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AUTHOR POST PRINT VERSION

Power, M., Quinn, K., Schmidt, S. & WHOQOL-OLD Group (2005). The development of the WHOQOL-OLD module. Quality of Life Research, 14, 2197-2214.

DEVELOPMENT OF THE WHOQOL-OLD MODULE

ABSTRACT

This paper describes the development of an add-on module for the WHOQOL measures of quality of life for use with older adults. The add-on module, known as the WHOQOL-OLD, was derived following standard WHOQOL methodology. In the pilot phase of the study, 22 centres from around the world carried out focus groups with older adults, with carers, and with professionals working with older adults in order to identify gaps in the coverage of the WHOQOL-100 that were relevant for quality of life in older adults. Items generated from the focus groups were then tested in over 7400 respondents from the centres, with items being tested and reduced using both classical and modern psychometric methods. These analyses indicated a further gap in the coverage of the items, so further items were generated that specifically assessed intimate relations in older adults. A field trial study was then carried out in a further approximately 5500 respondents, again with the use of both classical and modern psychometric methods. The outcome of this second round of data collection and analysis is a 24-item 6-facet module which can be used in conjunction with the WHOQOL-BREF or the WHOQOL-100 for assessment of quality of life in older adults.

INTRODUCTION

The initial development of the WHOQOL occurred in fifteen different centres worldwide [...], and there are now over forty centres involved in the project. The relatively recent production of the WHOQOL as a generic measure of quality of life ~~relatively recently available~~ makes it ideal for adaptation to the assessment of quality of life in older adults. A failure to operationalise the concept of quality of life adequately for the ageing population will endanger many claims, comparisons with other populations, welfare proposals, and so on, because no acceptable or satisfactory measure will have been developed on which to base such developments or comparisons.

One of the first questions that arises in the generic assessment of quality of life is whether or not questionnaires that have been developed in younger adult populations can be used equally validly for older populations. One or two informative studies have been carried out; thus, Brazier and colleagues [...] found that two commonly used measures, the EuroQol and the SF-36 could be fairly satisfactorily used with older adults, though a number of issues were noted. These issues included problems about format of administration, consistency of response, and some floor effects on particular sub-scales. In addition, the sample used by Brazier et al was a relatively healthy one compared to some of the patient groups that one would also wish to assess [cf. ...]. From the previously published data with the WHOQOL [...], a small proportion of respondents from each of the 15 Centres were 65 years or older. Re-analysis of these preliminary data shows that older adults report greater satisfaction on facets related to social support, relationships in general, finances, and certain aspects of the home environment, as well as reporting lower negative feelings. We obviously needed to replicate these analyses in the present ~~planned~~ study ~~and~~ with larger numbers. Nevertheless, they are in line with some of our own [...] and others [...] findings that older adults often report more satisfaction with relationships and report better psychological health than do younger adults, contrary to many of the stereotypes of old age.

Whatever the answer to this first question, a second question also arises of whether or not there are specific areas of quality of life that may be more important in older adults [cf. ...] and that therefore should ~~be~~ supplement~~ary to~~ a generic ~~-~~adult questionnaire in order to provide a broader-band and more valid general assessment. Dramatic examples of this problem exist even for younger adults simply through the comparison of established generic measures; for example, the WHOQOL instruments assess Spirituality and the Environment, domains that are absent from most other instruments. In fact, two facets (Sensory Problems, and Communication) that were originally included in the pilot WHOQOL, but dropped because of psychometric problems in a primarily younger adult population, are good examples of facets that may need to be added to an older adults module. The main aim of the ~~planned~~ study therefore was~~is~~ to answer both of these questions in relation to the WHOQOL: do the generic forms (the WHOQOL-100 and the WHOQOL-BREF) perform well, on a range of criteria, with an older adult~~s~~

population? and, second, do additional facets need to be added to the adult generic form in order to assess quality of life adequately in the older adult population? ~~These questions will be assessed across a number of European and associated cultures and not limited to any one culture in particular.~~

The coordination of the focus group feedback and the data analyses will also allow the question to be asked of whether it is possible to have a single cross-cultural Older Adults module or whether each culture requires its own culture-specific module. Although it has been possible to generate a common younger adults version of the WHOQOL and this has been supported by empirical analyses [...], the possibility remains that diverse attitudes across cultures towards older adults may require the production of different older adults modules. This possibility will be carefully tested across the different centres. The feedback from the focus groups and the data analyses will also allow the question of how well the existing WHOQOL-100 items, which have been selected for use with younger adults, perform when used with older adults. That is, one of the key objectives of the research will be to test the question of whether the existing WHOQOL-100 items only need to be supplemented with an additional module or whether these generic items need to be altered in some way or another.

In summary, therefore, the overall aim of the present research was to adapt the younger adults version of the WHOQOL for use with older adults and then test its use in a series of cross-cultural field trials. This adaptation ~~may~~ consisted of the development of a supplementary module that can be added to the existing WHOQOL instruments.~~, though this possibility will need to be tested with focus group work and with data analysis. The work programme will also allow the possibility to be tested of whether or not a single module can be used in all cultures or whether it is necessary to generate different modules for some cultures.~~ The end point of the work however will be the production of an Older Adults WHOQOL that can be used in a wide variety of studies including population epidemiology, service development, and clinical intervention trials in which issues about quality of life are crucial. In addition, the question of quality of life and healthy ageing will be addressed in a comparative cross-cultural study in order to assess personal, social, and cultural factors that contribute to healthy ageing.

PILOT STUDY

Methods

The WHOQOL-OLD Coordinating Field Centre produced a draft protocol based on the previous WHOQOL Group experiences in conducting international collaborative research for the development of the WHOQOL-100 and WHOQOL-BREF [...]. Following initial protocol development, it was circulated to each Field Centre for comment. It was iteratively revised using a Delphi technique until there was agreement among the participating Centres. In summary, the steps for the development of the WHOQOL-OLD followed the published WHOQOL methodology, which consisted of focus group work in collaborating centres, item generation, pilot testing, refinement and item reduction, and then field trial testing of the instrument, as described below. Prior to the focus group exercise the iterative Delphi process was also used to identify gaps in the coverage of the WHOQOL-100 that might be relevant for older adults, and any other issues about the use of the WHOQOL with older adults.

Focus Groups ~~The intent was that the protocol would facilitate consistent data collection and reporting of focus groups across all Centres, although the protocol stated that participating Centres could change the protocol for running the focus groups to suit their particular circumstances.~~ The protocol for conducting focus groups~~also e~~ established a common framework for interpreting and assessing the data reported by each Centre. Once agreed, the protocol was used in each Centre as the guide for planning and conducting focus groups for the purpose of eliciting the QoL concerns of older adults, and for reporting the data back to the Edinburgh Coordinating Centre.

The focus group discussions included four parts: a general unstructured discussion on the dimensions of QoL that were important for older adults; a commentary on and assessment of the facets and items from the WHOQOL-100 instrument; feedback on additional facets and items that had been previously suggested by Field Centres during the Delphi exercise described above; and the gathering of ideas from participants for additional areas of QoL or items that participants felt were not covered during discussion. ~~In general, the protocol outlined a model which followed the general guidelines for successful focus group implementation [...]. A semi structured approach was used to ensure that core concepts of QoL were covered across the groups conducted within each Field Centre, and that issues particular to each group could be explored~~. Each Centre agreed to conduct four focus groups with older adults (with approximately equal numbers 60-80 years and 80+years; equal male and female; and equal well and ill participants), one with their carers and one group with health professionals working with older adults (i.e. a minimum of six focus groups).

Suggestions for additional facets and items were translated into English as the working language; equivalent items were identified across the suggestions from each centre; and feedback was given to each centre about the proposed items. This process eventually led to the generation of a set of 40 pilot items, which were grouped conceptually by the participating centres into 6 facets (see below) (see also .... for a detailed paper about the focus group work). In addition, the focus group work suggested four supplementary items for existing WHOQOL-100 facets; namely, 2 items for Sexual Activity, and 1 item each for Thinking and for Home.

Participants The pilot testing was carried out in 22 different WHOQOL centres from around the world (see Table 1). Each centre was asked to test an opportunistic sample of a minimum of 300 older adults, within the following sampling frame: approximately equal numbers of male and female, equal numbers aged 60-80 and aged >80 years, and equal numbers of ill and well. (The only exceptions were the Geneva and Paris centres who shared the recruitment of French-speaking individuals between them.)

Comment [c1]: I've cut sections in order to br the length down, since this is not the main focus o this paper, but if we can accommodate the length, that's fine.

Insert Table 1 About Here

Measures The purpose of the pilot testing was primarily to collect data on the WHOQOL-OLD items for the purpose of item testing and item reduction. The measures included in the pilot study therefore were the WHOQOL-100 […], which is an established measure of quality of life with proven reliability and validity; a set of 40 items for the pilot WHOQOL-OLD module generated from the focus group work; a set of importance questions that asked about the importance of each WHOQOL-100 and WHOQOL-OLD facet for the respondent [….]; and a set of sociodemographic and health-related questions.

RESULTS

Descriptives The data presented in Table 1 provide summary descriptions of the samples from each of the 22 centres in terms of age, gender, health status, and sample size; the data in Table 2 present useful reference scores for the largest sample to date of older adults tested with the WHOQOL-100. The "health status" category refers to subjective assessment of health state, irrespective of objective health-related conditions; thus, seventy per cent of the sample describe themselves as healthy and 92% of people with one or more co-morbid conditions still rate themselves as healthy despite the presence of at least the 'objective' co-morbid conditions. As would be expected, the statistics indicate that there are some inter-centre differences for these descriptive variables. Where appropriate therefore subsequent tables show WHOQOL-100 facet and domain scores and WHOQOL-Old facet and domain scores adjusted for age, sex, and health status.

Insert Tables 2 and 3 About Here

There were very few missing values in the dataset (see Table 3). Almost all variables had missing values of approximately 2-3% with the exception of items relating to Facet 15 (Sexual Activity) and two items from Facet 19 (Health and Social Care) from the WHOQOL-100. Similarly, the two additional items from the Old module relating to physical intimacy (and included to expand facet 15) also had higher than average missing values. In general, however, lower missing values were found for Old facets than for those facets comprising the 100. These findings accord with those published from analyses of the original WHOQOL-100 […] which reported 85% of individual items had less than 2.0% missing values, with a range of missing values up to a maximum of 7.2% for the sex (F15), work (F12), and drugs (F11) facets. Following guidelines set out for the scoring of the WHOQOL […], missing values were replaced, where appropriate, with the relevant mean variable scores on subsequent analyses. This procedure provides a conservative approach to missing values […] and is recommended when the percentage of missing values is low.

Frequency, MAP and Reliability Analyses Ten items were identified as problematic in the pilot WHOQOL-Old measure. Every facet of the Old measure was affected with the exception of Facet 30: Death and Dying. To explore these results further, each Old item was examined for frequency and/or reliability problems to determine consistency of psychometric problems (see Table 3). One further set of analyses was based on the multi-trait analysis program (MAP) developed for the medical outcomes study (MOS) carried out by Ware and his colleagues […]' although for this study the analyses were run on SPSS (Windows). The purpose of the MAP analyses is to identify any item that loads higher on another sub-scale than on its own predicted sub-scale. Any items showing this pattern could then either be

eliminated altogether or could be considered for inclusion with the alternative sub-scale. In the event, our analyses showed that seven items presented with correlations lower than 0.4 on their own facet and greater than 0.4 on another facet:

F254, F265, F266, F274, F285, F295, F296

In addition, a less troublesome variant of the MAP problem was observed for five items, in which an item was found to correlate above .4 on its own sub-scale but correlated more highly with another subscale. These items were:

F264, F271, F273, F291, F294

In summary, no items within the pilot WHOQOL-OLD module, apart from the supplementary Sexual Activity items, were identified as having problems with missing values, therefore no items presented with problems at all four levels of analyses (i.e. percentage missing, frequency, reliability, MAP).

Three items (F254, F274 and F285) were problematic at 3 levels of analysis (frequency, reliability, and MAP) therefore it was agreed that these items should be dropped from further analyses. Due to high cross-loading of items from Facets 28 (use of Time)~~(use of Time)~~ and 29 (Participation/isolation), these facets were merged and the new scale psychometrically tested prior to any further items being dropped.

Facet and Domain Reliability Analyses

Two facets in the pilot WHOQOL-OLD had alphas below .7, F26 Autonomy and F29 Participation/Isolation. However, items were identified in all 6 facets with corrected item-total correlations below .4, which included F254, F255, F265, F266, F274, F285, F292, F293, F295, F296, and F308. It is clear from these results that, in relation to the original hypothesised structure, there were several psychometrically weak items. To determine the impact of each item on facet structure, a series of further exploratory analyses were performed. Each item identified from the first wave of analyses with poor corrected item-total correlation was temporarily removed from the second round of reliability analyses, starting with the item with the weakest corrected item-total correlation and subsequently removing the weakest item each time. One of the main changes that were suggested by these analyses was the possible merger of Facet 28 (Use of Time) and Facet 29 (Participation/Isolation). Facet 29 had poor reliabilities and a number of problematic items. Some of the items map both statistically and conceptually onto Facet 28 Use of Time, therefore these facets were merged in further analyses to investigate the possibility of a new facet of 'Social Participation' consisting of 8 items (F281, F282,

F283, F284, F286, F287, F291, and F294). At this stage therefore the intermediate structure of the WHOQOL-OLD module consisted of 30 items and 5 facets.

The original conceptual structure of the older adults module suggested a six facet model. This structure was compared to a single domain structure, with and without the inclusion of items with identified psychometric problems. Each analysis was performed on a split-half sample using EQS Version 5.7b for Windows. The original six facet structure fell well below 0.9 on the comparative fit index (CFI) (which ranges from 0 to 1, and for which a value of 0.9 or greater is considered as a good degree of "fit" for the model in question). The CFI barely improved when a single domain structure was applied, irrespective of the exclusion of problematic items. The fit did improve, however, when the refined module, with a five facet structure (as outlined above) was tested (CFI=0.70); the addition of a higher-order factor to this structure further substantially improved this model (CFI=0.875). This suggests that the modified facet structure is a reasonable starting point as a model for the data although it may be possible to improve this further, by, for example, allowing certain facet errors to covary.

Insert Table 4 About Here

IRT Analyses These have been carried out using WINMIRA [...] and RUMM [...]. The analyses were conducted both on the 30 item solution as well as on the level of the subscales. Overall, both sets of analyses identify the same items as lacking Rasch properties (see Table 4). The most important item selection criteria were item characteristics and threshold parameters as well as dispersion indices. The following items were identified as problematic (n.b. order indicates quality, i.e. item 307 has the worst properties):

1) F307	*How much are you worried about those that you will leave behind?*
2) F301	*How well are you able to face death?*
3) F262	*How much do you feel in control of your finances?*
4) F287	*Are you satisfied with how busy your life is?*

A range of further items demonstrated a lack of Rasch properties only in some of the selected criteria so were not recommended for item removal at this stage.

Further Comments The higher rate of missing values for the Sexual Activity facet of the WHOQOL-100 together with poor psychometric properties for older adults in the pilot study suggested that an

additional facet should be added to the WHOQOL-OLD module that addressed issues of intimacy but without explicitly referring to sexuality. For the Field Trial therefore the focus group material that related to intimacy was used to generate a set of 7 further questions, which were then included in a Delphi exercise to examine changes needed for the Field Trial. These new items were added to the 26 items retained from the combined analyses of the pilot version of the WHOQOL-OLD.

FIELD TRIAL

The field trial allowed the participating centres to carry out a range of different types of studies that ranged from epidemiological surveys to validity analyses to evaluation of longitudinal trials. Each centre however included a core dataset that could be further analysed to produce the final version of the WHOQOL-OLD module.

Methods

Participants The field study analyses were conducted in a sample of N=5556 with data coming from 20 national centres (Guangzhou and Hong Kong not included). The sample size recruited in each centre varied between N=116 (Edinburgh) and N=455 (Umea). The sample was balanced according to the age of older adults recruited in the different WHOQOL-OLD centres (see table 6). However, there was a certain heterogeneity according to the gender rates with particularly higher rates of females in the Edinburgh, Uruguay, and Hungarian centre. Furthermore, there was considerable heterogeneity according to health status, which was of course a function of the type of assessment, i.e. being either assessed by the single item on health report or by conditions on a chronic condition check list. On the level of the single subjective health status item, Bath, Geneva, Oslo, Victoria and Melbourne showed a high proportion of people that reported to be in good health on the item (>83%), while Izmir, Budapest, Vilnius had higher proportions of people with ill health (>40%).

Insert Table 6 About Here

Measures The core measures included in the Field Trial were the WHOQOL-BREF […], the 33-item WHOQOL-OLD interim module, sociodemographic and health status questions. The WHOQOL-BREF was used in the Field Trial because its shortness allowed centres to include other measures according to local interests and local availability of questionnaires. Sub-groups of centres included other measures of quality of life, but these analyses will be presented in other papers.

RESULTS

Insert Table 7 About Here

Descriptives Descriptive data for the WHOQOL-OLD field study results are displayed in Table 7 for the new Intimacy facet, but will be summarised in the text for the other facets for the sake of brevity. Overall the rate of missing data was below 2% except for one item from the "Death and Dying" subscale (7.1%; "Fear pain before death") and for several items from the "Intimacy" subscale (see Table 7). The skewness of items was acceptable (<.1.00 for all items) except for one item from the "Sensory Abilities" subscale (F254 "Problems with sensory functioning affect ability to interact") which also was meant to be used more as a screening measure in order to identify serious sensory disabilities. Considerable ceiling effects were observed in items from the "Death and Dying" subscale and F286 from the Social Participation scale. Internal consistency as measured with Cronbach's alphas of all subscales was acceptable, ranging between .72 for the "Autonomy" subscale and .91 for the "Intimacy" subscale. The descriptive analyses therefore would suggest the possible omission of items F286 (Social Participation), and F291 (Death and Dying), and F305 and F306 (Intimacy).

Insert Tables 8 to 13 About Here

IRT Analyses Analyses on the basis of item-response-theory were again carried out using the RUMM [...] and the WINMIRA [...] programs. The analyses suggested a good performance for all scales (see Tables 8 to 13). The Q-indices were explored for analysing the scale performance on an extended Rasch model approach for ordinal variables (which is generally referred to as the partial credit model). The overall Rasch performance was good, only very few items did not fit this model: Item F286 ($Zq=1.91$; $p=.03$) in the subscale "Social Participation", item F291 ($Zq=2.66$; $p<.01$) in the subscale "Death and Dying" and item F301 ($Zq=1.74$; $p=.04$) in the subscale "Intimacy". These results correspond to the performance of these items in classical psychometric test theory (i.e. no substantial benefit in internal consistency), the suggested items proposed for omitting therefore remains constant. Furthermore, with both the RUMM and the WINMIRA analyses two items were found to lack consistently the model prerequisite of ordered thresholds: item F261 in the "Autonomy" subscale and item F286 in the "Social Participation" subscale, though reverse thresholds per se are not a sufficient criterion for omitting items. Further analyses indicated a good performance of the items in terms of absence of differential item functioning (using a logistic regression approach for detecting DIF) when analysed across gender, age group, health status, or centre (see Tables 8 to 13). No item showed DIF with respect to the "cut-off" criterion for practical meaningful DIF of 2 % pseudo R^2-difference. Only 3 items (one item for health and age group) showed slight DIF, when the cut point was changed to 1 %.

Confirmatory Factor Analyses In combination with other classical and modern psychometric techniques, confirmatory factor analyses were used both to test the structure of the WHOQOL-OLD module and as part of the item-reduction procedure. In order to maintain consistency with the structure of the WHOQOL-100, it was decided that the final WHOQOL-OLD module would contain four items per facet. Initial CFA analyses showed that poor fit indices were obtained by a range of very different statistical methodologies for item F286. Poor performance was also shown for item F291 from the Death and Dying Scale and item F301 from the Intimacy scale in IRT and classical methods. CFA results suggested the further deletion of item F272 from the Past, Present and Future Activities Scale, to delete item F306 from the Intimacy Scale, and to delete items F276, F283, F285, and F305. The final model, which consisted of 6 facets of 4 items each, showed good fit indices (CFI=0.939; RMSEA=.052; $\chi 2$=3759.4, df=237).

Insert Table 14 About Here

Further Comments The final version of the WHOQOL-OLD module is presented in Table 14, which shows the 6 facets and their constituent items. The Cronbach alpha values show an acceptable range from 0~~9~~.72 to 0.88 for each facet. Although the purpose of the present paper has been to describe the development of the WHOQOL-OLD module rather than to provide details of the performance of the instrument in relation to validity, test-retest reliability, and usefulness, one or two results will be given as examples (detailed results will be presented in future papers).

Comment [c2]: Check? Extra number

Insert Figures 1 and 2 About Here

Subscale differences according to a range of subgroups are displayed in Figure 1 and 2. In terms of age, there are lower quality of life scales on all dimensions in participants older >80 years– except for t~~T~~he Death and Dying Scale where younger people have significantly more concerns about dying (see Figure 1). Gender effects are comparatively small, and occur mainly for the Death and Dying Facet with higher scores for males. The largest mean differences can be demonstrated for the Healthy vs. Unhealthy self report variable with individuals who report themselves to be healthy scoring significantly higher on all facets (see Figure 2).

GENERAL DISCUSSION

The two studies presented here summarise the development of an add-on module for the WHOQOL group of measures for use with older adults. The studies demonstrate the development of the module following the WHOQOL methodology […] in which a simultaneous approach to instrument development is employed […]. That is, the starting point for the WHOQOL methodology is an intense qualitative phase of cross-cultural focus groups, which for the WHOQOL-OLD were run in 22 centres throughout the world. The summary output from these focus groups was used to identify common themes and issues either absent from or poorly covered in the WHOQOL-100; these themes and issues were used to generate a set of pilot items for testing with older adults.

The focus group work together with the Delphi exercise with the WHOQOL experts had suggested two possible approaches to the amendment of the WHOQOL-100 for use with older adults. There were some themes that seemed to best form additional facets, such as that of issues around Death and Dying, whereas there were other aspects or items that seemed supplementary to existing facets within the WHOQOL-100 such as for the Sexual Activity facet. However, the quantitative analyses suggested that the supplementary items were best also included as part of the add-on module rather than being used to supplement or amend the scoring of an existing facet; the clearest demonstration of this point was for the Sexual Activity facet, in which the supplementary items were still problematic and added little to the existing facet. Instead, an additional set of items that focussed on Intimacy rather than Sexual Activity were written and tested at the Field Trial stage of the study and have now been included in the final version of the module as a separate facet.

In terms of psychometric performance, the items selected for the WHOQOL-OLD module demonstrate good performance both on classical and modern psychometric grounds. The approach taken here shows that both classical and modern methods can be fruitfully combined in scale development. Although modern psychometric methods such as the Rasch modelling approach taken here were primarily developed for use with unidimensional ability scales, their careful use with attitude scales provide a powerful methodology for the development of valid comparable measures across key populations, especially from different cultures. Traditional methods provide a powerful methodology with which to identify the appropriate dimensions of a complex attitudinal construct such as quality of life, but once the dimensionality has been well identified (both conceptually and empirically), then IRT methods such as the Rasch approach should then be used […].

In the event, the actual module developed focussed primarily on psychosocial aspects relevant to older adults. Although there are pertinent issues for example that arise in relation to the personal environment, there was general agreement across the focus groups that the existing scales of the WHOQOL-100 already covered the personal environment sufficiently. Instead, the new facets covered Sensory Functioning in the Physical Domain, which had been originally included in the 236-item pilot version of the WHOQOL but then dropped because of considerable ceiling effects in younger adults; and other new facets were related to the Psychological Domain (e.g. “Autonomy”) and to the Social Domain (e.g. “Intimacy”). The final version of the module contained 6 facets of 4 items each; the comparisons between the WHOQOL-100 and the WHOQOL-BREF used in the pilot and the field trial studies, respectively, suggest that the Older Adults module can be used in addition to *either* the WHOQOL-100 or the WHOQOL-BREF, whichever is the most appropriate for a study. The scoring of the module can then consist of a profile set of 6 facet scores, or, as supported by the existence of a higher order factor in the confirmatory factor analyses, there can be a single total score based on a summation of all 24 items in the module.

The Older Adults WHOQOL will also permit the assessment of the impact of service provision and of different health and social care structures on quality of life, especially in the identification of the possible

consequences of policies on QOL of older adults and a clearer understanding of investment areas to achieve best gains in QOL. A related issue is the estimation of the impact of physical and psychological interventions in a range of physical and psychiatric conditions related to old age. Cross-sectional studies between different services or treatments and longitudinal studies of interventions can be reliably assessed with the WHOQOL. Moreover, the unique cross-cultural approach to the development of the measure means that comparisons can be made between different cultures. The exacting standards of instrument development used for the WHOQOL mean that such comparisons do not run the risk of cultural bias that arises when an instrument is devised in one culture and then simply translated into another; the WHOQOL methodology provides a unique approach to instrument development that should provide the "gold standard" for the assessment of quality of life across the adult lifespan.

Table 1: General Descriptions of the Sample for the Pilot Study from each of the 22 Centres

Centre	n	Age ± SD	% Female	% Healthy
Edinburgh	303	73.3 ± 8.2	68.5	83.8
Bath	331	74.3 ± 8.0	59.5	84.5
Leipzig	433	72.3 ± 8.2	43.6	65.6
Barcelona	302	74.5 ± 7.5	56.6	63.6
Denmark	467	71.3 ± 8.3	52.5	83.6
Paris	130	73.3 ± 8.2	55.9	93.0
Prague	350	74.1 ± 8.2	50.3	62.0
Budapest	304	74.7 ± 8.1	65.1	41.1
Oslo	372	73.5 ± 6.6	74.6	73.2
Canada	430	74.4 ± 8.6	73.0	89.3
Melbourne	364	74.9 ± 7.9	55.1	82.0
Seattle	235	72.8 ± 7.6	63.4	57.9
Beer-Sheva	312	73.0 ± 8.3	52.4	71.3
Tokyo	410	70.8 ± 8.0	55.7	78.6
Umea	315	73.3 ± 6.6	54.6	74.2
Guangzhou	478	73.6 ± 8.5	48.5	61.5
HKong	319	72.5 ± 6.9	63.7	64.4
Brazil	339	73.4 ± 8.3	56.0	57.5
Uruguay	256	71.6 ± 7.4	61.3	72.3
Turkey	345	70.3 ± 5.8	52.2	57.4
Geneva	161	74.7 ± 8.3	75.8	90.6
Lithuania	445	73.3 ± 9.4	52.4	54.8
Total	7,401	73.1 ± 8.0	57.8	70.1

Note: Age $F(21, 7291) = 9.18$, $p < 0.001$; Gender $F(21, 7357) = 217.94$, $p < 0.001$; Health status $F(21, 7249) = 560.53$, $p < 0.001$.

Table 2. WHOQOL-100 Adjusted[1] Domain Mean Scores by Centre

Centre	Domain means (± SD)						
	Physical	Psychological	Independence	Social	Environment	Spirituality	Overall
Total	14.19 ± 2.85	14.64 ± 2.16	14.69 ± 3.28	14.52 ± 2.41	15.01 ± 2.19	13.78 ± 3.71	14.80 ± 1.96
Edinburgh	15.00 ± 2.85	15.22 ± 1.92	15.18 ± 3.64	15.38 ± 2.22	15.70 ± 1.68	13.28 ± 3.78	15.69 ± 2.65
Bath	14.13 ± 2.54	14.77 ± 1.99	15.01 ± 3.26	14.73 ± 2.16	15.39 ± 1.75	13.93 ± 3.77	15.52 ± 2.82
Leipzig	14.42 ± 2.64	15.24 ± 1.82	14.75 ± 3.35	15.03 ± 2.07	15.81 ± 1.67	15.01 ± 3.25	14.98 ± 2.40
Barcelona	13.12 ± 2.54	13.56 ± 1.90	13.66 ± 3.01	13.70 ± 2.54	13.85 ± 1.62	13.74 ± 3.74	13.82 ± 2.76
Copenhagen	15.72 ± 2.63	15.76 ± 1.95	16.35 ± 3.07	15.42 ± 2.17	16.60 ± 1.77	12.63 ± 3.94	16.30 ± 2.87
Paris	14.57 ± 2.49	14.14 ± 2.18	15.78 ± 2.32	14.60 ± 2.29	15.73 ± 1.76	12.38 ± 4.42	15.31 ± 2.47
Prague	13.78 ± 2.73	14.36 ± 2.17	14.28 ± 3.04	14.55 ± 2.27	14.83 ± 1.98	14.71 ± 3.36	14.52 ± 2.49
Budapest	13.33 ± 2.70	13.63 ± 2.07	12.79 ± 3.25	13.82 ± 2.77	14.03 ± 2.16	14.76 ± 3.63	13.51 ± 2.68
Oslo	14.72 ± 2.81	15.36 ± 1.84	15.05 ± 3.43	15.37 ± 2.12	16.14 ± 1.77	15.30 ± 3.82	15.57 ± 2.71
Victoria	14.79 ± 2.66	15.76 ± 1.87	15.88 ± 3.00	15.16 ± 2.27	16.50 ± 1.63	14.25 ± 3.53	16.42 ± 2.65
Melbourne	14.26 ± 2.66	15.17 ± 2.08	14.56 ± 3.12	15.09 ± 2.63	15.81 ± 1.87	13.78 ± 3.79	15.56 ± 3.02
Seattle	14.69 ± 2.74	15.46 ± 2.05	15.49 ± 3.31	14.82 ± 2.63	16.22 ± 2.06	15.30 ± 3.46	15.54 ± 3.22
Beer-Sheva	13.21 ± 3.01	14.83 ± 2.25	14.74 ± 3.40	14.41 ± 2.49	15.11 ± 2.24	13.09 ± 3.91	14.87 ± 2.92
Tokyo	14.19 ± 2.53	13.82 ± 2.13	14.68 ± 2.65	13.05 ± 1.91	13.99 ± 1.82	13.75 ± 3.09	14.34 ± 2.60
Umea	15.22 ± 2.49	15.31 ± 1.65	15.86 ± 2.65	15.14 ± 2.10	15.93 ± 1.54	13.29 ± 2.96	15.81 ± 2.28
Guangzhou	13.56 ± 2.56	13.87 ± 1.82	13.49 ± 2.93	14.01 ± 1.85	13.61 ± 1.83	11.08 ± 2.90	13.55 ± 2.93
Hong Kong	14.93 ± 2.90	14.16 ± 2.34	14.19 ± 3.20	13.82 ± 2.27	14.38 ± 2.19	10.35 ± 4.17	13.99 ± 2.77
Brazil	13.11 ± 2.95	14.91 ± 2.23	13.68 ± 3.59	15.01 ± 2.18	14.40 ± 2.03	16.11 ± 2.79	15.05 ± 2.89
Uruguay	15.18 ± 3.01	14.46 ± 2.10	15.52 ± 2.82	15.10 ± 2.64	14.49 ± 1.90	15.26 ± 2.74	14.93 ± 2.72
Turkey	12.47 ± 2.97	13.87 ± 2.26	13.45 ± 3.03	13.21 ± 2.45	13.87 ± 2.22	14.93 ± 2.56	13.09 ± 3.11
Switzerland	15.43 ± 2.47	15.30 ± 1.94	15.90 ± 3.02	15.11 ± 2.69	16.54 ± 1.66	13.75 ± 4.33	16.16 ± 2.42
Lithuania	13.50 ± 2.77	13.49 ± 1.96	14.36 ± 3.38	13.78 ± 2.26	13.12 ± 2.26	13.12 ± 2.76	12.76 ± 2.78

[1] Means adjusted for age, gender, and health status

TABLE 3. Item descriptives, reliability and MAP analyses

Item	Item Descriptives				Reliability Analyses			Map analyses	
	M (1-5)	SD	% Missing	Frequency Problem	Facet α	Item-total Corr.	α if item removed	< 0.4 on own facet and > 0.4 on another facet	> 0.4 on own facet and higher correlation with other facet
F251	3.78	1.123	1.4		.7670	.6771	.6840		
F252	3.65	.878	1.9		.7670	.5826	.7184		
F253	3.92	1.196	1.7		.7670	.6579	.6888		
F254	3.93	.871	1.5	✓	.7670	.3428	.7700	Use of time	
F255	3.65	.855	1.2	✓	.7670	.3059	.7771		
F256	4.01	1.182	1.8		.7670	.5105	.7348		
F261	4.02	.864	1.2	✓	.6821	.5416	.6076		
F262	3.9	1.169	1.6		.6821	.4470	.6290		
F263	3.23	1.076	1.5		.6821	.4713	.6201		
F264	3.63	1.023	1.4		.6821	.5273	.6019		Use of time
F265	3.06	1.199	1.4		.6821	.1786	.7279	Death and dying	
F266	3.74	.905	1.7	✓	.6821	.3890	.6493	Past, Present, Future	
F271	3.63	.835	2.3	✓	.7438	.5395	.6983		Use of time
F272	3.65	.817	2.2	✓	.7438	.4796	.7107		
F273	3.33	1.033	2.3		.7438	.5443	.6921		Use of time
F274	3.25	1.150	1.2	✓	.7438	.2068	.7792	Death and dying	
F275	3.45	.987	2		.7438	.5705	.6865		
F276	3.79	.816	1.6		.7438	.5262	.7017		
F277	3.32	1.071	1.6		.7438	.4453	.7172		
F281	3.68	.838	1.7	✓	.8287	.6497	.7970		
F282	3.59	.940	1.6		.8287	.6848	.7888		
F283	3.62	1.166	1.5		.8287	.5619	.8098		
F284	3.84	1.039	1.5		.8287	.6448	.7937		
F285	4.2	1.047	1.1	✓	.8287	.3430	.8433	Participation / Isolation	
F286	3.33	1.069	2.9		.8287	.5168	.8159		
F287	3.67	.877	1.6		.8287	.7051	.7876		
F291	4.33	.968	1.1	✓	.5605	.4091	.4728		Use of time

TABLE 3 (Contd.)

Item	Item Descriptives				Reliability Analyses			Map analyses	
	M (1-5)	SD	% Missing	Frequency Problem	Facet α	Item-total Corr.	α if item removed	< 0.4 on own facet and > 0.4 on another facet	> 0.4 on own facet and higher correlation with other facet
F292	3.28	1.520	2.1		.5605	.1936	.5972		
F293	2.94	.852	2.3		.5605	.2469	.5381		
F294	3.51	.938	2.3		.5605	.4379	.4629		Past, Present, Future
F295	3.14	1.042	1.7		.5605	.2815	.5236	Past, Present, Future	
F296	3.67	1.195	1.1		.5605	.3369	.4976	Death and dying	
F301	3.39	1.173	3.3		.7787	.3845	.7698		
F302	2.84	1.244	1.6		.7787	.4920	.7528		
F303	3.62	1.220	1.4		.7787	.6753	.7216		
F304	3.63	1.287	2.1		.7787	.6648	.7216		
F305	3.94	1.135	1.7		.7787	.6611	.7265		
F306	3.01	1.258	1.8		.7787	.5968	.7345		
F307	3.24	1.311	1.8		.7787	.4242	.7648		
F308	3.11	1.265	2.3		.7787	.0309	.8247		
F155	3.55	.949	5		.7818	.5168	.7525		
F156	3.52	.919	5.2		.7818	.5774	.7395		
F55	3.47	1.178	1.3		.7259	.3385	.7622		
F175	3.56	.915	1.9		.8498	.5148	.8585		

TABLE 4. IRT Analyses for Overall Scale

Overall: 30-item PSI=0.903 α=0.893 DIF (Overall Scale)

		Resid>9	χ^2>100	Reverse Thresholds Rumm	Reverse Thresholds Winmira	Gender	Age	Centre	Q-index WINMIRA >.20	Z of Q WINMIRA >3.0	Omit
F25	1 F251					n	n	n			
Sensory	2 F252					n	n	.002			
Abilities	3 F253					n	n	n			
α = 0.811	4 F256	22.3	282.1			n	.02	n			(x)
PSI=0.839											
F26	5 F261					n	n	n			
Autonomy	6 F262	9.1	100.3	√	√	n	n	.001		√	(x)
α =0.723	7 F263			√		n	n	.03			
PSI=0.785	8 F264		150.6			n	n	n			
	9 F266			√		.03	n	.03			
F27	10 F271		306.6			n	n	.02			(x)
PPFA	11 F272					n	n	.02			
α=0.773	12 F273		215.5			n	n	.001			
PSI=0.800	13 F275			√	(√)	n	n	n			
	14 F276					n	n	n			
	15 F277					n	n	n	√	√	(X)
F28/29	16 F281		466.6			n	n	n		√	(X)
Social	17 F282		419.4			n	n	.05			
Participation	18 F283					n	n	.001			
α=0.857	19 F284		191.9			n	n	n			
PSI=0.869	20 F286					n	n	n			
	21 F287		553.5			n	n	n		√	X
	22 F291			√	√	n	n	n			
	23 F294		254.7			n	n	n			
F30	24 F301	18.7	608.5	√	√	N	n	n		√	X
Death &	25 F302	20.4	639.9			n	n	n	√	√	X
Dying	26 F303					n	n	.002			
α=0.821	27 F304	12.4	214.4			n	n	.04			
PSI=0.846	28 F305				√	n	n	.001	√	√	
	29 F306	14.0	268.7			n	n	n			
	30 F307	30.9	1371.6			.001	n	n	√	√	X

TABLE 5. IRT Analyses for Subscales (5 facet 30-item model)

Subscale analyses | Subscales DIF

		Gender	Age	Centre	Resid/χ2	R.Thresh. RUMM	Rev. Thresh. WINMIRA	Q-index	Z of Q	Omit
F25	1 F251	n	n	.001	√					
Sensory	2 F252	n	.001	n	√					
Abilities	3 F253	n	n	.05	√√					
α = 0.811	4 F256	n	n	.001						
PSI=0.839										
F26	5 F261	n	n	.02	√					
Autonomy	6 F262	n	n	.002		√	√		√	**X**
α =0.723	7 F263	n	n	.005		√	√			
PSI=0.785	8 F264	n	n	n						
	9 F266	n	n	n		√	√			
F27	10 F271	n	n	n						
PPFA	11 F272	n	n	.04						
α=0.773	12 F273	n	n	.001						
PSI=0.800	13 F275	.02	.002	.03						
	14 F276	.02	n	.04						
	15 F277	n	n	.02					(√)	
F28/29	16 F281	n	.02	.002	√					
Social	17 F282	n	n	.001	√√					
Participation	18 F283	n	.001	.001	√√					
α=0.857	19 F284	n	n	n						
PSI=0.869	20 F286	n	n	n	√√					
	21 F287	n	n	.002	√√				√	X
	22 F291	n	n	.001	√√					
	23 F294	.03	n	n						
F30	24 F301	n	n	.001	√√	√	√		√	X
Death &	25 F302	n	n	n						
Dying	26 F303	n	n	n	√√				√	
α=0.821	27 F304	n	n	n	√√					
PSI=0.846	28 F305	n	n	n	√√					
	29 F306	n	n	n						
	30 F307	n	n	n	√√				√	X

Table 6 Sociodemographic characteristics of the WHOQOL-OLD field study sample (n=5,566)

Centre	Country	N	Gender				Age			Health status			
			Male		Female					Healthy		Unhealthy	
			n	*%*	*N*	*%*	*M*	*SD*	*Range*	*n*	*%*	*n*	*%*
Edinburgh	Scotland	116	38	32.8 %	78	67.2 %	77.59	10.47	60 - 100 (40)	92	82.1 %	20	17.9 %
Bath	United Kingdom	145	54	37.2 %	91	62.8 %	69.65	7.10	57 - 90 (33)	131	91.6 %	131	8.4 %
Leipzig	Germany	354	188	53.3 %	165	46.7 %	72.73	8.65	60 - 97 (37)	218	63.4 %	126	36.6 %
Barcelona	Spain	271	110	40.6 %	161	59.4 %	71.96	7.44	60 - 94 (34)	182	67.4 %	88	32.6 %
Copenhagen	Denmark	384	190	50.1 %	189	49.9 %	72.35	8.29	60 - 95 (35)	308	81.7 %	69	18.3 %
Paris	France	164	87	53.0 %	77	47.0 %	76.65	8.39	60 - 97 (37)	48	65.8 %	25	34.2 %
Prague	Czech Republic	325	131	40.3 %	194	59.7 %	71.36	7.72	60 - 93 (33)	196	61.1 %	125	38.9 %
Budapest	Hungary	333	103	30.9 %	230	69.1 %	73.80	8.68	60 - 97 (37)	143	42.9 %	190	57.1 %
Oslo	Norway	324	151	47.3 %	168	52.7 %	75.14	8.01	60 - 91 (31)	269	88.2 %	36	11.8 %
Victoria	Canada	202	93	46.0 %	109	54.0 %	72.93	8.52	60 - 95 (35)	168	84.4 %	31	15.6 %
Melbourne	Australia	376	153	41.8 %	213	58.2 %	75.63	6.92	62 - 94 (32)	307	83.7 %	60	16.3 %
Seattle	USA	295	124	42.0 %	171	58.0 %	72.00	8.35	60 - 95 (35)	218	73.9 %	77	26.1 %
Beer-Sheva	Israel	250	82	33.9 %	160	66.1 %	70.32	7.58	59 - 96 (37)	195	81.3 %	45	18.8 %
Tokyo	Japan	188	86	46.5 %	99	53.5 %	69.39	5.70	60 - 88 (28)	111	60.7 %	72	39.3 %
Umea	Sweden	455	212	46.6 %	243	53.4 %	72.74	8.21	60 - 99 (39)	337	76.2 %	105	23.8 %
Guangzhou	China	-	-	-	-	-	-	-	-	-	-	-	-
Hong Kong	China	-	-	-	-	-	-	-	-	-	-	-	-
Porto Alegre	Brazil	328	107	32.6 %	221	67.4 %	71.78	7.74	60 - 93 (33)	270	82.3 %	58	17.7 %
Montevideo	Uruguay	248	68	27.4 %	180	72.6 %	73.19	7.08	60 - 98 (38)	191	78.0 %	54	22.0 %
Izmir	Turkey	327	156	47.7 %	171	52.3 %	70.97	5.31	65 - 96 (31)	148	45.3 %	179	54.7 %
Geneva	Switzerland	139	61	44.2 %	77	55.8 %	74.34	7.32	60 - 89 (29)	116	88.5 %	15	11.5 %
Vilnius	Lithuania	342	104	30.4 %	238	69.6 %	68.66	6.67	60 - 91 (31)	195	57.0 %	147	43.0 %
Total	-	5566	2298	41.5 %	3235	58.5 %	72.52	8.01	57 - 100 (43)	3843	71.5 %	1534	28.5 %

Table 7. Descriptive item characteristics for the 7 items of the WHOQOL-OLD-subscale "Intimacy" (n=5,566)

No.		WHOQOL-OLD	N	N_{valid}	Missing	Mean	SD	Floor	Ceiling	Skewness	Kurtosis	α	$r_{item-total}$ [1]
					(%)			(20 %)	(20 %)			(* if del.)	
1	F301	Opportunities to share innermost thoughts	5,566	5,480	86 (1.5)	3.19	1.10	8.2	10.9	-.22	- .63	.91	.64
2	F302	Feel a sense of companionship in life	5,566	5,460	106 (1.9)	3.48	1.08	7.2	15.2	-.67	- .09	.90	.71
3	F303	Experience love in your life	5,566	5,408	158 (2.8)	3.50	1.13	8.2	17.4	-.68	- .22	.89	.77
4	F304	Opportunities to love	5,566	5,369	197 (3.5)	3.44	1.23	11.0	20.2	-.59	- .59	.89	.75
5	F305	Satisfied with opportunities for physical contact and closeness	5,566	5,286	280 (5.0)	3.39	1.03	5.8	11.6	-.52	- .18	.90	.74
6	F306	Satisfied with level of intimacy in your life	5,566	5,239	377 (5.9)	3.44	1.01	5.2	12.0	-.57	- .04	.89	.73
7	F307	Opportunities to be loved	5,566	5,318	248 (4.5)	3.47	1.13	7.7	17.8	-.58	- .35	.89	.78
•	Score	*Intimacy*	5,566	5,070[2]	496 (8.9)[2]	3.43	.89	5.2	18.3	- .44	.26	.91	-

Note: [1] Corrected for overlap; [2] listwise.

Table 8: Itemfit and parameter estimation for the 4-item-WHOQOL-OLD-subscale "Sensory Abilities" using WINMIRA and RUMM

	WHOQOL-OLD "Sensory Abilities"		Q	Zq	p (X>Zq)	location	resid	χ^2	reverse thresholds (RUMM)	reverse thresholds (WINMIRA)
1	F251	Impairments to senses affect daily life	0.04	- 0.44	0.67	0.06	- 5.635	200.522	-	-
2	F252	Rate sensory functioning	0.07	0.33	0.37	0.41	4.797	261.988	-	-
3	F253	Loss of sensory abilities affect participation in activities	0.03	- 1.54	0.70	- 0.28	- 8.755	153.671	-	-
4	F254	Problems with sensory functioning affect ability to interact	0.06	0.65	0.26	- 0.19	4.244	186.229	-	-

Differential item functioning analyses of the 4-item-WHOQOL-OLD-subscale "Sensory Abilities"

	WHOQOL-OLD "Sensory Abilities"		Gender		Age group		Health		Centre	
			Δ-R^2	p (Δ-χ^2)	Δ-R^2	p (Δ-χ^2)	Δ-R^2	p (Δ-χ^2)	Δ-R^2	p (Δ-χ^2)
1	F251	Impairments to senses affect daily life	.001	.001	.000	.939	.001	.001	.001	.353
2	F252	Rate sensory functioning	.000	.268	.000	.199	.004	.000	.001	.035
3	F253	Loss of sensory abilities affect participation in activities	.000	.238	.001	.033	.001	.078	.001	.017
4	F254	Problems with sensory functioning affect ability to interact	.005	.000	.001	.002	.004	.000	.000	.165

Table 9: Itemfit and parameter estimation for the 4-item-WHOQOL-OLD-subscale "Autonomy" using WINMIRA and RUMM

	WHOQOL-OLD "Autonomy"		Q	Zq	p (X>Zq)	location	resid	χ^2	reverse thresholds (RUMM)	reverse thresholds (WINMIRA)
1	F261	Freedom to make own decisions	0.09	- 0.61	0.73	- 0.55	- 4.703	65.327	+	+
2	F262	Feel in control of your future	0.09	0.20	0.42	0.77	0.635	20.180	+	-
3	F263	Able to do things you'd like to	0.11	0.46	0.32	- 0.10	6.449	69.521	-	-
4	F264	People around you are respectful of your freedom	0.11	- 0.00	0.50	- 0.12	1.482	13.353	-	-

Differential item functioning analyses of the 4-item-WHOQOL-OLD-subscale "Autonomy"

	WHOQOL-OLD "Autonomy"		Gender		Age group		Health		Centre	
			Δ-R^2	p (Δ-χ^2)	Δ-R^2	p (Δ-χ^2)	Δ-R^2	p (Δ-χ^2)	Δ-R^2	p (Δ-χ^2)
1	F261	Freedom to make own decisions	.001	.220	.001	.025	.005	.000	.001	.032
2	F262	Feel in control of your future	.000	.803	.001	.009	.002	.000	.002	.000
3	F263	Able to do things you'd like to	.002	.000	.009	.000	.014	.000	.001	.119
4	F264	People around you are respectful of your freedom	.001	.428	.009	.000	.003	.000	.001	.010

Table 10: Itemfit and parameter estimation for the 6-item-WHOQOL-OLD-subscale "Past, Present and Future Activities" using WINMIRA and RUMM

	WHOQOL-OLD "Past, Present and Future Activities"		Q	Zq	p (X>Zq)	location	resid	χ^2	reverse thresholds (RUMM)	reverse thresholds (WINMIRA)
1	F271	Happy with things to look forward to	0.14	- 0.19	0.57	- 0.24	-0.988	11.785	-	-
2	F272	Satisfied with contribution to society	0.17	0.77	0.22	- 0.11	1.223	6.163	-	-
3	F273	Satisfied with opportunities to continue achieveing	0.12	0.01	0.50	0.35	-0.805	13.122	-	-
4	F274	Received the recognition you deserve in life	0.11	- 0.55	0.71	0.19	-2.737	18.619	-	-
5	F275	Satisfied with what you've achieved in life	0.11	- 0.86	0.81	- 0.23	-1.399	15.004	-	-
6	F276	Enough opportunities to talk about your past	0.14	1.83	0.20	0.04	6.605	43.805	-	-

Differential item functioning analyses of the 6-item-WHOQOL-OLD-subscale "Past, Present and Future Activities"

	WHOQOL-OLD "Past, Present and Future Activities"		Gender		Age group		Health		Centre	
			Δ-R^2	p (Δ-χ^2)	Δ-R^2	p (Δ-χ^2)	Δ-R^2	p (Δ-χ^2)	Δ-R^2	p (Δ-χ^2)
1	F271	Happy with things to look forward to	.001	.026	.001	.002	.010	.000	.008	.000
2	F272	Satisfied with contribution to society	.001	.095	.001	.106	.001	.054	.004	.000
3	F273	Satisfied with opportunities to continue achieving	.001	.0128	.015	.000	.010	.000	.002	.000
4	F274	Received the recognition you deserve in life	.002	.003	.009	.000	.004	.000	.001	.015
5	F275	Satisfied with what you've achieved in life	.001	.037	.002	.000	.005	.000	.003	.000
6	F276	Enough opportunities to talk about your past	.001	.372	.003	.000	.006	.000	.001	.010

Table 11: Itemfit and parameter estimation for the 7-item-WHOQOL-OLD-subscale "Social Participation" using WINMIRA and RUMM

	WHOQOL-OLD "Social Participation"		Q	Zq	p (X>Zq)	location	resid	χ^2	reverse thresholds (RUMM)	reverse thresholds (WINMIRA)
1	F281	Satisfied with the way you use your time	0.11	- 0.78	0.78	- 0.95	- 4.692	79.174	-	-
2	F282	Satisfied with level of activity	0.09	- 1.19	0.88	0.17	- 7.025	83.896	-	-
3	F283	Get out as much as you'd like to	0.10	0.42	0.34	- 0.20	4.225	17.190	-	-
4	F284	Have enough to do each day	0.09	- 0.64	0.74	- 0.05	- 1.636	20.893	-	-
5	F285	Engage in meaningful activities	0.12	- 0.03	0.51	0.14	3.452	12.786	-	+
6	F286	Feel isolated from the people around you	0.17	1.91	0.03	0.40	11.110	247.308	+	+
7	F287	Satisfied with opportunity to participate in community	0.13	0.12	0.45	0.49	0.467	20.050	-	-

Differential item functioning analyses of the 7-item-WHOQOL-OLD-subscale "Social Participation"

	WHOQOL-OLD "Social Participation"		Gender		Age group		Health		Centre	
			Δ-R^2	p (Δ-χ^2)	Δ-R^2	p (Δ-χ^2)	Δ-R^2	p (Δ-χ^2)	Δ-R^2	p (Δ-χ^2)
1	F281	Satisfied with the way you use your time	.001	.509	.004	.000	.001	.006	.001	.007
2	F282	Satisfied with level of activity	.000	.538	.000	.705	.003	.000	.006	.000
3	F283	Get out as much as you'd like to	.006	.000	.002	.000	.002	.002	.005	.000
4	F284	Have enough to do each day	.005	.000	.001	.061	.001	.051	.008	.000
5	F285	Engage in meaningful activities	.001	.122	.002	.000	.004	.000	.007	.000
6	F286	Feel isolated from the people around you	.002	.002	.002	.005	.001	.645	.003	.003
7	F287	Satisfied with opportunity to participate in community	.002	.001	.000	.967	.001	.026	.002	.000

Table 12: Itemfit and parameter estimation for the 5-item-WHOQOL-OLD-subscale "Death and Dying" using WINMIRA and RUMM

	WHOQOL-OLD "Death and Dying"		Q	Zq	p (X>Zq)	location	resid	χ^2	reverse thresholds (RUMM)	reverse thresholds (WINMIRA)
1	F291	Worried about the death of people close to you	0.14	2.66	0.00	0.54	17.559	431.551	-	-
2	F292	Concerned about the way you will die	0.06	- 1.44	0.93	- 0.33	- 7.957	151.350	-	-
3	F293	Afraid of not being able to control death	0.06	- 1.01	0.84	- 0.24	- 6.567	111.935	-	-
4	F294	Scared of dying	0.09	- 0.28	0.61	- 0.76	-1.661	51.814	-	-
5	F295	Fear pain before death	0.10	0.37	0.35	0.80	4.197	17.633	-	+

Differential item functioning analyses of the 5-item-WHOQOL-OLD-subscale "Death and Dying"

	WHOQOL-OLD "Death and Dying"		Gender		Age group		Health		Centre	
			Δ-R^2	p (Δ-χ^2)	Δ-R^2	p (Δ-χ^2)	Δ-R^2	p (Δ-χ^2)	Δ-R^2	p (Δ-χ^2)
1	F291	Worried about the death of people close to you	.001	.046	.003	.092	.003	.000	.004	.000
2	F292	Concerned about the way you will die	.001	.665	.002	.000	.001	.004	.001	.004
3	F293	Afraid of not being able to control death	.001	.030	.001	.263	.000	.141	.001	.005
4	F294	Scared of dying	.000	.274	.002	.000	.002	.000	.006	.000
5	F295	Fear pain before death	.000	.175	.000	.045	.002	.000	.004	.000

Table 13: Itemfit and parameter estimation for the 7-item-WHOQOL-OLD-subscale "Intimacy" using WINMIRA and RUMM

	WHOQOL-OLD "Intimacy"		Q	Zq	p (X>Zq)	location	resid	χ^2	reverse thresholds (RUMM)	reverse thresholds (WINMIRA)
1	F301	Opportunities to share innermost thoughts	0.09	1.74	0.04	0.34	13.259	184.438	-	-
2	F302	Feel a sense of companionship in life	0.07	0.21	0.42	- 0.25	2.875	11.751	-	-
3	F303	Experience love in your life	0.04	- 1.22	0.89	- 0.27	-4.143	32.543	-	-
4	F304	Opportunities to love	0.05	- 0.62	0.73	- 0.30	-2.046	24.281	+	-
5	F305	Satisfied with opportunities for physical contact and closeness	0.07	0.18	0.43	0.20	- 1.658	11.069	-	-
6	F306	Satisfied with level of intimacy in your life	0.07	0.31	0.38	0.16	- 1.067	13.704	-	-
7	F307	Opportunities to be loved	0.05	- 0.51	0.69	0.11	- 6.144	42.982	-	-

Differential item functioning analyses of the 7-item-WHOQOL-OLD-subscale "Intimacy"

	WHOQOL-OLD "Intimacy"		Gender		Age group		Health		Centre	
			Δ-R^2	p (Δ-χ^2)	Δ-R^2	p (Δ-χ^2)	Δ-R^2	p (Δ-χ^2)	Δ-R^2	p (Δ-χ^2)
1	F301	Opportunities to share innermost thoughts	.001	.010	.000	.150	.002	.000	.002	.000
2	F302	Feel a sense of companionship in life	.001	.019	.000	.946	.002	.001	.002	.000
3	F303	Experience love in your life	.001	.016	.001	.014	.001	.045	.002	.000
4	F304	Opportunities to love	.002	.000	.002	.000	.001	.000	.003	.000
5	F305	Satisfied with opportunities for physical contact and closeness	.001	.044	.001	.278	.002	.000	.000	.228
6	F306	Satisfied with level of intimacy in your life	.001	.010	.002	.002	.000	.649	.007	.000
7	F307	Opportunities to be loved	.002	.000	.001	.012	.001	.241	.001	.020

Table 14. Final set of Items for WHOQOL-OLD Module

Facet 25: Sensory Abilities $\alpha = .84$

F251 Impairments to senses affect daily life
F252 Rate sensory functioning
F253 Loss of sensory abilities affect participation in activities
F254 Problems with sensory functioning affect ability to interact

Facet 26: Autonomy $\alpha = .72$

F261 Freedom to make own decisions
F262 Feel in control of your future
F263 Able to do things you'd like to
F264 People around you are respectful of your freedom

Facet 27: Past, Present and Future Activities $\alpha = .74$

F271 Happy with things to look forward to
F273 Satisfied with opportunities to continue achieving
F274 Received the recognition you deserve in life
F275 Satisfied with what you've achieved in life

Facet 28: Social Participation $\alpha = .79$

F281 Satisfied with the way you use your time
F282 Satisfied with level of activity
F284 Have enough to do each day
F287 Satisfied with opportunity to participate in community

Facet 29: Death and Dying $\alpha = .84$

F292 Concerned about the way you will die
F293 Afraid of not being able to control death
F294 Scared of dying
F295 Fear pain before death

Facet 30: Intimacy $\alpha = .88$

F302 Feel a sense of companionship in life
F303 Experience love in your life
F304 Opportunities to love
F307 Opportunities to be loved

Figure 1: Subscale scores of the revised scales according to age

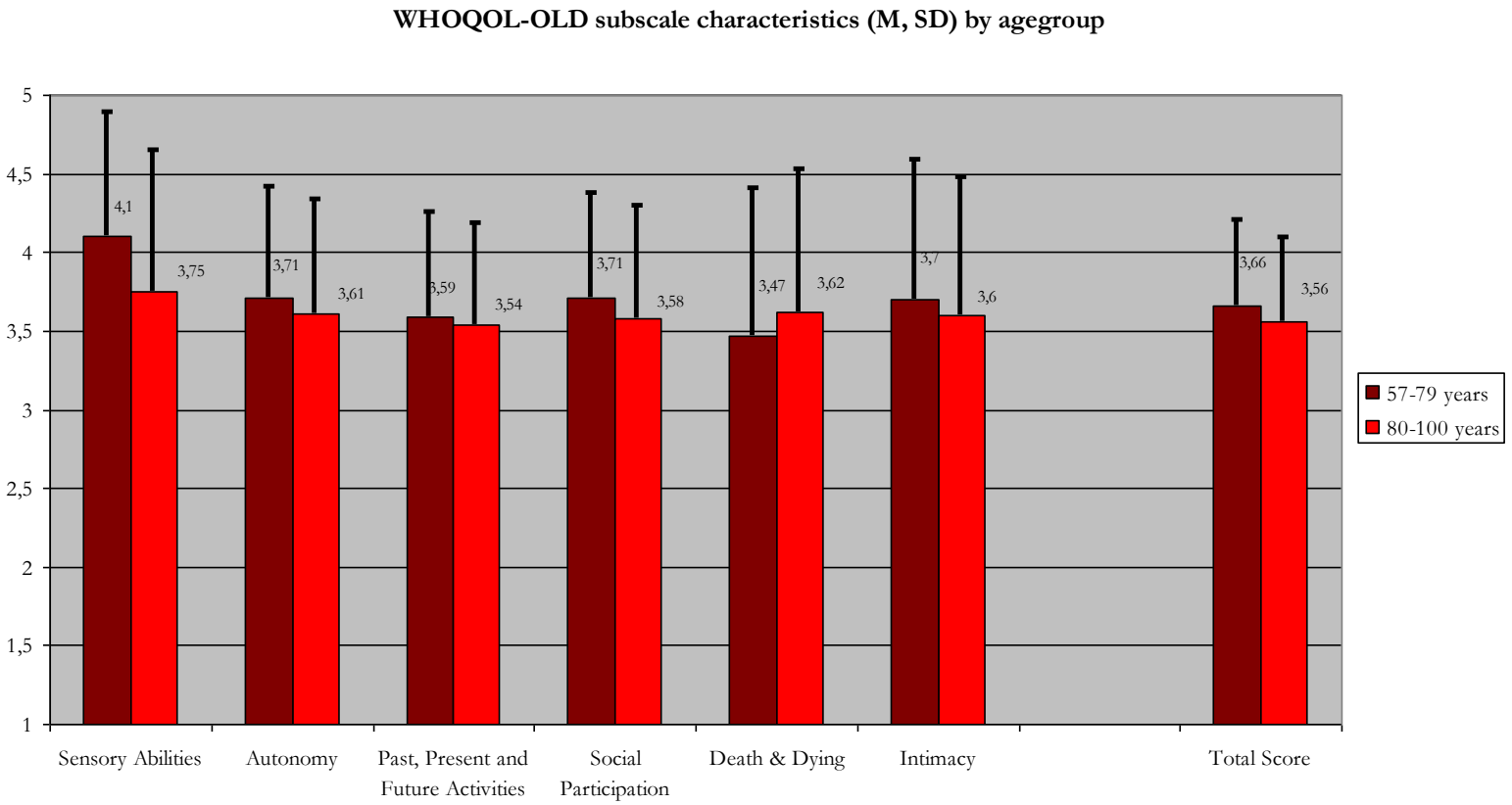

Figure 2: Subscale scores of the revised scales according to health status