



# Temporal changes in importance of quality of life domains: a longitudinal study in community-dwelling Swiss older people

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Accepted: 28 August 2018 / Published online: 3 September 2018  
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## Abstract

**Purpose** Population aging is a global phenomenon requiring interventions to improve quality of life (QoL), a subjective and dynamic concept. Such interventions should be based on QoL domains considered as important from older people's viewpoint. It is unclear whether and how much these domains may vary over time as people age. This study aims to assess the importance of QoL domains, their pattern and determinants of change among the non-institutionalized older population over a 5-year period.

**Methods** This longitudinal study included community-dwelling older adults ( $N=1947$ , aged 68–77 years at baseline) from the Lausanne cohort 65+. In 2011 and 2016, participants rated the importance of 28 QoL items in seven domains. The difference between scores (0–100) of importance attributed to each QoL domain between two assessments was calculated and used as a dependent variable to assess the associations with covariates in multivariable analysis for each domain.

**Results** Importance scores slightly but significantly decreased in five of the seven QoL domains. Despite the majority of participants did not modify their ranking of importance for each QoL domain between the two time points, the proportion of change was still substantial. Bivariate and multivariable analyses showed that education and to a lesser extent age, living arrangement and morbidity, were associated with decrease in the importance of specific QoL domains; characteristics indicating vulnerability (e.g., low education or morbidity) were associated with a decline in the importance.

**Conclusion** Although aging individuals modified the importance they give to the seven QoL domains, at population level, changes in opposite directions overall resulted in only small decline; importance seems less stable over time among individuals with vulnerable sociodemographic and health profiles.

**Keywords** Quality of life · Importance · Older people · Longitudinal study

**Electronic supplementary material** The online version of this article (<https://doi.org/10.1007/s11136-018-1983-4>) contains supplementary material, which is available to authorized users.

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## Introduction

Population aging is a global phenomenon with an accelerating pace. Projections indicate that the proportion of persons aged 60 years or over will increase from 12.3% in 2015 to 16.5% in 2030 worldwide; this phenomenon is poised to have implications for almost all sectors of society [1] leading to interest in interventions to add quality to extended years of life in older people [2]. To achieve this aim, it would be critical to gain better insight on domains that are considered important for the quality of life (QoL) in older persons.

There is no consensus on the definition of QoL [3]; indeed, since QoL is a multidimensional and subjective concept covering domains of varying importance to different people [4]. Furthermore, assessment of QoL results from the dynamic interaction between external conditions and internal perceptions of those conditions [5]. As these conditions may vary over time, the importance of specific domains may not necessarily remain static for a given individual [6] and, accordingly, the respective weights and importance individuals attach to these domains may also change in varied phases of life [4]. Also, in assessing change in QoL, such variability can lead to the so-called ‘response shift’ phenomenon referred as a change in the respondent’s internal standards (recalibration), values (change in the importance of the component domains or reprioritization) or conceptualizations (redefinition of the concept of QoL) which then affects perceived QoL [7–9]. Studies showed that changes in health-related QoL were underestimated when response shift was not taken into account [10–13]. Hence, questions arise not only over how important the domains of QoL are but also the extent to which their importance change with time.

The difference and change in importance of QoL have been studied in clinical settings (referred as between patients variation [14] and within patients variation [6] or reprioritization [8], respectively) and only regarding health-related aspect of QoL, which have been long used as outcomes in the evaluation of health and social care interventions [2, 15, 16]. To our knowledge, studies investigating the change in importance or so-called reprioritization of QoL domains—broadly defined—are still lacking among non-institutionalized older people. Thus, this study aimed (1) to measure the importance of QoL domains at two time points; (2) to assess the change in the importance of each domain over 5 years; and (3) to examine the determinants of change in the importance of each domain.

## Materials and methods

### Study population and design

This is a longitudinal study using data drawn from the Lausanne cohort 65+, an observational cohort study investigating age-related frailty among persons aged 65 years and over living in Lausanne, Switzerland. Detailed descriptions of the study design have been reported elsewhere [17]. Two representative samples of the community-dwelling population of Lausanne city enrolled at the age of 65–70 in 2004 and 2009 were drawn. The current study focuses on surviving, non-institutionalized, participants still living in Lausanne, without cognitive impairment in 2011 and who completed both 2011 and 2016 assessments in person (i.e., only self-reports were included and proxy-reports were excluded) (Supplementary Fig. 1). The two samples were combined; in 2011 from the initial 3053 participants, 2459 (80.5%) were eligible for the 2011 assessment of QoL. In 2016, 1947 (79.2% of participants eligible in 2011) were still eligible and had complete data. The protocol was approved by the Ethics Committee of the Faculty of Biology and Medicine of the University of Lausanne (Protocol No. 19/04).

### Data collection

All the data required for the current study (sociodemographic, health and quality-of-life-related data) were collected through a postal questionnaire [18].

### Sociodemographic and health-related measures

Sociodemographic data included gender, age groups in 2011 (68–72 years vs. 73–77 years), educational level categorized, based on the International Standard Classification of Education (ISCED) [19], as low (obligatory school or ISCED 0–2), medium (apprenticeship or ISCED 3) or high (college, university degree or equivalent or ISCED 4–8), and living arrangement in 2011 (alone vs. not alone). For morbidities in 2011, the participants were asked whether they suffered from or received treatment for any of 12 selected health conditions or diseases diagnosed by a physician over the last 12-month period: hypertension, myocardial ischemia, other heart disease, stroke, diabetes, chronic lung disease, asthma, osteoporosis, arthrosis or arthritis, malignant neoplasm, ulcer and Parkinson’s disease. The number of reported medical diagnoses was further categorized into three groups (“zero,” “one,” “two or more”).

### Importance of QoL domains and its change

In 2011 and 2016, the same 28-item questionnaire reflecting the convergence of health, social, cultural and economic

factors was filled by participants to assess the importance of each item on their QoL (Supplementary Table 1). Participants were asked to rate the importance of each item (0 = very low; 1 = quite low; 2 = quite high; 3 = very high). A factorial structure, consisting of seven QoL domains, was previously explored and validated with sufficient internal consistency within each domain; the seven domains include “Material resources,” “Close entourage,” “Social and cultural life,” “Esteem and recognition,” “Health and mobility,” “Feeling of safety,” and “Autonomy” [18]. The importance score of each domain at both study time points was computed through summing up the ratings of constituent items, dividing by the maximum possible score (number of constituent items multiplied by three), and then multiplying by 100 to obtain a score ranging from 0 to 100, with higher scores indicating higher importance. The importance scores for QoL domains with more than one missing constituent item within each domain were treated as missing. The difference between importance scores of QoL domains in two assessments was calculated by subtracting the importance scores of the 2011 assessment from those of 2016 for each domain.

### Statistical analysis

Statistical analysis was performed using Stata software version 15.0 (Stata Corp, College Station, TX, USA). The QoL data (mean scores) of baseline and follow-up were compared using the *t* test. The effect size of change score (difference between follow-up and baseline) for each domain was calculated using Cohen’s *D*. Effect size was interpreted as small ( $> 0.2$ ), medium ( $> 0.5$ ), or large ( $> 0.8$ ) [20]. The mean differences of scores between baseline and follow-up in subgroups of the study were presented and compared using a linear regression analysis adjusting for the mean importance score at baseline for each domain. Considering difference score of importance between baseline and follow-up as outcome, linear regression analyses were performed adjusting for independent variables including importance score for each domain at baseline, gender, age group, educational level category, living arrangement, and morbidity category. Statistical significance was considered for a two-side test with  $P < 0.05$ .

## Results

### Characteristics of participants

Descriptive characteristics of the included participants are summarized in Table 1. The majority were female, aged between 68 and 72 years, with middle or high education and cohabiting. More than two-thirds of them were diagnosed with no or one active disease or medical condition.

### Scores of the importance of QoL domains

Mean scores of the importance of the seven domains of QoL at baseline and follow-up and mean of change (difference between baseline and follow-up) are summarized in Table 2. There was a decreasing trend in the importance of all QoL domains but the “Material resources” domain. The effect size of change score (difference between follow-up and baseline) for all domains was lower than 0.20.

### Ratings of the importance of QoL domains

Ratings of the importance of the QoL domains at baseline and follow-up are summarized in Supplementary Fig. 2. While “very high” was the most frequent rank for the “Health and mobility,” “Feeling of safety,” and “Autonomy” domains at both assessments, “quite high” was the most frequent rank for other domains at both baseline and follow-up.

### Change in the importance of QoL domains

The proportions of change in the mean importance score of QoL domains between baseline and follow-up are presented in Fig. 1 (proportions of change per items were also provided in Supplementary Table 1). In all domains, the proportion of participants whose importance ratings decreased was higher than that of increased ratings; this pattern was particularly obvious in the “Health and mobility” domain.

**Table 1** Baseline (2011) characteristics of included participants ( $n = 1947$  participants)

	Number (%)
Gender	
Men	741 (38.1)
Women	1206 (61.9)
Age (years)	
68–72	1076 (55.3)
73–77	871 (44.7)
Education	
High	792 (40.7)
Middle	776 (39.9)
Low	376 (19.4)
Living arrangement	
Not alone	1161 (59.9)
Alone	778 (40.1)
Morbidity	
0 Active medical condition	660 (34.0)
1	667 (34.4)
2 or more	612 (31.6)

**Table 2** Scores of the importance of QoL domains at baseline (2011) and 5-year follow-up (2016)

Domains	Baseline (2011)	Follow-up (2016)	<i>P</i> value*	Mean $\pm$ SD of change (difference between follow-up and baseline)	Effect size**
Health and mobility	84.8 $\pm$ 16.8	81.8 $\pm$ 18.4	<0.001	-3.28 $\pm$ 17.8	0.17
Feeling of safety	80.7 $\pm$ 17.3	79.9 $\pm$ 17.4	0.031	-0.92 $\pm$ 18.4	0.05
Autonomy	80.2 $\pm$ 15.3	78.8 $\pm$ 16.6	<0.001	-1.31 $\pm$ 15.8	0.09
Close entourage	73.0 $\pm$ 18.7	71.3 $\pm$ 18.9	<0.001	-1.76 $\pm$ 17.0	0.09
Esteem and recognition	69.6 $\pm$ 19.4	68.9 $\pm$ 19.8	0.061	-0.90 $\pm$ 20.5	0.04
Material resources	69.5 $\pm$ 15.0	69.8 $\pm$ 15.5	0.555	0.22 $\pm$ 16.4	0.00
Social and cultural life	58.3 $\pm$ 20.4	57.3 $\pm$ 20.8	0.003	-1.23 $\pm$ 17.1	0.05

Results are expressed as mean  $\pm$  standard deviation

\*Based on *t* test

\*\*Cohen's *d* effect size. Effect size is interpreted as small (>0.2), medium (>0.5) or large (>0.8)

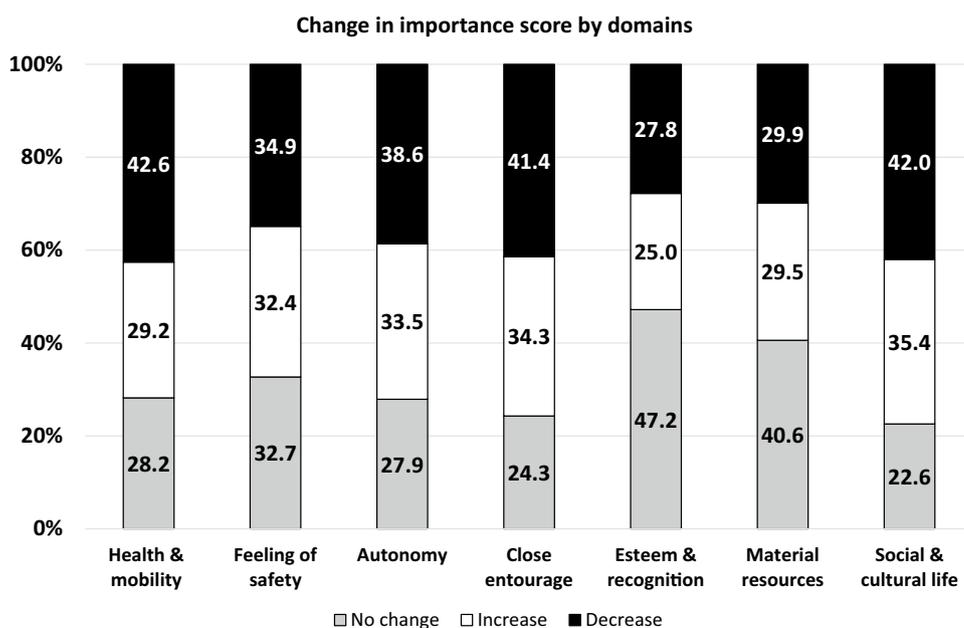
### Determinants of change in the importance of QoL domains

Mean and standard deviation of difference between importance mean scores of baseline and follow-up per domain according to the participants' characteristics in 2011 are presented in Table 3 (bivariate analysis); according to adjusted *P* values for importance score in baseline, age group was associated with change in importance given to "Health and mobility" ( $P < 0.001$ ), "Feeling of safety" ( $P = 0.004$ ), and "Social and cultural life" ( $P = 0.035$ ) domains; education level was associated with change in "Health and mobility" ( $P < 0.001$ ), "Feeling of safety" ( $P = 0.007$ ), "Autonomy" ( $P < 0.001$ ), "Close entourage" ( $P = 0.045$ ), and "Social and cultural life" ( $P = 0.005$ ) domains. Living arrangement was associated with change

in "Close entourage" ( $P < 0.001$ ) and morbidity was associated with "Health and mobility" ( $P < 0.001$ ) and "Social and cultural life" ( $P = 0.001$ ) domains. Gender had no significant effect on the evolution of importance given to any domain.

Determinants of change in the importance of the QoL domains are presented in Table 4 (multivariable analysis). A decreasing importance with time was recorded for the higher age category in "Health and mobility" ( $P = 0.002$ ) and "Feeling of safety" ( $P = 0.007$ ) domains, and lower education levels were associated with decreasing importance given to all but the "Esteem and recognition" and "Material resources" domains. Likewise, living alone at baseline was related to decreasing importance of the "Close entourage" ( $P < 0.001$ ) domain and a higher level of morbidity was associated with declining importance

**Fig. 1** Prevalence of change in the mean importance score of QoL domains between baseline (2011) and follow-up (2016)



**Table 3** Mean  $\pm$  standard deviation of difference in importance mean scores between 2011 and 2016 per domain according to the participants' characteristics in 2011

	Health and mobility	Feeling of safety	Autonomy	Close entourage	Esteem and recognition	Material resources	Social and cultural life
<b>Gender</b>							
Men	-2.40 $\pm$ 18.3	-0.53 $\pm$ 17.9	-1.17 $\pm$ 15.5	-1.97 $\pm$ 16.7	-0.53 $\pm$ 20.3	0.23 $\pm$ 16.9	-1.07 $\pm$ 16.8
Women	-3.84 $\pm$ 17.5	-1.18 $\pm$ 18.7	-1.40 $\pm$ 15.9	-1.61 $\pm$ 17.2	-1.13 $\pm$ 20.6	0.22 $\pm$ 16.0	-1.34 $\pm$ 17.3
Adjusted <i>P</i> value*	0.203	0.296	0.202	0.912	0.100	0.943	0.142
<b>Age at baseline</b>							
68–72	-2.64 $\pm$ 17.6	-0.03 $\pm$ 18.3	-1.14 $\pm$ 15.2	-1.26 $\pm$ 16.5	-0.76 $\pm$ 20.2	0.52 $\pm$ 16.2	-0.64 $\pm$ 16.8
73–77	-4.11 $\pm$ 18.0	-2.07 $\pm$ 18.5	-1.53 $\pm$ 16.4	-2.42 $\pm$ 17.6	-1.08 $\pm$ 20.8	-0.15 $\pm$ 16.6	-2.02 $\pm$ 17.5
Adjusted <i>P</i> value	<0.001	0.004	0.109	0.088	0.179	0.319	0.035
<b>Education</b>							
High	-2.44 $\pm$ 16.5	-0.42 $\pm$ 17.8	-0.67 $\pm$ 14.7	-1.88 $\pm$ 16.5	-1.09 $\pm$ 20.7	-0.48 $\pm$ 14.9	-1.98 $\pm$ 15.9
Middle	-3.83 $\pm$ 18.0	-1.37 $\pm$ 18.5	-1.99 $\pm$ 16.1	-1.69 $\pm$ 16.3	-1.07 $\pm$ 19.8	0.22 $\pm$ 16.3	-0.87 $\pm$ 16.7
Low	-4.06 $\pm$ 20.2	-1.18 $\pm$ 19.4	-1.36 $\pm$ 17.1	-1.71 $\pm$ 19.6	-0.15 $\pm$ 21.6	1.87 $\pm$ 19.5	-0.48 $\pm$ 20.5
Adjusted <i>P</i> value	<0.001	0.007	<0.001	0.045	0.311	0.104	0.005
<b>Living arrangement</b>							
Not alone	-3.20 $\pm$ 17.5	-0.62 $\pm$ 18.4	-1.19 $\pm$ 15.5	-2.14 $\pm$ 15.6	-0.97 $\pm$ 19.9	0.26 $\pm$ 16.3	-1.18 $\pm$ 16.9
Alone	-3.36 $\pm$ 18.3	-1.42 $\pm$ 18.4	-1.53 $\pm$ 16.2	-1.09 $\pm$ 19.3	-0.82 $\pm$ 21.3	0.20 $\pm$ 16.4	-1.26 $\pm$ 17.4
Adjusted <i>P</i> value	0.970	0.585	0.339	<0.001	0.516	0.143	0.854
<b>Morbidity</b>							
0 Active medical condition	-2.55 $\pm$ 17.3	0.32 $\pm$ 18.5	-0.99 $\pm$ 15.4	-2.14 $\pm$ 16.7	-1.34 $\pm$ 20.9	0.88 $\pm$ 16.3	-0.28 $\pm$ 16.3
1	-3.39 $\pm$ 17.2	-1.25 $\pm$ 17.6	-1.46 $\pm$ 15.9	-1.86 $\pm$ 17.0	-0.21 $\pm$ 20.5	-0.19 $\pm$ 16.4	-1.35 $\pm$ 17.5
2 or more	-3.93 $\pm$ 19.0	-1.90 $\pm$ 19.1	-1.54 $\pm$ 16.1	-1.28 $\pm$ 17.3	-1.09 $\pm$ 19.9	-0.03 $\pm$ 16.5	-2.27 $\pm$ 17.5
Adjusted <i>P</i> value	<0.001	0.149	0.080	0.649	0.347	0.127	0.001

\*Using linear regression adjusting for importance score at baseline

in the “Health and mobility” ( $P=0.001$ ) and “Social and cultural life” ( $P=0.004$ ) domains.

## Discussion

This population-based study provides the first evidence on the change in importance of QoL domains among non-institutionalized older people over time as well as detailed information on the main determinants of these changes in the importance of each domain.

### Importance of QoL domains at two time points and their changes

Although all QoL domains, at both time points, were found to be “quite high” to “very important,” the proportion of the older population attributing a “very high” importance slightly decreased in all domains between baseline and

follow-up assessments. The decrease in the importance of all domains, in general, and of the “Health and mobility” domain, in particular, can also be interpreted by the model of selective optimization with compensation, proposed by Paul Baltes and Margret Baltes [21]. This model conceptualizes aging as a process of continuous selection in the investment of motivational and cognitive resources, under conditions of an age-related decline in the ratio between developmental gains and losses and of decreasing reserve capacity [22]. However, this model should be tested using data on such losses. In sum, changes in the importance of QoL domains might be explained by the model of selective optimization with compensation and the extent of change can be related to the nature and vulnerability of domains by aging, i.e., older people gave less importance to those QoL domains that have deteriorated. Also, at individual level, such a decrease, from the highest extreme on first assessment could be partly due to the so-called phenomenon of the regression to the mean by which, when observing repeated measurements in the

**Table 4** Determinants of change in the importance of the QoL domains, multivariable models

	Health and mobility	Feeling of safety	Autonomy	Close entourage	Esteem and recognition	Material resources	Social and cultural life
Baseline importance score	<b>-0.51 (-0.55; -0.46)</b>	<b>-0.57 (-0.61; -0.52)</b>	<b>-0.47 (-0.52; -0.43)</b>	<b>-0.44 (-0.48; -0.40)</b>	<b>-0.55 (-0.59; -0.51)</b>	<b>-0.58 (-0.63; -0.54)</b>	<b>-0.35 (-0.39; -0.32)</b>
Gender							
Man	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.
Woman	-0.55 (-2.15; 1.06)	1.33 (-0.25; 2.90)	1.13 (-0.30; 2.56)	1.29 (-0.29; 2.87)	1.34 (-0.43; 3.12)	0.51 (-0.89; 1.91)	1.56 (-0.05; 3.17)
Age at baseline							
68–72	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.
73–77	<b>-2.42 (-3.92; -0.92)</b>	<b>-2.02 (-3.48; -0.56)</b>	-0.90 (-2.22; 0.42)	-1.19 (-2.69; 0.31)	-0.97 (-2.62; 0.68)	-0.48 (-1.78; 0.82)	-1.18 (-2.67; 0.32)
Education							
High	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.
Middle	<b>-3.27 (-4.90; -1.65)</b>	-0.94 (-2.52; 0.65)	<b>-2.51 (-3.94; -1.07)</b>	-0.88 (-2.50; 0.74)	-1.69 (-3.48; 0.10)	-1.05 (-2.47; 0.37)	<b>-2.15 (-3.80; -0.50)</b>
Low	<b>-5.55 (-7.69; -3.40)</b>	<b>-2.75 (-4.82; -0.69)</b>	<b>-3.48 (-5.36; -1.60)</b>	<b>-2.56 (-4.73; -0.40)</b>	-0.78 (-3.11; 1.55)	-1.34 (-3.18; 0.51)	<b>-3.07 (-5.26; -0.88)</b>
Living arrangement							
Not alone	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.
Alone	0.41 (-1.18; 1.99)	-0.71 (-2.27; 0.85)	0.42 (-0.99; 1.83)	<b>-3.96 (-5.66; -2.26)*</b>	0.19 (-1.56; 1.94)	-1.12 (-2.50; 0.27)	-0.35 (-1.95; 1.24)
Morbidity							
0 Active medical condition	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.
1	-0.63 (-2.40; 1.13)	0.29 (-1.45; 2.02)	-0.52 (-2.08; 1.05)	0.15 (-1.61; 1.91)	0.94 (-1.01; 2.89)	-0.95 (-2.50; 0.59)	-1.46 (-3.23; 0.30)
2 or more	<b>-2.99 (-4.83; -1.15)</b>	-0.80 (-2.59; 1.00)	-1.06 (-2.68; 0.57)	-0.28 (-2.14; 1.58)	-0.73 (-2.75; 1.30)	-0.96 (-2.56; 0.64)	<b>-2.68 (-4.52; -0.85)</b>

Results are expressed as regression coefficients beta and 95% confidence interval

Significant coefficients are in bold

same subject, relatively high (or relatively low) observations are likely to be followed by less extreme ones, nearer the subject's true mean [23]. This phenomenon may particularly affect the "Health and mobility" domain, which had the highest importance at baseline and also the highest difference (decrease) between both assessments.

An important contribution of this study is to highlight that the overall slight decrease at population level in the importance score of the QoL domains may not reflect the extent of individual-specific changes. In all domains, the proportion of change was substantial, with similar proportions in the direction of change within each domain. This suggests a very dynamic ranking that a global measure of change at the population level will not bring out.

### Determinants of change in the importance of QoL domains

Positive associations between living alone and decreased importance of "Close entourage" domain, between low

education and decreased importance of most of the domains, as well as between a higher level of morbidity and decreased importance of "Social and cultural life" domain can be due to the higher vulnerability of people living alone, low educated and with higher number of morbidities. Regarding age group, those in higher age were more likely to decrease the importance of "Health and mobility" and "Feeling of safety" domains. This finding is consistent with a cross-sectional study assessing the importance of different aspects of QoL to older adults across diverse cultures which showed a decrease in the importance of QoL aspects by age, a downward trend reflected in the means of all the cultures studied [24]. The importance of the domain of health and mobility was also reported to be negatively associated with age in a study using the same questionnaire in different study populations [18]. Gender was not associated with change in the importance of any QoL domain. However, significant gender differences in importance of most of the 38 studied QoL facets to older adults in 22 countries were noted in a cross-sectional international investigation [25]; and certain items of QoL were

also perceived more important to women than men among Norwegian older adults [4]. It seems that gender is associated with the importance of QoL domains cross-sectionally but not with changes observed longitudinally. In sum, education and to a less extent, age, living arrangement and morbidity, may have an impact on the evolution, inducing particularly a decrease in the importance given to specific QoL domains; characteristics indicating vulnerability were associated with a decrease in the importance of specific QoL domains. In general, it seems that poorer individual sociodemographic and health conditions tended to more decrease the importance of specific QoL domains.

## Strengths and limitations

This study attempted to contribute to a deeper understanding of the diversity and variability of the importance of QoL domains over time in the aging process. Its main strength included a longitudinal design that allowed us to assess the change in the importance of QoL domains over 5 years in a population-based sample. While the change in importance of the domains or reprioritization has been taken into account in health-related QoL research as a source of response shift, to our knowledge there is no study assessing change in importance of broadly defined QoL domains.

A limitation of this study is the relatively short time frame (5 years) that limited the ability to observe major shift; yet, significant changes were observed; further analysis with a longer follow-up would be interesting to perform to further understand the dynamic evolution of the ranking in domains of importance in QoL.

## Conclusion

There are slight changes in the importance of the seven domains of QoL at population level because individual reports of increased and decreased importance balance practically. Decreases in the importance of QoL domains occurred more frequently in vulnerable sociodemographic and health profiles. Professionals and policy makers designing interventions to add quality to extended years of life for older people should likely consider the decrease of perceived importance of QoL domains among older, especially most vulnerable, people over time.

**Funding** This work was supported by a prize awarded by the Leenaards Foundation. The Lc65+ study has been supported by University of Lausanne Hospital Centre; University of Lausanne Department of Ambulatory Care and Community Medicine; Canton de Vaud Department of Public Health; City of Lausanne; Loterie Romande (research Grant 2006–2008); Lausanne University Faculty of Biology and Medicine (multidisciplinary research Grant 2006); Swiss National Foundation for Scientific Research (Grant 3247B0-120795/1); and Fondation

Médecine Sociale et Préventive, Lausanne. The sponsors had no role in the design, execution, analysis and interpretation of data, or writing of the study.

## Compliance with ethical standards

**Conflict of interest** The authors have no conflict of interest to declare.

**Ethical approval** All procedures were in accordance with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. The protocol of the study was approved by the Ethics Committee of the Faculty of Biology and Medicine of the University of Lausanne (Protocol No. 19/04).

**Informed consent** Informed consent was obtained from all individual participants in Lc65+.

**Confidentiality** The data were collected and coded before being handled for analysis and the investigators were blinded to the identities of the participants.

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