, however, that this does not mean that

the questionnaire is not valid, but that the QOL facets are linked in quite different ways. Therefore, we strongly recommend considering the 24 facets without reducing them to four factors that often do not generalize across subgroups. Given that WHOQOL-BREF item scores are reliable and valid indicators of specific QOL facets among older people, we suggest using item profiles for both sample mean scores and individual assessment in order to consider these different facets appropriately.

Although profile comparisons have not been routinely applied with respect to WHOQOL-BREF assessment, we think that they can offer new insights into differences not only between specific groups of people, but also between individuals and norm groups. Given the problems to cross-validate the proposed four-factor structure of the WHOQOL-BREF in later studies that dealt with specific subgroups, a systematic comparison of item-level profiles between specific groups would be more informative than comparing the four domain scores. As our results showed, female and male participants differed on two specific items only. Hence, item-level profiles convey more information than domain scores, and this information surplus might be crucial in the research on QOL in old age. The mean level comparison with the international validation sample of the WHOQOL-BREF, which combines data from 23 countries across gender and age groups, revealed that our sample of Swiss older people, on average, were more satisfied with most domains of life. Future cross-national studies should explore to which degree subjective evaluations of QOL are determined by objective living conditions, such as economic resources or health care systems, and individual expectation levels, which might be cohort-specific (Walker 2005).

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