



Do established health-related quality-of-life measures adequately capture the impact of chronic conditions on subjective well-being?

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ABSTRACT

Objectives: The paper explores how two well-established, utility-based health-related quality-of-life (HRQoL) measures (EQ-5D and 15D) capture the negative effects of various chronic conditions on subjective well-being (SWB). This is important, as both SWB and health utility can be important aims of health policy and instruments in resource allocation. **Methods:** A general population survey representing the Finnish population aged 30 years and over covering 25 self-reported somatic conditions and four psychiatric disorders diagnosed by interviews.

Results: Both EQ-5D and 15D fail to capture the effects of some chronic conditions on SWB, but the conditions differ between the instruments. Even after controlling for both EQ-5D and 15D simultaneously, common psychiatric disorders decrease SWB by 0.4 points on a scale 1–10.

Conclusions: Using health utility as a basis for resource allocation is likely to underfund the treatment of psychiatric disorders, in comparison to their effect on the SWB of the population. Different HRQoL instruments yield somewhat different results for different conditions.

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1. Introduction

Health is an integral component of the quality of life. Health-related quality of life (HRQoL) is an increasingly important outcome measure in health care, as the ethos of health care has gradually changed from the paternalistic reduction of illness to improving the subjective well-being of autonomous individuals. Another reason has been the epidemiological transition of the burden of disease from high-mortality diseases, such as infections, to

various chronic conditions. Third, the optimal allocation of health care resources is a crucial issue in all industrialized countries, because a rapidly aging population and new technologies increase both possibilities and costs. HRQoL holds great promise for health economics [1]. The debate as to which outcome measure should be used in the allocation of resources is, however, far from over, for both theoretical and practical reasons [2].

Preference-based, generic health-related quality-of-life (HRQoL) measures, such as EQ-5D, SF-6D, HUI, AQoL and 15D, enable numeric valuation of different health states as a single summary score. This is commonly referred to as health utility, and reflects the subjective preferences of individuals for various health states [1]. Utility scores are also the quality-component of quality-adjusted life years (QALYs) which enable direct comparison of different

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diseases and treatments. QALYs have become important in health economics and health policy decision-making [3], but the differences in methodology have resulted in greatly varying estimates for specific conditions [4].

However, the ultimate goal for human existence, in many streams of ancient and modern culture, is not health or functional capacity as such but to make people “happy” or “satisfied” with their lives [5]. In psychology and economics, the pursuit of determining what makes people happy or satisfied with their lives has been done by means of quantitative research using representative data sets with answers to questions on subjective well-being (SWB) [6–11].

It is evident that HRQoL measures and SWB focus, at least partly, on different aspects of well-being. HRQoL measures stress the state of health and functional capacity strongly, while SWB puts more weight on the personal feeling of well-being. Thus, SWB captures also non-health aspects of individual well-being. Hence, its main promise is that it is a broader measure of individual well-being than HRQoL. The potential discrepancy between HRQoL and SWB measures is particularly topical, because the prominent economists and social scientists have advocated recently that the advanced societies should put much more emphasis on the improvement of SWB and even use SWB as the ultimate metric of social progress [5]. This potential difference becomes also a major health policy issue when one of these measures is used to set health care goals and to measure outcomes. Therefore, it is particularly important to know whether the increasingly popular HRQoL and SWB measures are competing concepts in policy setting.

The purpose of this paper is to empirically approach these two strands of health policy aims by estimating whether SWB and HRQoL measures disagree in their ability to capture the negative effects of chronic conditions. More specifically, the aim is to test whether 29 common somatic and psychiatric conditions influence SWB, even after controlling for the state of health and functional capacity as defined by two established utility-based HRQoL measures, EQ-5D and 15D. To our knowledge, this has not been systematically explored previously.

The implications of this are important especially for health policy setting. If chronic conditions are associated with lower SWB even after controlling for HRQoL, this reveals that HRQoL measures do not adequately measure all the negative effects of ill health. In particular, if there are systematic differences between chronic conditions, choosing SWB or HRQoL as a basis for rationing resources in the health care sector will systematically bias some conditions. Furthermore, if health utility scores produced by different HRQoL instruments differ between conditions, comparison of QALYs achieved with different instruments becomes also problematic.

2. Materials and methods

2.1. The survey

The study is based on the Health 2000 survey, which comprehensively represents the Finnish population aged 30 years and over. The methods and base results of the sur-

vey have been previously described in detail [12], and are available at <http://www.terveys2000.fi/>. Briefly, the survey had a two-stage, stratified cluster sampling design, with double sampling of people over 80 years of age [13]. Data were collected between August 2000 and July 2001. Of the original sample of 8028 people, 93% participated in at least one part of the study.

2.2. Socio-demographic factors and diagnostics

Data on socio-demographic factors and somatic diseases were collected using structured interviews at home or in an institution, with a participation rate of 88%. Participants were asked whether they had ever been diagnosed for any of 43 specified diseases and conditions by a physician. If they answered yes, detailed condition-specific questions were asked. Twenty-five somatic conditions were included in this analysis, based on their public health importance, chronic nature, and the reliability of self-report diagnostic classification [14]. The conditions were grouped in clinically relevant ICD-10-based categories [15]. Chronic obstructive pulmonary disease, chronic bronchitis, and asthma were classified as pulmonary disorders. Heart failure, myocardial infarction, coronary heart disease, and hypertension were classified as cardiovascular disorders. Rheumatoid arthritis, osteoarthritis, and problems of the back or neck requiring a visit to a physician in the last 12 months were classified as musculoskeletal disorders. Hearing loss and disturbing tinnitus were classified as problems of hearing. Unoperated cataract, glaucoma, and macular degeneration were classified as problems of vision. Migraine, Parkinson's disease, and stroke (as the only exception from the ICD-10, due to its mostly neurological sequela) were classified as neurological disorders. Diabetes, a disturbing allergy requiring a visit to a physician in the last 12 months, psoriasis, inflammatory bowel disease, cancer, and urinary incontinence were grouped as other disorders.

As psychiatric disorders cannot be reliably diagnosed with self-report, we used a structured interview, the Munich version of the Composite International Diagnostic Interview (M-CIDI) [16]. Of the sample, 75% participated in the CIDI, which lasted 23 min, on average, and was used to assess a 12-month prevalence of depressive-, alcohol use- and anxiety disorders [17] with DSM-IV [18] criteria. Psychotic disorders were included if self-reported or if the physician conducting the health examination made a diagnosis of probable psychotic disorder.

2.3. Health-related quality-of-life and subjective well-being

We use two established HRQoL measures: 15D and EQ-5D. 15D, available at www.15d-instrument.net, includes 15 dimensions: mobility, vision, hearing, breathing, sleeping, eating, speech, elimination, usual activities, mental function, discomfort and symptoms, depression, distress, vitality, and sexual activity [19–21]. Each dimension has five grades of severity. In calculating the 15D score, valuations elicited from the Finnish population using the multiattribute utility method were used [20]. The 15D

values range between 1 (full health) and 0 (dead). 15D compares favourably with similar instruments in most of the important properties [19–23]. Subjects with 12 or more completed 15D dimensions were included, and missing values were predicted with linear regression analysis using the other 15D dimensions, age and sex as independent variables [19].

EQ-5D [24–26], available at www.euroqol.org, has five dimensions: mobility, self-care, usual activities, pain or discomfort, and anxiety or depression. These are each divided into three categories of severity corresponding to no, moderate, or extreme problems. We used the most common tariff, the UK time-trade-off (TTO) values [27] to convert these HRQoL states to health utility scores. EQ-5D TTO scores range from 1 (full health) to -0.59 (0 = being dead). EQ-5D is among the most evaluated of HRQoL measures [28]. Only respondents fully completing the EQ-5D questionnaire were included in the analysis.

SWB was measured by asking: “All things considered, how satisfied have you been with your life as a whole during the past 30 days?” on a scale from 1 to 10, where 0 is anchored as the poorest possible and 10 as the best possible quality of life. The mean level of SWB is 7.591 with the standard deviation of 1.734. This is the type of question that is used in psychology and economics to capture happiness or life satisfaction. Seventy-seven percent of the sample completed the 15D, 77% completed the EQ-5D and 83% completed the SWB measure.

2.4. Statistical methods

We estimate OLS regressions with the following structure:

Model (1): $SWB = a_i(\text{chronic condition}_i) + \text{controls}$.

Model (2): $SWB = a_i(\text{chronic condition}_i) + b(15D) + \text{controls}$.

Model (3): $SWB = a_i(\text{chronic condition}_i) + b(\text{EQ-5D TTO}) + \text{controls}$.

Model (4): $SWB = a_i(\text{chronic condition}_i) + b(15D) + c(\text{EQ-5D TTO}) + \text{controls}$.

SWB is the dependent variable in all four specifications. Model (2) controls for 15D and model (3) controls for EQ-5D TTO. Finally, model (4) controls for both 15D and EQ-5D TTO. This is done because different HRQoL instruments differ somewhat in the domains they include [2], and controlling for two different HRQoL instruments should capture the whole concept of HRQoL better. All models (1)–(4) include the following (unreported) control variables that capture socioeconomic status: sex, age categories (30–44, 45–54, 55–64, 65–74 and 75–), an indicator for those who are married or cohabiting, education categories (basic, secondary or higher education), and tax-based family income that was adjusted for family size [29] and divided into quintiles. To account for the prevalence of comorbidity (i.e. the fact that many old individuals, especially, have two or more chronic conditions simultaneously), we estimate models (1)–(4) by including all eight groups of chronic conditions in the same specification.

The coefficient of interest in all different specifications is “ a_i ”, which quantifies the negative well-being effect of chronic condition i on SWB. In particular, the estimation results from the models (2)–(4) reveal whether chronic conditions have a negative effect on SWB even after controlling for 15D or/and EQ-5D TTO. We use Stata version 10.1 (Stata Corp, College Station, TX) to estimate linear OLS regressions. The stratified sampling framework of the data is accounted for in the empirical analyses, as we use survey data methods and appropriate weights in all estimations.

3. Results

The results and prevalence of conditions are reported in Table 1. All chronic conditions have a statistically significant negative effect on SWB (Column 1). The coefficients reveal that having a psychiatric disorder has the largest negative impact on SWB, by a wide margin. The common psychiatric disorders that are included decrease SWB by ~ 1 point on a scale 1–10, other things being equal. This effect is more than twice that of musculoskeletal disorders, which have the second largest negative effect on SWB. Cardiovascular disorders have the smallest effect of all the eight chronic conditions on SWB. They are the most common chronic condition (Column 5).

After controlling for 15D and all individual background attributes, musculoskeletal disorders and psychiatric disorders are still statistically significantly negatively related to SWB (Column 2). The largest negative coefficient prevails for psychiatric disorders. The point estimate implies that the prevalence of psychiatric disorders decreases SWB by 0.45 points on a scale 1–10, after controlling for 15D.

After controlling for EQ-5D, psychiatric disorders and other disorders are still associated with lowered SWB (Column 3). The largest negative effect on SWB prevails again for psychiatric disorders: they decrease SWB by 0.65 points after controlling for EQ-5D TTO.

After controlling for as wide a concept of HRQoL as possible, i.e. both 15D and EQ-5D TTO, psychiatric disorders still have a substantial independent negative effect on SWB: -0.42 points (Column 4). 15D and EQ-5D together do capture the effects of other groups of chronic conditions.

4. Discussion

Different conditions have varying effects on different domains of functioning and subjective well-being. Preference-based HRQoL instruments are a theoretically promising and increasingly used approach to measuring health and functional status. Although HRQoL and SWB are both important, they are different concepts and may yield different results if used as outcome measures in health care and health policy. Further, different HRQoL instruments include different domains of health [2], so comparison of instruments is essential.

This study examines the role of 25 somatic conditions and four psychiatric disorders as determinants of SWB, and whether two established HRQoL measures are able to capture the negative effects of chronic conditions on SWB. Our approach shows why it is important to consider the effects of different aspects of health on SWB.

Table 1
Chronic conditions as determinants of subjective well-being in the total population.

	Model (1): SES	Model (2): SES + 15D	Model (3): SES + EQ-5D	Model (4): SES + 15D + EQ-5D	Prevalence, %
Pulmonary disorders	−0.228*** (0.0683)	0.0444 (0.0552)	−0.115 (0.0608)	0.0293 (0.0554)	12.5
Cardiovascular disorders	−0.132*** (0.0430)	−0.00706 (0.0373)	−0.0693 (0.0400)	−0.00833 (0.0370)	32.7
Musculoskeletal disorders	−0.468*** (0.0592)	−0.153*** (0.0506)	−0.0699 (0.0530)	−0.0292 (0.0497)	31.3
Hearing problems	−0.144*** (0.0559)	−0.0428 (0.0489)	−0.0976 (0.0499)	−0.0460 (0.0476)	23.0
Vision problems	−0.200* (0.0799)	0.0285 (0.0750)	−0.0926 (0.0774)	0.0226 (0.0759)	8.5
Psychiatric disorders	−0.999*** (0.0695)	−0.450** (0.0627)	−0.651*** (0.0605)	−0.417*** (0.0600)	11.7
Neurological disorders	−0.217*** (0.0691)	−0.0514 (0.0617)	−0.0756 (0.0606)	−0.0223 (0.0592)	10.8
Other disorders	−0.333*** (0.0556)	−0.0799 (0.0455)	−0.154*** (0.0481)	−0.0550 (0.0435)	27.8
N	5584	5584	5584	5584	5584

Notes: The dependent variable is SWB in all four models. All models include the following (unreported) control variables that capture socioeconomic status (SES): sex, age groups, indicator for those who are married or cohabiting, education, and family income, as described in the text. The model in Column 2 also controls for 15D and the model in Column 3 controls for EQ-5D TTO. The model in Column 4 controls for both 15D and EQ-5D TTO. All models are estimated by using OLS. Standard errors in parentheses. Column 5 reports the means of the indicators for chronic conditions.

** $p < 0.05$ (statistical significance).

*** $p < 0.01$ (statistical significance).

Our results reveal that all the medical conditions studied have a significant impact on SWB after controlling for socioeconomic factors. The impact of common psychiatric conditions is largest, being around two times larger than that of the next serious group, musculoskeletal conditions.

We find that HRQoL measures do not fully capture the SWB losses associated with all chronic conditions. Most importantly, psychiatric disorders have a large negative effect on SWB even after controlling for 15D or/and EQ-5D. The point estimate shows that the prevalence of psychiatric disorders decreases SWB by 0.4 points on a scale 1–10, even after controlling for both 15D and EQ-5D. The quantitative size of this effect is considerable, because the observations on SWB are quite strongly bunched towards the higher end of the scale. As noted earlier, the mean level of SWB in the data is 7.591. The result implies that if 15D or/and EQ-5D is/are being used as a basis for resource allocation decisions in the health care sector the treatment of psychiatric disorders is most likely to be seriously underfunded with respect to other chronic conditions, in comparison to their effect on the SWB of the population. This insight supports the thinking of a group of prominent British researchers and policy-makers who have argued that the advanced societies should allocate considerably more resources to the treatment of depression and chronic anxiety disorders [30,31].

The importance of psychiatric disorders as determinant of SWB even after controlling for 15D or/and EQ-5D is particularly significant empirical finding from the public health perspective, because depression was the fourth leading cause of the burden of disease in the world in 2000, accounting for 4.4% of total disability adjusted life years, and it also causes the largest amount of non-fatal burden, accounting for almost 12% of the whole total of years lived with disability worldwide [32]. Furthermore, evidence shows that depression is the leading cause of dis-

ease burden for women aged 15–44 in both high-income and low- and middle-income countries [33]. Thus, the discrepancy between SWB and HRQoL is largest for the increasingly important aspect of health.

We also found interesting differences between 15D and EQ-5D. Musculoskeletal disorders are not statistically significant determinants of SWB after controlling for EQ-5D, but they are after controlling for 15D. Thus, EQ-5D better captures the negative effect of musculoskeletal disorders on SWB than 15D. However, the contrary is true for the group of “other disorders”. To examine this in more detail, we have also estimated the models by using the individual chronic conditions that made up the group of “other disorders” separately (data not shown). This revealed that all other individual disorders except allergy and inflammatory bowel disease were negatively related to SWB in model 1, with the largest negative impact found for diabetes (−0.483). However, none of the individual conditions had a statistically significant negative impact on SWB after controlling for 15D or EQ-5D.

4.1. Strengths and weaknesses

The study is based on the Health 2000 survey, which comprehensively represents the Finnish population aged 30 years and over. The Health 2000 survey uses oversampling of old people and has a very high response rate for a complex and burdensome survey. The main strength of this study is the use of two HRQoL measures simultaneously in order to capture the concept of HRQoL as wholly as possible. Another strength is the use of large representative general population data with a high response rate, allowing the estimation of the effects of chronic conditions on SWB as they are experienced in the population on average. This contrasts with clinical studies where patients are somehow selected and usually more severely ill. The psy-

chiatric diagnostics used were also exceptionally thorough for a large general population survey. This emphasises the validity of our main finding: that HRQoL measures do not adequately capture the negative impact of common psychiatric disorders on SWB.

A theoretically interesting question in the use of preference-based measures is the cross-national applicability of the findings. In theory, if the valuations used to form the HRQoL scores differ significantly between countries, they accurately reflect only the preferences of the country where they were elicited. However, it seems that the differences between the health state description systems (i.e. the domains of health included and the formulation of the questions) is far more important than the valuation algorithms [2,34]. We used the most common EQ-5D tariff, the UK TTO values, to increase the value of our findings to other researchers. However, to check whether the valuation algorithm had anything to do with our findings, we also run all our analyses using Finnish VAS-based values for EQ-5D [35] (data not shown) as we have also done earlier [14]. This did not influence the results.

5. Conclusions

HRQoL measures capture the effects of most conditions on SWB well, but they do not capture all. Different HRQoL instruments capture the impact of different conditions differently. Even after controlling for both EQ-5D and 15D simultaneously, common psychiatric disorders had a large negative impact on SWB. Using health utility as a basis for resource allocation is likely to underfund the treatment of psychiatric disorders, at least in comparison to their effect on the SWB of the population. SWB and HRQoL are to be seen as complementary – or competing – goals for health policy.

References

- [1] Dolan P. The measurement of health-related quality of life for use in resource allocation decisions in health care. In: Culyer AJ, Newhouse JP, editors. *Handbook of health economics*. Amsterdam: Elsevier; 2000. p. 1723–60.
- [2] Hawthorne G, Richardson J, Day NA. A comparison of five multi attribute utility instruments. Working paper 140. Melbourne: Centre for Health Program Evaluation, Monash University; 2003.
- [3] Rawlins MD, Culyer AJ. National Institute for Clinical Excellence and its value judgments. *British Medical Journal* 2004;329:224–7.
- [4] Tengs TO, Wallace A. One thousand health-related quality-of-life estimates. *Medical Care* 2000;38:583–637.
- [5] Stiglitz J, Sen A, Fitoussi JP. Report by the commission on the measurement of economic performance and social progress; 2009 [accessed 19 April, 2010], available at: <http://www.stiglitz-sen-fitoussi.fr>.
- [6] Kahneman D, Krueger A. Developments in the measurement of subjective well-being. *Journal of Economic Perspectives* 2006;20:3–24.
- [7] Kahneman D, Diener E, Schwarz N, editors. *Well-being: the foundations of hedonic psychology*. New York: Russell Sage Foundation; 1999.
- [8] Clark A, Frijters P, Shields M. Relative income, happiness and utility: an explanation for the Easterlin Paradox and other puzzles. *Journal of Economic Literature* 2008;46:95–144.
- [9] Oswald A. Happiness and economic performance. *Economic Journal* 1997;107:1815–31.
- [10] Oswald A, Wu S. Objective confirmation of subjective measures of human well-being: evidence from the USA. *Science* 2010;327:576–9.
- [11] Blanchflower DG, Oswald A. Hypertension and happiness across nations. *Journal of Health Economics* 2008;27:218–33.
- [12] Heistaro S, editor. *Methodology report. Health 2000 survey*. Helsinki: National Public Health Institute; 2008.
- [13] Aromaa A, Koskinen S, editors. *Health and functional capacity in Finland. Baseline results of the health 2000 health examination survey*. Helsinki: National Public Health Institute; 2004.
- [14] Saarni SI, Härkänen T, Sintonen H, Suvisaari J, Koskinen S, Aromaa A, et al. The impact of 29 chronic conditions on health-related quality of life: a general population survey in Finland using 15D and EQ-5D. *Quality of Life Research* 2006;15:1403–14.
- [15] Saarni SI, Suvisaari J, Sintonen H, Koskinen S, Härkänen T, Lönnqvist J. The health-related quality-of-life impact of chronic conditions varied with age in general population. *Journal of Clinical Epidemiology* 2007;60:1288–97.
- [16] Wittchen HU, Lachner G, Wunderlich U, Pfister H. Test-retest reliability of the computerized DSM-IV version of the Munich-Composite International Diagnostic Interview (M-CIDI). *Social Psychiatry and Psychiatric Epidemiology* 1998;33:568–78.
- [17] Pirkola SP, Isometsä E, Suvisaari J, Aro H, Joukamaa M, Poikolainen K, et al. DSM-IV mood-, anxiety- and alcohol use disorders and their comorbidity in the Finnish general population: Results from the Health 2000 Study. *Social Psychiatry and Psychiatric Epidemiology* 2005;40:1–10.
- [18] *Diagnostic and statistical manual of mental disorders*. 4th ed. Washington, DC: American Psychiatric Association; 1994.
- [19] Sintonen H. The 15D measure of health-related quality of life: reliability, validity and sensitivity of its health state descriptive system. Working paper 41. Melbourne: Centre for Health Program Evaluation, Monash University; 1994.
- [20] Sintonen H. The 15D measure of health-related quality of life. II. Feasibility, reliability and validity of its valuation system. Working paper 42. Melbourne: Centre for Health Program Evaluation, Monash University; 1995.
- [21] Sintonen H. The 15D instrument of health-related quality of life: properties and applications. *Annals of Medicine* 2001;33:328–36.
- [22] Hawthorne G, Richardson J, Day NA. A comparison of the assessment of quality of life (AQoL) with four other generic utility instruments. *Annals of Medicine* 2001;33:358–70.
- [23] Stavem K, Bjornæs H, Lossius MI. Properties of the 15D and EQ-5D utility measures in a community sample of people with epilepsy. *Epilepsy Research* 2001;44:179–89.
- [24] The EuroQoL Group. EuroQoLda—new facility for the measurement of health-related quality of life. *Health Policy* 1990;16:199–208.
- [25] Brooks R. EuroQoL: the current state of play. *Health Policy* 1996;37:53–72.
- [26] Rabin R, de Charro F. EQ-5D: a measure of health status from the EuroQoL Group. *Annals of Medicine* 2001;33:337–40.
- [27] Kind P, Hardman G, Macran S. UK population norms for EQ-5D. Discussion paper 172. York: The Centre for Health Economics, University of York; 1999.
- [28] Garratt A, Schmidt L, Mackintosh A, Fitzpatrick R. Quality of life measurement: bibliographic study of patient-assessed health outcome measures. *British Medical Journal* 2002;324:1417.
- [29] OECD. *The OECD list of social indicators*. Paris: Organisation for Economic Co-operation and Development; 1982.
- [30] Bell S, Clark D, Knapp M, Layard R, Meacher M, Priebe S, et al. *The depression report. A new deal for depression and anxiety disorders*. London: London School of Economics, The Centre for Economic Performance's Mental Health Group; 2006.
- [31] Layard R, Clark D, Knapp M, Mayraz G. Cost-benefit analysis of psychological therapy. *National Institute Economic Review* 2007;202:90–8.
- [32] Ustun T, Ayuso-Mateos J, Chatterji S, Mathers C, Murray CJ. Global burden of depressive disorders in the year 2000. *British Journal of Psychiatry* 2004;184:386–92.
- [33] WHO. *The global burden of disease 2004 update*. Switzerland: World Health Organization; 2008.
- [34] Prieto L, Sacristan JA, Hormaechea JA, Casado A, Badia X, Gómez JC. Psychometric validation of a generic health-related quality of life measure (EQ-5D) in a sample of schizophrenic patients. *Current Medical Research and Opinion* 2004;20:827–35.
- [35] Ohinmaa A, Sintonen H. Inconsistencies and modelling of the Finnish EuroQoL (EQ-5D) preference values. In: Greiner W, Von Graf D, Schulenburg JM, Piercy J, editors. *EuroQoL plenary meeting*. Hannover: Uvi-Verlag Witte; 1999. p. 57–74.