The effect of perspective, duration, and views on life after death on valuation of severe health states of EQ-5D-Y-3L

Zhongyu Lang[a,b,c], Bram Roudijk[d], Peep Stalmeier[e], Stefan A. Lipman[b,c], Arthur E. Attema[b,c]

[a] (Corresponding author) Erasmus School of Health Policy & Management, Erasmus University, P.O. Box 1738, 3000 DR Rotterdam, the Netherlands. E-mail: zhongyu.lang@eshpm.eur.nl; Tel: +31.10.408.2948

[b] Erasmus Centre for Health Economics Rotterdam, EsCHER, the Netherlands

[c] Erasmus School of Health Policy & Management, Erasmus University Rotterdam, the Netherlands

[d] EuroQol Research Foundation, Rotterdam, the Netherlands

[e] Department for Health Evidence, Radboud University Medical Center, the Netherlands

February 2024

Key Words: EQ-5D-Y-3L, severe health states, proxy perspectives, views on life after death

JEL CLASSIFICATION: I10

Acknowledgements: This research was made possible through a grant from The EuroQol Group, project number EQ Project 1602-RA. The views expressed in this paper are those of the authors and do not necessarily reflect the views of The EuroQol Group. Dr. Lipman is also co-funded by Smarter Choices for Better Health Initiative.

Abstract

Objectives

Prior research has shown that the composite time trade-off (cTTO) utilities vary with perspectives as adults tend to assign lower utilities to severe health states when they value health states for themselves (self-perspective) compared to valuing health states for children (proxy perspective). Utilities may also depend on the exact framing of the proxy perspective, i.e., whether adult respondents decide for a child (proxy 1 perspective) or when they imagine what a child wants (proxy 2 perspective). Such discrepancies may lead to health states being better than dead (BTD) under one perspective, yet worse than dead (WTD) under another. It has been suggested that unwillingness to trade-off life years for children explains these results, yet this would only affect methods that include duration (i.e., cTTO). We investigate whether the (inclusion of) duration of health states influences individuals' propensity to value a health state WTD or BTD when taking different perspectives. We also explore whether religious people are less willing to consider states WTD.

Methods

We integrated ranking tasks with a paired comparison task, employing the BTD method (i.e., respondents were asked to choose between a health state lasting for a specific time and death) in an online sample recruited from the UK public through Prolific. To capture a wide range of beliefs about the afterlife, participants were sampled in groups of equal size on whether they were religious or not and asked about attitudes towards death and euthanasia. These discrete choices were contextualized with 3 different perspectives (adult-own, proxy 1 and proxy 2), 5 different health states described in terms of the EuroQol EQ-5D-Y-3L classification system (21111, 22222, 23333, 33323, and 33333) and 4 different durations (1 year, 5 years, 10 years, and 20 years).

Results

Our results indicate that in the ranking task without duration, there is no difference in valuing severe health states WTD, regardless of perspective or religious belief. Within the paired comparison task, increasing the duration leads to a substantial rise in the percentage of participants who consider severe health states WTD across all perspectives, with a notably

higher tendency in the non-religious group. We confirm the previous finding that health states are more favored over death in proxy 1 than in the self-perspective in both groups. We also observe that people are more likely to choose death over a health state when they agree more with euthanasia and when durations are longer (10 and 20 years). Religious beliefs are found to have a negative significant correlation with choosing health states WTD.

Conclusion

Overall, duration, religion and opinions on euthanasia influence tendencies to value a health state being BTD or WTD under both self and proxy perspectives. QALY anchored utility may be duration dependent and future research is encouraged to take into account religion in sampling.

1. Introduction

Health-related quality of life (HRQOL), as outcome assessment, is pivotal in clinical practices, patient health monitoring, and evaluation of healthcare services. Traditionally centered on the adult demographic, the measurement of HRQOL is increasingly being recognized as equally critical among children and adolescents. To cater to these younger populations, several multi-attribute classification systems have been devised, such as HUI2 (Torrance et al., 1996), CHU9D (Stevens, 2011), and EQ-5D-Y-3L (Wille et al., 2010). The HUI2 system uses seven dimensions to specifically measure pediatric oncology with extended progression (Torrance et al., 1996). In contrast, the CHU9D expands the extent to a wider range of clinical conditions, utilizing nine dimensions, each with five levels to measure HRQOL in children (Stevens, 2011). The EQ-5D-Y-3L, derived from the adult version EQ-5D-3L, is specifically adapted to younger populations aged between 8 to 15 years. It has demonstrated to be both concise and transferable (Wille et al., 2010). This instrument describes five dimensions of a person's health, mobility (walking), self-care (washing or dressing oneself), usual activities, pain or discomfort, and anxiety or depression. It allows respondents to value their own health by choosing one of the three levels of severity within each dimension, cumulating in a health state represented by a five-digit code. For example, 32212, indicating a health state of having a lot of problems walking about, some problems washing or dressing, some problems doing one's usual activities, no pain or discomfort, a bit worried, sad, or unhappy.

In line with the EQ-5D-Y-3L protocol, the composite time trade-off (cTTO) and discrete choice experiment (DCE) are the recommended methodologies for eliciting health state utilities in the pediatric population. The valuation approach for children's health states diverges from typical adult self-assessment used in standard EQ-5D valuation, where adults value health states for themselves (self-perspective). Instead, adults are instructed to value health states for a 10-year-old child (Ramos-Goñi et al., 2020), thereby employing a proxy perspective, termed *proxy1 perspective* in our study. Evidence from previous research has indicated that these two perspectives yield different utility scores. Notably, adults tended to value severe health states lower when evaluating from their self-perspective as opposed to the proxy1 perspective, where they were considering for a 10-year-old child (Kreimeier et al., 2018; Lipman et al., 2021; Shah

et al., 2020). This difference extends beyond adults deciding for a 10-year-old child; it also manifests when adults imagine what a child really wants, referred as *proxy2 perspective* in our study. Severe health states were observed to receive lower utilities in the proxy1 than in the proxy2 perspective (Lipman et al., 2022), suggesting the perception of whether a health state is considered better than dead (BTD) or worse than dead (WTD) may vary across perspectives.

Although no study up to date has compared all three perspectives (self, proxy1 and proxy2) aggregately, based on the evidence mentioned above, the likelihood of severe states being valued as WTD appears to be the greatest from the self-perspective, with a diminished probability in the proxy1 and further reduced in the proxy2 perspective. In light of the ongoing debate about the existence and significance of WTD utilities, it is worth exploring the proportion of health states being considered WTD across the self and proxy perspectives.
The reasons underlying the variation in the EQ-5D-Y-3L utility scores across different perspectives remain to be unclear. Qualitative studies indicate that adults face challenges when making health-related decisions for children (Powell et al., 2021; Reckers-Droog et al., 2022). People tend to be, on the one hand, reluctant to imagine children in extremely severe states of suffering, but, on the other hand, believe that children may adapt better to severity compared to adults (Dewilde et al., 2022; Reckers-Droog et al., 2022). One important factor to consider is the duration of the health state used in the valuation as it could impact individuals' decision on whether a health state is considered WTD from a proxy perspective. For instance, in the context of adult valuations, the concept of Maximum Endurable Time (MET) has been well-documented (Stalmeier et al., 1997; Stalmeier et al., 2001; Stalmeier et al., 2007), suggesting that certain health states are viewed as BTD when endured for shorter durations but WTD if experienced over a longer term. While adult valuation studies using the BTD method (Roudijk et al., 2020; Stalmeier et al., 2007; Van Hoorn et al., 2014) have explored time-dependent preferences across a range of durations, not much prior research on the EQ-5D-Y-3L valuation has been done. For example, in the discrete choice experiment (DCE) where no time duration is presented, health states were found more likely to be chosen over death in the proxy1 perspective than in the self-perspective (Kreimeier et al., 2018). The impact of duration on the proportion of WTD valuations within EQ-5D-Y-3L remains ambiguous. Further investigation

could shed light on the reasons for the observed discrepancies. Recent studies that employed other samples and methodologies have either failed to identify significant differences in time trade-off (TTO) responses across perspectives or have found only minimal differences (Attema et al., 2023; Lang et al., 2023; Lipman et al., 2021). It is worth to note that a substantial portion of this methodological research has been conducted in the Netherlands, prompting that whether a country setting, or the population attitudes might obscure potential differences. An earlier study found a notable gap between the self and proxy1 perspectives in TTO values across countries, with Germany, Spain, and the UK exhibiting greater disparities than the Netherlands (Kreimeier et al., 2018). Given that the valuation was also found to be different between countries in another study (Roudijk et al., 2019), and considering Netherlands' comparatively progressive stance on euthanasia (Inglehart et al., 2021), cultural context may indeed play a role. Further evidence of this is also seen in other studies that highlight how religious beliefs, which often intersect with views on life-after-death and euthanasia, can influence valuation (Augestad et al., 2013; Barry et al., 2017; Van Nooten et al., 2009; van Nooten et al., 2016).

Our research is designed to deepen the understanding of how the EQ-5D-Y-3L instrument is used to value health states from various perspectives, with a particular focus on the valuation of severe health conditions. The primary objective of our study is to examine how frequently severe health states are deemed WTD across three distinct perspectives: adult self-perspective, proxy1, and proxy2. Additionally, we aim to investigate the interplay between two key factors: the duration of the health states and the respondents' beliefs in life after death. Specifically, we seek to determine whether any observed differences in WTD valuations across perspectives are influenced by the length of time the health state is endured and by the respondents’ levels of religiousness and attitudes towards death.

2. Methods

2.1 Experimental design

In this study, we employed the Better Than Dead (BTD) method, as delineated in prior research (Roudijk et al., 2020; Stalmeier et al., 2007; van Hoorn et al., 2014) to assess time-dependent preferences for various health states. This methodological approach was aimed at capturing nuanced variations in health state valuations, particularly focusing on the discrepancies observed in health state valuation between adults and children. The BTD tasks were programmed in Qualtrics. Specifically, participants were asked to make choices between immediate death and living in health states for varying durations: no duration, 1 year, 5 years, 10 years, and 20 years. The inclusion of a 'no duration' option was operationalized through ranking tasks. This approach was designed to facilitate comparisons with the findings from prior research (Kreimeier et al., 2018). Considering the potential respondent burden, the study was designed to avoid an overly exhaustive within-subject full factorial design, which would typically require each participant to make 75 discrete choices (5 health states × 5 durations × 3 perspectives) presented in a randomized order. To mitigate this, we opted for a modified approach, dividing the sample into two blocks. One block encompassed choices from the self-perspective and proxy1 perspective, while the other involved the self-perspective and proxy2 perspective. This adjustment resulted in a more manageable 50 choices per participant (5 health states × 5 durations × 2 perspectives), aligning with the feasibility demonstrated in van Hoorn et al. (2014), which involved 108 tasks per subject. To further enhance respondent engagement and reduce fatigue, we interspersed the choice tasks with demographic questions. The experiment started with participants self-reporting their health status using the EQ-5D-Y-3L, acquainting them with the classification system. This was followed by a series of demographic questions. These questions not only gathered standard demographic information but also delved into participants' religious beliefs and their attitudes towards death and euthanasia. To enrich our understanding of these aspects, we incorporated questions from another study (Inglehart et al., 2021), focusing on the role and significance of religion for the respondents.

2.2 Health states

In this study, five health states were selected from the EQ-5D-Y-3L system (Wille et al., 2010). This measurement tool describes five dimensions of health problems: mobility, self-care, usual activities, pain/discomfort, and anxiety/depression. Within each dimension, there are three levels of severity, no problems, some problems, and a lot of problems. A specific health state is described by a combination of five numbers, such as 21111, which indicates some problems with mobility (walking about), no problem with self-care (washing or dressing), no problems with usual activities, no pain/discomfort, and no anxiety/depression. In this study, we used health states with differential severity, i.e., 21111, 22222, 23333, 33323, and 33333, to increase the likelihood that they are valued as (partially) WTD.

2.3 Sample size

After obtaining approval from the Ethics Review Committee at the Erasmus School of Health Policy and Management (case number ETH2223-0482), we initiated our study by conducting five pilot data collection sessions. These sessions, involving colleagues, were crucial for identifying potential errors and assessing the feasibility of our software. We opted for a traditional yet adequate sample size of 1,000 participants. This figure was determined based on the sample size used in a related study (Kreimeier et al., 2018), ensuring robustness while adhering to the budget constraints set by the grant from the EuroQol Research Foundation. Participants were recruited from the UK general public through Prolific and engaged in a computer-assisted survey administered via Qualtrics. To capture diverse perspectives on euthanasia and beliefs about life after death, participants were first screened for religious beliefs. They were then randomly assigned to one of two groups: religious or non-religious.

2.4 Data collection

Prior to participation, respondents were required to sign a consent form. The survey commenced with demographic inquiries, including age, gender, and current residence (options included England, Scotland, Wales, or Northern Ireland). Participants then self-reported their current health status using the EQ-5D-Y and the Visual Analogue Scale. To familiarize them with

the choice task, two preliminary exercises were conducted. Initially, participants engaged in two warm-up choice tasks from their own perspective. In these tasks, they compared two health states and selected the one they deemed preferable for themselves. This was intended to prepare them for more complex discrete choice exercises later in the survey. Subsequently, they completed another warm-up task, but this time from either the proxy1 or proxy2 perspective. Following this, a warm-up ranking task was introduced, where participants were asked to order various health states, including death, from most to least favorable.

The main component of the survey involved a ranking task, serving as a baseline comparison for the paired comparison task. Participants ranked health states, presented in random order, from most to least favorable, without consideration of duration. These rankings were done from two perspectives: self and either proxy1 or proxy2. Next, the paired comparison task commenced, initially from a self-perspective. Participants were presented with binary choices, deciding between living in a specific health state for a defined duration (1, 5, 10, or 20 years) and death. The survey then continued with additional demographic questions to diverge respondents from fatigue, covering education level and employment status. The second part of the DCE followed, requiring choices to be made from either the proxy1 or proxy2 perspective. This was succeeded by further demographic queries, including household income, number of children, and life expectancy estimations for oneself and for a 10-year-old child. The final section of the survey included questions from the World Values Survey, targeting attitudes towards euthanasia (Inglehart et al., 2021)

3. Results

3.1 Demographic descriptions of the sample

Table 1 below shows the overall sample description. The sample comprised 989 participants post-data cleaning, with 497 individuals in the religious group and 492 in the non-religious group. The data cleaning process adhered to the following criteria: (1) exclusion of participants who failed to complete the entire task, (2) exclusion of those who completed tasks in under 360 seconds (equivalent to 6 minutes), suggesting insufficient engagement, and (3) exclusion of responses where all entries were marked as "NA", indicating a lack of information.

Demographically, the majority of respondents in both groups were from England, identified as female, aged between 25-54 years, and had attained higher education, defined as having obtained at least a bachelor's degree from a university. Approximately half of the respondents reported earning a low income, defined as less than £39,999 annually. Within the religious group, 66.6% had children, whereas 44.9% in the non-religious group did not have children. Overall, between two study groups, no significant differences were found in terms of demographics, country of origin, age, gender, education, income, or childrearing status.

Table 1. Sample statistics by group

Respondent characteristics	Category	Religious, n=497	Nonreligious, n=492	Total, n=989
Country, n (%)	England	436 (87.73%)	413 (83.94%)	849 (85.84%)
	Scotland	32 (6.44%)	47 (9.55%)	79 (7.99%)
	Wales	19 (3.82%)	28 (5.69%)	47 (4.75%)
	Northern Ireland	10 (2.01%)	4 (0.81%)	14 (1.42%)
Age, n (%)	18-24 years old	34 (6.84%)	42 (8.54%)	76 (7.68%)
	25-34 years old	124 (24.95%)	138 (28.31%)	262 (26.46%)
	35-44 years old	124 (24.95%)	142 (28.86%)	266 (26.90%)
	45-54 years old	98 (19.72%)	64 (13.01%)	162 (16.36%)
	55-64 years old	77 (15.49%)	39 (7.93%)	116 (11.73%)

	65+ years old	42 (8.45%)	37 (7.46%)	79 (7.97%)
Gender, n (%)	Female	323 (64.99%)	288 (58.54%)	611 (61.78%)
	Male	171 (34.41%)	198 (40.24%)	369 (37.31%)
	Non-binary / third gender /other	3 (0.60%)	6 (1.22%)	9 (0.91%)
Education level, n (%)	Low education	206 (41.45%)	222 (45.12%)	344 (43.28%)
	High education	291 (58.55%)	270 (54.88%)	645 (56.72%)
Income, n (%)	Less than 20,000 GBP	65 (13.08%)	69 (14.02%)	134 (13.55%)
	20,000-39,999 GBP	174 (35.01%)	188 (38.21%)	362 (36.60%)
	40,000-59,999 GBP	130 (26.16%)	115 (23.37%)	245 (24.77%)
	60,000-99,999 GBP	101 (20.32%)	101 (20.53%)	202 (20.42%)
	More than 100,000 GBP	27 (5.43%)	19 (3.86%)	46 (4.65%)
Whether have kids, n (%)	Yes	331 (66.60%)	219 (44.49%)	550 (55.61%)

3.2 Ranking data

By using Wilcoxon signed-rank tests for within-subject comparisons in both groups, negligible differences were observed in the ranking of health states between the pairs of self vs. proxy1 perspective and self vs. proxy2 perspective across all health states. A marginal yet statistically significant difference was noted between self and proxy2 perspectives regarding health state 33323 within the religious cohort, where the p-value was 0.05. In the between-subject comparison, we found no significant differences between the religious and non-religious groups

across all health states and under all three perspectives. Furthermore, comparisons yielded neither significant differences between proxy1 and proxy2 perspectives within each group, nor across the groups.

Table 2. Within-subject comparison for each health state ranked under two perspective pairs in religious group with p values

Health states	Self vs Proxy1	Self vs Proxy2
23333	0.37	0.99
33333	0.87	0.45
22222	0.71	0.66
33323	0.41	0.05 *
21111	0.15	0.74
Dead	0.83	0.67

Table 3. Within-subject comparison for each health state ranked under two perspective pairs in non-religious group with p values

Health states	Self vs Proxy1	Self vs Proxy2
23333	0.77	0.44
33333	0.78	0.70
22222	0.29	0.92
33323	0.89	0.81
21111	0.16	0.15
Dead	0.13	0.63

3.3 Paired comparison data

In parallel with our analysis of ranking data, we conducted within-subject analyses for the paired comparison data, incorporating duration in health state valuation. The results, illustrated in Table 4, are derived from the tetrachoric correlation test. They demonstrate a strong positive

correlation within individuals when valuing health states from the self and proxy1 perspectives, as well as from the self and proxy2 perspectives, in both groups. Table 5 presents the McNemar test outcomes, indicating significant differences when duration is accounted for, between the self and proxy1 perspectives, and between the self and proxy2 perspectives within both groups. However, no significant difference was observed between the proxy1 and proxy2 perspectives. Between-subject analysis, utilizing chi-square tests as shown in Table 6, revealed significant differences between religious and non-religious groups under each perspective. Figures 1 and 3 further underscore these distinctions, showcasing a notably higher tendency for participants in the non-religious group to opt for health states being WTD under the self and proxy2 perspectives across the majority of health state-duration pairings. Conversely, Figure 2 reveals a lower inclination among non-religious individuals to select WTD for mild conditions under the proxy1 perspective. However, this tendency shifts dramatically, with a significantly higher percentage choosing WTD states as the severity of health states increases.

Table 4. Tetra-correlation test for perspective pairs in both groups

	Religious		Non-religious	
Perspective pairs	Self vs Proxy1	Self vs Proxy2	Self vs Proxy1	Self vs Proxy2
Tetrachoric relation	0.89	0.9	0.92	0.89

Table 5. Mcnemar test for perspective pairs in both groups

Groups	Religious			Non-religious		
Perspective pairs	Self vs Proxy1	Self vs Proxy2	Proxy1 vs Proxy2	Self vs Proxy1	Self vs Proxy2	Proxy1 vs Proxy2
P value	< 2.2e-16 ***	< 2.2e-16 ***	0.93	< 2.2e-16 ***	< 2.2e-16 ***	0.19

Table 6. Chi-square test for each perspective between both groups

	Self (religious vs nonreligious)	Proxy1 (religious vs nonreligious)	Proxy2 (religious vs nonreligious)
P value	< 2.2e-16 ***	< 2.2e-16 ***	1.046e-13 ***

Figure 1. Percentage of WTD choices by state under the self-perspective in both groups

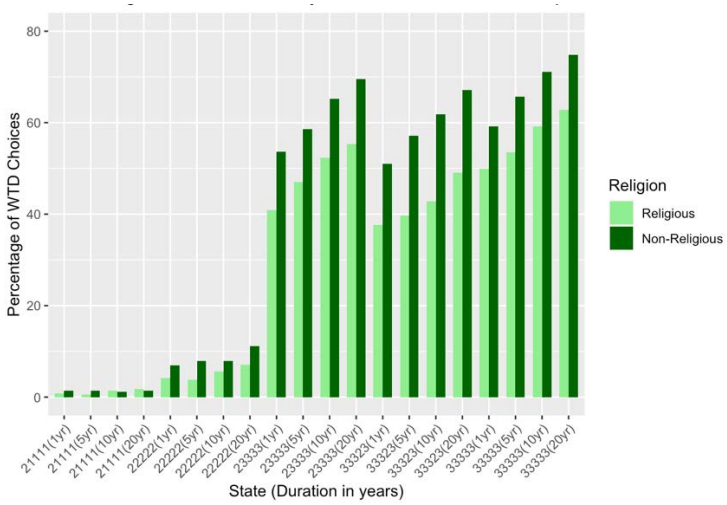


Figure 2. Percentage of WTD choices by state under the proxy1 perspective in both groups

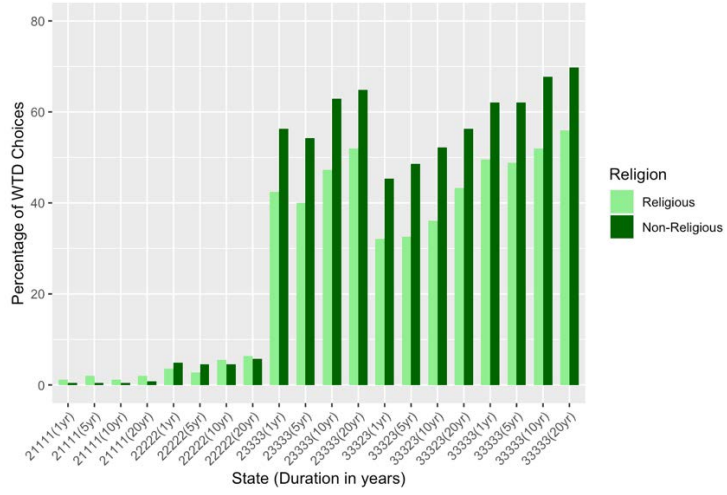
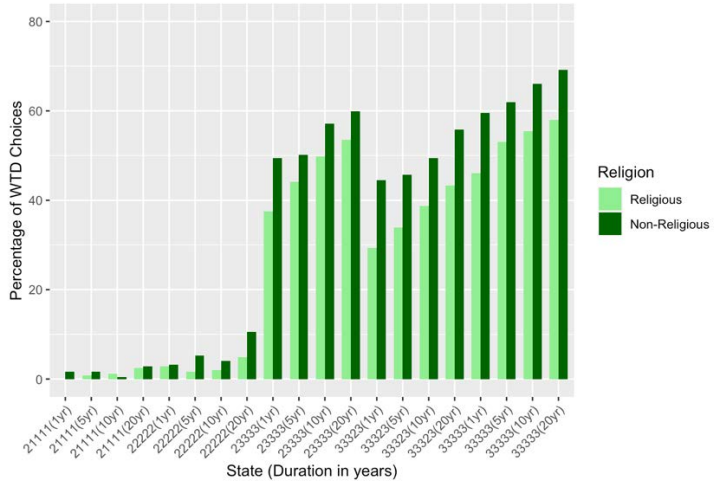


Figure 3. Percentage of WTD choices by state under the proxy2 perspective in both groups



3.4 Maximal endurable time (MET)

We further analyzed the MET phenomenon across the three perspectives within both groups and also considered MET individually for each perspective. Figure 4 illustrates that, generally, the pattern of MET distribution across health states, ranging from the mildest to the most severe, is similar between the two groups. Figure 5 reveals a higher tendency for non-religious participants to reach the MET across each health state compared to their religious group. Conversely, as shown in Figure 6, individuals from the religious group are more likely to reach MET in milder health states when valuing from the proxy1 perspective. In contrast, they tend to endure MET in more severe health states under the proxy2 perspective, as demonstrated in Figure 7.

Figure 4. The percentage of MET reach in each health state in both groups

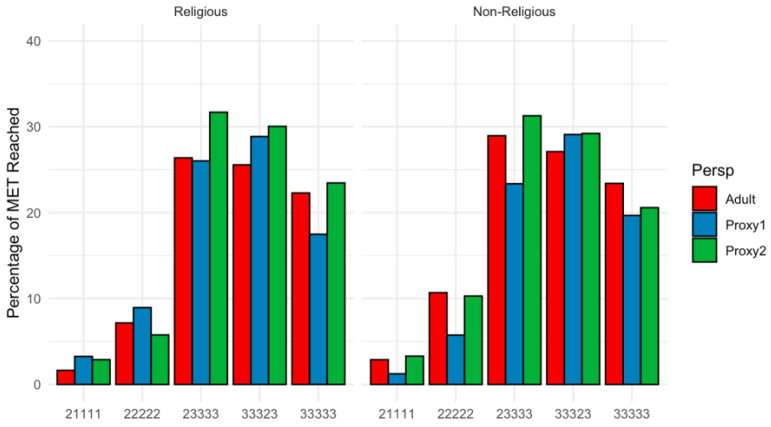


Figure 5. The percentage of MET reach under the self-perspective

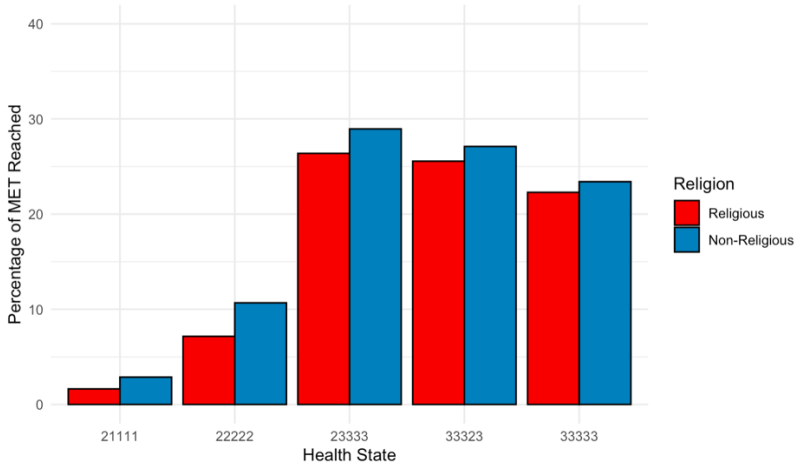


Figure 6. The percentage of MET reach under the proxy1 perspective

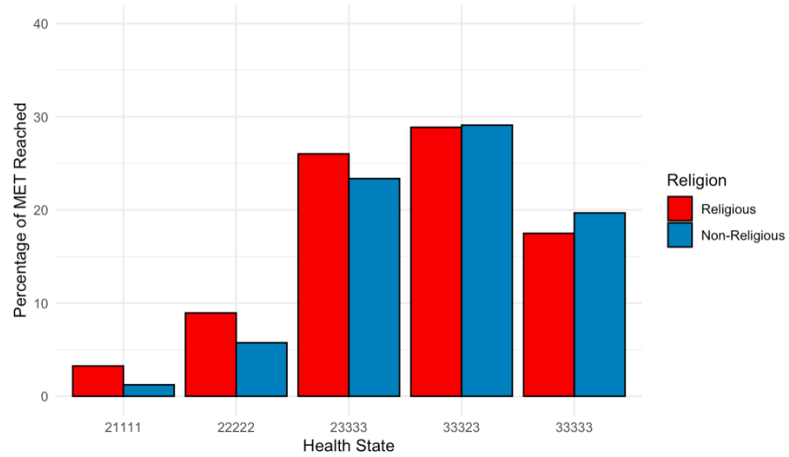
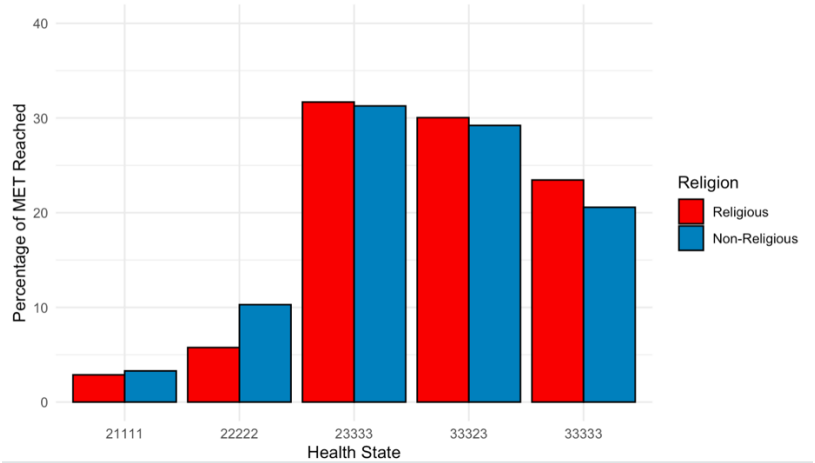


Figure 7. The percentage of MET reach under the proxy2 perspective



3.5 Regression results

Table 7 presents the outcomes of our logistic regression analysis, which was conducted to examine the relationships between the propensity to choose health states as WTD and the main effects, as well as the interaction effects, of perspective with duration and perspective with religious belief. The analysis revealed that religiousness is inversely associated with the selection of WTD states, suggesting that religious individuals are less likely to view severe health states as WTD. In contrast, durations of health states are positively correlated with the likelihood of them being classified as WTD. Upon incorporating interaction terms into the model, the influence of the proxy1 perspective was found to be more pronounced on the duration effect. Conversely, for individuals with religious affiliations, the proxy2 perspective was observed to have a higher impact on the proportion of WTD choices. Furthermore, Model 3 indicates that individuals' attitudes toward euthanasia, both in relation to children and adults, alongside their beliefs in an afterlife, are positively and significantly associated with a greater likelihood of selecting WTD states.

Table 7. Logit regression results from two models with main effects, interactions, and key demographics.

WTD choices	1	2	3
Proxy1 perspective	-0.50 (0.19) ***	-0.13 (0.10)	-0.48 (0.00) ***
Proxy2 perspective	-0.49 (0.05) ***	-0.54 (0.10) ***	-0.49 (0.00) ***
Health state 22222	1.90 (0.13) ***	1.90 (0.13) ***	1.80 (0.00) ***
Health state 23333	6.98 (0.13) ***	6.99 (0.13) ***	6.91 (0.00) ***
Health state 33323	6.40 (0.13) ***	6.41 (0.13) ***	6.32 (0.00) ***
Health state 33333	7.67 (0.13) ***	7.67 (0.13) ***	7.57 (0.00) ***
Being religious	-1.13 (0.20) ***	-1.23 (0.20) ***	-1.01 (0.00) ***
Duration of 5 years	0.25 (0.05) ***	0.38 (0.07) ***	0.27 (0.00) ***
Duration of 10 years	0.68 (0.05) ***	0.82 (0.07) ***	0.70 (0.00) ***
Duration of 20 years	1.12 (0.05) ***	1.28 (0.07) ***	1.12 (0.00) ***
Proxy1*duration 5 years		-0.41 (0.13) **	

Proxy2*duration 5 years		-0.11 (0.13)	
Proxy1*duration 10 years		-0.39 (0.13) **	
Proxy2*duration 10 years		-0.17 (0.13)	
Proxy1*duration 20 years		-0.49 (0.13) ***	
Proxy2*duration 20 years		-0.14 (0.13)	
Proxy1*being religious		-0.07 (0.10)	
Proxy2*being religious		0.32 (0.10) **	
Views on euthanasia on adults			0.36 (0.00) ***
Views on euthanasia on children			0.36 (0.00) ***
Views on life after death			0.00 (0.00) ***

Note: *** indicates p value at 0.1%; ** indicate p value at 1%; * indicate p value at 5%

4. Discussion

This study sought to explore the effects of perspective, duration, and beliefs in life after death on the valuation of severe health states using the EQ-5D-Y-3L instrument, employing the BTD method. We examined variations in the valuation of health states deemed WTD across different perspectives and religious beliefs, considering both situations where duration was and was not included. Our findings revealed that when duration was not included, perspectives and religious beliefs did not influence the rankings of health states. However, within the paired comparison tasks incorporating duration, significant differences emerged in choosing WTD states across the three perspectives, which was particularly pronounced among nonreligious participants.

The absence of differences in perspectives when duration was not considered contrasts with earlier findings from Kreimeier et al. (2018). This discrepancy may be attributed to three factors: (1) our use of a ranking task to gauge comparative valuations of health states against death without duration, serving as a baseline for the subsequent paired comparison task; (2) the employment of a narrower set of five health states, as opposed to the 17 used by Kreimeier et al. (2018); and (3) our focus on a UK sample exclusively, while the comparative study drew from a broader European setting including Germany, the Netherlands, Spain, and England.

Further analysis revealed that within the paired comparison task, the likelihood of a health state being rated as WTD was higher from the self-perspective compared to the proxy1 perspective in both religious and nonreligious groups. This gradient from self-perspective to proxy1 to proxy2 was evident only in the nonreligious cohort. Religious respondents, on the other hand, showed an increased tendency to consider severe health states as WTD through the proxy2 perspective as duration extended, suggesting nuances in moral and ethical considerations impacting valuation (van Hoorn et al., 2014; Devlin et al., 2004). Our results support those of van Hoorn et al. (2014) in that religious beliefs are significantly related to WTD valuations. In addition, our findings align with Devlin et al. (2004), indicating that ethical stances towards euthanasia may modulate preferences for health states relative to death. Moreover, a positive correlation was noted between beliefs in life after death and WTD selections.

Consistent with states Roudijk et al. (2020), we observed an increase in the percentage of WTD choices as health states' severity escalated. This was also true for duration, supporting

the findings from Stalmeier et al. (2007). It appears that as health states become more severe or are endured for longer, individuals' inclination towards valuing them as WTD increases.

Our study, while comprehensive, is not without limitations. The inclusion of only five health states—although matching the approach of Stalmeier et al. (2007)—is less than the seven used by Roudijk et al. (2020) and much fewer than the fifty employed by van Hoorn et al. (2014). Despite this, we presented respondents with fifty choice tasks to maintain a balance between comprehensive evaluation and participant burden. Among the strengths of our research is the incorporation of all three perspectives in WTD valuation. This comprehensive approach, combined with the application of the BTD method within the EQ-5D-Y-3L framework and the integration of duration in paired comparison tasks, distinguishes our study. Additionally, we delved into how religious beliefs, euthanasia for children and adults, and concepts of the afterlife might interact with WTD valuation in a binary choice experiment. Lastly, we measured the MET across individuals with varying religious affiliations, providing insights into endurance thresholds for health states.

5. Conclusion

The most important finding of our study is that the likelihood to value health states as WTD between perspectives is influenced by more than duration. We found that religious beliefs and attitudes towards death also have a considerable effect on the valuations. This suggests that health utility assessments may be shaped by a complexity of factors. Therefore, it is recommended that future preference-based measurements should strive to incorporate a more diverse sample, encompassing a broad spectrum of religious beliefs and death-related attitudes. This approach could provide a more nuanced understanding of utility valuations. Furthermore, to validate and expand upon our findings, it is encouraged to replicate this study across different cultural and national contexts, which may reveal how regional and cultural differences impact health state valuations.

Reference

Attema, A. E., Lang, Z., & Lipman, S. A. (2023). Can independently elicited adult-and child-perspective health-state utilities explain priority setting? *Value in Health, 26*(11), 1645-1654.

Augestad, L. A., Rand-Hendriksen, K., Stavem, K., & Kristiansen, I. S. (2013). Time trade-off and attitudes toward euthanasia: Implications of using 'death'as an anchor in health state valuation. *Quality of Life Research, 22*, 705-714.

Barry, L., Hobbins, A., Kelleher, D., Shah, K., Devlin, N., Ramos-Goñi, J. M., & O'Neill, C. (2017). Do changing attitudes to death have implications for national tariffs for health states? results from an examination of attitudes to euthanasia in the republic of ireland. *Value in Health, 20*(9), A686.

Devlin, N. J., Hansen, P., & Selai, C. (2004). Understanding health state valuations: A qualitative analysis of respondents' comments. *Quality of Life Research, 13*, 1265-1277.

Dewilde, S., Janssen, M. F., Lloyd, A. J., & Shah, K. (2022). Exploration of the reasons why health state valuation differs for children compared with adults: A mixed methods approach. *Value in Health, 25*(7), 1185-1195.

Inglehart, R. C., Nash, R., Hassan, Q. N., & Schwartzbaum, J. (2021). Attitudes toward euthanasia: A longitudinal analysis of the role of economic, cultural, and health-related factors. *Journal of Pain and Symptom Management, 62*(3), 559-569. https://doi.org/10.1016/j.jpainsymman.2021.01.009

Kreimeier, S., Oppe, M., Ramos-Goñi, J. M., Cole, A., Devlin, N., Herdman, M., Mulhern, B., Shah, K. K., Stolk, E., Rivero-Arias, O., & Greiner, W. (2018). Valuation of EuroQol five-dimensional questionnaire, youth version (EQ-5D-Y) and EuroQol five-dimensional questionnaire, three-level version (EQ-5D-3L) health states: The impact of wording and perspective. *Value in Health, 21*(11), 1291-1298. https://doi.org/10.1016/j.jval.2018.05.002

Lang, Z., Attema, A. E., & Lipman, S. A. (2023). The effect of duration and time preference on the gap between adult and child health state valuations in time trade-off. *The European Journal of Health Economics,* , 1-13.

Lipman, S. A., Reckers-Droog, V. T., Karimi, M., Jakubczyk, M., & Attema, A. E. (2021). Self vs. other, child vs. adult. an experimental comparison of valuation perspectives for valuation of EQ-5D-Y-3L health states. *The European Journal of Health Economics, 22*, 1507-1518.

Lipman, S. A., Essers, B. A., Finch, A. P., Sajjad, A., Stalmeier, P. F., & Roudijk, B. (2022). In a child's shoes: Composite time trade-off valuations for EQ-5D-Y-3L with different proxy perspectives. *PharmacoEconomics, 40*(Suppl 2), 181-192.

Powell, P. A., Rowen, D., Rivero-Arias, O., Tsuchiya, A., & Brazier, J. E. (2021). Valuing child and adolescent health: A qualitative study on different perspectives and priorities taken by the adult general public. *Health and Quality of Life Outcomes, 19*, 1-14.

Ramos-Goñi, J. M., Oppe, M., Stolk, E., Shah, K., Kreimeier, S., Rivero-Arias, O., & Devlin, N. (2020). International valuation protocol for the EQ-5D-Y-3L. *PharmacoEconomics, 38*, 653-663.

Reckers-Droog, V., Karimi, M., Lipman, S., & Verstraete, J. (2022). Why do adults value EQ-5D-Y-3L health states differently for themselves than for children and adolescents: A think-aloud study. *Value in Health, 25*(7), 1174-1184.

Roudijk, B., Donders, A. R. T., & Stalmeier, P. F. (2019). Cultural values: Can they explain differences in health utilities between countries? *Medical Decision Making, 39*(5), 605-616.

Roudijk, B., Donders, A. R. T., & Stalmeier, P. F. (2020). A head-on ordinal comparison of the composite time trade-off and the better-than-dead method. *Value in Health, 23*(2), 236-241.

Shah, K. K., Ramos-Goñi, J. M., Kreimeier, S., & Devlin, N. J. (2020). An exploration of methods for obtaining 0= dead anchors for latent scale EQ-5D-Y values. *The European Journal of Health Economics, 21*, 1091-1103.

Stalmeier, P. F., Chapman, G. B., De Boer, A. G., & Van Lanschot, J. J. (2001). A fallacy of the multiplicative QALY model for low-quality weights in students and patients judging hypothetical health states. *International Journal of Technology Assessment in Health Care, 17*(4), 488-496.

Stalmeier, P. F., Lamers, L. M., Busschbach, J. J., & Krabbe, P. F. (2007). On the assessment of preferences for health and duration: Maximal endurable time and better than dead preferences. *Medical Care,* , 835-841.

Stalmeier, P. F., Wakker, P. P., & Bezembinder, T. G. (1997). Preference reversals: Violations of unidimensional procedure invariance. *Journal of Experimental Psychology: Human Perception and Performance, 23*(4), 1196.

Stevens, K. (2011). Assessing the performance of a new generic measure of health-related quality of life for children and refining it for use in health state valuation. *Applied Health Economics and Health Policy, 9*, 157-169.

Torrance, G. W., Feeny, D. H., Furlong, W. J., Barr, R. D., Zhang, Y., & Wang, Q. (1996). Multiattribute utility function for a comprehensive health status classification system: Health utilities index mark 2. *Medical Care,* , 702-722.

Van Hoorn, R. A., Donders, A., Oppe, M., & Stalmeier, P. (2014). The better than dead method: Feasibility and interpretation of a valuation study. *PharmacoEconomics, 32*, 789-799.

Van Nooten, F. E., Koolman, X., & Brouwer, W. (2009). The influence of subjective life expectancy on health state valuations using a 10 year TTO. *Health Economics, 18*(5), 549-558.

van Nooten, F. E., van Exel, N., Eriksson, D., & Brouwer, W. (2016). “Back to the future”: Influence of beliefs regarding the future on TTO answers. *Health and Quality of Life Outcomes, 14*, 1-7.

Wille, N., Badia, X., Bonsel, G., Burström, K., Cavrini, G., Devlin, N., Egmar, A., Greiner, W., Gusi, N., & Herdman, M. (2010). Development of the EQ-5D-Y: A child-friendly version of the EQ-5D. *Quality of Life Research, 19*(6), 875-886.