THINKING ABOUT IT: THOUGHTS ABOUT HEALTH AND VALUING QALYs

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SUMMARY

When valuing health states (e.g. for use in the assessment of health technologies), health economists often ask respondents how many years of life in poor health they would be willing to trade-off in order to live in full health. Problems with preferences of this kind have led to calls for the use of more direct measures of the utility associated with experiencing a health state. The fact remains, however, that individuals are often willing to make large sacrifices in life expectancy to alleviate conditions for which there appears to be a considerable degree of hedonic adaptation. The purpose of this study is to investigate this important discrepancy in more detail. Data from 1173 internet and telephone surveys in the United States suggest that time trade-off responses are related to the frequency and intensity of negative thoughts about health in ways that may not be very well captured by any of the proposed valuation methods. Copyright © 2010 John Wiley & Sons, Ltd.

1. INTRODUCTION

Decisions about who gets what treatment should be informed by the value of the benefits that health services generate. The question is how to judge the value of those benefits. Until about 100 years ago, economists would have thought about benefits in terms of people's experiences – the greater the gains in an individual's enjoyment of an outcome, the greater the benefit (Edgeworth, 1881). More recently, they have thought about benefits in terms of preferences – the stronger an individual's preference for that outcome, the greater the benefit (Fisher, 1918). The two definitions amount to the same thing if people want most what they will eventually enjoy best and this is a common, albeit often implicitly made, assumption in economics. It is also descriptively flawed (Dolan and Kahneman, 2008). Since we value health using preference-based methods and since we may wish to know what effect health interventions have on people's experiences, we need further enquiry into the difference between strength of preference and intensity of experience.

   Methods have been developed for valuing states of health that are based on preferences and which allow for the calculation of quality-adjusted life years (QALYs). The QALY approach assigns a weight between 0 (for death) and 1 (for full health) to each state of health and then multiplies that value by how long the state lasts. QALYs are increasingly being used by health technology assessment agencies to help determine the relative cost-effectiveness of different interventions e.g. they are used by the National Institute for Health and Clinical Excellence (NICE) in the UK. There are three main questions that need

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to be addressed to calculate the 'quality adjustment' part of the QALY: *what* is to be valued; *how* is it to be valued; and *who* is to value it (Dolan, 2000)?

The choice of *what* refers to the dimensions of health or well-being being considered. Most health economists would recommend using an established generic measure of health that is designed specifically for generating QALYs. One such descriptive system is the EQ-5D, which describes health in terms of three levels (broadly, no problems, some problems and extreme problems) for each of five dimensions (mobility, self-care, usual activities, pain/discomfort and anxiety/depression). The choice of *how* refers to the ways in which the health states are valued so that they lie on a 0–1 scale. One of the most widely used preference-based methods is the time trade-off (TTO), which requires respondents to consider how many years in full health are equivalent to a longer period of time in a poor health state. The choice of *who* refers to the source of health state values, such as 'patients' experiencing a particular state or the 'public' asked to imagine it.

A set of valuations for the EQ-5D have been estimated from the responses to hypothetical TTO questions of a representative sample of over 3000 members of the UK general population (Dolan, 1997). NICE recommends that patients describe their own health using the EQ-5D and that the population valuation set be used to determine the number of QALYs associated with any change in health state as a result of intervention. These recommendations are also being followed in other countries (e.g. Australia and Canada), and are broadly consistent with the current emphasis in economics on an account of well-being that is based on the satisfaction of preferences.

It is increasingly recognised that a person's preferences at time 0 are often a poor guide to that person's preferences at time 1 (see Loewenstein and Angner, 2003 for a good review). Although very few longitudinal studies exist, we do find in the health state valuation literature that members of the general public (analogous with an assessment at $t = 0$ before circumstances change) generally consider most adverse health states to be more severe than do those in the states (an assessment at $t = 1$) (de Wit *et al.*, 2000). Beyond this, there is also good evidence to suggest that the strength of preference is often a poor guide to the intensity of experience (Schkade and Kahneman, 1998; Wilson and Gilbert, 2003). This is partly because we exaggerate the extent to which we will attend to the state being valued (Dolan and Kahneman, 2008) and we are all ('public' and 'patients') susceptible to exaggeration.

Imagine being asked to value walking with a cane. It is almost impossible to avoid imagining that as you walk you will be thinking about the cane much of the time when, in fact, the cane will rarely be the focus of your attention, especially as time passes. Focussing effects are an issue for any preference elicitation question for any population, including those with experience of the condition, since what we focus on in the question may not be focussed on the same extent in the experience of our lives. A person who walks with a cane who is asked to imagine having their walking restrictions alleviated will inevitably imagine actively enjoying the freedom of normal walking, which they may quickly take for granted.

This is not to say that walking with a cane will not have any effect on utility but, rather, that its effect is likely to be considerably less than we think about it being. As Adam Smith noted over 250 years ago: 'The great source of both the misery and disorders of human life seems to arise from over-rating the difference between one permanent situation and another' (Smith, 1759). This may generally be true but some things, like the effects of prolonged and unexplained pain (Peters *et al.*, 2000), may perhaps turn out to be worse than we imagine them to be. The important general point is that the focus of attention that drives our strength of our preferences is different from the focus of attention that explains the intensity of our experiences.

Partly in response to such problems, increasing interest is being shown in the direct assessment of experienced utility, as approximated by the flow of feelings during the day (Dolan and Kahneman, 2008). The day reconstruction method (DRM), for example, has been specifically designed to measure experienced utility in this way (Kahneman *et al.*, 2004). The DRM asks respondents to divide the previous day into a number of episodes and then to rate different feelings during those activities. Any

summary measure of feelings will have cardinal properties so long as each unit of time is treated equally. There are serious questions about how measures of experienced utility can be expressed on a standard 0–1 (dead to full health) QALY scale but we do not discuss these in this paper.

This paper focuses on the apparently compelling evidence showing that people are often willing to make large sacrifices in life expectancy to alleviate conditions for which there is a considerable degree of hedonic adaptation. For example, Smith *et al.* (2006) elicited median TTO values for the reversal of colostomy from colostomy patients of 0.85 (on the standard 0–1 scale) despite those patients apparently experiencing levels of affect similar to people without colostomies. Such results may well lend further support to the focussing illusion, whereby nothing in life (including a colostomy) is quite as important as you think it is while you are thinking about it. We should also consider the possibility, however, that assessments of affect may not provide a fully adequate description of the effects of states of health and illness on experienced utility itself. By focussing attention on activities, the DRM, for example, may bias the response toward the feelings that are normal for these activities and so the experiential effects of other thoughts and concerns may be underweighted in this procedure.

In fact, there is now good evidence that our attention drifts between current activities and concerns about other things (Smallwood and Schooler, 2006). Such 'mind-wandering' is frequent e.g. about 20% of the time spent reading is spent thinking about other things (Schooler *et al.*, 2005) and this rises to 50% for more mundane activities (Smallwood *et al.*, 2004). Generally speaking, positive (negative) thoughts result in higher (lower) experienced utility (Watkins, 2008) and returning to the same repetitive thoughts, such that they become intrusive, is associated with lower experienced utility (Klinger and Cox, 1987). At the extreme, constant rumination has seriously debilitating effects on mental health (Brewin, 1998). Hence, while the mood of colostomy patients and non-patients may be similar when they are thinking about the activities in their lives, or in thinking about their mood over the course of a day generally, colostomy patients may sometimes have lower experienced utility as a result of more frequent, negative thoughts about their health.

Intrusive thoughts may then go some way towards explaining why some patients are willing to trade-off life years to improve their health state. We therefore conducted an on-line and telephone study of 1173 members of the US general population, which focussed on testing the degree to which TTO responses can be explained by thoughts about health in addition to the EQ-5D and assessments of mood. Only the mental health dimension of the EQ-5D is statistically significant across different models. TTO responses are unrelated to overall feelings yesterday but thoughts about health are significantly related to TTO values: frequent, negative thoughts are highly significant and reduce TTO values by about 7.5%.

In the next two sections, we describe our study in more detail. In the final section, we discuss our results, which provide some fresh insight into the discrepancy between preferences and experiences, and we suggest some directions for future research. Since experienced utility can be derived from a number of sources, such as the activities we engage in and the thoughts we have, some research efforts should be devoted to understanding more about the effect of what we attend to and how our attention is related to the health states we experience.

2. METHODS

2.1. Questionnaire

The questionnaire consisted of three main sections followed by standard questions on background characteristics (e.g. sex, age, marital status and income). In the first section, there were two questions relating to yesterday: '*Overall, how satisfied were you with your day yesterday [on a 0-6 scale]?*' and '*Overall, how did you feel yesterday? Please rate each feeling on the scale given. A 0 means that you did not experience that feeling at all and a 6 means that you experienced that feeling very strongly*' The adjectives

were friendly, lethargic, stressed, happy, sad, interested, useful, calm, angry, tired, inspired, depressed, in control, worried and focused. These responses are used as proxies for DRM-type data. Second, there were questions about the frequency and intensity of thoughts yesterday about work, family, finances and health. Respondents were asked how often they had thought about each domain (not at all, a few times, many times, or continually). All reporting a few times or more were asked about the intensity of happy, angry, depressed and worried feelings on the same 0–6 scale as used for overall feelings yesterday. These questions represented our attempt to pick up the degree to which thoughts affect respondents on a day-to-day basis.

Third, respondents were asked to describe their health using the EQ-5D and to value their health using the TTO with a 10-year time frame (as per Dolan, 1997): '*Please indicate whether you would choose 10 years with your current health problems or fewer years, as specified below, without any health problems*'. There were two *variants* of the TTO: one where the number of years without any health problems started at 10 and decreased ('top down') and one where the number of years without problems started at 0 and increased ('bottom up') to test for anchoring effects (Tversky and Kahneman, 1974). There were also two *versions* of the main survey itself: one where section three (the EQ-5D and TTO) came last and one where it came first. This allows us to elicit the EQ-5D and the TTO in the standard ('uncontaminated') way and to test whether those responses are influenced by the feelings and thoughts questions.

2.2. Sample

The questionnaire was administered via on-line and telephone interviews with respondents who are part of a panel of members of the general public that are used by Rand in various health surveys. There are, of course, many issues about selection bias in relation to internet and telephone samples but this study was not designed to elicit responses from a truly representative sample of the population but, rather, to advance our understanding of the discrepancies between preference-based and experience-based measures of utility and of the various components of experienced utility. We include all 1173 respondents in our analyses as we had no *a priori* reasons to exclude anyone.

2.3. Analysis

We begin by presenting some basic descriptive statistics about the respondents and about their responses to the main questions of interest in the study. For the TTO responses, which are in 6-month intervals, we take the mid-point to represent the point of indifference. Hence, if a respondent is willing to trade-off something but then says 10 years of their current health condition is preferred to 9.5 years in full health, then their TTO value would be taken to be 0.975. Using the mid-point as the value is a standard practise in the health state valuation literature (Brazier *et al.*, 2002).

We then use standard regression analysis to explain TTO responses in terms of the EQ-5D, the various measures of well-being, and a range of background variables. We present the results from only the most parsimonious models but describe here all the variables used in the analysis (and the results of all regression results are of course available from the authors on request). Following Dolan (1997), 11 dummy variables are created for the EQ-5D i.e. one for each of the two possible moves away from level 1 for each of the five dimensions plus one dummy to pick up whether any dimension is at level 3. Because of the 'core' nature of these health variables, we include them all in every model irrespective of their significance levels.

We enter affect yesterday in a number of ways e.g. the highest and the average of all negative adjectives, the highest and the average of all positive adjectives and the difference between the averages of positive and negative affect (these measures share similarities with the measures reported in Kahneman *et al.*, 2004). For each domain of life that we ask about thoughts, the reference case is 'no thoughts at all'. If respondents thought about health etc. a few times they were placed in the low

frequency group and if they thought about health etc. many times or continually they were placed in the high frequency group. For each group, we use the 'U-index method' reported in Kahneman *et al.* (2004) to determine positive or negative thoughts: namely if 'happy' was the highest or joint-highest rated feeling, the dummy takes a value of 0 (and the thoughts are labelled as 'positive') and if the highest rated feeling was 'angry', 'depressed' or 'worried', it takes a value of 1. We adopt a 'stepwise' approach to the analysis by adding additional variables and check the size and significance of the coefficients on existing variables do not vary as we do so. We use a 5% level of significance on a two-tailed test throughout.

We appreciate that these are cross-sectional data and, consistent with most other studies in this area, we cannot control for individual heterogeneity. While instrumental variables analysis might be suitable for some data (e.g. when attempting to control for the endogeneity of income in happiness equations; see Oswald and Powdthavee, 2008), it raises further problems of its own and is not appropriate for these data. We also appreciate that, again like most health state valuation studies involving the general public, TTO responses are highly skewed toward a value of 1 (full health). However, as noted above, we are only really interested here in the qualitative interpretation of the results and we have established from various additional analyses that standard regression techniques generate very similar results to non-parametric and logistic regression methods in terms of the significance or otherwise of the variables used to explain the TTO.

3. RESULTS

Table I shows important descriptive statistics from the study, and how the respondents compare with the US general population. More of the sample here are married and the average incomes are a bit higher. The distribution of respondents across the EQ-5D is broadly comparable with a larger ($n = 3773$) US population study (Shaw *et al.*, 2005), with slightly fewer people reporting pain.

Beyond this table, as would be expected from a community-based sample, there are very few people in level 3 of any of the dimensions, and only 5% are in an EQ-5D state that contains at least one level 3. There are, however, significant numbers of people in level 2 and, as a result, only 36% of the sample is in state 11111. A greater proportion of respondents (39%) have moderate pain/discomfort or moderate anxiety/depression, or both. Applying the UK general population TTO-based valuation 'tariff' for the EQ-5D reported in Dolan (1997) to the distribution of EQ-5D states results in a mean value of 0.816. This compares with a mean of 0.885 from the TTO responses in this study (while the data come from different countries, the higher values are consistent with the evidence (e.g. de Wit *et al.*, 2000) to suggest

Table I. Summary statistics

	Sample	US average
Median age	51	47[a]
Male	46%	49%[a]
Single	15%	27%[a]
Married	65%	51%[a]
Employed	62%	59%[a]
Average household income	$54 237	$46 326[a]
No problems walking about	81%	82%[b]
No problems with self-care	97%	96%[b]
No problems with usual activities	83%	85%[b]
No pain/discomfort	51%	41%[b]
No anxiety/depression	67%	74%[b]
Average time trade-off response	0.885	0.84[b]
Average 'happiness' yesterday (0–6)	4.5	
Average 'sadness' yesterday (0–6)	1.1	

[a]US Census Bureau.
[b]Shaw *et al.* (2005).

that those in poor health states do not consider them to be as bad as those imagining those states). The average TTO value is not that different from that obtained in a larger US sample (0.84 in Shaw *et al.*, 2005).

Table II shows the frequency of the thoughts about four important domains of life. It can be seen that the domains are generally thought about a few times or many times by the majority of respondents: health was not thought about at all yesterday by about one-quarter of the respondents but only continually by 4% of the sample. Table III shows the categories of respondents according to the frequency of their thoughts about health and whether the highest rated feeling associated with those thoughts is non-negative (happy is rated at least as highly as the other feelings) or negative (angry, depressed or worried). It can be seen that 44% of respondents have positive thoughts and 30% have negative thoughts, with 12% of the sample having negative thoughts many times or continually.

The main regression models are shown in Table III. The analysis begins by considering the degree to which the EQ-5D dimensions and levels explain the TTO responses (Model I). The only dummy variables that are significant are when usual activities are at level 2, when anxiety/depression is at level 3 and when any dimension is at level 3. We next add in dummy variables for the variant of the TTO and the version of the survey (Model II). Consistent with a great deal of evidence to support anchoring effects, TTO responses are significantly higher in the top down variant than in the bottom up one: a mean of 0.92 compared with 0.85. More striking is the difference between the proportions of respondents unwilling to trade-off any time at all: 52% in the top down variant as compared with 11% in the bottom up variant. The importance of TTO variant would be a concern if our focus was on generating a TTO-based tariff of values but we are interested in explaining TTO responses and it turns out that what explains them is unaffected by whether the TTO is top down or bottom up (Table IV).

Of more importance to the potential impact of the thoughts about health on TTO responses, there are no differences in the TTO responses – or in the degree to which they are explained by the EQ-5D dimensions – according to whether the TTO come before or after the well-being and thoughts and feelings questions. While we could expect TTO responses to be contaminated by having previously been asked to report on thoughts about health, it is less likely that thoughts about health will be contaminated by having previously been asked a TTO question. The robustness of any impact of thoughts about health or other domains of life, on TTO responses is therefore enhanced by the fact that TTO responses are unaffected by the version of the questionnaire.

Table II. Frequency of thoughts

Domain	Not at all (%)	A few times (%)	Many times (%)	Continually (%)
Work	29	32	28	11
Family	2	25	51	22
Finances	16	56	19	8
Health	26	57	12	4

Table III. Type of thoughts about health

No thoughts about health	26%
Low frequency and positive thoughts	40%
High frequency and positive thoughts	4%
Low frequency and negative thoughts	18%
High frequency and negative thoughts	12%

If respondents thought about health 'a few times' they were placed in the low frequency group and if they thought about health 'many times' or 'continually' they were placed in the high frequency group. For each group, we use the 'U-index method' to determine positive or negative thoughts: namely, if 'happy' was the highest or joint-highest rated feeling, the dummy takes a value of 0 (and the thoughts are labelled as 'positive') and, if the highest rated feeling was 'angry', 'depressed' or 'worried', it takes a value of 1.

Table IV. TTO regressions

Dependent variable: TTO[a]	(I)	(II)	(III)	(IV)	(V)
Mobility level 2	0.008	0.013	0.002	0.002	0.010
Mobility level 3	−0.018	−0.002	0.011	−0.008	−0.018
Self-care level 2	−0.001	−0.015	−0.020	−0.013	−0.009
Self-care level 3	−0.119	−0.166	−0.183	−0.169	−0.157
Usual activities level 2	−0.061*	−0.063*	−0.065*	−0.060*	−0.047
Usual activities level 3	0.182	0.168	0.141	0.151*	0.169
Pain level 2	−0.029	−0.029	−0.040*	−0.032*	−0.029
Pain/ discomfort level 3	0.189	0.177	0.164	0.184	0.186*
Anxiety/depression level 2	−0.001	−0.001	0.007	0.038*	0.043*
Anxiety/depression level 3	0.257*	0.243*	0.258*	0.322*	0.319*
Any dimension at level 3	−0.440*	−0.422*	−0.415*	−0.412*	−0.393*
Order of TTO responses (descending values vs ascending values)		−0.073*	−0.074*	−0.074*	−0.074*
Age			0.011*	0.011*	0.010*
Age^2			0.000*	0.000*	0.000*
Average 'happiness' yesterday				0.015	0.013
Average 'sadness' yesterday				−0.013	−0.007
Thoughts about health: low frequency and positive thoughts					0.040
Thoughts about health: high frequency and positive thoughts					0.035
Thoughts about health: low frequency and negative thoughts					−0.030
Thoughts about health: high frequency and negative thoughts					−0.076*
Constant	0.920*	1.016*	0.724*	0.688*	0.664*
R^2	0.07	0.09	0.11	0.11	0.12
Observations	1173	1173	1173	1173	1173

The reference 'thoughts about health' variable is 'no thoughts at all'. If individuals thought about health a few times they were placed in the low frequency group and if they thought about health many times or continually they were placed in the high frequency group. For each group, we use the 'U-index method' for determining positive or negative thoughts: if 'happy' was the highest or joint-highest rated feeling, the dummy takes a value of 0 (and thoughts are labelled as 'positive') and if the highest rated feeling was 'angry', 'depressed' or 'worried', it takes a value of 1.
[a]TTO responses on the standard 0 (dead) to 1 (full health) scale. The wording of the questions was: 'Please indicate whether you would choose 10 years with your current health problems or fewer years, as specified below, without any health problems.'*5% significance level.

Interestingly, there are no significant differences in any of these variables according to whether the questionnaire was completed via the internet or over the phone. When we additionally add in the standard set of background variables, we find that age and age squared are both significant (Model III), which is supportive of previous evidence that shows TTO values are the highest in middle age (Dolan *et al.*, 1996). We did not include sex, employment status, marital status and income as they are all insignificant. None of these results are particularly striking or novel but do go some way towards validating the responses to the internet and telephone survey against what has previously been found in the literature from face-to-face interviews.

We next introduce the responses to the questions about affect yesterday and they are not significant in explaining TTO responses (we report on the results for average positive and negative affect but the results hold for other ways of categorising the ratings). Note, however, that affect and thoughts are related to one another in the expected way i.e. worse affect yesterday is associated with frequent and negative thoughts.

Next, we add in the thoughts about each domain, where only thoughts about health are important in explaining TTO responses. The results have a monotonic pattern to them; that is, more frequently and positive thoughts are associated with higher TTO values and more frequent and negative thoughts are associated with lower TTO values. Those who have the most frequent and predominantly negative thoughts about health have significantly lower TTO values. The size of the effect is comparable to the size of the effect of the order in which the TTO responses are presented: about 7.5% of the standard 0–1 scale. Note that this effect holds after controlling for their actual EQ-5D health state and also holds for the version in which the TTO question immediately follows the EQ-5D and where respondents would arguably be primed to think about their health only in terms of the EQ-5D.

4. DISCUSSION

Health economists have followed the standard approach in economics of using preference-based methods to value of states of health and illness. TTO values from the general public are now being used by NICE in the UK to help determine the cost-effectiveness of health technologies. The evidence (e.g. Smith *et al.*, 2006) to show that people are willing to make relatively large sacrifices in life expectancy to alleviate conditions for which there is a considerable degree of hedonic adaptation can be explained by a focussing illusion (Schkade and Kahneman, 1998; Wilson and Gilbert, 2003). Every preference elicitation question, by its very nature, focuses our attention on something, and so we will generally be led to overstate the relative importance to our lives of the things that we are asked to focus on (e.g. dimensions of the EQ-5D). Moreover, the classification systems focus attention disproportionately on the negative aspects of health (Jansen *et al.*, 2000) and it is hard to get respondents to shift their focus from such negative things (Ubel *et al.*, 2001).

There is, however, at least one other way in which poor health might show up in our experiences in addition to its impact on measures of feelings during or over a day; namely, in relation to our 'mind-wanderings' and thoughts about health. In this exploratory study, we have considered the ways in which feelings over the course of a day and intrusive thoughts about health might explain TTO preferences in addition to the effect of the health state itself. Consistent with the discrepancy between assessments of affect and expression of preference, feelings yesterday are not significant in explaining TTO responses. Those who think about their health frequently and negatively when they do so (which is related to affect yesterday), however, are more willing to sacrifice life years in order to alleviate their health problems. This result holds for those that are asked for their TTO response after *and* before being asked about their thoughts about health.

There are good grounds for supposing that these results are generated partly by a focussing effect. When asked to think about sacrificing life years in order to remove their health problems, it is likely that respondents focus on thinking about their health problems much more than they would routinely do so in the experience of their lives: nothing in life (including thoughts about health) is quite as important as you think it is while you are thinking about it. Respondents were not explicitly asked to think about how intrusive thoughts impact on their lives, yet in being asked about their current health problems they seem to have had their attention drawn specifically to thoughts about health – yet not, seemingly, to those about work, family and finances. As a simple manipulation of the TTO question, respondents in a future study could be asked for their willingness to give up life years to improve their health and reduce *any* concerns they might have. We should certainly consider what else to draw attention to in addition to the dimensions of a health state classification system, not least because, when we die prematurely, we lose everything in life and not just the (usually negative) things associated with our health states that we are traditionally asked to focus our attention on.

We cannot draw attention to everything that might be relevant to the experience of our lives and we cannot force respondents to pay most attention to those things that will matter most in their experiences but, insofar as TTO preferences reflect something about the impact of health states on experienced utility, it is encouraging that thoughts about health are significant in explaining TTO responses irrespective of whether they are asked about before or after the TTO. This finding does make intuitive sense: we are concerned about the thoughts we have about our health in addition to our state of health, and we are willing to trade-off life years to reduce negative thoughts just as we are willing to trade-off life years to improve our health state. The results presented in this paper, particularly if they are replicated elsewhere, may go some way toward explaining the important discrepancy between preferences and experiences. Further and fuller consideration of the things that we regularly think about may help economists to reconcile some of the differences that exist between the different measures of utility.

Empirical evidence of the kind presented in this paper does not have any normative implications in itself. A lack of correspondence between preferences and experiences does not say anything directly

about the normative significance of a preference-based account of utility (Bruckner, 2010). If intrusive thoughts are indeed found to be important determinants of both preferences and the flow of experiences, however, they could in the very least lead us to consider alternative ways of thinking about utility in economics and in health policy. By paying attention to our intrusive thoughts alongside more conventional changes in health status, policymakers may give more consideration to interventions that focus on improving the ways in which we think and feel about our health.

There is now good evidence that negative thoughts, such as worry, are associated with adverse health outcomes, such as increased cortisol levels and increased heart rate, and that such thoughts may actually cause increased heart disease and fatigue, and slower recovery from surgery (for a review, see Watkins, 2008). Of course, negative thoughts might also be good for health through their effects on health-promoting behaviours, and there is evidence, for example, that increased worry about breast cancer is associated with a greater probability of undertaking screening (Hay et al., 2006). These issues go well beyond the implications of our data but some future research efforts could be directed toward determining when to reduce negative thoughts, by how much, and for whom.

In relation to our central question of how to value health, activity-focussed or more general assessments of feelings will not provide a complete account of the full flow of utility if intrusive thoughts about health impact on us in ways that are not picked up by those measures. We make no great claims about the approach adopted here and a future DRM type study could certainly ask respondents about thoughts and feelings before asking about them what they are doing and who they are with. It may be that asking people about their main activity before asking them about their mood draws their attention away from what they were thinking about and such a study would allow us to say something about the importance of activity-related and general mood-related focussing effects.

Whatever the design of future studies which seek to improve on our methods, it would be worthwhile to show how robust these kinds of effects are to controlling for different attributes of health and for measures of health that are more refined than the EQ-5D (and which are therefore potentially able to control away more of the variance associated with health state per se). In the meantime, NICE and other agencies should consider whether and how to identify those whose thoughts and feelings are most affected by different health states and possibly look to target interventions accordingly. It is worth a thought, anyhow.

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