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Think of the Children: A Discussion of the Rationale for and Implications of the Perspective Used for EQ-5D-Y Health State Valuation

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ABSTRACT

Objectives: The recently published EQ-5D-Y valuation protocol prescribes the general public values EQ-5D-Y health states for a 10-year-old child. This child perspective differs from the individual perspective applied for valuation of adult EQ-5D instruments. This article discusses the rationale for and implications of applying a child perspective for EQ-5D-Y health state valuation.

Methods: This article was informed by an exploration of the normative and empirical literature on health state valuation. We identified and summarized key discussion points in a narrative review.

Results: Although valuing EQ-5D-Y health states from an individual perspective is feasible, it may be problematic for several reasons. The use of a child perspective implies that—rather than valuing one's own health—someone else's health is valued. This may require the projection of one's own beliefs, expectations, and preferences on others, which could change the decision processes underlying the elicited preferences. Furthermore, because preferences are obtained for a 10-year-old child, it is unclear if this given age as well as other (missing) information on the described child beneficiary (should) affect valuation of EQ-5D-Y health states.

Conclusions: The change from an individual to a child perspective in the valuation of EQ-5D-Y will likely lead to differences in utilities. This has implications for the estimation of incremental health-related quality-of-life gains in economic evaluations of health technologies for children and adolescents and therefore might affect reimbursement decisions. Further research is necessary for gaining insight into the extent to which this impact is normatively and empirically justified.

Keywords: adolescents, children, EQ-5D-Y, health-related quality of life, health state valuation, QALY.

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Introduction

Economic evaluations of new health technologies are increasingly used in child and adolescent patient populations.¹ In economic evaluations, treatment-related health gains are often expressed in quality-adjusted life-years (QALYs), as this facilitates the comparison of health gains across health technologies and patient populations.² QALYs are calculated by multiplying gains in life expectancy by a weight that represents the utility or value associated with the health-related quality of life (HRQOL) experienced during that time. The HRQOL component of the QALY is normalized such that the utility of perfect health equals 1 and of being dead equals 0. HRQOL can be assessed with the use of generic outcome measures, of which EQ-5D instruments are often recommended by decision bodies dealing with health technology assessment and appraisal.³⁻⁵

EQ-5D instruments are used to describe and measure a broad range of health states (see [text box 1](#)). The utilities associated with each of these health states can be based on preferences that are

elicited directly from persons who experience or experienced living in these health states, such as patients.⁸⁻¹⁰ Nevertheless, utilities can also be based on preferences that are elicited indirectly from persons who (may) lack that experience. The latter approach is referred to as indirect, because the EQ-5D is used to assess patients' HRQOL, while the utility associated with the (possible change in their) health state is not based on their own preferences, but rather on preferences of a sample of adult members of the general public. EQ-5D valuation studies obtain these preferences by using a standardized valuation protocol that enhances data quality and comparability between valuation studies in countries.¹¹ This protocol employs a combination of composite time trade-off (cTTO) and discrete choice experiment (DCE) valuation tasks.¹² These tasks are completed by adult members of the general public who imagine themselves living in the EQ-5D health states under valuation.¹¹ In this article, this is referred to as the *individual perspective*.

Interest in measurement and valuation of HRQOL in child and adolescent patient populations is also increasing.¹ This led to the

TEXT BOX 1. EQ-5D instruments: EQ-5D-3L, EQ-5D-5L and EQ-5D-Y

Currently, 3 EQ-5D instruments are available for describing and measuring health-related quality of life, ie, the EQ-5D-3L, EQ-5D-5L, and EQ-5D-Y.⁶ Use of the EQ-5D-3L or EQ-5D-5L is recommended for persons aged 16 and older. The descriptive systems of these instruments comprise the dimensions mobility, self-care, usual activities, pain/discomfort, and anxiety/depression.⁷ Depending on whether the EQ-5D-3L or EQ-5D-5L is used, each dimension has three or five problem levels (ranging from having “no problems” to “extreme problems,” or “being unable to”). The best health state described by the EQ-5D instruments is coded as 11111 and describes a health state with “no problems” in any of the dimensions. The worst health state is coded as 33333 by the EQ-5D-3L and as 55555 by the EQ-5D-5L and describes “extreme problems” or “being unable to” in all dimensions. The EQ-5D-3L descriptive system describes a total of 243 (3⁵) unique health states and that of the EQ-5D-5L describes a total of 3,125 (5⁵) health states. Compared to the adult instruments, the wording of the dimensions and levels of EQ-5D-Y are slightly different such that they are suitable for use in child and adolescent populations. The following 5 dimensions are used: mobility (walking about), looking after myself, doing usual activities, having pain or discomfort, and feeling worried, sad or unhappy. Furthermore, the dimension “usual activities” is described by means of child-relevant examples, such as “going to school” and “playing,” rather than “going to work” and “doing housework.” The levels in the 3L version of EQ-5D-Y are “no problems,” “some problems” and “a lot of problems,” with a slight change for feeling worried, sad or unhappy (this uses the labels: “not,” “a bit” and “very”).

introduction of the EQ-5D Youth (EQ-5D-Y): a measure of self-reported HRQOL for children and adolescents aged 8 to 15. The instrument is adapted from the EQ-5D-3L,^{13,14} and hence has a similar descriptive system, except for some differences in wording of the dimensions and problem levels (see [text box 1](#)). Throughout this article we refer to this instrument as EQ-5D-Y, because the points discussed in this article likely apply to the instrument currently used as well as the 5-level version of the EQ-5D-Y that is still under development.¹⁵ Furthermore, much of what is discussed may also apply to other child and adolescent HRQOL instruments.¹⁶

Amid ongoing discussion about the sample, type of valuation tasks, and perspective used for valuation of child and adolescent health states,^{17,18} the valuation protocol for the EQ-5D-Y was published,¹⁹ which resembles the protocol used for valuation of adult EQ-5D health states.¹¹ It includes the same sample of the adult general public and combination of valuation tasks (although the emphasis has shifted from cTTO to DCE tasks). Nevertheless, the protocol prescribes that the valuation tasks are completed while considering the health of a 10-year-old child.¹⁹ This involves a 3-fold change in the perspective used: (1) respondents do not value health states for themselves but for someone else, (2) they do not value health states for an adult but for a child, and (3) they do not value health states for any child but specifically for a 10-year-old child.¹⁹ In this article, this will be referred to as the *child perspective*.

Whereas the rationale for and implications of the choice for sample and valuation tasks used for developing EQ-5D-Y value sets have been broadly discussed,^{17,18,20} the choice for using a child perspective has received less attention. A critical evaluation of the consequences of this choice appears relevant, because earlier research has shown that the use of a child perspective, rather than an individual perspective, yielded different utilities for EQ-5D-Y health states.^{21,20,22-24} For cTTO the evidence points at higher utilities when valuation for EQ-5D-Y is performed with a child perspective,^{21,23,24} whereas for visual analog scales the direction of this effect is ambiguous.^{22,24,25} Hence, the objective of the current article is to address this gap and discuss the rationale for and implications of the choice for using a child perspective for valuation of EQ-5D-Y health states. Rather than suggest further changes to the perspective are necessary, our main motivation is to facilitate interpretation of the results of the first EQ-5D-Y valuation studies^{26,27} and to suggest directions for future research.

The article is structured as follows. We first discuss the rationale for using an individual perspective in valuation of adult

EQ-5D health states and why this perspective may be inappropriate for valuation of the EQ-5D-Y. Next, we discuss the normative and practical implications of the change from individual to child perspective for valuation of the health states. Subsequently, we discuss the possible implications of using a child perspective for the estimation of incremental HRQOL gains in economic evaluations of health technologies for children and adolescents. We conclude with a discussion of several directions for future research.

Rationale for (Not) Using an Individual Perspective

In earlier work exploring the normative framework for valuation of the EQ-5D and related instruments, the rationale provided for the choice of perspective and sample have been inextricably linked. It seems worthwhile to summarize this rationale, and explore the rationale provided for a child perspective in valuation of the EQ-5D-Y.¹⁹

EQ-5D valuation studies so far have exclusively elicited preferences using an individual perspective in a sample of adult members of the general public.²⁸⁻³¹ Earlier work exploring the rationale for valuation with such an indirect approach suggested the following arguments: (1) *adaptation*—a general public sample is preferred because patients may adapt to their conditions and employ coping strategies (eg, denial or shifting expectations), and consequently may overestimate the utility associated with their health state; (2) *payer perspective*—in publicly financed healthcare systems, the utilities used for economic evaluation should reflect preferences of those who collectively bear the costs of healthcare (or could influence healthcare spending through voting); and (3) *veil of ignorance*—patients may have a vested interest in the reimbursement of new health technologies and this could affect the valuation of their health state and, as such, utilities should reflect preferences of individuals who are not certain that they will ever become patients (see reviews^{8,32}).

In the article describing the development of the EQ-5D-Y valuation protocol, Ramos-Goni et al¹⁹ appear to take this payer perspective. That is, they state that the protocol will continue eliciting preferences from the taxpaying public, because this can be considered fair considering that they bear the costs of healthcare. Furthermore, the authors argue that including children, and to a lesser extent adolescents, in health state valuation is disputed, as the valuation tasks may be considered to be too complex or

ethically undesirable. For example, it may be ethically undesirable or burdensome to ask children and adolescents to imagine their own foreseeable or immediate death in the cTTO tasks.¹⁸ Nevertheless, no further rationale is provided for using a child perspective for EQ-5D-Y valuation. In fact, the authors argue it may be considered arbitrary and may hamper the comparison between EQ-5D and EQ-5D-Y valuation studies.¹⁹

Hence, one could question why a change in perspective for valuation of EQ-5D-Y health states would be necessary, because valuation of EQ-5D-Y health states from an individual perspective would, in theory, be possible.

Why May an Individual Perspective for Valuation of EQ-5D-Y Health States Be Inappropriate?

Nevertheless, valuation of EQ-5D-Y health states by a general public sample with an individual may be considered inappropriate for (at least) 2 reasons.

First, it may not be possible to fully extend the rationales provided for applying an individual perspective for valuation of adult EQ-5D health states to the EQ-5D-Y. As mentioned above, for valuation of adult EQ-5D instruments this approach is justified by arguing that it includes the preferences of those bearing the costs of treatments, before knowing if, when, and for which health state they will need treatment (ie, no vested interests). In other words, the use of an individual perspective in EQ-5D valuation aligns with the preferences of those bearing costs of treatments evaluated by the instrument with those whose benefits can (in principle) be captured by the instrument. By contrast, when adults of the general public value EQ-5D-Y health states for themselves, these states are drawn from an instrument that is not intended to capture their health benefits in the first place. At the same time, the preferences of children and adolescents, for whom the EQ-5D-Y is intended and, thus, may—at some point—experience the HRQOL described by it, are excluded. As a result, there is no longer direct alignment between preferences of those bearing the costs of those whose possible benefits EQ-5D-Y can capture. Extending the individual perspective to EQ-5D-Y valuation may only realize this alignment when members of the general public benefit indirectly from health improvements in children and adolescents measured by the EQ-5D-Y (eg, through their children), which may not be the case for all respondents. The normative implications of this lack of alignment between payers and (possible) beneficiaries in EQ-5D-Y valuation are unclear.

Second, by eliciting preferences from adult members of the general public with an individual perspective, the estimated utilities may not reflect aspects of HRQOL that are considered important by children and adolescents aged 8 to 15, for whom the instrument is intended. For example, it is conceivable that some health problems, for example, associated with self-care and doing usual activities, may be considered more acceptable for young children than for adults,³³ as the former are often assisted by adult caregivers. Nevertheless, similar health problems may be considered less acceptable for adolescents, for whom the use of the EQ-5D-Y is also recommended. Before the introduction of the EQ-5D-Y, EQ-5D value sets have not been developed with the explicit aim of reflecting preferences for a single age. Rather, age-specific preferences were aggregated and therefore (implicitly) included in the value set. Some authors see this as problematic,³⁴ because this aggregation is insufficiently sensitive to preference heterogeneity, and age is a demonstrable source of heterogeneity in valuation of the EQ-5D.³⁵ Extending the individual perspective to the valuation of the EQ-5D-Y would imply that only adults' age-specific preferences are considered, while excluding

age-specific preferences for and of children and adolescents themselves.

Implications of Using a Child Perspective for Valuation of EQ-5D-Y Health States

Even though the choice for a child perspective can be considered arbitrary,¹⁹ it may still create the opportunity to explicitly take into account preferences associated with the health states of a younger age group. Hence, rather than discussing other possible perspectives and their (lack of) normative justification, a discussion of the possible implications of a child perspective may help in interpreting results from extant and future valuation studies. To date, existing work suggest that health states are valued differently between individual and child perspectives.^{21,22,23,36} These differences could result from (at least) 2 changes implied by the use of a child perspective. First, decisions are made for another person and this may introduce (additional) uncertainty in a valuation study. Second, the health states are described for a 10-year old child and (the lack) of additional information may influence the decision-making process and resulting preferences of respondents.

Uncertainty About Another Person's Beliefs, Preferences, and Goals

The economic literature suggests that decisions made for others differ in many respects from decisions made for oneself,³⁷⁻⁴⁰ because they are affected by uncertainty about the other person's beliefs, preferences, and goals.⁴¹ Hence, EQ-5D-Y valuation may be affected by the degree to which respondents are willing and able to impose their own beliefs on someone else. For example, consider the choice between living 10 years in severe health state and immediate death. Making such a choice from an individual perspective is likely affected by one's views on life after death and euthanasia as well as the amount of time certain health states are perceived as being bearable (ie, maximum endurable time⁴²). The use of a child perspective in valuation of the EQ-5D-Y thus requires respondents to determine if these beliefs should apply to health states experienced by another person.

Furthermore, the theoretical foundation that allows deriving utilities from preferences (eg, the linear QALY model⁴³) is based exclusively on models of preferences for own health. Whether the strict assumptions about preferences present in the theoretical foundation of health state valuation hold (or are violated to the same degree) when using a child perspective is, thus, unknown. For example, linear utility of life duration is assumed (ie, no discounting). When preferences are elicited with an individual perspective, cTTO utilities have been argued to depend on time preferences and loss aversion, which can be defined as the importance assigned to recent relative to later years and overweighting of life-year losses.^{44,45} In this context, respondents trade off their own health and, thus, their own preferences for (losing) life expectancy are relevant. When a child perspective is used, these trade-offs are completed with someone else's life, and preferences associated with loss aversion and discounting may be different when they affect someone else.^{37,38}

Moreover, evidence suggests that valuation of EQ-5D health states may be influenced by respondents' extrinsic goals⁴⁶ and expectations.⁴⁷⁻⁴⁹ Hence, the use of a child perspective may introduce a tendency to consider such extrinsic goals for another person during the valuation tasks (eg, graduation, reaching adulthood, obtaining a driver's license). Additionally, cTTO

typically involves a significant reduction in life expectancy for the beneficiary, which was shown to influence valuation in an individual perspective.⁴⁷⁻⁴⁹ Individuals may differ in the degree to which they are able to approximate another person's goals and expectations or be prone to project such considerations of their own onto deciding for others. It is unclear if such heterogeneity should be included in valuation of the severity of the health states described.

Lack of Information on the 10-Year-Old Child

By asking respondents to consider a 10-year old child, the beneficiary is described as having a specific age but no further information is provided for who the child is and which relationship the respondent has with the child. Hence, the use of a child perspective implies that age is explicitly considered when completing the cTTO and DCE valuation tasks, while other characteristics are left ambiguous. Examples of how this may affect valuation of EQ-5D-Y are discussed below.

The use of a child beneficiary may imply that if some dimensions of HRQOL are of different importance to children and adolescents, these will be reflected in valuation. Nevertheless, this only holds to the extent that adults are sufficiently aware of this importance and deliberately consider it. It is, furthermore, unclear if value sets derived based on the specific preferences for a child of 10 years old are applicable for the full age range relevant to the EQ-5D-Y. This may be particularly true in cTTO tasks. Interestingly, a substantial part of the life duration considered in cTTO does not strictly involve time the beneficiary spends as a child. One could question whether it is appropriate to derive EQ-5D-Y utilities from trading off live years of a (young) adult, especially when lead time is introduced in cTTO tasks.

The child perspective prescribed provides no details about the imagined 10-year-old child other than age. This lack of context may result in a more comprehensive value set in which various preferences are implicitly taken into account. Nevertheless, it also introduces heterogeneity in the child imagined. For example, adults could imagine the beneficiary in health state valuation to be a specific child (ie, their own child or another child known to them) or a hypothetical child. Further, when respondents value the health states for some imagined child and the characteristics of these imagined children are diverse, this could introduce differences in the relationship between the respondent and the beneficiary. Such differences could be relevant for the valuation, because these relationships could lead to different justifications for having to decide for a child (without involving the child himself/herself). That is, parents or guardian may have experience with and be legally allowed to decide on behalf of children, which may play a role if they imagine the beneficiary to be their own child. Such a legitimate basis may be lacking for respondents with different imagined child beneficiaries. It is currently unclear how such heterogeneity affects EQ-5D-Y valuation, and whether aggregating preferences for different imagined children is desirable.

Implications of Using a Child Perspective for Estimation of Incremental HRQOL Gains

One may argue that some of the implications mentioned above may be yet another source of heterogeneity in health state valuation, requiring the recruitment of a sample that is sufficiently representative of the general public. At this point, however, it is unclear whether these implications affect EQ-5D-Y valuation at all, and if they do, if valuation of the EQ-5D-Y should reflect this heterogeneity. Currently, the limited

empirical evidence suggests that using a child perspective, rather than an individual perspective, may yield higher utilities for valuation of similar EQ-5D health states.²¹ Hence, using utilities elicited from a child perspective rather than from an individual perspective may have implications for the estimation of incremental HRQOL gains in economic evaluations of health technologies for children and adolescents. In particular, 2 possible implications arise.

First, if the most severe health states yield higher utilities when elicited from a child perspective, this would result in a narrower utility range between the best and worst health states described by the instrument and, thus, in a smaller overall possibility for incremental HRQOL gain. Second, the utility associated with incremental health gains may depend on whether a child or individual perspective is used. That is, transitions between health states across the severity scale may yield different incremental utility depending on the perspective used to elicit them. To illustrate how both implications could affect incremental costs per QALY gained (and possibly reimbursement decisions), data from Kreimeier et al²¹ are used in several straightforward examples (see [text box 2](#)).

Given that the evidence is currently limited and formal value sets for EQ-5D-Y have only just become available in some countries,^{26,27} it is currently unclear whether and to what extent these implications will actually occur. It is important to consider, however, that if they occur, this may yield different estimations of incremental HRQOL gain in patients for whom adult EQ-5D instruments are used (elicited from an individual perspective) and those for whom the EQ-5D-Y is used (elicited from a child perspective). As such, this could yield different incremental costs per QALY or reimbursement decisions for adults and children (and adolescents). Hence, it is recommended to take these possible implications into account and consider the extent to which they align with societal preferences before implementing EQ-5D-Y value sets in decision-making frameworks. Importantly, although distinguishing between treatments for adults and children and adolescents may be aligned with societal preferences,⁵⁰⁻⁵² the use of EQ-5D-Y value sets should not be confused with or replace explicit age-based priority setting in reimbursement decisions, for example, through applying equity weights to QALY gains.⁵⁰ EQ-5D-Y value sets capture the value associated with incremental HRQOL in children and adolescents from the perspective of the general public. Determining whether these incremental gains should be prioritized relative to other population groups requires direct comparisons among children, adolescents, and other patient populations.

Directions for Further Research

Further work on the role of perspective in valuation of the EQ-5D-Y should explore and compare the rationale for and implications of alternative perspectives and alternative (imagined) child beneficiary. The following examples could provide ideas for an agenda for future research:

- It appears relevant to consider children and adolescents' valuation of EQ-5D-Y health states from an individual perspective, and compare to general public valuation of the EQ-5D-Y using a child perspective.²⁰
- The effects of deciding for another person could be investigated by comparing utilities for adults deciding for themselves and another adult, or alternatively it may be explored if it is possible and appropriate to ask 10-year-old children to value health states with both an individual and child perspective.

TEXT BOX 2. Examples of implications of a child perspective on cost per QALY gained

Table 1 presents the mean cTTO utilities for five EQ-5D-Y health states, obtained by Kreimeier et al.²¹ using individual and child perspectives (denoted HS1 to 5). These health states were selected to represent the 11112 to 33333 health-state range and supplemented with the utility associated with full health (FH) for reasons of clarity. These data are used to illustrate in 2 examples how the use of a child perspective, as compared to the use of an individual perspective, may impact the incremental cost per QALY ratios of health technologies.

Example 1: A child perspective may result in a narrower utility range

Imagine a patient population with a remaining life expectancy of 5 years living in HS5. Now, a treatment becomes available that will restore all patients to full health for those 5 years (ie, health state 11111) at a cost of €46 500 per patient. The health gains such a treatment would yield depend on the perspective used: each patient gains 1.17 or 1.14 QALYs when an individual or child perspective is used respectively. This small difference could yield different incremental cost-effectiveness ratios (ICERs), because without discounting the individual perspective ICER is €39.743 per QALY while the child perspective ICER is €40.789 per QALY (see Table 2). If we consider, on the other hand, a treatment returning patients from 33323 to FH, ICERs are affected to a much larger degree. Now, the individual perspective ICER is €45.588 per QALY while for child perspective ICER is €55.357 per QALY. The use of a child perspective, as such, could decrease cost-effectiveness and influence reimbursement decisions when these ICERs are compared to relevant thresholds.

Example 2: Incremental differences between health states elicited from an individual or child perspective may or may not be affected depending on severity of the health states

Treatments improving health from HS4 or HS5 to FH are perhaps unrealistic, with improvements between health states closer in severity being more likely. The influence the use of a child perspective may have could differ depending on the severity of the health states. For example, Table 1 shows that for HS2-HS1 increments, incremental health gains are smaller from a child perspective compared to an individual perspective, while for HS4-HS3 increments the opposite holds. Assuming the same costs and 5-year duration, Table 2 shows that the impact the use of a child perspective has on ICERs involving health states of different severity is unclear.

Table 1. Mean cTTO utilities for four health states derived from Kreimeier et al.²¹

EQ-5D-Y health state	FH: 11111	HS1: 11112	HS2: 22222	HS3: 32313	HS4: 33323	HS5: 33333	Range
Individual perspective	1.00	0.95	0.7	0.28	-0.02	-0.17	1.17
Child perspective	1.00	0.96	0.83	0.54	0.16	-0.14	1.14

cTTO indicates composite time trade-off.

Table 2. ICERs for treatments involving health states selected from Kreimeier et al.²¹

Cost per QALY	HS5 - FH	HS4 - FH	HS1 - FH	HS2 - HS1	HS3 - HS2	HS4 - HS3	HS5 - HS4
Individual perspective	€39 743	€45 588	€930 000	€186 000	€110 714	€155 000	€310 000
Child perspective	€40 789	€55 357	€1 162 500	€357 692	€160 345	€122 368	€155 000
Difference	-€1046	-€9769	-€232 500	-€171.692	-€49.630	€32 632	€155 000

Note. All ICERs are calculated by: $(5 \times 46.500)/(5 \times (\text{utility HS}_b - \text{utility HS}_a))$, where HS_a and HS_b are the states included (e.g. HS1-HS2). FH indicates full health; ICER indicates incremental cost-effectiveness ratio; QALY, quality-adjusted life-year.

- A combination of samples and perspectives, eg, adult and child and adolescent preferences can be considered.¹⁸
- It might be relevant to explore the extent to which use of a child perspective and the implications thereof concurs with viewpoints of the taxpaying public and of decision makers in the context of reimbursement decisions.

Conclusions

The use of a child perspective is the main change prescribed in the standardized valuation protocol developed for the EQ-5D-Y¹⁹ compared with the valuation protocol for adult EQ-5D instruments. Applying an individual perspective for valuation of the EQ-5D-Y would be possible, but may not be suitable. As such, the

change to a child perspective seems warranted. Nevertheless, the decision to value EQ-5D-Y health states from a child perspective may have several implications for value sets and estimation of incremental HRQOL gains for children and adolescents. Both empirical and normative research is needed for interpreting the results and implications of future EQ-5D-Y valuation studies. Importantly, this article suggest that no single way forward exists that is without problems. Whether the general public should or should not be asked to *think of the children* while valuing EQ-5D-Y health states ultimately remains a value judgment.

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