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RESEARCH

NORMATIVE AND PSYCHOMETRIC PROPERTIES OF THE WHOQOL OLDER ADULTS MODULE (WHOQOL-OLD) IN THE NATIONAL REPOSITORY

ABSTRACT

Introduction: The main objectives of this study were to present population norms and the construct validity of the WHOQOL-OLD using classical and modern (Rasch) psychometric analyses.

Methods: This study was conducted on the pooled data of 29 studies, 16 of which were representative of the population (n=6951). The psychometric properties of the WHOQOL-OLD were evaluated with classical (confirmatory factor analysis and multivariate regression model) and probabilistic test theory (Rasch and DIF) analyses.

Results: The mean age of the Turkish WHOQOL-OLD data pool was 73.2±6.8. The mean overall scale score was 81.27±13.57 and the range of the mean dimension scores was between 12.34 (social participation) and 14.59 (intimacy). The elderly (advanced age) and women are more sensitive to the decrease in quality-of-life (QoL) scores. Both Cronbach's alpha values and item analyses indicated good internal consistency for all dimensions. Exploratory factor analyses (EFA) generated five factors instead of a six-factor original scale structure. "Past, present, and future activities" and "social participation" were combined in a single dimension in the EFA. Confirmatory factor analyses resulted in acceptable goodness of fit indices, such as Confirmation Fit Index (CFI)=0.951 and Root Mean Square Error of Approximation (RMSEA)=0.055. Turkish elders perceive the death and dying dimension as culturally closer to the culture of developing countries than developed Western cultures.

Conclusion:

Turkish older adults' QoL scores were more or less like those of other older adults in developing countries. This study's results confirm that the acceptable psychometric properties of the WHOQOL-OLD-TR with some items (items 9 and 20) need to be worked on further.

Keywords: Aged; Quality of Life; Surveys and Questionnaires; Turkey.



INTRODUCTION

Increasing rates of old age in all societies in recent years have necessitated not only objective indicators but also subjective measures such as quality of life (QoL) in order to manage the health problems and disability of the elderly. Therefore, QoL studies have been fascinating and functional for health professionals dealing with the health conditions and disabilities of the elderly. These studies help to understand and determine whether morbidity and disability in the elderly have an impact on their QoL, in order to determine which treatments are more effective, and increase life satisfaction for older adults.

It is vital that QoL instruments are valid and reliable. Additionally, it is important to ensure invariance between the validity and reliability results among the subgroups in the population. Psychometric analyses of large population samples are required to ensure the validity of the results of commonly used QoL measurement tools in the population. Data representing the population are useful not only for psychometric analysis but also for revealing the community norms of that instrument, and population norm of a QoL instrument is key to interpreting the differences between groups or individuals of different ages or genders living in the society.

The World Health Organization (WHO) developed, the older adult's module (WHOQOL-OLD) of the generic WHOQOL-BREF scale as a tool that evaluates the six elderly-specific dimensions of QoL through a multicenter and multicultural project (1). The WHOQOL-OLD was validated into Turkish on a small-scale study of older adults following the development of the instrument (2). Although various cultural validity studies of the WHOQOL-OLD have been published (3,4), the population norms of the WHOQOL-OLD scale have not yet been published in any country.

The main objectives of this study were to investigate the construct validity of the WHOQOL-OLD using classical psychometric analyses and the Rasch

model and to provide normative data for the Turkish WHOQOL-OLD national data pool.

MATERIALS AND METHODS

The authors -who have assisted Turkish researchers about the use and scoring of the WHOQOL-OLD module since 2008 - have obtained permission from researchers using the WHOQOL-OLD data they collected in their studies, to test the reliability and validity of the module in a larger sample and to use the scale in order to generate population norms. In this study, data (n=6951) from 29 researchers who allowed their data to be included in the national WHOQOL-OLD data pool between 2008 and 2022 were used. The studies that contributed to the data pool were evaluated in three different groups: 1) samples that are representative of the community, 2) samples obtained from nursing homes, and 3) clinical studies. Only the data of the studies representing the population of concern were used in the population norm analyses, whereas the entire data pool was used in the psychometric (reliability-validity) analyses.

WHOQOL-OLD

The WHOQOL-OLD module consists of 24 Likert scale items and six dimensions: "sensory abilities" (SAB), "autonomy" (AUT), "past, present, and future activities" (PPF), "social participation" (SOP), "death and dying" (DAD), and "intimacy" (INT). Each of the dimensions has four items, and the score range of possible values for all dimensions is between 4 and 20 (see Table 1). All 24 single items of the WHOQOL-OLD module can be combined to produce a general (overall) score for QoL in older adults. Higher scores represent higher QoL.

Statistical Analyses

Population norms are presented for the mean dimension scores and distribution properties by

age and gender. Psychometric analyses were conducted based on classical psychometric theory and Rasch analyses using both exploratory and confirmatory approaches. Scale distribution analyses were presented using floor-ceiling effects, skewness, and kurtosis. Item analyses and internal consistency (by Cronbach's alpha value) of each of the dimensions were evaluated to explore any problematic items and the reliability of the structure of each of the six dimensions of the WHOQOL-OLD module. An alpha value ≥ 0.70 indicates acceptable internal consistency of the dimension. Both item-dimension correlation coefficients smaller than 0.35 and alpha values greater than the overall alpha value of the dimension when the item is removed may indicate to a problematic item.

Construct validity was assessed by exploratory factor analysis (EFA), confirmatory factor analysis (CFA), convergent validity and known groups validity analyses. Principal component analyses using the Varimax rotation method were employed in EFA. Kaiser-Meyer Olkin (KMO) values greater than 0.5 confirm the sample size adequacy, and Eigen values greater than 1.0 indicate the factor formation in the EFA. Fit indices such as the Confirmatory Fit Index (CFI), Normed Fit Index (NFI), Root Mean Square Error of Approximation (RMSEA), and chi-square/SD that were generated in CFA were used for the structural properties of the Turkish version compared to the original scale construct. $CFI \geq 0.90$ and $RMSEA \leq 0.8$ shows acceptable agreement between the original scale structure and the Turkish WHOQOL-OLD scale structure (5). Known groups validity is an approach that shows the difference in scores according to variables whose effects on scale scores are known before. Age, gender, and health condition (ill-well) were used in the known groups validity analyses by Student's t test and Cohen's effect size values.

In item analysis, item difficulty and discrimination of the scale were examined. Items were scored between 0 and 4. The difficulty and discrimination

values of the items were calculated in the range of 0–1. When the difficulty value obtained is above 0.5, the response to the item (QoL) increases. In a test in which the correct answer is accompanied by distractors, item discrimination is expected to be in the range of 0.3–0.7. (Standardized Mean Difference -SMD) (6).

In terms of item difficulty, values close to zero indicate moderate, negative values indicate that they agree with the situation expressed in the relevant item, and positive values indicate that respondents agree with the situation in the related item in a decreasing direction. Infit (weighted mean square [WMS]) and outfit (unweighted mean square [UMS]) values were examined to evaluate scale item fit. Infit shows harmony with the variation of the distribution in the item, while outfit shows the effect of the outlier values. It is desirable that these values be in the range of 0.8 to 1.2 (around 1 value) (6). Another criterion for scale compatibility in Rasch analysis is the person separation index (PSI). The PSI is a measure of how different respondents give different answers from each other. A PSI value above 1.5 refers to a sufficient fit, above 2 is good, and above 3 indicates an excellent fit (7,8). For the item separation index, it is required to be above 1.5 in the analysis at the individual level and above 2.5 in the analysis of the groups (9).

DIF analysis was used in this study to determine the bias of items for gender, age, and educational status. In the DIF analysis, Cochran Mantel Haenszel (CMH) statistics for statistical decision, Effect Size (ES) for delta statistics and sP-DIF classification were made. According to this classification, it was decided whether the items showed DIF feature or not. The CMH procedure tests for statistical significance, and like other hypothesis tests, it is influenced by sample size. Therefore, it is necessary to incorporate practical significance into the identification of DIF in polytomous items such as Likert type items. We used CMH, ES and sP-DIF. Polytomous items have a similar classification scheme, but it only involves a



consideration of practical significance. The rules follow the recommendations for the sP-DIF statistic by dividing the Standardized Mean Difference (SMD) by the item score range. This change to the SMD limits it to values between 0 and 1. Refer to this new value of the SMD as sP-DIF. According to Dorans et al., the rules are as follows: "AA" items have an sP-DIF value strictly less than 0.05; "BB" items are neither "AA" nor "CC" items; "CC" items have an sP-DIF statistic that is 0.10 or larger (10).

SPSS v. 23 was used in conventional statistics and Exploratory Factor Analyses, JASP (Version 0.16.3 in CFA and Jmetrik for Polytomus Rasch Analysis 4.1.1. version (11) was used. Maximum type 1 error is accepted as 0.05 in all hypothesis testing analyses.

RESULTS

This research was conducted on the WHOQOL-OLD national data repository (pool), which consisted of the data of 29 different studies conducted between 2008–2021 (see *Supp. Table 1*). Sixteen of these studies were population-based studies ($n=5156$). In this paper, the normative findings of the WHOQOL-OLD module were created by analyzing the data from population-based studies, while the validity and reliability results were produced over the entire data pool ($n=6951$).

All data of the WHOQOL-OLD revealed that the mean age of the data pool was 73.2 ± 6.8 ; 51.2% was female; 27.0% had no school diploma and 39.2% were primary school graduates; 56.8% were retired; 91.8% had social security and 75.7% were ill (see *Supp. Table 2*).

Standardized scores for the six dimensions of the WHOQOL-OLD by age group and gender are presented in Table 1. The mean WHOQOL-OLD overall score was 81.27 ± 13.57 , and the range of the mean dimension scores were between 12.34 (social participation) and 14.59 (intimacy). The range of the mean overall WHOQOL-OLD scores was between 10.86 (social participation) and 14.59 (intimacy) in

women and 10.87 (social participation) and 15.21 (death and dying) in men. The mean overall scale score range was between 77.89 (age group 80-84) and 79.91 (age group 70-74) in women and 79.44 (age 90+) and 83.20 (age group 70-74) in men. As age increases, women are more sensitive than men to decreasing QoL scores.

Psychometric analyses of the WHOQOL-OLD national data pool consist of distribution characteristics, item analyses, reliability, and validity analyses. The distribution properties, item analyses, and the internal consistency of the dimensions are presented in Table 2. Floor and ceiling effects were within acceptable limits for all dimensions except for the death and dying dimension, which had a borderline ceiling effect (16.1%), if we consider the upper acceptable limit as 15.0% for ceiling effect. On the other hand, skewness, and kurtosis values were all within acceptable limits for all the dimensions.

Alpha values of the WHOQOL-OLD dimensions were all over 0.70, indicating good internal consistency. Items 9, 14, 20, and 21, which have limited contribution to internal consistency (those items whose alpha value calculated by their removal was higher than the total alpha value of the dimension they belong to), were all associated with a correlation coefficient higher than 0.35 with the dimension score to which they belong. Construct validity of the WHOQOL-OLD-TR was evaluated by factorial validity, convergent validity, and known groups validity analyses.

Exploratory factor analyses generated five factors instead of a six-factor original scale structure. Past, present, and future activities and social participation dimensions were united under the same dimension. The remaining items were all distributed under their original dimensions (see *Supp. Table 3*).

The Fit Indices of the five factor structure that emerged in the exploratory factor analyses are as follows: CFI=0.94, NFI=0.94, RMSEA=0.062, on the other hand, the CFA of the original six-dimension structure showed acceptable goodness of fit indi-

Table 1. Standardized scores for the six domains of the WHOQOL-OLD Turkish data pool. by age groups and gender (n=5156)*

Domain	Age groups	WOMEN						MEN						Overall sample n:5156
		65-69 n:1123	70-74 n:613	75-79 n:479	80-84 n:245	85-89 n:114	>90 n:44	65-69 n:918	70-74 n:591	75-79 n:447	80-84 n:312	85-89 n:118	>90 n:32	
Sensory Abilities	Mean score	13.46	13.43	13.53	12.93	13.03	13.14	13.63	13.79	13.73	13.61	13.25	13.19	13.56
	SD	2.80	2.77	2.78	2.90	2.70	2.90	3.00	2.85	2.80	2.97	3.01	2.44	2.85
	Floor (%)	0.4	0.3	0.2	0.4	1.8	4.5	0.4	0.5	0.2	0.6	0.8	3.1	0.3
	Ceiling (%)	0.2	0.2	0.4	1.2	1.8	4.5	0.7	1.0	0.4	0.6	0.8	6.3	0.4
	Skewness	-0.535	-0.324	-0.114	-0.074	-0.183	0.020	-600	-0.543	-0.392	-0.353	-0.249	-0.232	-0.431
	Kurtosis	0.102	-0.420	-0.806	-0.409	-0.925	-1.134	-0.061	-0.035	-0.436	-0.530	-0.846	-0.984	-0.264
Autonomy	Mean score	13.36	13.21	13.00	12.83	12.60	12.48	14.23	14.07	13.70	13.34	13.64	13.44	13.58
	SD	3.16	3.31	3.29	3.37	3.29	3.79	2.86	3.11	3.05	3.06	3.14	3.38	3.18
	Floor (%)	0.4	0.7	0.4	1.2	1.8	4.5	0.1	0.3	0.2	0.3	1.7	3.1	0.3
	Ceiling (%)	1.5	2.1	1.3	2.9	2.6	4.5	2.7	4.4	3.4	1.9	4.2	6.3	2.7
	Skewness	-0.089	-0.125	-0.148	0.076	0.135	0.200	-0.084	-0.230	-0.095	0.029	0.137	0.233	-0.129
	Kurtosis	-0.275	-0.346	-0.434	-0.518	-0.271	-0.781	-0.293	0.062	-0.212	-0.133	-0.075	-0.159	-0.273
Past, Present and Future Activities	Mean score	13.01	12.90	13.06	12.65	13.02	13.00	13.73	13.47	13.44	12.88	13.45	12.59	13.26
	SD	3.15	3.41	3.32	3.45	3.62	3.97	2.83	3.33	3.22	3.22	3.26	3.27	3.23
	Floor (%)	0.4	0.5	0.4	0.4	0.9	2.3	0.7	0.8	0.2	0.6	0.8	3.1	0.4
	Ceiling (%)	2.0	2.1	2.5	1.6	3.5	6.8	2.4	2.9	2.0	1.6	3.4	3.1	2.3
	Skewness	-0.200	-0.179	-0.176	-0.051	-0.012	-0.189	-0.123	-0.272	-0.217	-0.145	-0.072	-0.091	-0.213
	Kurtosis	-0.131	-0.365	-0.365	-0.415	-0.632	-0.548	-0.289	-0.171	-0.355	-0.373	-0.382	0.351	-0.258
Social Participation	Mean score	12.60	12.30	12.08	11.39	11.17	10.86	12.93	12.48	12.32	11.46	11.58	10.87	12.34
	SD	3.15	3.38	3.49	3.38	3.61	3.83	3.01	3.27	3.31	3.16	3.31	3.18	3.29
	Floor (%)	0.3	1.0	1.7	1.6	0.9	4.5	0.3	0.8	1.1	1.3	4.2	3.1	0.9
	Ceiling (%)	2.0	1.6	1.5	0.4	0.9	2.3	1.5	1.5	2.0	0.6	0.8	3.1	1.5
	Skewness	0.045	-0.123	-0.034	0.091	0.112	0.086	-0.165	-0.130	-0.018	0.094	-0.175	0.231	-0.072
	Kurtosis	-0.265	-0.372	-0.466	-0.680	-0.653	-0.545	-0.097	-0.103	-0.195	-0.254	-0.167	0.323	-0.296
Death and Dying	Mean score	12.59	13.81	13.64	13.95	14.02	14.43	13.89	14.45	14.73	15.21	15.14	15.06	13.92
	SD	4.90	4.67	4.90	4.73	4.66	5.22	4.84	4.83	4.50	4.55	4.45	4.09	4.86
	Floor (%)	9.7	4.6	6.5	4.9	4.4	11.4	5.3	5.1	2.9	2.9	3.4	6.3	5.8
	Ceiling (%)	11.0	16.0	17.3	15.1	16.7	18.2	17.5	20.8	19.5	23.4	21.2	15.6	18.0
	Skewness	-0.158	-0.365	-0.352	-0.480	-0.397	-0.753	-0.411	-0.605	-0.602	-0.768	-0.798	-0.925	-0.428
	Kurtosis	-1.040	-0.940	-0.979	-0.809	-0.859	-0.515	-0.931	-0.772	-0.697	-0.541	-0.299	-0.054	-0.933
Intimacy	Mean score	14.50	14.25	14.45	14.13	14.59	14.41	14.73	14.93	14.53	14.20	14.61	14.28	14.59
	SD	3.34	3.52	3.49	3.49	3.50	3.80	3.00	3.27	3.33	3.01	3.05	4.27	3.33
	Floor (%)	0.6	0.8	0.4	0.8	1.8	2.3	0.4	0.3	0.4	0.3	0.8	6.3	0.5
	Ceiling (%)	8.9	8.6	12.7	6.5	10.5	6.8	8.5	13.5	8.3	5.4	7.6	15.6	10.0
	Skewness	-0.424	-0.358	-0.144	-0.476	-0.522	-0.541	-0.445	-0.368	-0.436	-0.256	-0.404	-0.630	-0.395
	Kurtosis	-0.127	-0.327	-0.549	-0.184	-0.230	-0.240	0.397	-0.125	-0.176	-0.241	0.039	-0.194	-0.142
Overall	Mean score	79.50	79.91	79.76	77.89	78.42	78.32	83.14	83.20	82.45	80.72	81.69	79.44	81.27
	SD	13.30	14.34	14.34	14.62	14.61	16.06	12.28	13.33	12.86	12.00	13.41	11.50	13.57
	Floor (%)	0.1	0.2	0.2	0.4	0.9	2.3	0.1	0.2	0.2	0.3	0.8	3.1	0.00
	Ceiling (%)	0.1	0.3	0.2	0.4	0.9	2.3	0.1	0.2	0.4	0.3	0.8	3.1	0.00
	Skewness	-0.082	-0.047	-0.026	-0.074	0.044	0.134	0.026	-0.164	0.155	0.007	-0.118	0.229	-0.073
	Kurtosis	-0.181	-0.452	-0.218	-0.324	-0.706	-1.022	-0.463	0.231	-0.343	0.063	-0.304	-0.442	-0.239
	Min.	40.00	36.00	35.00	40.00	47.00	25.00	52.00	37.00	51.00	45.00	44.00	58.00	35.00
	Percentiles													
	10	63.00	61.00	61.00	58.00	58.50	57.00	67.00	67.00	66.00	66.00	63.90	63.30	64.00
	20	69.00	67.00	68.00	65.00	65.00	62.00	72.00	72.40	71.00	70.00	71.00	68.20	70.00
	30	72.00	72.00	72.00	70.80	70.50	68.50	76.00	76.00	75.00	74.90	74.00	73.90	74.00
	40	77.00	76.00	75.00	74.00	74.00	72.00	79.00	80.00	79.00	78.00	78.60	76.00	78.00
	50	80.00	80.00	80.00	78.00	78.00	76.00	83.00	83.00	82.00	81.00	82.00	79.00	81.00
	60	83.00	84.00	84.00	82.00	84.00	83.00	86.00	87.00	85.00	83.00	84.00	81.80	85.00
	70	87.00	88.00	87.00	86.00	86.50	90.50	90.00	90.00	89.00	87.00	89.30	86.00	89.00
80	91.00	92.00	92.00	91.00	92.00	94.00	94.00	94.00	93.00	91.00	93.20	89.60	93.00	
90	97.00	99.00	99.00	96.40	98.00	101.50	99.00	101.00	99.20	96.00	101.10	95.70	99.00	
Max.	113.00	114.00	117.00	114.00	110.00	110.00	119.00	120.00	116.00	115.00	110.00	104.00	120.00	

*Population representative data



Table 2. Item analyses and internal consistency of the WHOQOL-OLD-TR (n= 6951)*

Domain	Mean (SD)	Floor (%)	Ceiling (%)	Skewness	Kurtosis	Cronbach's alpha (CI 95%)	Correlation coefficients / (Corrected Item-Total Correlation)	If Item Deleted Cronbach's Alpha values
Sensory Abilities	14.04 (3.96)	0.8	7.6	-0.279	-0.776	0.898 (0.894-0.902)	-	-
	Item 1 (Impairments to senses)						0.845	0.841
	Item 2 (Loss of sensory abilities)						0.852	0.838
	Item 10 (Problems with sensory functioning)						0.788	0.863
	Item 20 (Rate sensory functioning)						0.616	0.921
Autonomy	13.54 (3.24)	0.2	2.5	-0.143	-0.258	0.744 (0.734-0.754)	-	-
	Item 3 (Freedom to make own decisions)						0.600	0.651
	Item 4 (Feel in control of your future)						0.543	0.683
	Item 5 (People around you are respectful of your freedom)						0.534	0.688
	Item 11 (Able to do things you'd like)						0.477	0.719
Past, Present and Future Activities	13.28 (3.24)	0.4	2.2	-0.262	-0.239	0.815 (0.807-0.821)	-	-
	Item 12 (Satisfied with opportunities to continue achieving)						0.672	0.747
	Item 13 (Received the recognition you deserve in life)						0.632	0.767
	Item 15 (Satisfied with what you've achieved in life)						0.671	0.748
	Item 19 (Happy with things to look forward to)						0.561	0.801
Social Participation	12.35 (3.32)	1.0	1.4	-0.131	-0.334	0.800 (0.793-0.808)	-	-
	Item 14 (Have enough to do each day)						0.473	0.816
	Item 16 (Satisfied with the way you use your time)						0.693	0.714
	Item 17 (Satisfied with level of activity)						0.738	0.688
	Item 18 (Satisfied with opportunity to participate in community)						0.572	0.773
Death and Dying	13.98 (4.62)	4.7	16.1	-0.448	-0.786	0.890 (0.875-0.884)	-	-
	Item 6 (Concerned about the way you will die)						0.815	0.818
	Item 7 (Afraid of not being able to control death)						0.843	0.806
	Item 8 (Scared of dying)						0.813	0.817
	Item 9 (Fear pain before death)						0.521	0.931
Intimacy	14.49 (3.34)	-0.403	-0.099	0.5	9.3	0.898 (0.89-0.90)	-	-
	Item 21 (Feel a sense of companionship in life)						0.746	0.914
	Item 22 (Experience love in your life)						0.837	0.881
	Item 23 (Opportunities to love)						0.826	0.885
	Item 24 (Opportunities to be loved)						0.827	0.885
Overall	81.71 (14.57)	0.0	0.0	-0.139	-0.233	-	-	-

*overall data pool

Table 3. Correlation matrix (convergence) among the domains of the WHOQOL-OLD.

	Total Score	Sensory Abilities	Autonomy	Past, Present and Future Activities	Social Participation	Death and Dying	Intimacy
Total Score	1.000						
Sensory Abilities	0.643	1.000					
Autonomy	0.725	0.323	1.000				
Past, Present and Future Activities	0.810	0.340	0.667	1.000			
Social Participation	0.747	0.343	0.575	0.716	1.000		
Death and Dying	0.482	0.252	0.080	0.141	0.069	1.000	
Intimacy	0.726	0.299	0.513	0.629	0.528	0.142	1.000

ces such as CFI=0.95, NFI=0.96, and RMSEA=0.055 for the comparison of the WHOQOL-Old-TR and the original scale structure (Supp. Figure 1).

Convergence of the dimensions among each other is presented in table 3. Past, Present and Future Activities, Autonomy, Social Participation and intimacy dimensions show high convergence among themselves whereas Sensory Abilities and Death and Dying dimensions did not any significantly.

Known groups' validity analyses tested the effect of age, gender, and health condition of the respondents. The greatest Cohen's effect size figure was obtained in the social participation dimension for age in favor of the younger age group. In death and dying and autonomy dimensions for gender in favor of men, and in the social participation dimension for health condition in favor of "well" respondents. Past, present, and future activities and intimacy dimensions were not statistically sensitive to age; intimacy was not statistically sensitive to gender; and autonomy was not statistically sensitive to health status as a result of the Known Groups Analyses ($p < 0.001$) (table 4).

Differential item functioning analyses and Rasch analysis are presented in Table 5. According to the item analyses, the item difficulty values ranged from

0.48 to 0.68. The discrimination values of the items were between 0.49 and 0.90. For all items, both item difficulties and discrimination were at stable levels. The range of item reliability values were 0.98–0.99, and person reliability values were between 0.77–0.87 for all dimensions. Item discrimination index scores were between 8.70–28.73, and person discrimination index scores were in the range of 1.84–2.63. Person reliability was 0.91, and item reliability was 0.99 as the goodness of fit reliability criterion for the entire scale in Rasch analyses. The PSI was 3.18 and the item separation index was 22.50. On the other hand, infit values were between 0.61 and 1.70, and outfit values were between 0.58 and 1.82 (table 5).

When the results of DIF analysis and MH chi-square analysis were evaluated together in terms of classification, it was understood that the items did not have DIF in terms of gender, age, and educational status: sP-DIF value strictly less than 0.05 indication no DIF for all of the items of the WHOQOL-OLD (table 5). Item characteristic curves (ICC) are presented in Supplementary Figure 2. The distribution of the responses of the intimacy scale revealed fewer than five descriptors for all items (Supp. Figure 2).



Table 4. Known Groups Validity

	Age			Gender			Health Condition		
	65-74 (n:4215)	75 and over (n:2736)	ES * (%)	Women (n:3496)	Men (n:3335)	ES * (%)	Well (n:1304)	Ill (n:4059)	ES * (%)
	Mean (SD)	Mean (SD)		Mean (SD)	Mean (SD)		Mean (SD)	Mean (SD)	
Sensory Abilities	14.3(3.9)***	13.6(4.0)***	17.2	13.8(4.0)**	14.1(3.9)**	7.8	14.4(3.8)***	13.7(4.0)***	18.2
Autonomy	13.7(3.1)***	13.3(3.2)***	11.2	13.2(3.2)***	13.8(3.0)***	21.5	13.5(3.0)	13.3(3.1)	-
Past, Present and Future Activities	13.3(3.2)	13.2(3.3)	-	13.0(3.3)***	13.5(3.1)***	13.3	13.3(3.2)***	12.9(3.2)***	13.6
Social Participation	12.7(3.2)***	11.8(3.4)***	24.7	12.2(3.4)**	12.4(3.2)**	5.1	12.6(3.2)***	12.0(3.3)***	16.6
Death and Dying	13.6(4.7)***	14.5(4.5)***	18.8	13.4(4.7)***	14.4(4.5)***	22.5	14.4(4.4)***	13.8(4.8)***	11.5
Intimacy	14.5(3.3)	14.4(3.4)	-	14.4(3.4)	14.5(3.2)	-	14.5(3.1)**	14.3(3.4)**	6.0
Total Score	82.2(14.3)**	80.9(14.9)**	8.6	80.1(15.0)***	82.8(13.8)***	18.8	82.7(13.1)***	80.1(14.9)***	18.1

* Cohen's d (as an effect size method) is defined as the difference between two means divided by a standard deviation for the data. Effects size 0.2 refers to a weak effect; 0.5 to moderate effect; 0.8 refers to good effect and values above 1.0 refers to very satisfactory effect.

p<0.05, *p<0.001

DISCUSSION

Although some articles have been published about the norm values of the WHOQOL in the literature, as far as we know, no article has been published on the norm values of WHOQOL-OLD, which was developed as the older adults' module of the WHOQOL-Bref in any community or country. For this reason, the only option was to compare the norm value we produced in this study with the data of population-based studies using the WHOQOL-OLD module for different purposes in the literature. In all dimensions, higher dimension scores were obtained in males than females in all age groups except aged 90 years and older. The social participation dimension score decreased after the age of 80 for both men and women, while the autonomy dimension score dropped significantly after the age of 85 only for women.

The dimension scores obtained in this study were like the scores of the WHOQOL-OLD Turkish validation study (2) and were lower than the scores obtained in developed societies (12-14), whereas

closer dimension scores were obtained with the other developing countries such as India, Iran, Brazil, and Mexico (15-18). When we compared the dimension scores obtained from this study with the findings of the multicenter international development study published by Power et al. (1), the mean dimension scores we obtained were lower than the scores obtained from the international study in all dimensions except the intimacy dimension, which is about the same as in the development study. The highest dimension score was the intimacy dimension score, which was close to or higher than that obtained in different cultures as well (12,13,16, 19-21). During the development of WHOQOL-OLD, it is noteworthy that the death and dying dimension score, which is sensitive to different cultures, was lower than most Western cultures but higher than that of Eastern cultures (16,22,23,15). Previous studies have shown that, death is perceived differently in Eastern and Western societies (24). In this respect, the fact that our death and dying dimension score was between Western and Eastern societies is consistent with Turkey's geographical and cultur-

Table 5. WHOQOL-OLD Rasch & Differential Item Functioning Analysis

Dimensions	Item Numbers	Item Analysis		Rasch Analysis in Dimensions					DIF Analyses								
		Item difficulty (0-1)	Discrimination (0-1)	Difficulty by dimensions	Infit	Outfit	Item - Person Reliability	Item - Person Separation Index	Sex (male-female)			Age (65to74-75to94)			Education(graduate*-not)		
									χ^2	E.S.[95% CI]	Class	χ^2	E.S.[95% CI]	Class	χ^2	E.S.[95% CI]	Class
Sensory Abilities	Q1	0.65	0.89	-0.30	0.69	0.65	0.99 - 0.87	28.73 - 2.63	7.49 ^b	0.03(0.01, 0.05)	AA	11.68 ^b	0.04(0.02, 0.06)	AA	3.28 ^a	0.02(-0.00, 0.05)	AA
	Q2	0.65	0.90	-0.31	0.65	0.58			0.32 ^a	-0.01(-0.03, 0.02)	AA	5.33 ^b	0.03(0.00, 0.05)	AA	1.40 ^a	-0.01(-0.04, 0.01)	AA
	Q10	0.67	0.84	-0.49	0.93	0.85			0.70 ^a	0.01(-0.01, 0.04)	AA	1.32 ^a	0.01(-0.01, 0.04)	AA	7.65 ^b	-0.04(-0.07, -0.01)	AA
	Q20	0.54	0.64	1.10	1.70	1.82			5.20 ^b	-0.04(-0.07, -0.01)	AA	25.48 ^b	-0.08(-0.11, -0.05)	AA	3.56 ^a	0.03(-0.00, 0.07)	AA
Autonomy	Q3	0.68	0.63	-0.51	0.84	0.81	0.99 - 0.77	21.22 - 1.84	17.21 ^b	0.06(0.03, 0.09)	AA	11.82 ^b	0.05(0.02, 0.08)	AA	3.18	0.03(-0.00, 0.07)	AA
	Q4	0.52	0.56	0.44	1.01	1.02			0.07 ^a	0.01(-0.03, 0.04)	AA	4.95 ^b	-0.04(-0.07, -0.01)	AA	0.03	0.00(-0.03, 0.04)	AA
	Q5	0.64	0.56	-0.19	1.00	0.99			10.91 ^b	-0.05(-0.09, -0.02)	AA	1.94 ^a	0.02(-0.01, 0.06)	AA	0.50	0.02(-0.03, 0.06)	AA
	Q11	0.55	0.49	0.25	1.16	1.18			0.45 ^a	-0.01(-0.05, 0.02)	AA	4.85 ^b	-0.04(-0.08, -0.01)	AA	5.96	-0.05(-0.10, -0.01)	AA
Past, Present and Future Activities	Q12	0.56	0.70	0.16	0.90	0.90	0.99 - 0.83	17.76 - 2.20	6.80 ^b	0.04(0.01, 0.07)	AA	0.61 ^a	0.01(-0.02, 0.04)	AA	3.80	-0.03(-0.06, 0.01)	AA
	Q13	0.62	0.66	-0.35	0.99	0.98			10.04 ^b	-0.04(-0.07, -0.02)	AA	15.71 ^b	0.06(0.03, 0.09)	AA	0.36	-0.02(-0.05, 0.02)	AA
	Q15	0.62	0.70	-0.31	0.89	0.88			1.94 ^a	0.02(-0.01, 0.05)	AA	6.52 ^b	0.03(0.01, 0.06)	AA	7.76	0.05(0.02, 0.08)	AA
	Q19	0.52	0.58	-0.50	1.22	1.24			0.41 ^a	-0.01(-0.04, 0.02)	AA	39.58 ^b	-0.10(-0.14, -0.07)	AA	0.03	-0.00(-0.04, 0.03)	AA
Social Participation	Q14	0.48	0.49	0.30	1.39	1.40	0.99 - 0.81	13.76 - 2.13	71.69 ^b	-0.16(-0.19, -0.12)	AA	71.82 ^b	-0.16(-0.20, -0.12)	AA	0.01	-0.00(-0.04, 0.04)	AA
	Q16	0.57	0.72	-0.36	0.80	0.80			19.31 ^b	0.06(0.03, 0.08)	AA	30.94 ^b	0.08(0.05, 0.10)	AA	7.42	-0.04(-0.07, -0.01)	AA
	Q17	0.54	0.77	-0.13	0.69	0.69			1.99 ^a	0.02(-0.01, 0.04)	AA	33.66 ^b	0.07(0.05, 0.10)	AA	0.00	-0.00(-0.03, 0.03)	AA
	Q18	0.50	0.59	0.18	1.11	1.12			20.18 ^b	0.08(0.04, 0.11)	AA	0.11 ^a	0.11(-0.03, 0.04)	AA	4.19	0.04(0.00, 0.08)	AA
Death and Dying	Q6	0.65	0.87	-0.19	0.75	0.76	0.99 - 0.79	26.53 - 1.93	0.27 ^a	-0.01(-0.03, 0.02)	AA	0.12 ^a	-0.00(-0.03, 0.02)	AA	3.33	-0.03(-0.06, 0.00)	AA
	Q7	0.67	0.91	-0.29	0.61	0.60			5.82 ^b	-0.03(-0.05, -0.01)	AA	0.42 ^a	-0.01(-0.03, 0.01)	AA	0.26	-0.01(-0.04, 0.02)	AA
	Q8	0.68	0.89	-0.33	0.69	0.67			0.00 ^a	-0.00(-0.03, 0.03)	AA	2.18 ^a	0.02(-0.01, 0.04)	AA	4.53	0.03(0.00, 0.07)	AA
	Q9	0.50	0.55	0.81	1.88	1.82			3.18 ^a	0.04(-0.00, 0.08)	AA	0.12 ^a	-0.00(-0.05, 0.04)	AA	0.01	0.00(-0.05, 0.05)	AA
Intimacy	Q21	0.63	0.79	0.40	1.35	1.24	0.98 - 0.86	8.70 - 2.57	31.30 ^b	0.06(0.04, 0.09)	AA	14.43 ^b	-0.04(-0.07, -0.02)	AA	14.48	-0.05(-0.08, -0.03)	AA
	Q22	0.66	0.89	-0.04	0.84	0.74			1.57 ^a	0.01(-0.01, 0.03)	AA	0.06 ^a	0.00(-0.02, 0.02)	AA	4.14	-0.02(-0.05, -0.00)	AA
	Q23	0.67	0.88	-0.30	0.88	0.78			9.04 ^b	-0.03(-0.05, -0.01)	AA	4.78 ^b	0.02(0.00, 0.04)	AA	15.49	0.05(0.02, 0.07)	AA
	Q24	0.66	0.88	-0.06	0.90	0.80			24.98 ^b	-0.05(-0.07, -0.03)	AA	5.19 ^b	0.02(0.00, 0.04)	AA	7.70	0.03(0.01, 0.06)	AA

*at least primary school graduate Item Reliability=0.99 Person Reliability=0.91 Item Separation Index=22.50 Person Separation Index=3.18

a: p>0,05 b: p<0,05 E.S.[95% CI]: Effect Size [95% Confidence Interval] Class: DIF analysis classification, AA: No-DIF



al characteristics as a transitional culture between East and West. As a matter of fact, the absence of any item from the death and dying dimension in the short version (WHOQOL-AGE), in which the WHOQOL-OLD and the main scale WHOQOL-BREF were combined, indicates that this dimension differs at the global level (25).

Considering the distribution characteristics of the WHOQOL-OLD dimension scores and the total scale score, floor and ceiling effects were within acceptable limits in all dimensions, except for the death and dying dimension. The death and dying dimension showed a 16% ceiling effect, which is slightly above the acceptable upper limit of 15%. The distribution of all dimensions of the scale conforms to the normal distribution in the context of skewness (<1.0) and kurtosis (close to 0.0). The alpha values indicating the internal consistency of the WHOQOL-OLD dimensions were between 0.74–0.90, which is quite satisfactory in agreement with many previous studies using the WHOQOL-OLD module (2,12,1,22,26). When the “if item deleted alpha values” were evaluated, the 20th item in the sensory abilities dimension, the 14th item in the social participation dimension, the 9th item in the death and dying dimension, and the 21st item in the intimacy dimension negatively affected internal consistency of the dimensions they were in. However, the correlations of these potentially problematic items (based on the results of alpha analyses) with the dimension scores they belonged to, were in the range of 0.47–0.75, which is quite satisfactory. According to the Turkish national WHOQOL-OLD data pool analysis, some items (i.e., items 9 and 20) that seemed to be potentially problematic were also found to be problematic items as a result of the analysis of Turkey data in the development phase of the scale (2). Similar results were obtained for items 9 and 20 in the Rasch analyses, which gave infit and outfit values far from 1.0 (1.88/1.82 for Q9; 1.70/1.82 for Q20, respectively, for infit and outfit values presented in Table 5). These two items were sound

in terms of the infit values in the German WHOQOL-OLD validation study (26).

Classical construct validity analyses consisted of factor analyses, convergent-divergent analyses and known groups validity analyses. According to the results of the correlation matrix of the dimensions, the highest correlated dimension with the overall scale score was the past present and future activities dimension, which was reported as a key facet of QoL with strong interconnections to other QoL facets by Brinkhof et al (13). The past, present, and future activities dimension gave high collinearity (VIF value was higher than 2.0) with other dimensions in the linear regression analysis (not presented here), and the items of this dimension combined with the items of the social participation dimension to form a single dimension in the explanatory factor analysis. This makes one think that the activities of the past, present, and future are close to social participation by older Turkish adults. On the other hand, the pooled data of the Turkish version of WHOQOL-OLD showed that the Turkish version fits with the original scale structure (CFI and NFI > 0.90 and RMSEA < 0.08) very well.

All of the dimensions of the WHOQOL-OLD could discriminate between younger and older age, male and female, and ill and well significantly except for the intimacy dimension, which was only sensitive to the health condition of the participant. The intimacy dimension score was higher than all other dimension scores, and it seems that older Turkish adults have been homogeneously distributed in society in terms of intimacy. The effect size values indicated that while the age of the person mostly affects the social participation and death and dying dimensions, the gender of the older adult highly affects autonomy and death and dying dimensions. Overall scale scores were significantly lower in females than in males, and lower in ill older adults than those are well.

It is an expected situation that has been shown in the literature that women have lower QoL scores

than men, the poor than the wealthy, and the ill than well (27). Hence, the disadvantaged situation of women compared to men in terms of the autonomy and death and dying dimension scores was very striking in this study.

When the results of the item analysis were examined, the item difficulty values were between 0.48 and 0.68, and the item discrimination values of the items were between 0.49 and 0.90, indicating acceptable values (all between 0.0–1.0) for all of the items. The distribution of item reliability values was between 0.98–0.99, and the distribution of person reliability values was between 0.77–0.87. Thus, both the PSI and the item separation index exhibited a sufficient discrimination. The item difficulty values were distributed close to zero for each item which indicates that all items had moderate difficulty values. On the other hand, the distribution of infit and outfit values were around 1.0, except for items 9 and 20, which were the potential problematic items of the WHOQOL-OLD-TR as mentioned above.

In the DIF analysis of each item for gender, age, and educational status, MH chi-square values were found to be nonsignificant in some items and significant in others, while the effect sizes calculated for these were found to be at low levels. For statistical significance in DIF analysis, ES (95%CI) was used and sP-DIF classification were made for delta statistics because chi-square statistics is affected by big sample sizes as in this study (11).

To conclude, WHOQOL-OLD Turkish norm values showed that in all dimensions, higher dimension scores were obtained in males than females in all age groups except 90 years and older. The social participation dimension score decreased after the age of 80 for both men and women, while the autonomy dimension score dropped significantly after the age of 85 only for women. Turkish older adults' QoL perceptions are considerably poorer than those of living in Western countries and more

or less like other older adults in developing countries. Classical psychometric analyses of the Turkish WHOQOL-OLD repository data showed good internal consistency and generated acceptable fit values with the original scale structure. The Turkish version of the overall WHOQOL-OLD module can be considered as a valid and reliable scale suitable for application in the field of health. Nevertheless, the dimensions past, present, and future activities and social participation were combined in a single dimension in the exploratory factor analyses. The death and dying dimension and items 9 and 20 of the Turkish WHOQOL-OLD version showed weak psychometric properties that need further work (i.e., retranslation and/or cultural adaptation).

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SUPPLEMENTARY TABLES

Supplementary table 1. Studies contributing to the research data pool

	Project title (applied to the national WHOQOL center)	Year	Authors	Type of data	Sample size	Status of disseminating/publishing
1	Evaluating of the effect of regular monitoring of the elders through home visits in the primary health care services on the health related quality of life	2014	Aylin Sena BELİNER Aliye MANDIRA-CIOĞLU	Community-based	97	Doctoral Dissertation
2	The relationship between Quality of Life and Cognitive Functions, Anxiety and Depression among Hospitalized Elderly Patients	2015	Ayşe Semra DEMİR AKÇA	Clinical-based	243	Published Article doi:10.9758/cpn.2015.13.2.194
3	Frequency of application the healthcare organization more than one due to same reason, depression frequency, life quality among 65 age and over individuals which living in the centre of Burdur and related factors	2016	Aysun GÜZEL Fatih KARA	Community-based	765	Doctoral Dissertation
4	Factors affecting quality of life and depression levels in the population aged 65 and over living in the district of Palandöken in Erzurum	2018	Banu BEDİR Elif Okşan ÇALI-KOĞLU	Community-based	480	Speciality Thesis
5	Investigation of flexibility among geriatric subjects with different age groups, sex and physical activity levels	2016	Elvan KELEŞ İbrahim Engin ŞİMŞEK	Community-based	120	Master's Thesis
6	The relationship between quality of life and adaptation to aging in elderly people	2020	Selin KÜÇÜKKAYA Fatma Nevin ŞAHİN	Community-based	444	Master's Thesis
7	Yaşlılarda Yaşam Kalitesi ve Yaşam Doyumu ile İlişkili Faktörler	2016	Gizem UZUN	Community-based	109	Unpublished
8	Huzur Evinde Kalan Yaşlılarda Yaşam kalitesinin Değerlendirilmesi.	2012	Gönül GÜRBÜZ Asiye DURMAZ AKYOL	Nursing Home	99	Unpublished
9	Is There a Correlation Between the Quality of Life of Old People and Their Attitude to Aging?	2022	Gülengül MERMER Aysun UYSAL TORAMAN	Nursing Home	147	Published Article doi:https://doi.org/10.31067/acusaglik.944893
10	Gazimaçusa Bölgesinde Yaşayan 65 Yaş Ve Üzeri Bireylerin Sağlık Profili, Yaşam Kalitesi Ve Bakım Verme Yükü Hemşirelik Alan Projesi	2016-2017	Handan SEZGİN	Community-based	762	Unpublished
11	Yaşlıların beslenme şekilleri ve yaşam kalitesi	2012	Hande ŞAHİN Semra AKAR ŞAHİNGÖZ	Community-based- Nursing Home	99	Unpublished
12	The relationship of nutritional habits with telomere length and adrenomedullin levels in aging	2021	Hatice Kübra GÜZELDERE Meral AKSOY	Community-based	120	Doctoral Dissertation
13	Association Between Quality of Life and Nutritional Status of Nursing Home Residents or Community Dwelling Elderly.	2021	Hilal ŞİMŞEK Aslı UÇAR	Community-based- Nursing Home	100	Published Article DOI:10.14744/etd.2020.74150
14	The evaluation of the life qualities of people over 65 years old living in Samsun in Tekkeköy	2011	Hülya DOĞAN Şennur DABAK	Community-based	361	Doctoral Dissertation
15	Toplum İçinde Yaşayan 80 Yaş Üstü Ve 80 Yaş Altı Yaşlı Bireylerde Grup Egzersizlerinin Etkilerinin Karşılaştırılması		Hülya DONAT TUNA Nursen İLÇİN	Clinical-based	16	Unpublished study

16	The Effects Of Myofascial Release Technique Combined With Core Stabilization Exercise In Elderly With Non-Specific Low Back Pain: A Randomized Controlled, Single-Blind Study	2019	İsmail ÖZSOY Nursen İLÇİN	Clinical-based	43	Published Article DOI: 10.2147/CIA.S223905
17	Covid 19 Ulusal Kısıtlar Döneminde Geriatrik Bireylerde Fonksiyonel Düzey, Fiziksel Aktivite Düzeyi, Depresyon Ve Yaşam Kalitesi Arasındaki İlişkinin İncelenmesi	2021	Mine PEKESEN KURTÇA	Communit- y-based	118	Unpublished
18	Assessment of physical function, quality of life, daily life activities of geriatric individuals with type 2 diabetes mellitus and their relationship with nutrition	2017	Mustafa CEMALİ Zafer ERDEN	Nursing Home	68	Master's Thesis
19	Huzurevinde Yaşayan Yaşlı Bireylerin Ağrı Düzeyleri ve Ağrı İnançlarının Yaşam Kalitesine Etkisi	2014- 2015	Nevin DOĞAN Songül GÖRİŞ	Nursing Home	108	Unpublished
20	Depression, quality of life, and influential factors in the elderly	2012	Nihal BAKAR Rabia HACIHASA- NOĞLU AŞILAR	Communit- y-based	450	Master's Thesis
21	The effect of applied reminiscence therapy on the quality of life older adults in living nursing home	2015	Nilay ERCAN ŞAHİN Oya Nuran EMİ- ROĞLU	Nursing Home	136	Doctoral Dissertation
22	Macula dejenerasyonu ve diyabetik gözü olan yaşlı hastalarda hastalık algısı, depresyon, anksiyete ve yaşam kalitesi ile ilişkisi	2018	Ömer ŞENORMANCI	Clinical-based	74	Unpublished
23	Nutritional status and effecting factors among elderly individuals in Edirne city center.	2016	Özge CEMALİ Hamdi Nezi DAĞDEVİREN	Communit- y-based	1000	Master's Thesis
24	An analysis of factors affecting the life quality of above 65 years of age elders at the nursing home	2013	Recep YAĞCIOĞLU Aliye MAVİLİ AKTAŞ	Nursing Home	216	Master's Thesis
25	Care Dependency and Quality of Life in Older Adult Patients	2021	Saide FAYDALI	Clinical-based	350	http://www.internationaljourna- lofcaringsciences.org/docs/34_ gulnar_original_14_1.pdf
26	Validity of the Turkish Occupational Self Assessment for Elderly Individuals	2018	Serkan PEKÇETİN	Communit- y-based	117	Published Article DOI: 10.1177/1539449217743457
27	The effects of telerehabilitation application with elderly on sleep quality, life quality, level of depression and physical parameters in different time periods of the day	2022	Tolunay KESKİN Nursen İLÇİN	Communit- y-based	30	Master's Thesis
28	The risk factors associated with falls in the elderly living in nursing homes and their own homes	2014	Zeynep BULUT DOĞAN Nuray KIRDI	Communit- y-based- Nur- sing Home	160	Master's Thesis
29	Kayışdağı Darülaceze Müdürlüğünde yaşamını sürdürmekte olan sakinlerin yaşam kalitelerinin değerlendirilmesi	2008	Ayşe KARAN Nurten ESKİYURT	Nursing Home	119	Unpublished study



Supplementary table 2. Baseline characteristics for the Turkish WHOQOL-OLD data pool

Sociodemographic Characteristics		Number	Percent
Age	Mean±SD	73.2±6.8	
Gender	Women	3496	51.2
	Men	3335	48.8
Marital Status	Married	3183	52.4
	Not Married	1068	17.6
	Widow	1828	30.1
Education Status	Unqualified	1604	27.0
	Primary School	2330	39.2
	Middle School	890	15.0
	High School	704	11.8
	University	420	7.1
Working Status	Working	183	4.8
	Not working	1479	38.5
	Retired	2182	56.8
Social Security	No	461	8.8
	Yes	4769	91.2
Smoking	No	3974	85.5
	Yes	673	14.5
Alcohol Drinking	No	3296	93.3
	Yes	236	6.7
Drug Use	No	670	23.8
	Yes	2148	76.2
Health Condition	Well	1304	24.3
	Ill	4059	75.7

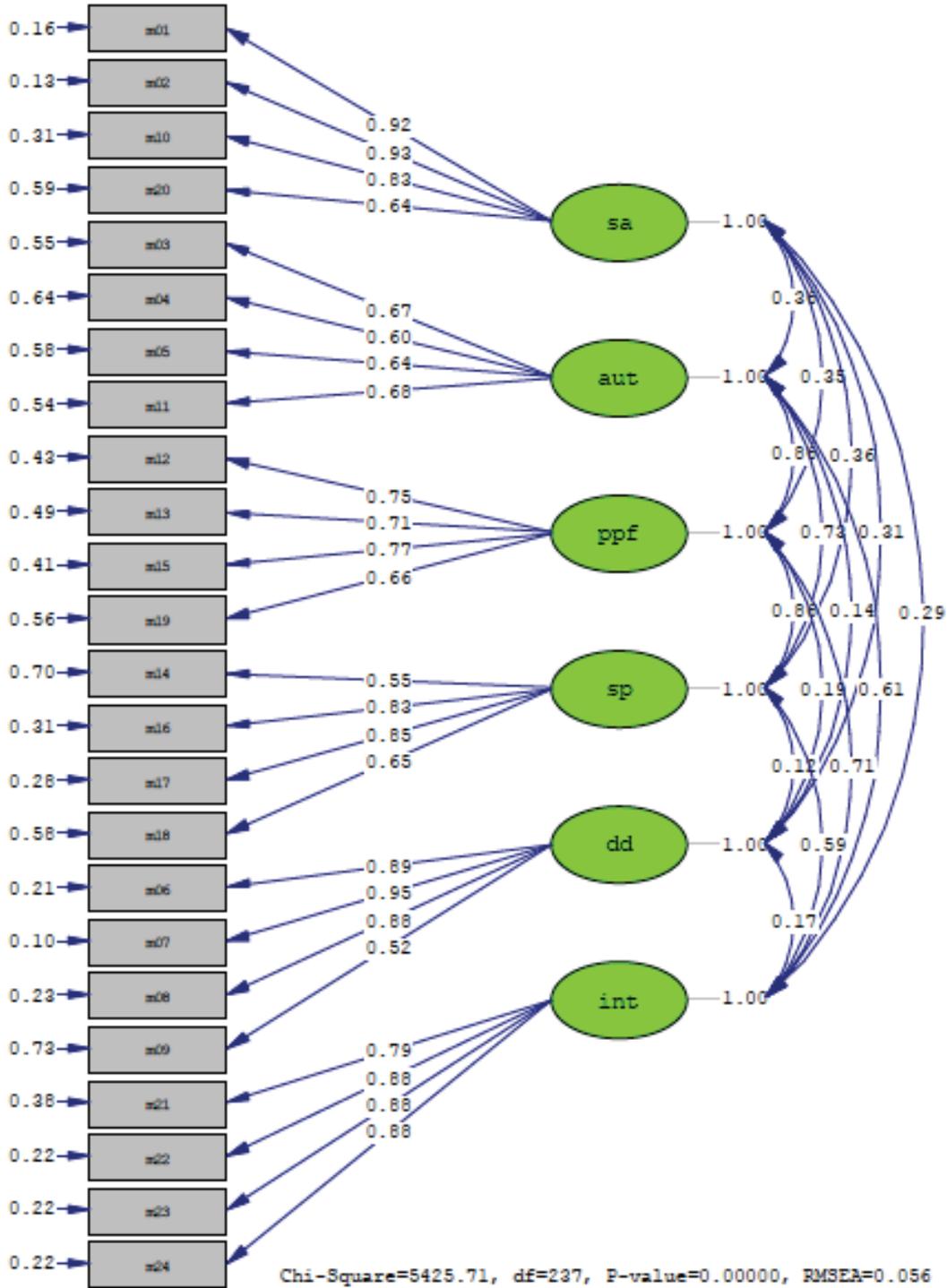
Supplementary table 3. Exploratory factor loadings of the WHOQOL-old-TR (Varimax rotation solution)

Items	Domain	Components				
		1	2	3	4	5
Q1	Sensory Abilities	0,103	0,090	0,902	0,127	0,083
Q2		0,137	0,095	0,899	0,139	0,082
Q10		0,117	0,091	0,858	0,157	0,079
Q20		0,279	0,111	0,702	-0,001	0,117
Q3	Autonomy	0,230	0,138	0,146	0,087	0,751
Q4		0,270	0,092	0,093	-0,082	0,689
Q5		0,181	0,309	0,058	0,020	0,699
Q11		0,576	0,103	0,141	0,020	0,419
Q6	Death and Dying	0,037	0,034	0,137	0,899	0,044
Q7		0,033	0,048	0,155	0,914	0,045
Q8		0,047	0,035	0,147	0,896	0,059
Q9		-0,012	0,065	-0,022	0,688	-0,067
Q12	Past, Present and Future Activities + Social Participation	0,600	0,224	0,129	0,055	0,399
Q13		0,489	0,367	0,016	0,086	0,393
Q14		0,637	0,089	0,095	-0,077	0,101
Q15		0,653	0,294	0,112	0,129	0,251
Q16		0,770	0,216	0,142	0,058	0,140
Q17		0,798	0,173	0,169	0,020	0,126
Q18		0,678	0,176	0,086	0,012	0,054
Q19		0,633	0,283	0,102	0,018	0,161
Q21	Intimacy	0,305	0,751	0,134	0,045	0,174
Q22		0,297	0,828	0,119	0,066	0,175
Q23		0,267	0,847	0,088	0,066	0,145
Q24		0,263	0,847	0,101	0,050	0,164

*Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization.



Supplementary Figure 1. Confirmatory factor model for the six WHOQOL-OLD dimensions (standardized loadings).



Supplementary Figure 2. Item Characteristics Curves (ICC) of the WHOQOL-OLD

