What drives differences in preferences for health states between patients and the public? A qualitative investigation of respondents' thought processes.

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# Abstract

Cost-effectiveness analyses using quality-adjusted life-years (QALYs) are used in decisionmaking regarding which interventions are available via many national healthcare systems. QALYs are calculated based on health state values provided by preference elicitation techniques. Several national decision-making bodies recommend that health state values should be based on preferences elicited from general populations, rather than from patients. Previous studies have shown systematic differences between health state values elicited from members of the general population and from patients. Various explanations for this phenomenon have been proposed, however empirical evidence for these is scarce. We aimed to explore possible reasons for discrepancies between public and patient valuations by undertaking qualitative cognitive interviews, asking 14 members of the general population and 12 people with multiple sclerosis (MS) to think aloud while completing a preference elicitation task (time trade-off) for MS-related health states. The interviews were undertaken between December 2016 and October 2017 in the [redacted for peer review] region of England, and were analysed using the Framework Method. As anticipated, we found that participants with MS had more experience of health problems and used this experience to consider how they might adapt to the health states over time, and which dimensions of health-related guality of life were most important to them. We found no evidence that participants with MS were less affected by framing effects and

focusing illusions, more likely to prioritise non-physical dimensions of health, or more prone to loss aversion, endowment effects and non-compensatory decision-making. These findings contribute to our understanding of how patients and members of the general population respond to preference elicitation exercises, and why their preferences may differ, and may help to inform developing areas of research, such as the joint presentation of costeffectiveness results from multiple perspectives, and the use of preferences elicited from patients for experienced health states.

Keywords: health economics, time trade-off, health state values, public preferences, patient preferences, qualitative methods, cognitive interviews, framework method

# 1. Introduction

### 1.1 Background

Economic evaluations commonly use a measure that combines quality and length of life, the quality-adjusted life-year (QALY), as the primary economic endpoint. Preference-based measures of health-related quality-of-life are widely used to provide the health state values (HSVs) required to calculate QALYs. HSVs are typically estimated by asking a sample of the general population (the public) or people with the relevant health condition (patients) to express their preferences for health states, using a preference elicitation technique (Brazier et al., 2012). Consequently, the findings of cost-effectiveness analyses rely heavily on these preference elicitation techniques; in turn, these analyses influence the interventions that are available to patients via many national healthcare systems.

Although current methodological guidance issued by national decision making bodies, such as the National Institute for Health and Care Excellence (NICE, 2013), recommends basing HSVs on public preferences, debate continues regarding the most appropriate source of preference data (Helgesson et al, 2020; Versteegh and Brouwer, 2016). Empirical evidence suggests that public preferences differ significantly from preferences elicited from patients, with potentially important implications for the magnitude of health gains estimated for use in cost-effectiveness analysis (Versteegh and Brouwer, 2016). Typically, patients provide higher HSVs than the general public, although this varies according to the severity of the health state and the specific dimensions of health-related quality-of-life affected. No consensus has been reached about why and how this phenomenon occurs (Brazier, 2008). Multiple sclerosis (MS) is a complex neurological disorder with diverse symptoms and effects, which have a major impact on quality of life (Zajicek et al., 2007). An MS-specific preference-based measure, the Multiple Sclerosis Impact Scale-8D (MSIS-8D), has been developed to provide HSVs for MS health states (Goodwin et al., 2015). The MSIS-8D represents eight dimensions of importance to people with MS: physical tasks, social and leisure activities, mobility, daily activities, fatigue, emotion, cognition and depression (Figure 1). Preferences for MSIS-8D health states were elicited using a time trade-off (TTO) survey, based on the protocol used to generate the UK tariff for the EuroQoL EQ-5D-3L. This offers respondents a choice between a sub-optimal health state for a given number of years (Life B) or full health for a shorter period of time (Life A). Preferences are quantified by asking respondents to trade between quality and length of life, with their point of indifference indicating the HSV for the state described (Dolan, 1997). Preferences were elicited for the same MSIS-8D health states from representative samples of the UK population (n=1702) (Goodwin et al., 2015), and of people with MS living in the UK (n=1635) (Goodwin et al., 2018). Overall, people with MS provided significantly higher HSVs than members of the general population, ie they were less willing to trade length for quality of life. People with MS placed more weight on Cognition than the general public; the reverse was true for the Daily Activities, Fatigue and Depression dimensions (Goodwin et al., 2020). Previous research has explored how respondents interpret and respond to preference elicitation tasks (van Nooten et al., 2018). While evidence suggests that respondents consider such questions thoroughly and are capable of complex trade-offs, resulting in "well-constructed preferences" (Baker and Robinson, 2004), it does appear that they frequently consider additional, non-health related factors when assessing health states, such as the availability of support, their ability to participate in valued activities, their religious beliefs and their attitudes towards life and death (Karimi et al., 2017; van Nooten et al., 2018). Some studies have found that health state values vary according to age or

current health status, and can be affected by a respondent's expectations regarding their own future quality of life and subjective life expectancy (van Nooten et al., 2018). Health state valuations may also be influenced by extrinsic goals such as parents wishing to live long enough to see their children through to maturity (van der Pol and Shiell, 2007), by the maximum endurable time in a given health state, or by the extent to which respondents anticipate they might adapt to a health state over time (van Osch and Stiggelbout, 2008). Another important factor is the impact that a particular TTO choice would have on others, either in reducing the length of time spent with loved ones, or in feeling that one would become a burden due to ill health (Karimi et al., 2017; Krol et al., 2016). Little is known, however, about how patients and the public may differ in the ways they interpret and respond to preference elicitation tasks, producing the frequently observed differences in valuations.

#### **1.2 Study aims and conceptual framework**

Previous research articles and commentaries (Brazier, 2008; Happich and von Lengerke, 2005; Mulhern et al., 2013; Stiggelbout and de Vogel-Voort, 2008; Ubel et al., 2003) have identified factors that may influence responses to preference elicitation surveys and may hence explain differences between patient and public values. In this study, we aimed to explore these proposed explanations by (i) investigating the thought processes employed by respondents as they answer TTO questions, and (ii) comparing these between patients and the general public, using qualitative methods.

In order to provide a conceptual framework for the study, we used a framework developed by Stiggelbout and de Vogel-Voort (2008), which describes the mechanisms that come into

play during the process of health state valuation. This uses theories of information processing (stimulus response models), based on social cognition theory. According to the framework, when responding to a survey question, respondents engage in primary appraisal, secondary appraisal and a response process. At each stage, respondents will draw upon their own experiences. Differences in the experiences of patients and the general public may cause them to interpret and respond to preference elicitation questions differently.

In undertaking primary appraisal, respondents interpret the information provided. Patients' experiences of ill health may allow them to view health states within a broader context, taking into account a wider range of factors, many of which remain unaffected by their health. Conversely, the general public may be more prone to *framing effects*, focusing on the dimensions within the health state that are most adversely affected, and *focusing illusions*, giving greater weight to the negative impact of health states than to the aspects of their lives that would remain unaffected (Stiggelbout and de Vogel-Voort, 2008). Furthermore, previous research suggests that patients place greater importance on non-physical dimensions of health compared to the general public (Brazier, 2008).

During secondary appraisal, respondents make judgements that enable them to formulate their answers. Patients' views of a health state may be affected by *shifting inter-personal and intra-personal comparisons,* as they experience more severe health states in themselves and encounter other patients in poor health over time (Ubel et al., 2003). Previous research has highlighted the importance of *adaptation*, whereby people become accustomed to a health state over time. Respondents who lack experience of poor health typically underestimate the extent to which they would adapt to a compromised health state

(Happich and von Lengerke, 2005). Other factors are related to the similarity of a hypothetical health state to the respondent's own. People tend to be more sensitive to losses than they are to gains, relative to their current position. In the TTO context, this loss *aversion* could be expected to affect patients and members of the public differently. For a patient, whose current situation is more likely to be similar to the hypothetical health state, the "loss" of life-years compared to the 10 years in the hypothetical health state would outweigh the "gain" of achieving full health. Conversely, a respondent who is currently experiencing full health is faced with a choice between two losses compared to their reallife situation: a reduction in health or a reduction in life-years. Hence loss aversion would encourage the patient to choose 10 years in the hypothetical health state, rather than fewer years in full health (the effect of loss aversion on the choice made by a respondent in full health being less clear). Similarly, endowment effects can cause people to value goods (or health states) more highly if they 'own' them, which may be the case for patients who are experiencing health states similar to those presented in the TTO. All these factors will cause patients to value health states more highly than members of the general population (Stiggelbout and de Vogel-Voort, 2008).

During the response process stage, respondents fit the "answer" generated during secondary appraisal into the response categories available, requiring them to trade between life years and health status. However, an emotional response to a health state may result in *non-compensatory decision-making*, eg unwillingness to trade life years. This is more likely to affect patients who are experiencing or likely to experience the health state being valued (Stiggelbout and de Vogel-Voort, 2008).

This conceptual framework (which is summarised, along with an outline of the main findings from this study, in Table 1) was used to inform the development of both the interview guide and the initial thematic framework for analysis.

# 2. Methods

#### 2.1 Cognitive interviews

The thought processes employed by respondents to interpret and answer TTO questions were explored using a cognitive interviewing technique, which requires respondents to think aloud while completing survey questions (Willis, 2015). These methods were previously used to compare preference elicitation techniques for the EQ-5D-5L (Mulhern et al., 2013) and to explore the use of capability measures (Coast, 2017).

Participants completed the TTO questions on a laptop, using the program developed for the original MSIS-8D surveys (Goodwin et al., 2015). An example TTO question is provided in Figure 2, and an abridged version of the interview guide is presented in the Appendix. Further details of the survey are provided in the electronic supplementary material.

The interviews used unstructured think-aloud and semi-structured questions, enabling participants to describe their thought processes freely while ensuring that issues of relevance to the study were covered (Collins, 2015). Participants were asked to complete the TTO tasks while explaining how they were answering the questions and to voice any thoughts about the TTO task or the health states. Interview questions were based on the conceptual framework for the study (Table 1) and were adapted to explore new themes identified from previous interviews. At the end of the interview, participants were given the opportunity to raise any further issues.

Two facilitators were present: an experienced qualitative interviewer to lead the sessions [initials redacted for peer review] and a health economist [initials redacted for peer review] to make notes, probe emerging issues and provide clarification where required. In order to minimise participant burden, we set a maximum interview length of 40 minutes. Participants completed as many TTO questions as they were comfortable with, and were given the option of ending the interview early if they wished. The interviews were recorded digitally and transcribed verbatim. Ethical approval was granted by the [redacted for peer review] Research Ethics Committee in June 2016, and interviews were conducted between December 2016 and October 2017. Participants were provided with an information sheet, which provided details of the research aims, the content and length of the interviews, and how their data would be collected and used. Each participant signed a consent form prior to the interview. Members of our Public and Patient Involvement (PPI) Group, which acted in an advisory capacity for the overall programme of research [citation redacted for peer review], were involved in the design of the interviews and of the information sheet for participants.

#### 2.2 Selection and recruitment of participants

In order to undertake the comparison between "patients" and "the public", we needed to recruit two samples: one of people with a diagnosis of MS, and another of people without MS. There is no agreed method for determining sample sizes for cognitive interviews (Willis, 2015). Based on the principle of data saturation, ie the point at which no new themes are identified from the data, we estimated that we would require 12 to 15 participants for each of the two samples (Corbin and Strauss, 2008). Our intention had been to employ a purposive sampling strategy, aiming to ensure representation within each sample from subgroups that had differed in their responses to the original MSIS-8D valuation surveys (Goodwin et al., 2020), however we were unable to fulfil some of our sampling criteria, due to difficulties in recruiting younger participants and female participants with MS.

People with MS were recruited from a local MS Centre, and members of the public via a local research network in the [region redacted for peer review] of England. While these routes for recruitment facilitated our access to potential participants (and, in the case of participants with MS, provided a familiar and accessible location for the interviews), it is arguable that those recruited may not be typical of people with MS or the wider population in general. In order to broaden our reach, we also placed poster advertisements in public places around [city redacted for peer review]. All individuals who expressed an interest in participating, who arranged and attended an interview appointment, and who provided informed consent were included in the study.

#### 2.3 Data analysis

Data from the cognitive interviews were analysed using the Framework Method (Ritchie and Spencer, 1994), a form of qualitative content analysis that is increasingly used in health research and provides a practical tool, independent of any particular theoretical or epistemological perspective, that is suitable for application to a range of types of research question (Gale et al., 2013). This was highly relevant in this case, where we required a combined approach to analysis that would enable the investigation of concepts identified *a priori* (deductive reasoning), while allowing for the incorporation of additional concepts, built from unexpected observations and patterns in the data (inductive reasoning), that may offer alternative explanations (Hyde, 2000). A further salient feature of this approach is that it facilitates the identification of differences between groups of participants (Gale et al., 2013).

The analytical process is summarised in Figure 3. Following familiarisation with the interview recordings and transcripts, initial coding was undertaken to identify themes in the data (Ritchie et al., 2003). These themes were organised into a draft thematic framework, which was informed both deductively, from the initial conceptual framework for the study, and inductively, from concepts and patterns identified in the data (Gale et al., 2013). The framework was progressively revised and refined throughout the process of analysing the interview data (Ritchie et al., 2003). The initial coding, and the development and application of the framework, were undertaken by [Author 1 initials redacted for peer review], and were independently reviewed by [Author 4 initials redacted for peer review] and [Author 2 initials redacted for peer review]. Any differences of opinion in the coding, framework structure or application were resolved through discussion, and an amended version of the framework was agreed (Bryman and Burgess, 1999). The agreed version of the framework to the data were undertaken in NVivo 11.

The structure of themes and subthemes provided by the thematic framework was used to construct a set of matrices, one for each of the main themes. Each matrix consisted of a Microsoft Excel spreadsheet, with one row for each "case" (an individual participant) and one column for each subtheme (Gale et al., 2013). The application of the framework to the data that had previously been undertaken was used to "chart" the data into the matrices, in order to provide a summary of the data, organised according to the thematic framework (Ritchie et al., 2003). This process facilitates the analysis of the data, both by case and by (sub)theme, by highlighting key patterns and characteristics (Srivastava and Thomson, 2009). In order to identify differences in the thought processes reported by participants with and without MS as they completed the preference elicitation exercise, a version of the

framework matrix was created using tables in Microsoft Word, in which the "cases" were groups of participants (ie participants with MS and participants without MS), rather than individuals (Gale et al., 2013).

The interpretation of the analysis involved discussions among the research team and the PPI Group to explore and agree the key findings (Gale et al., 2013). These findings included the thought processes employed by participants with and without MS as they completed the preference elicitation exercise, the nature of any apparent differences between these groups, the extent to which these reflected potential explanations for the discrepancies typically observed between "patient" and "public" values identified from relevant literature, and whether the analysis indicated any alternative explanations (Srivastava and Thomson, 2009).

# 3. Results

Twenty-six people were interviewed: 12 with, and 14 without, MS. Nine participants without MS, and four with MS, were female. Those with MS included people with relapsingremitting, primary progressive and secondary progressive subtypes. The majority of participants were aged over 50. Participants answered TTO questions for a maximum of seven health states; most completed between one and four. Health states were selected at random by the survey software. The final thematic framework is presented in Figure 4.

# **3.1** Primary appraisal

#### 3.1.1 Interpreting the information presented in the TTO scenarios

The vast majority of participants had no difficulty understanding the TTO tasks, although several participants without MS stated that the hypothetical nature of the scenarios made them difficult to imagine, particularly for participants with limited experience of ill health in themselves or others.

I'm in good health at the moment and I find it almost impossible to imagine how I would be if I wasn't [NonMS-11].

In contrast, participants with MS reported little difficulty with imagining the health states, and found that they could relate at least some of them to their own experiences. However, some struggled to remember what it was like to experience full health. Most participants reported that they were prioritising specific dimensions when assessing each health state. Participants with MS typically identified which dimensions were most important by (i) considering how and how much each dimension affected their lives and their abilities to do the things that they wanted to do, or (ii) observing the effects of problems in particular dimensions on other people with MS that they knew.

#### I've seen it, there are people here who are depressed and it's yeah, no [MS-05].

A few participants without MS had current or previous experience of health problems that had caused them problems with one or more of the dimensions. They were able to use this experience to inform their prioritisation of which dimensions were the most important to them. Most, however, had to rely on their imagination. Typically, they considered how much each dimension would affect their ability to participate in activities that were important to them.

# You've been moderately bothered by being stuck at home. Well if that meant I couldn't go hiking I wouldn't be a happy bunny [NonMS-03].

Most participants considered the mental and cognitive dimensions to be more important than the physical dimensions. Mental fatigue and cognitive problems were mentioned by the highest number of participants with MS, followed by mood (irritable, impatient or shorttempered), as the most important of the dimensions. Among the participants without MS, depression, mood and mental fatigue were most frequently mentioned. Those without MS, however, varied much more in terms of which dimensions they considered most important, with each of the eight dimensions being mentioned by at least three participants.

# 3.1.2 Contextual information

In addition to the information provided in the TTO scenarios, many participants took contextual factors into account. In particular, both groups considered the impact that their choices would have on those closest to them. The main difference was in attitudes towards practical and emotional support from family members or friends. Participants without MS generally felt that this support would help to make poor health states more bearable. Those who lacked such support felt this would make it more difficult to cope with ill health, causing them to favour quality over length of life.

I don't have a family. So there's nobody really to look after me. That's why quality of life is of paramount importance to me [NonMS-04].

In contrast, participants with MS viewed a need for support from others more negatively. They described feeling uncomfortable with being dependent on others, and saw greater independence as a benefit of full health.

I hate being as dependent as I am, so getting worse is actually a really big deal [MS-05].

## 3.2 Secondary appraisal

#### 3.2.1 Adaptation

Participants with MS spoke about adaptation more frequently and in greater depth than those without MS. These participants reported how they had adjusted by working out what they could and could not do, and where they were prepared to compromise. They frequently expressed concepts found in the adaptation literature, such as finding new ways to achieve and maintain existing goals and activities, changing goals or activities, and

psychological adjustments such as altering one's conception of what constitutes "health" (Menzel et al., 2002). This made them less willing to forgo life-years in order to avoid a given health state. Some reported that they had found the physical effects of MS easier to adapt to than the psychological and cognitive effects.

I'd sort of got used to living with the physical side but it's how you change mentally [MS-04].

Some participants without MS did anticipate the extent to which they would adapt to particular health states. Typically, these were older people who considered that some deterioration in their own health was inevitable and who had found themselves able to cope with far more than they would have thought possible when they were younger. Some participants without MS considered how they might reframe their goals and activities in response to a deterioration in their health.

*OK*, I'm a bit reduced in my mobility, which is not a good thing and I wouldn't like it, but all the time I can do something that's mentally stimulating, like a crossword or doing research, I'm still going to keep going for Life B [NonMS-07].

## 3.2.2 Comparison processes

To help them assess the scenarios, many participants referred to their own experiences or those of people they knew. These assessments are described below for each group.

#### Participants with MS

All but one all of the participants with MS related the health states to their own health, compared to around half of the participants without MS. They automatically used their

experiences of MS to help them understand what it would be like to inhabit the health states and to inform their TTO choices.

Most participants with MS said that at least one of the health states was similar to their own current situation, or to one they had previously experienced.

"Been there, seen it, done it and got the T-shirt" [MS-06]. They explained that this meant they did not need to imagine what it was like to inhabit these states.

> I am there, the way I am now, I am physically affected, socially affected, all those things, they impact on my life and have done for a few years now so it's not a case of imagining" [MS-07].

A few felt that some states were worse than their own current health.

Participants with MS spoke at length about how their opinions (regarding their own health and the hypothetical health states) were shaped by their experiences of adapting to life with a long-term condition. Several considered the impact of the individual dimensions on their daily lives, their relationships and their abilities to participate in valued activities, enabling them to identify which dimensions were most important to them.

*My mood, because of its impact on other people as well. When I get irritable I can level small cities [MS-01].* 

Some participants with MS spoke about people they knew who were more severely affected by MS than themselves, particularly those who had lost their independence or were affected by cognitive problems. This influenced how they weighted the relevant dimensions of the MSIS-8D.

I think keeping the mental faculties going is important ... some of the people [with MS] here are in trouble in all sorts of ways [MS-05].

#### Participants without MS

A few participants without MS identified strongly with one of the health states, making them very reluctant to trade time. This resulted in non-compensatory decision-making – a phenomenon that was not observed among participants with MS.

This is me! All the way, it's going to be, forget it, I prefer Life B - for sure - because it's described me. And I don't wanna be dead. I am not prepared to give up any time [NonMS-01].

A couple of people who were currently experiencing health problems used this experience to identify which dimensions had the greatest impact on their lives.

The ones that you can relate to, that you experience or are important to you are the ones that you care more about" [NonMS-12].

Participants without MS tended to rely on experiences with other people who had health problems, although younger participants stated that their lack of such experiences made it more difficult to imagine more severe health states. Those who were older had more examples of relatives and friends who were affected by their health.

As you get older and more of your friends get cancer and heart disease and various nasties, you get a lot more experience of what can happen ... I could probably cope with that, that and that, but I probably couldn't cope with that [NonMS-08].

## 3.3 Response

Three strategies were apparent when choosing a response from the options provided (ie prefer Life A, prefer Life B, Life A and Life B are about the same).

Some participants prioritised quality of life over length of life. No participants with MS indicated that they were prioritising quality over length of life at any stage; this strategy was mentioned only by participants without MS.

It's better to live a hundred days as a lion than ten years as a sheep [NonMS-02].

Some participants prioritised length of life over quality of life. This strategy was mentioned more frequently by participants with MS than those without.

I've got MS, I've got limitations but ... without question, yes, I want to live as long as I can [MS-12].

The majority of participants, with and without MS, explicitly described trading-off between length and quality of life at some point in their interview.

## 4. Discussion

We have described a qualitative investigation of the thought processes employed by respondents as they answer TTO questions, aiming to explore a number of possible explanations for observed differences in HSVs provided by patients and the general population (Table 1). The results of our analysis are discussed in relation to these possible explanations below.

Participants' own experiences of health provided an important reference point against which to assess health states. There was strong evidence of "shifting inter-personal and intra-personal comparisons", with people with MS explaining how their experiences of compromised health, within themselves and through contact with other people with MS, had shifted their reference points, making their assessments of hypothetical health states more favourable (Ubel et al., 2003). Participants with MS referred to their own health more frequently and in greater detail, and many reported experiencing health states similar to those presented. This made it easier for participants with MS to imagine inhabiting the health states, put the health states into context and identify which dimensions were most important to them. As predicted (Happich and von Lengerke, 2005), they were able to recall and convey how they had adapted to life with a long-term condition, and explicitly took this into account when making their choices. These findings support the idea that the observed differences in MSIS-8D HSVs between people with MS and the general population were caused, not by the differences in the health status of these groups, but by attitudinal differences associated with the experience, and the process, of living with a long-term condition (Goodwin et al., 2020).

The differences between participants with and without MS were less marked for the older participants without MS. The increased exposure to health problems as people get older, whether in themselves or in others, appears to provide a level of experience closer to that of people with MS (van Nooten et al., 2018). Younger participants had fewer such contacts, making it more difficult to assess the more severe health states. While direct experience of MS was clearly the most effective means of interpreting the health state descriptions, this finding suggests that broader experience of health problems can work in a similar way to direct experience of a specific condition. This is consistent with other studies (van Nooten et al., 2018), which have found that health state valuations may be influenced by the respondent's age, and is reflected in the results of the MSIS-8D valuation surveys, where older respondents gave significantly higher health state values than younger respondents (Goodwin et al., 2020).

Participants with and without MS took similar contextual factors into account, beyond those included in the TTO scenarios, when assessing health states (Stiggelbout and de Vogel-Voort, 2008). As other studies have found, all participants were concerned about the impact of their choices on those close to them, particularly their children or grandchildren (Karimi et al., 2017; van der Pol and Shiell, 2007). Where the two groups differed was in their attitudes towards family members providing informal care: people without MS felt the availability of potential carers could enable them to live for longer in a poor health state, while people with MS expressed discomfort at being dependent on others. These findings reflect the concepts of "longevity altruism" – wishing to prolong life in order to spend more time with loved ones - and "quality of life altruism" – wishing to avoid becoming a burden on others - identified by Krol and colleagues (2016).

Participants from both groups were consistent in the importance they placed on dimensions across different health states, giving greater weight to dimensions that were related to activities that were important to them. When considered alongside the findings relating to the consideration of factors outside the health state descriptions, it did not appear that the participants without MS in this study were more prone to framing effects or focusing illusions, as suggested by Stiggelbout and de Vogel-Voort (2008).

Previous research has found that patients give greater weight to non-physical dimensions of health (Brazier, 2008). The results of the MSIS-8D preference elicitation surveys revealed a more mixed picture, in which people with MS weighted Cognition more highly than members of the general population, and the general population gave greater weight to Depression (Goodwin et al., 2020). This pattern was reflected in the current study: comparing health states to their own or others' health appeared to cause the groups to weight particular dimensions more highly, specifically Cognition (people with MS) and Depression (people without MS). Overall, however, the majority of participants, both with and without MS, prioritised mental health and cognition over the other dimensions of the MSIS-8D. This appears to be linked to adaptation: participants with MS reported that they had found it easier to adjust to the physical effects of MS, and people without MS felt that activities requiring cognitive involvement could replace physical activities, but not vice versa. This implies that some health states are easier to adapt to than others, and potentially there are health states to which one cannot adapt (Dolan and Kahneman, 2008). Given the higher HSVs provided by people with MS in the online preference elicitation surveys (Goodwin et al., 2020), it is unsurprising that participants with MS tended to prioritise length of life, while only participants without MS routinely prioritised quality of

life. The majority of participants from both groups described trading between quality and length of life at some point during their interview. The main reason for refusing to trade years in full health for improved quality of life appeared to be a combination of loss aversion, endowment effects and non-compensatory decision-making, which occurred where the participant identified closely with the health state presented. While previous research suggests that patients are more susceptible to these effects (Stiggelbout and de Vogel-Voort, 2008), it was only participants without MS who exhibited this behaviour in this study.

Recent contributions to the literature suggest a shift away from the traditional "public versus patient" dichotomy, towards a recognition that each approach has advantages and disadvantages (Helgesson et al., 2020). By better understanding the forces underpinning observed discrepancies between public and patient preferences, we will be better equipped to interpret the unique perspective offered by each source. This may assist in developing approaches to the joint presentation of cost effectiveness results from both sources to inform decision-making (Versteegh and Brouwer, 2016).

There is also increasing interest in using "experienced health states", ie respondents' valuations of their own health states, to generate HSVs (Helgesson et al., 2020). While the current study focuses on the valuation of hypothetical health states, the insights gained from this investigation may be of relevance to this developing area of research by serving to highlight issues that should be considered when using patient preferences, either for experienced or for hypothetical health states.

#### Limitations of the study

It is important to note that this study focuses on MS. A similar research design undertaken with a different patient group or with health states described according to a different classification system could produce different findings. For example, the typically relapsingremitting or progressive nature of MS, and the heterogeneity of symptoms experienced by individuals (Zajicek et al., 2007), may cause people with MS to consider the scenarios presented in a TTO differently, compared to people with more stable and predictable longterm conditions. Health states described according to the MSIS-8D classification system will differ in content from health states based on generic or other condition-specific preferencebased measures, and this too may influence the thought processes and the factors taken into consideration by participants when completing TTO questions. Furthermore, the MSIS-8D is unusual in referring to the extent to which the person is "bothered by" each dimension. Framing health states around perceived impact rather than objective description could reflect a degree of adaptation, and interpretation might have varied between participants. The choice of patient group and preference-based measure for this study was pragmatic, informed primarily by access to the relevant survey software and data. Further research of this type would provide insights into how differences between patient and public values may vary according to the patient group or health state classification system used.

Participants were self-selecting, ie those who responded to invitations or advertisements, thereby potentially limiting the representativeness and diversity of the sample. Due to recruitment difficulties, we were unable to employ a purposive sampling strategy to ensure representation from subgroups that had differed in their responses to the MSIS-8D

valuation surveys. These difficulties resulted in samples with a higher proportion of people aged over 50, and a lower proportion of women (compared to men) with MS than we would expect.

The process of thinking aloud in an interview situation may not reveal what people would be thinking if they were completing the survey alone. For example, participants may feel obliged to provide a definitive or comprehensive answer to a question and, in doing so, may elaborate or speculate on their actual thought processes. Care was taken to construct probing questions in accordance with good practice guidelines in order to mitigate this (Willis, 2015).

## Summary and conclusions

This research provides new insights into the possible reasons for commonly observed discrepancies between patient and public preferences for hypothetical health states. The key differences between participants with and without MS in this study related to their secondary appraisal of TTO questions. Participants with MS had more experience of health problems and used this experience to assess the hypothetical health states. They were also more likely to consider how they would adapt to the health states. However, many older participants without MS had experience of health conditions that they were able to use in similar ways. We found little difference between participants with and without MS in terms of being affected by framing effects and focusing illusions, taking into account factors that are not included in the TTO scenarios and the relative priorities of physical and non-physical dimensions of health. Contrary to the findings of previous studies, we found that participants with MS were less prone to loss aversion and endowment effects, and less likely

to engage in non-compensatory decision processes. Thus it would appear that the main reasons for the discrepancies in patient and public values for the MSIS-8D are related to the ways in which direct experience of a long-term health condition affects the internal reference point by which respondents assess hypothetical health states, and the extent to which they consider they will adapt to a given health state. We hope that these insights will help to inform developing areas of research, such as the joint presentation of costeffectiveness results from multiple perspectives, and the use and interpretation of preferences elicited from patients for experienced health states.

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Reference for PPI Group to be added following peer review.

# **APPENDIX: protocol for cognitive interviews**

1. Give the participant an information sheet

2. Ask if the participant has any questions

3. Ask the participant to sign the consent form

4. Ask the participant to complete the MSIS-8D questions for their own health

5. Tell the participant that you are starting the recording, check they are happy to continue

6. Introduce think-aloud familiarisation task

## 7. Give the participant the 'Which holiday would you choose?" card.

We would like you to read and answer this question. Imagine that you have a choice of two holidays, which differ in certain ways that may (or may not) influence your decision. When you are thinking about the holidays and choosing between them, please just say out loud whatever is going through your mind, even if it seems obvious or irrelevant. Remember that we just want to hear how you think - there are no right or wrong answers, and there are no right or wrong ways to think.

# 8. Provide feedback based on think-aloud familiarisation task

9. Introduce MSIS-8D familiarisation task and ask participant to think aloud while ranking health states.

#### **10.** Computerised TTO questions

Please look at and answer the following questions. When you are doing this, please just say out loud whatever is going through your mind as you answer the questions even if it seems obvious. Remember, there are no right or wrong answers, we just want to hear how you think about these issues.

#### 11. Possible probing questions

Probing questions will only be asked if they were not covered during the think aloud part of the interview, or in a response to a previous probe.

- What were you taking into consideration when you were answering that question?
  Were you thinking only about the description of the health state that you were given, or did you take anything else into account if so, what was that?
- Did you consider all the dimensions equally or were some more important to your decision than others? If so, which dimensions were most and least important and why?
- Did your own experiences of your health affect how you felt about the health state?
  Could you tell me a bit more about that?
- When you were thinking about living in the blue health state for a period of time, did you imagine that you would feel the same about it for the whole period, or did you think that may change? Can you tell me a bit more about that?

- Were you comparing the health state with anything or with anyone you know? Could you tell me a bit more about that?
- Final health state only: Overall, how do you feel about the questions where you were asked to choose between health states?

Upon reaching the end of the probing questions for any health state, if the duration of the interview has reached 35 minutes, do not ask the participant to complete any further health states, and go to 15.

# 12. At the end of the probing questions

- If this is the last health state, go to 15.
- If the participant has chosen one of the responses that bring the survey automatically to a close at the end of the questions for the practice health state, go to 15.

# 14. Repeat steps 10-13 for each health state

# 15. End of TTO questions

- 16. Ask if the participant has any further comments or queries
- 18. Close of interview

# Figure and table captions

Figure 1. Descriptive system for the MSIS-8D

Figure 2. Example TTO question

Figure 3. Process for analysis of interview data

Figure 4. Thematic framework: results from analysis of cognitive interviews

Table 1: Anticipated differences between patients and the public and brief outline of findings