



## Valuing the EQ-5D and the SF-6D health states using subjective well-being: A secondary analysis of patient data

Clara Mukuria\*, John Brazier

Health Economics and Decision Science, ScHARR, University of Sheffield, Sheffield, UK

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### ABSTRACT

The economic evaluation of health care technologies employs a standard economic approach based on preferences to provide utility information. Previous studies have used happiness rather than preferences to weight health states using general population data. However, these data may not reflect the full range and scope of health and happiness experienced by patients. This paper applies a similar approach to a large patient sample ( $N = 15,184$ ) from a hospital in Wales, UK collected between 2002 and 2004. Logit regression models were used to assess the relationship between happiness and the health state classifications of two measures, the EQ-5D and the SF-6D. The results suggest a different weighting across dimensions to that from preference elicitation techniques such as time trade-off and standard gamble. While mental health (depression and anxiety), vitality and social functioning were found to have a large significant association with the patients' own happiness assessment, pain was less so and physical health had no association.

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### Introduction

#### Background

There has been an increased interest in measuring subjective well-being (SWB) to inform public policy in the United Kingdom as well as in other countries (Abdallah et al., 2011; Forgeard, Jayawickreme, Kern, & Seligman, 2011; Waldron, 2010). This has been driven in part by evidence that increase over time in measures of material well-being such as gross national income has not been matched by increase in SWB. As one of the aims of public policy is to increase overall well-being, including both material and subjective aspects of well-being measures to measure progress and inform public policy decisions is important.

In neo-classical economics, income has been used as a proxy for well-being or utility as higher income provides individuals with opportunities to choose more goods or services. Individuals are assumed to be utility maximisers and choices indicate preferences for goods or services that will increase their well-being. This is in contrast to the approach taken by classical economists such as Jeremy Bentham who proposed measuring the well-being of an object based on its ability to increase pleasure or happiness, or to

reduce pain which is directly related to SWB (Bentham, 1781/2000; Layard, 2005). Perceived problems with measuring SWB led to the move away from this definition of utility and towards preferences. Kahneman distinguishes between the two forms of utility by referring to the former as decision utility and the latter as experience utility (Kahneman, 2000).

Health care policy makers rely on information from the economic evaluation of health care technologies to make resource allocation decisions. Cost utility analysis is an economic evaluation technique which uses the Quality Adjusted Life Year (QALY) to measure the health effects of conditions and associated medical interventions. The QALY is estimated by weighting survival with the health related quality of life (HRQoL) enjoyed in each time period using health state utility values (Torrance & Feeny, 1989). The health state utility values are obtained using preference based HRQoL measures, such as the EQ-5D, SF-6D and the Health Utilities Index (HUI 2 and HUI 3). These measures have a health state classification (HSC) describing health states typically in terms of physical, mental, role and social functioning which is completed by patients. The completed HSC is then scored using existing values obtained via preference elicitation techniques such as the standard gamble (SG) and time trade-off (TTO). SG and TTO aim to elicit utility values associated with hypothetical health states by asking individuals to trade in uncertainty or healthy life years. The values obtained represent preferences or decision utility for hypothetical health states. These values are obtained from members of the

\* Corresponding author. Tel.: +44 114 222 6395.

E-mail address: [c.mukuria@sheffield.ac.uk](mailto:c.mukuria@sheffield.ac.uk) (C. Mukuria).

general population rather than patients following the recommendations of the Washington Panel and the National Institute of Health and Clinical Excellence (NICE) in England (Gold, Siegel, Russell, & Weinstein, 1996; National Institute for Health and Clinical Excellence, 2008). This approach is based on the premise that the cost and consequences of health care are borne by the general population and their preferences should therefore inform decision-making (Gold et al., 1996). The question is whether these general population preferences match the experiences of patients as health care resource allocation decisions based on these values impact directly on patients.

For preferences to match experience, individuals have to accurately predict what the impact of different health states will be on their actual well-being (Dolan & White, 2006). Evidence shows that patient values of experienced health states tend to be higher than values of similar but hypothetical health states generated by the general population for several reasons (De Wit, Busschbach, & De Charro, 2000). Adaptation to poorer health states in patient groups leads to a reduced perceived effect of these health states (Ubel, Loewenstein, & Jepson, 2005). Individuals also mispredict how quickly they adapt to changes in their own lives (Kahneman & Sugden, 2005). The general population is likely to ignore adaptation when undertaking valuations as they may not have experienced the health states they are valuing leading to overestimation of the duration and intensity of experiencing the imagined health states. However, this problem can also affect patients as they may overestimate the duration and intensity of positive changes to health (Dolan & Kahneman, 2008). In addition individuals may focus on specific aspects of being in the hypothetical health state such as the impact of being immobile on their work or transition into these particular health states at the expense of other domains of life, described as focussing illusions, which may lead to overestimation of the negative impact of health states (Ubel, Loewenstein, & Jepson, 2003; Ubel et al., 2005). Loss aversion, where individuals value losses more than gains, may also have an impact. Those who do not have the experience of a health state may place larger weight on the potential loss of health while patients may place relatively smaller weight on gains (Baron et al., 2003). There is evidence that patients are unwilling to trade life years or take risks which may be as a result of loss aversion whereas those who do not suffer from the condition do not have these problems (De Wit et al., 2000; Menzel, Dolan, Richardson, & Olsen, 2002). Differences between the anticipated effect of experiencing particular health states and actual experience of health states can lead to sub-optimal resource allocation decisions. It is therefore important to consider valuation methods that reflect the experiences of patients (Dolan, 2007; Kahneman, 2009; Kahneman & Sugden, 2005; Kahneman, Wakker, & Sarin, 1997).

Economists have begun to explore the use of SWB measures in health state valuation as direct measures of health state utility instead of preferences (Dolan, 2007; Dolan & Kahneman, 2008). A number of recent studies have focused on this approach (Dolan, Lee, & Peasgood, 2012; Dolan & Metcalfe, 2012; Graham, Higuera, & Lora, 2011). Graham et al. (2011) assessed the relationship between the EQ-5D and both life and health satisfaction in Latin American countries ( $n = 14,000$ ). Their results indicate that anxiety and pain have relatively stronger associations with SWB than physical health, with larger impacts on health satisfaction compared to life satisfaction. Dolan and Metcalfe (2012) use data from the US ( $n = 1173$ ) that includes the day affect measure, a momentary measure of well-being experienced the day before, and report similar findings for mental health although pain has a smaller effect in their study. Dolan et al. (2012) show that these results persist when unobserved characteristics such as personality are taken into account using data in the British Household Panel

Survey (BHPS) ( $n = 19,230$ ) and the SF-6D. These results provide evidence that there are differences between preferences and SWB as valuations based on TTO or SG give relatively larger weight to physical functioning and pain compared to mental health (Brazier, Roberts, & Deverill, 2002; Brazier & Roberts, 2004; Dolan, 1997). However, the datasets used in these studies are general population data rather than patient data. As the focus is on experience, it is important to assess the outcomes of patients who may have experienced a wider range of health states than the general population. In this paper we use a large patient dataset containing both routinely collected data and survey data to assess the impact of valuing the EQ-5D and the SF-6D health states using well-being.

## Methods

### Data

We use anonymised data from the Health Outcomes Data Repository (HODaR) which is a postal survey of individuals who are treated as inpatients or outpatients at the Cardiff and Vale NHS hospitals, Wales. It has been on-going since June 2002. Details of the survey were submitted to the Bro Taf Local Research Ethics Committee (02/4685).

All inpatients that are 18 years or over are included in the survey except for individuals whose primary diagnosis was a psychological illness. A sample of outpatient clinics is selected each year on a rotational basis with all patients from a selected clinic being surveyed. Patients can do the survey multiple times if they attend the hospital more than once. Inpatients are surveyed 6 weeks after they have been discharged by postal survey. Outpatients are given the survey pack by the clinic receptionist when they attend the clinic. There are no reminders sent. HODaR data are closely matched demographically to that of England and Wales but subjects are slightly more deprived and have higher levels of morbidity (Currie, McEwan, Peters, Patel, & Dixon, 2005).

We use data from completed surveys sent from August 2002 to January 2004. We focus on the 15,184/24,661 observations from 14,448 patients (11,562 inpatients and 2886 outpatients) with non-missing data. Response rate over this period is 36% with evidence that non-responders were systematically different from responders with the latter being older and more likely to have an elective admission (Currie et al., 2005).

### Measures

*Subjective well-being* is commonly measured using questions relating to happiness, life satisfaction or affect but there is no gold standard. Measures can focus on intensity (e.g. how happy were you with response very happy to not happy) or frequency (response more than usual, less than usual). Intensity questions are more common than frequency questions (Dolan, Peasgood, & White, 2008). We use a happiness question (question SF-30) that focuses on frequency. This question is part of the SF-36 (version 2) questionnaire, where respondents are asked about their feelings over the past four weeks. The happiness question asks: "Have you been happy?" Respondents have 5 options to choose from: 'all of the time', 'most of the time', 'some of the time', 'a little of the time' or 'none of the time' and these are reverse coded to reflect increasing happiness.

*Health state classifications* (HSC) of two preference-based measures, the EQ-5D and the SF-6D, were used. The measures focus on different dimensions although these are broadly similar. They use different valuation techniques resulting in different utility values for similar conditions (Brazier, Roberts, Tsuchiya, & Busschbach, 2004). It is therefore useful to assess whether there are differences across the two measures.

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