in all patients with debilitating orthostatic hypotension? MacLean and Allen revisited after 70 years. Clin Auton Res 2009; 19: 8–12.
10. Fan CW, Gasparro D, Crowley V *et al* Acute haemodynamic response to sleeping head-up at 6 inches in older inpatients. Clin Auton Res 2009; 19: 51–7.
11. The Consensus Committee of the American Autonomic Society and the American Academy of Neurology. Consensus statement on the definition of orthostatic hypotension, pure autonomic failure, and multiple system atrophy. Neurology 1996; 46: 1470.
12. Cockcroft DW, Gault MH. Prediction of creatinine clearance from serum creatinine. Nephron 1976; 16: 31–41.
13. The Criteria Committee of the New York Heart Association. Diseases of the Heart and Blood Vessels. 6th edition. Boston, MA: Little Brown, 1964.
14. Fan CW, Coakley D, Walsh JB *et al* Sleeping with the head of the bed elevated: compliance and safety study on patients with orthostatic hypotension. Irish Gerontological Society Meeting 2005, 2005, UCD, Dublin, Ireland, 46.
15. Jordan J, Shannon JR, Black BK *et al* The pressor response to water drinking in humans: a sympathetic reflex? Circulation 2000; 101: 504–9.
16. Schroeder C, Bush VE, Norcliffe LJ *et al* Water drinking acutely improves orthostatic tolerance in healthy subjects. Circulation 2002; 106: 2806–11.
17. Shannon JR, Diedrich A, Biaggioni I *et al* Water drinking as a treatment for orthostatic syndromes. Am J Med 2002; 112: 355–60.
18. Claydon VE, Schroeder C, Norcliffe LJ *et al* Water drinking improves orthostatic tolerance in patients with posturally related syncope. Clin Sci (Lond) 2006; 110: 343–52.

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Comparing the importance of different aspects of quality of life to older adults across diverse cultures

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Abstract

Background: there is limited research examining the relative importance of aspects of quality of life (QOL) to older adults across cultures.
Objective: to examine the relative importance of 31 internationally agreed areas of QOL to older adults in 22 countries in relation to health status, age and level of economic development.
Design: a survey quota sampling design was used to collect cross-cultural data. This study reports a secondary analysis of WHOQOL-OLD pilot study, which was collected simultaneously in 22 centres.
Settings: a variety of community, primary, secondary and tertiary health care settings located in Australia, France, Switzerland, England, Scotland, USA, Israel, Spain, Japan, China (mainland and Hong Kong), Turkey, Lithuania, Czech Republic, Hungary, Canada, Norway, Sweden, Denmark, Germany, Brazil and Uruguay.
Participants: the total sample contained 7,401 people over 60 years with a mean age of 73.1 years; 57.8% were women and 70.1% considered themselves 'healthy'.
Results: there were significant differences in the importance given to various aspects of QOL for people living in medium and high-development countries. Culture explained 15.9% of the variance in the importance ratings of QOL. However, the interaction showed that cultural differences were reduced once health status, gender and age were taken into account. The

importance of QOL to age bands in different cultures was not significantly affected by whether or not participants perceived themselves to be healthy.
Conclusion: understanding the self-reported importance of diverse aspects of QOL for different cultures and for healthy and less healthy people may assist national and international policy makers to decide on priorities for the development of programmes for the ageing population.

Keywords: *ageing, World Health Organization, quality of life, cross-cultural, WHOQOL-100, WHOQOL-OLD*

Introduction

Although there is considerable research relating to quality of life (QOL) of older adults, there has been little interest in the importance of the various dimensions of QOL, nor has this been systematically investigated across diverse cultures. Data about the perceived importance of aspects of QOL could be useful in making decisions about those areas that warrant greatest attention in health and social care. The present study afforded a unique opportunity to assess the importance of a wide range of QOL dimensions in a large sample of sick and well older adults in 22 cultures.

A few studies within a single culture have investigated QOL importance in depth. In UK, Bowling [1] randomly selected 2,000 participants who identified and ranked the most important aspects of their QOL. Most highly ranked were relationships with family, their own health, health of a close person and finances/standard of living/housing, but during longstanding illness, different rankings were obtained [1]. Two other studies from single cultures focus on one single dimension of QOL, namely sex-life [2, 3].

Other methods have been used to study importance cross-culturally. For example, Saxena *et al.* [4] assessed the importance of QOL in a sample of 4,804 adults under age 65 recruited in 15 countries world-wide (mean age 45.6 years). They found significant differences in the mean importance ratings of people living in developing and developed countries. However, rank orders of important dimensions were highly correlated among centres. Greatest importance was awarded to activities of daily living (ADLs), having energy, overall health, happiness and enjoyment of life. Least important but not unimportant were the physical environment, support from others, body image and appearance and sex-life. Since the most participants were under 65 years, the findings cannot be confidently generalised to older populations.

Importance ratings have also been used to investigate whether it is possible to identify the very poorest QOL [5]. Skevington *et al.* [5] found that where QOL was especially important and also rated as poor, high importance further disenhanced the perception that QOL was poor. This effect that distinguished those with the poorest QOL from those with better levels was particularly evident for five areas (facets) of QOL, namely, mobility, social support, financial resources, negative feelings and working capacity. Such studies show how meaningful information about the importance of QOL could be.

In the present study, we investigated the relative importance of 31 QOL issues to older adults in 22 countries. We explored how socio-demographic differences in health status, gender and age affect these ratings, and whether people living in low- and middle-income countries rate their QOL any differently to those in high-income countries.

Methods

We present a secondary analysis of survey data from the WHOQOL-OLD pilot study which was used to develop and test the psychometric properties of the WHOQOL-OLD. This measure was designed to assess the QOL of adults over 60 years [6]. Testing was completed in 2003 simultaneously in 22 WHOQOL-OLD centres: Melbourne, Australia; Paris, France; Geneva, Switzerland; Bath, England; Edinburgh, Scotland; Seattle, USA; Beer Sheeva, Israel; Barcelona, Spain; Tokyo, Japan; Guangzhou, China; Hong Kong; Istanbul, Turkey; Vilnius, Lithuania; Prague, Czech Republic; Budapest, Hungary; Victoria, Canada; Oslo, Norway; Umea, Sweden; Copenhagen, Denmark; Leipzig, Germany; Porto Alegre, Brazil; Montevideo, Uruguay.

Design

A cross-sectional survey design was used to collect self-report data from participants. Quota sampling targeted equal numbers (50%) of men and women, younger and older (60–79 and 80+ years), and well and sick people. The international protocol recommended a minimum of 300 participants per centre.

Measures

Participants completed the WHOQOL-100 [7], WHOQOL-OLD [6] and 38 questions to rate the importance of 31 facets of QOL (some facets were assessed by more than one importance item). They also completed a range of socio-demographic and health questions, and identified themselves as healthy or unhealthy.

The WHOQOL-100 has 100 items organised into six domains and 24 facets of QOL; overall QOL and health comprise an overarching concept as the 25th dimension. The instrument has proven reliability and validity [7] with

internal consistency reliability exceeding 0.7 for most facets ($a = 0.65–0.93$). Test–retest reliability (2–8 weeks) ranged from 0.68 to 0.95. The instrument discriminates between sick and well people. Construct validity has been established internationally, using exploratory and confirmatory factor analysis [7].

The WHQOL-OLD module 'rounds out' the concept of QOL for older people by addressing six additional issues specific to the lives of older adults: sensory abilities, autonomy, past, present and future activities, social participation, death and dying and intimacy. Psychometric properties have been tested; the internal consistency reliability of the WHOQOL-OLD facets is high ($a = 0.83–0.94$) [6].

The importance questions (rather than the QOL core items) were the focus of this study. Thirty-eight importance questions covered the 31 facets of QOL in the WHOQOL-OLD and WHOQOL-100. Respondents report how important each aspect of life is to their QOL on a five-point Likert-type interval scale, from Not at all important (1) to extremely important (5). Cronbach's alpha for the importance items was calculated to be 0.94.

The Human Development Index (HDI) was obtained for each country. It was designed by the United Nations Development Program to assess country development levels annually [8], and combines life expectancy, educational attainment and income information into a composite index ranging between 0 and 1. Highly developed countries score 0.8 or above; scores for medium-development exceed 0.5 [9]. In this study, 19 developed countries (including Hong Kong) were in the high band of development, and China, Brazil and Turkey were in the medium HDI band [8].

Data collection

The research received ethical approval in each centre. The measures were translated and back-translated using an iterative process involving monolingual and bilingual groups [10]. They were completed by participants in the 22 countries using a variety of culturally appropriate methods; 2,965 questionnaires were returned by mail, 2,546 were self-administered (but not mailed), 1,381 participants were interviewer-assisted and other strategies were used for 169 participants.

Data analysis

Independent *t*-tests for differences between means were used to compare importance scores for the medium and highly developed countries. Comparisons were carried out using MANCOVA with repeated measures to investigate differences between cultures, including health status, age and gender as covariates. For this analysis, each WHOQOL-OLD facet was allocated to a WHOQOL domain, based on the international findings from the WHOQOL-OLD pilot study [6] and prior focus group research [11], and mean domain scores were calculated. Sensory abilities was allocated to the physical domain; autonomy, past, present and future activities to the psychological domain; social participation to the social domain; and death and dying to the spiritual domain. Age was recoded into three age bands: <69 years, 70–79 years and 80+ years.

Results

A total of 7,401 older adults participated, with a mean age of 73.1 years, of which 57.8% were female; 70.1% considered themselves to be healthy, although 92% reported one or more co-morbid conditions. Most variables had fewer than 3% missing values, except for items relating to sex-life (8.7%), and death and dying (6.7%). Demographic characteristics of participants in each of the 22 centres can be found in Supplementary data available in *Age and Ageing* online at http://www.ageing.oxfordjournals.org/.

Total sample means are summarised in Table 1. Mean importance ratings for all facets except sex-life were >3.0 on the five-point scale. These results showed that, with one exception, all these facets were important or very important to older adults. Highest importance was attributed to ADL ($M = 4.46$, SD = 0.71), general health ($M = 4.33$; SD = 0.67), sensory abilities ($M = 4.30$; SD = 0.71), mobility ($M = 4.29$; SD = 0.75), autonomy ($M = 4.24$; SD = 0.83) and energy ($M = 4.2$, SD = 0.70). Least important was sex-life ($M = 2.31$, SD = 1.29), opportunity to learn new skills ($M = 3.16$; SD = 1.12), social participation ($M = 3.32$; SD = 1.08) and a positive body image and appearance ($M = 3.36$, SD = 1.06).

The importance scores were compared for countries in the high-development ($n = 19$) and medium-HDI-development bands ($n = 3$), i.e. China, Turkey and Brazil [8] (see Table 1). Statistically significant differences between the ratings of participants in high- and medium-development countries on the *t*-tests are noted with asterisks. Overall, participants in highly developed countries rated the importance of most facets higher than those from the medium development group. However, eight facets of QOL were rated higher by the medium development group: health, freedom from pain, energy, restful sleep, freedom from dependence on medication or treatment, support from others, financial resources and access to adequate social care. There were no differences between development bands in terms of perceived home environment, and very small differences for energy or happiness; furthermore these facets were very important.

Table 2 shows the mean importance ratings for each culture, and there are a number of interesting findings, not all of which can be described here. Generally, the highest mean importance ratings were found in Uruguay and the lowest in Lithuania, although there are differences for each specific facet by culture. ADLs had the highest mean in all participating countries except Japan, mainland China and Hong Kong, Brazil, Turkey and Lithuania. Health was of

Table 1. Mean ratings of importance questions relating to country development level

Importance question	Overall		Development level				
			Developed		Developing		
	Mean	SD	Mean	SD	Mean	SD	
1. Overall QOL	3.96	0.78	3.97	0.75	3.88	0.90	***
2. Health	4.33	0.67	4.32	0.66	4.39	0.72	***
Domain 1: Physical health							
3. Free of pain	4.14	0.83	4.10	0.82	4.33	0.82	***
4. Energy	4.20	0.70	4.20	0.69	4.24	0.77	*
5. Restful sleep	4.14	0.74	4.12	0.74	4.24	0.72	***
Domain 2: Psychological							
6. Feel happiness/enjoyment of life	4.12	0.76	4.12	0.74	4.06	0.895	*
7. Feel content	4.08	0.75	4.10	0.72	3.96	0.91	***
8. Feel hopeful	3.98	0.82	4.01	0.80	3.84	0.93	***
9. Able to learn and remember important information	3.90	0.93	3.97	0.83	3.54	1.26	***
10. Able to think through everyday problems/make decisions	3.96	0.87	4.03	0.80	3.63	1.08	***
11. Being able to concentrate	4.02	0.80	4.08	0.73	3.69	1.04	***
12. Feel positive about self	3.95	0.86	3.99	0.82	3.76	1.03	***
13. Body image and appearance	3.36	1.06	3.45	0.97	2.91	1.36	***
14. Free of negative feelings	3.96	0.89	4.00	0.86	3.77	1.02	***
Domain 3: Levels of independence							
15. Able to move around	4.29	0.75	4.32	0.73	4.15	0.85	***
16. Able to take care of ADL	4.46	0.71	4.48	0.70	4.34	0.75	***
17. Free of dependence on medicines/treatments	3.93	1.01	3.89	1.02	4.16	0.89	***
18. Able to work	3.78	1.07	3.82	1.02	3.59	1.26	***
Domain 4: Social relationships							
19. Relationships with other people	4.02	0.80	4.05	0.77	3.84	0.93	***
20. Support from others	3.62	0.94	3.59	0.93	3.76	0.95	***
21. Sex-life	2.31	1.29	2.34	1.28	2.15	1.32	***
Domain 5: Environmental							
22. Feeling physically safe and secure	4.06	0.78	4.08	0.75	3.95	0.87	***
23. Home environment	4.14	0.75	4.14	0.74	4.12	0.81	
24. Financial resources	3.93	0.84	3.92	0.82	4.00	0.92	**
25. Being able to get adequate health care	4.23	0.76	4.25	0.74	4.14	0.85	***
26. Being able to get adequate social help	3.66	1.09	3.62	1.11	3.85	0.95	***
27. Chances for new information or knowledge	3.62	1.01	3.68	0.94	3.30	1.28	***
28. Chances to learn new skills	3.16	1.12	3.18	1.08	3.01	1.31	***
29. Relaxation/leisure	3.72	0.90	3.74	0.87	3.59	1.03	***
30. Environment	3.93	0.84	3.96	0.82	3.80	0.93	***
31. Adequate transport in everyday life	3.85	0.96	3.90	0.92	3.62	1.10	***
Domain 6: Spiritual, religious and personal beliefs							
32. Spiritual, religious and personal beliefs	3.70	1.13	3.75	1.07	3.43	1.39	***
WHOQOL-OLD facets							
33. Sensory abilities	4.30	0.71	4.31	0.69	4.24	0.80	**
34. Autonomy	4.24	0.83	4.32	0.75	3.85	1.08	***
35. Past, present and future activities	3.65	0.96	3.68	0.90	3.53	1.19	***
36. Use of time	3.76	0.92	3.82	0.85	3.46	1.16	***
37. Social participation	3.32	1.08	3.38	1.02	3.03	1.28	***
38. Death and dying	3.52	1.10	3.55	1.08	3.39	1.18	***

*$P < 0.05$; **$P < 0.01$; ***$P < 0.001$.

the highest importance in East Asia (Japan, China and Hong Kong) and Turkey. The mean importance of overall health was above 4.0 for all countries except for Lithuania (M = 3.86) but general QOL was not so highly rated. Sex-life was ranked of lowest importance to QOL in every country studied, from 1.71 in China to 3.09 in Uruguay. Spiritual, religious and personal beliefs were of least importance (2.38) in China and most importance to QOL (4.26) in Uruguay. In Brazil, sensory ability was most highly rated.

MANCOVA was used to investigate the effects of culture, age and health status on the importance of QOL and showed that there are significant differences in the importance given to QOL by older adults in different cultures. The most influential of these variables was culture, explaining 15.9% of the variance in the importance ratings of QOL. However, the interaction shows that the effect of cultural differences was reduced and therefore less important, once health status, gender and age were taken into account. The importance of QOL to age bands in different cultures was not significantly affected by whether or not participants perceived themselves to be healthy, as the results of this interaction show. The main effects show that

Table 2. Mean importance ratings by country

Importance Question	Overall	Edi	Bat	Lei	Bar	Den	Par	Pra	Bud	Osl	Can	Mel	Sea	Bee	Tok	Ume	Gua	Hko	Bra	Uru	Tur	Swi	Lit
Overall QOL	3.56	4.00	4.06	4.25	3.63	4.20	3.80	3.96	3.75	4.15	4.12	4.00	4.17	4.30	3.82	3.98	3.89	3.59	4.05	4.33	3.68	3.92	3.40
Health	4.33	4.22	4.24	4.63	4.17	4.48	4.06	4.35	4.06	4.45	4.37	4.36	4.38	4.63	4.47	4.09	4.44	4.37	4.41	4.59	4.32	4.06	3.86
Domain 1																							
Free of pain	4.14	3.96	3.89	4.57	4.12	4.38	3.77	4.03	4.07	3.94	3.91	4.07	3.97	4.36	4.28	3.87	4.32	4.24	4.44	4.55	4.24	3.64	3.80
Energy	4.20	4.08	4.16	4.46	4.12	4.35	4.14	4.13	4.11	4.15	4.24	4.19	4.26	4.53	4.22	3.97	4.17	4.09	4.35	4.63	4.22	4.08	3.80
Restful sleep	4.14	3.97	3.98	4.48	4.02	4.18	3.87	4.05	4.07	4.18	4.02	4.07	4.03	4.45	4.17	3.86	4.18	4.29	4.38	4.58	4.17	3.94	3.84
Domain 2																							
Feel happiness	4.12	4.02	4.08	4.43	4.15	4.38	4.06	4.09	3.75	4.11	4.08	4.15	4.22	4.42	4.13	4.04	3.96	3.99	4.34	4.62	3.94	4.13	3.59
Feel content	4.08	4.07	4.10	4.45	4.01	4.31	3.88	4.16	3.84	4.19	4.01	4.13	4.20	4.35	4.09	4.01	3.73	3.79	4.32	4.57	3.91	4.03	3.62
Feel hopeful	3.98	4.01	4.01	4.29	3.90	4.01	3.88	4.02	3.97	4.02	3.96	4.03	4.16	4.26	3.98	3.95	3.59	3.78	4.22	4.62	3.80	4.00	3.49
Able to learn	3.90	3.95	3.95	4.08	3.75	4.46	3.96	3.87	3.51	4.24	4.03	4.05	4.16	4.23	4.10	3.94	2.96	3.56	4.21	4.30	3.66	3.86	3.35
Able to think through	3.96	4.03	4.12	4.26	3.80	4.44	3.84	3.82	3.64	3.86	4.23	4.23	4.37	4.38	3.94	3.88	3.37	3.59	4.06	4.45	3.57	3.85	3.57
Able to concentrate	4.02	4.03	4.10	4.42	3.97	4.40	3.97	3.93	3.97	4.18	4.14	4.21	4.18	4.35	3.91	3.92	3.37	3.89	4.04	4.38	3.76	4.02	3.55
Feel positive	3.95	3.95	3.96	4.31	4.12	4.49	4.09	3.60	3.88	3.77	4.12	4.11	4.15	4.41	3.65	3.95	3.5	3.73	4.28	4.56	3.62	4.20	3.15
Body image	3.36	3.25	3.25	3.91	3.43	3.74	3.20	3.23	3.39	3.40	3.60	3.50	3.58	3.84	3.04	3.82	2.35	3.14	3.88	4.06	2.74	3.20	2.83
Free of neg. feelings	3.96	3.84	3.91	4.35	4.07	4.34	3.92	3.84	3.92	4.08	3.89	4.07	4.03	4.36	3.83	3.89	3.48	3.69	4.29	4.49	3.65	3.84	3.55
Domain 3																							
Able to move	4.29	4.23	4.37	4.73	3.91	N/A	4.32	4.24	4.33	4.54	4.44	4.39	4.46	4.50	4.18	4.25	4.09	3.79	4.39	4.80	4.00	4.32	4.00
ADL	4.46	4.44	4.56	4.80	4.24	4.67	4.56	4.36	4.45	4.67	4.54	4.50	4.63	4.75	4.27	4.47	4.34	4.04	4.46	4.85	4.21	4.48	3.96
Medicines/treatments	3.93	3.63	3.74	4.03	3.90	4.21	3.99	3.69	3.98	3.62	3.66	3.79	3.63	4.39	3.88	3.64	4.19	4.04	4.27	4.45	4.02	3.79	3.80
Able to work	3.78	3.42	3.67	4.04	3.75	4.12	3.95	3.92	3.89	4.05	3.36	3.45	3.69	4.03	3.90	3.81	3.09	3.46	4.11	4.55	3.74	3.86	3.78
Domain 4																							
Relationships	4.02	3.99	4.01	4.24	3.96	4.16	3.96	4.00	4.04	4.32	4.07	3.92	4.16	4.27	3.93	4.10	3.54	3.59	4.29	4.47	3.80	4.06	3.80
Support from others	3.62	3.52	3.48	3.77	3.95	3.77	3.51	3.56	3.33	3.90	3.43	3.42	3.67	3.60	3.05	3.65	3.67	3.73	4.12	4.50	3.53	3.25	3.26
Sexual life	2.32	2.06	2.22	2.59	2.37	2.70	2.50	2.03	1.77	2.20	2.28	2.30	2.60	2.95	2.21	2.58	1.71	1.90	2.74	3.09	2.15	2.05	2.03
Domain 5																							
Physically safe	4.06	4.08	3.99	4.34	4.05	4.21	3.83	3.93	3.98	4.24	4.00	4.11	4.22	4.35	4.03	4.00	3.69	3.93	4.25	4.55	4.02	3.82	3.77
Home environment	4.14	4.26	4.29	4.58	4.19	4.08	3.98	3.69	4.16	4.41	4.21	4.20	4.17	4.50	3.85	4.14	3.89	3.86	4.40	4.55	4.15	3.99	3.63
Financial resources	3.93	3.93	3.98	4.29	3.67	3.63	3.59	3.67	3.84	3.90	4.05	4.06	4.21	4.31	3.79	3.93	3.99	3.74	4.18	4.40	3.84	3.54	3.73
Adequate health care	4.23	4.19	4.22	4.48	4.20	4.47	4.10	3.96	4.17	4.23	4.45	4.29	4.44	4.58	4.10	4.20	3.89	4.24	4.40	4.63	4.22	3.90	3.73
Adequate social help	3.66	3.54	3.36	3.95	4.01	3.96	3.54	3.41	3.56	3.10	3.41	3.72	3.67	3.26	3.67	3.46	3.60	3.76	4.14	4.53	3.93	3.35	3.42
New information	3.62	3.54	3.51	3.99	3.50	4.06	3.62	3.66	3.40	3.73	3.79	3.42	3.91	3.98	3.78	3.64	2.66	3.30	4.01	4.17	3.48	3.49	3.19
Learn new skills	3.16	2.94	2.90	3.25	3.00	3.35	3.41	3.45	2.95	3.16	3.16	2.82	3.48	3.44	3.13	3.42	2.34	2.98	3.73	4.09	3.22	3.30	2.78
Relaxation/leisure	3.72	3.77	3.80	4.11	3.56	3.94	3.87	3.85	3.70	3.78	3.78	3.70	3.78	3.47	3.85	3.44	3.45	3.44	4.03	4.04	3.36	3.84	3.37
Environment	3.93	3.92	4.02	4.31	3.86	4.06	3.80	3.85	3.95	3.93	4.15	3.96	4.00	4.12	3.92	3.80	3.80	3.67	3.99	4.13	3.62	3.85	3.69
Transportation	3.85	3.91	4.03	4.17	3.75	3.88	4.03	3.68	3.73	3.91	4.11	3.97	4.22	4.11	3.95	3.86	3.19	3.58	4.03	4.17	3.81	4.04	3.28
Extra facets																							
Personal beliefs	3.70	3.71	3.69	4.10	3.73	3.39	3.21	3.71	4.12	3.98	3.90	3.85	4.11	4.02	3.84	3.38	2.38	3.07	4.17	4.26	4.11	3.36	3.53
Sensory abilities	4.30	4.28	4.24	4.60	4.14	4.51	4.22	4.27	4.17	4.54	4.28	4.34	4.37	4.60	4.13	4.25	4.09	4.26	4.49	4.70	4.18	4.19	3.78
Autonomy	4.24	4.36	4.44	4.48	4.11	4.60	4.39	4.27	4.04	4.33	4.49	4.46	4.51	4.68	4.17	4.21	3.50	3.81	4.33	4.61	3.86	4.39	3.82
Past present future activities	3.65	3.62	3.60	4.14	3.56	3.87	3.65	3.64	3.73	3.62	3.56	3.72	3.65	4.15	3.69	3.50	2.88	3.14	4.17	4.36	3.80	3.65	3.11
Use of time	3.76	3.77	3.84	4.37	3.73	3.87	3.75	3.96	3.72	3.82	3.70	3.79	3.68	4.15	3.94	3.44	3.21	3.56	3.97	4.33	3.30	3.70	3.41
Social participation	3.32	3.24	3.28	4.01	3.35	3.16	3.09	3.18	3.68	3.98	3.34	3.42	3.36	3.46	3.34	3.57	2.53	3.03	3.65	N/A	3.10	3.32	2.85
Death and dying	3.52	3.63	3.72	3.71	3.78	3.41	3.70	3.31	3.58	4.02	3.83	3.77	3.94	3.60	3.42	3.59	3.15	2.66	3.80	N/A	3.31	3.75	2.92

Table 3. Results of a cross-cultural comparison of the importance of QOL in relation to age band and health status, adjusted for gender (MANCOVA)

	Sum of squares	df	Mean square	*F*	*P*	Partial eta squared
Gender	82.67	1	82.67	66.16	0.0001	0.009
Culture	1636.77	21	77.94	62.37	0.0001	0.159
Health status	17.65	1	17.65	14.12	0.0001	0.002
Age band	143.03	2	71.52	57.23	0.0001	0.016
Culture × Health	29.14	21	1.39	1.11	0.328	0.003
Culture × Health × Age	52.72	42	1.26	1.00	0.463	0.006

the importance of QOL decreases from 3.9, for those under 69, to 3.7 for over 80 s, and this downward trend is reflected in the means of all the cultures studied (Table 3).

Discussion

To our knowledge, the present study is the only one to systematically assess the importance attributed by older adults to various aspects of QOL in a large number of diverse cultures. These importance rankings are useful for policy analysts who may wish to plan for improvement to areas of QOL that are of greatest importance to older adults in their country or culture. A multifaceted approach considering national population health and social data, importance rankings and QOL scores (both the WHOQOL-100 and WHOQOL-OLD) would be useful to policy makers in allocating scarce resources. Given limited resources, it may be useful to make decisions about programmes and services for older adults on the basis of perceived importance to the older adults themselves. It appears that many of the physical aspects of QOL such as energy, freedom from pain, ADLs and ability to move are especially important.

As might be expected, there were statistically significant differences in the mean importance ratings between participants in developed and developing countries. People in developing countries rated overall health and every facet of physical QOL of higher importance than those in developed countries. Similarly, it was more important in developing countries to have support from others, sufficient financial resources to meet their needs, and to be able to get adequate social care. These findings are consistent with those of Skevington *et al.* [5] who found that mobility, financial resources, social support, working capacity and being free from negative feelings best distinguished those with the poorest QOL from others whose QOL was better. More recently, Skevington [12] ran focus groups in the low- and middle-income countries of Ethiopia, Bangladesh, Peru and Thailand and found that physical fitness and survival, social status, community relations, family life, work opportunity and environment, fairness and equality and perceptions of political institutions were new aspects of QOL that were particularly important to people in developing countries. Another issue of interest is that three very important aspects of QOL showed little difference between developing and developed countries, suggesting that energy, happiness and home environment may be universally of high importance to older adults; this could be further investigated in more countries.

It was interesting to consider the cross-cultural differences in the perceived importance of the various aspects of QOL. In this study, participants in Lithuania and Hungary reported the lowest importance ratings for health as well as the lowest rates of self-reported health. In countries where health is poor, one might expect that it would be highly important. For example, people in Turkey rated health to be of the highest importance, but only 57.4% considered themselves to be healthy. In Hungary and Lithuania, ADLs and movement were rated higher on average than health, although only 41 and 54.8% of the samples, respectively, considered themselves to be healthy. Both Hungary and Lithuania are undergoing socioeconomic transitions and some have described a 'post-communist syndrome' characterised by lack of feeling of citizenship, lack of identification with community and withdrawal into family that may affect perceptions of importance of aspects of QOL [13, 14].

Although there were differences in the magnitude of mean ratings, facet rankings of QOL were similar in this sample of older adults to those of younger adults under 65 [4], particularly at the upper and lower extremes. For instance, ADLs were rated highest by older adults in the present study (mean 4.52), and the previous younger population (mean 4.29). Importance of overall health (4.33) in this study was similar (4.28) to that of younger adults in the Saxena *et al.* [4] study in 15 countries. Both younger and older populations rated sex life as lowest in importance (3.29 and 2.32 respectively) [2].

Although different levels of importance were attributed to aspects of QOL in various cultures, such differences ceased to be apparent when a person's health status, gender and age were taken into account. That is, culture was less important when health was controlled. Numerous studies have noted the significant effect of health on QOL *per se* [15], but it is interesting to note that health significantly impacts older adults' perceptions of importance. Professionals designing programmes and/or policies should likely consider the different perceptions of healthy and ill older adults.

The study is limited because quota and convenience sampling, rather than representative sampling strategies were employed. Study samples could not be representative of the general population in the participating countries because the statistics necessary to construct this sampling frame were not available in every centre. Not all regions of the world were represented in the study, notably Africa and the sub-continent of India. The sample also included a limited number of the oldest old population, who are typically sicker, less active and more likely to be cognitively impaired. Replication of these findings with representative samples and across a wider range of cultures would enhance their generalisability.

Because of the preliminary nature of this research, explanations for perceived importance ratings have not been fully explored. A mixed-methods approach that included qualitative methods would offer an opportunity to gain better understandings of participants' reasons for decisions about importance and insights into cross-cultural and health-related differences in the perceptions of importance of various aspects of QOL. Future research could also address the relative importance of other aspects of life not considered in this study. Suffering, grief and negative aspects of life could be considered as well as the facets of QOL.

It is evident that there are differences in importance ratings related to QOL on the basis of socioeconomic status of countries, culture, health status and age. Understanding the self-reported importance of diverse aspects of QOL for different cultures and for healthy and less healthy people may be useful to policy makers to decide on priorities for the development of programmes for the ageing population.

Key points

- There are differences in importance given to aspects of QOL in developed and developing countries.
- Culture explained the highest proportion of the variance in importance ratings of QOL. There is an interaction with age, health and culture.
- Overall, the highest mean ratings of importance were found in Uruguay, and the lowest in Lithuania.
- Ability to perform ADL had the highest mean rankings most countries.

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Supplementary data

Supplementary data mentioned in the text is available to subscribers in *Age and Ageing* online.

Conflicts of interest

None declared.

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References

1. Bowling A. What things are important in people's lives? A survey of the public's judgements to inform scales of health related quality of life. Soc Sci Med 1995; 41: 1447–62.
2. Gott M, Hinchliff S. How important is sex in later life? The views of older people. Soc Sci Med 2003; 56: 1617–28.
3. Robinson J. Older Adults and Sexuality: The Relationship to Quality of Life. Masters thesis. University of Victoria: Victoria, British Columbia, Canada, 2004.
4. Saxena S, Carlson D, Billington R, Orley J. The WHO quality of life assessment instrument: the importance of its items for cross-cultural research. Qual Life Res 2001; 10: 711–21.
5. Skevington SM, O'Connell KA, WHOQOL Group. Can we identify the poorest quality of life? Assessing the importance of quality of life using the WHOQOL-100. Qual Life Res 2004; 13: 23–4.
6. Power M, Quinn K, Schmidt S, WHOQOL-OLD Group. Development of the WHOQOL-OLD module. Qual Life Res 2005; 14: 2197–214.
7. WHOQOL Group. The World Health Organization Quality of Life assessment: development and general psychometric properties. Soc Sci Med 1998; 46: 1569–85.
8. United Nations Development Program. Human development reports. http://hdr.undp.org/en/statistics/ (18 June 2008, date last accessed).

9. Noorbakhsh F. A modified Human Development Index. World Dev 1998; 26: 517–28.
10. The WHOQOL Group: In Orley J, Kuyken W, eds. The Development of the World Health Organisation Quality of Life Assessment Instrument (the WHOQOL), Quality of Life Assessment: International Perspectives. Heidelberg: Springer, 1994; 41–60.
11. Hawthorne G, Davidson N, Quinn K *et al* Issues in conducting cross-cultural research: implementation of an agreed international protocol designed by the WHQOL Group for the conduct of focus groups eliciting the quality of life of older adults. Qual Life Res 2006; 15: 1257–70.
12. Skevington SM. Conceptualizing dimensions of quality of life in poverty. J Community Appl Soc Psychol 2009; 19: 35–50.
13. Klicperova M, Feierabend IK, Hofstetter CR. In the search for a post-communist syndrome. A theoretical framework and empirical assessment. J Community Appl Soc Psychol 1997; 7: 39–52.
14. Dragomirecka E, Bartonova J, Eisemann M *et al* Demographic and psychosocial correlates of quality of life in the elderly from a cross-cultural perspective. Clin Psychol Psychother 2008; 15: 193–204.
15. Low G, Molzahn AE. Replication of a quality of life model for older adults. Res Nurs Health 2007; 30: 141–50.

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Effects of ageing on cerebral haemodynamics assessed during respiratory manoeuvres

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Abstract

Background: cerebral autoregulation (CA) is the ability to control cerebral blood flow during fluctuations in arterial blood pressure (ABP). It is impaired in a number of conditions including acute stroke, though studies so far have not found a decline in CA with age. CA is very sensitive to changes in pCO_2.
Objective: this study investigates the effect of ageing on CA using a moving-window autoregressive moving average (MW-ARMA) to calculate CA as autoregulatory index (ARMA-ARI) during hypercapnia and hypocapnia, to ascertain whether this method would detect age-related differences in CA due to change in pCO_2.
Method: ECG was used to measure R–R interval, Finapres to measure ABP and capnography to measure end-tidal CO_2. Transcranial Doppler ultrasonography was used to measure left and right middle cerebral artery cerebral blood flow velocity (CBFV). Hypercapnia was induced by a breath-hold, hypocapnia by hyperventilation.
Results: thirty volunteers of mean age 25 ± 6 years and 30 volunteers of mean age 64 ± 4 years were recruited. CBFV was higher and change in CBFV due to respiratory manoeuvre was significantly greater in the younger group compared with the older group. However, no difference in ARMA-ARI was found between the groups.
Conclusion: these findings suggest that CA is not affected by healthy ageing.

Keywords: *ageing, cerebral blood flow, cerebral autoregulation, autoregulation index, end-tidal CO_2, hypercapnia, elderly*

Introduction

Cerebral autoregulation (CA) is the ability of the cerebral vasculature to maintain cerebral blood flow (CBF) despite fluctuations in cerebral perfusion pressure [1]. It has static properties (described as the response to gradual changes in perfusion pressure) and dynamic properties (the response to very rapid changes) [2]. CA is impaired in some disease states, including head injury [3, 4], carotid artery disease [5], liver failure [6], neonatal prematurity [7, 8] and autonomic failure [9].