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*Supplementary Information for article*: CALY-SWE value set: An integrated approach for a valuation study based on an online-administered TTO and DCE survey

*Author names*: Kaspar Walter Meili, Brendan Mulhern, Richard Ssegonja, Jan Hjelte, Kerstin Edin, Fredrik Norström, Inna Feldman, Anna Månsdotter, Lars Lindholm

*Corresponding author*: Kaspar Walter Meili, Department of Epidemiology and Global Health, Umeå University

# TTO and DCE Experimental designs

|              | 0            |
|--------------|--------------|
| DCE Config 1 | DCE Config 2 |
| 111321       | 232233       |
| 112232       | 233111       |
| 112313       | 233222       |
| 113113       | 231322       |
| 121133       | 212312       |
| 121233       | 212112       |
| 122331       | 213213       |
| 123212       | 211121       |
| 123322       | 211231       |
| 131312       | 222221       |
| 137372       | 222221       |
| 132722       | 223331       |
| 132223       | 223132       |
| 122721       | 221313       |
| 211212       | 221133       |
| 211212       | 22121        |
| 211332       | 222211       |
| 212125       | 222222       |
| 213233       | 221212       |
| 213331       | 331213       |
| 221221       | 312133       |
| 222132       | 313311       |
| 222222       | 313131       |
| 223121       | 311333       |
| 223313       | 311222       |
| 231133       | 322312       |
| 231323       | 322232       |
| 232211       | 323123       |
| 232311       | 323223       |
| 233112       | 321321       |
| 311223       | 132132       |
| 312131       | 133313       |
| 312211       | 133123       |
| 313122       | 131331       |
| 313322       | 131231       |
| 321112       | 112321       |
| 321311       | 112223       |
| 322113       | 113322       |
| 322323       | 113232       |
| 323231       | 111113       |
| 331121       | 122333       |
| 331232       | 122111       |
| 332332       | 123211       |
| 333213       | 121122       |

Table S1. DCE design.

#### Block TTO Config Type

| 1 | 111111 | Pit      |
|---|--------|----------|
| 1 | 221331 | Design   |
| 1 | 133113 | Design   |
| 1 | 312222 | Design   |
| 1 | 332232 | Learning |
| 2 | 111111 | Pit      |
| 2 | 313133 | Design   |
| 2 | 122211 | Design   |
| 2 | 231322 | Design   |
| 2 | 322233 | Learning |
| 3 | 111111 | Pit      |
| 3 | 332231 | Design   |
| 3 | 211113 | Design   |
| 3 | 123322 | Design   |
| 3 | 332232 | Learning |
| 4 | 111111 | Pit      |
| 4 | 111121 | Design   |
| 4 | 223232 | Design   |
| 4 | 332313 | Design   |
| 4 | 233232 | Learning |
| 5 | 111111 | Pit      |
| 5 | 321223 | Design   |
| 5 | 132132 | Design   |
| 5 | 213311 | Design   |
| 5 | 323223 | Learning |
| 6 | 111111 | Pit      |
| 6 | 321112 | Design   |
| 6 | 112333 | Design   |
| 6 | 233221 | Design   |
| 6 | 222333 | Learning |
| 7 | 111111 | Pit      |
| 7 | 222123 | Design   |
| 7 | 331331 | Design   |
| 7 | 113212 | Design   |
| 7 | 223323 | Learning |
| 8 | 111111 | Pit      |
| 8 | 131233 | Design   |
| 8 | 323121 | Design   |
| 8 | 212312 | Design   |
| 8 | 232233 | Learning |

Table S2. TTO design. Types: *Pit* denotes the worst state 111111, *Design* states are generate by the experimental design algorithm, and *Learning* are the added learning state.

## Web survey

### Changelog

| Version                                  | Change   |
|--|--|
| Stage 1 (based on qualitative survey)    | <ul> <li>Change of DCE question format to use the same visual layout as TTO questions</li> <li>Video explaining the TTO question</li> <li>Optimization of text elements for describing the questions</li> <li>Animation for the number of traded TTO years in each iteration</li> </ul>  |
| Stage 2 (based on evaluation of Stage 1) | <ul> <li>10 instead of 20 years as TTO upper<br/>limit</li> <li>1 instead of 0 as the TTO lower limit</li> <li>Rename TTO answer option <i>Equal</i> to<br/><i>About Equal</i> and change the iteration<br/>procedure so that <i>About equal</i> no<br/>longer directly selects a TTO answer<br/>but results in a bisection interval<br/>around the centre of the current<br/>bisection interval, with half the width<br/>of the current bisection interval</li> <li>Directly clickable submit buttons<br/>instead of radio buttons in TTO<br/>questions</li> <li>TTO overview question</li> <li>Possible to undo previous iterations</li> <li>Colour coding of the two DCE and<br/>TTO states under consideration</li> <li>Introduction of the TTO learning<br/>state while reducing the number of<br/>DCE question from 6 to 5 (plus the<br/>consistency check)</li> </ul> |
| Stage 3                                  | Minor spelling mistakes and editing     in text elements   |

Table S3. Changelog between versions.

#### Survey construction

The survey contained the following sections: 1) informed consent, 2) CALY-SWE instrument 3) DCE questions, 4) TTO questions including a TTO overview questions where participants reviewed their TTO answers and indicated if they were satisfied with them, and 5) demographic and socioeconomic questions. This order worked well based on the feedback from the qualitative interviews where participants confirmed that the DCE format was conceptually easier to understand than the TTO questions. Participants could this way familiarize themselves with the statement phrasing first while answering the CALY-SWE statements. Then, they would first encounter the easier DCE questions before tackling the more challenging TTO questions.

We randomized the order of dimensions per participant, the assignment of colours of answer alternatives per participant, the order of DCE choice alternatives per question, the order of DCE questions, and the order of TTO question except for the initially displayed learning state. Participants indicated their DCE answers using radio buttons and a submit button

We also included an identical DCE question for all participant as a consistency check where one state was the logically consistent choice, as all attribute levels were higher or equal (always 232332 vs 222332, but in randomized order).

#### Survey screenshots

Selected survey screenshots follow below.

| Avsnitt 2 / 17  | Section 2 / 17   |
|---|--|
| Vi börjar med en fråga som handlar om din nuvarande livssituation. Scrolla ner för att fortsätta.   | We start with a question about your current situation in life. Scroll down to continue.  |
| Hälsa   | Health   |
| "Jag har ett bra allmänt hälsotillstånd (psykiskt och fysiskt) som nästan alltid (säg minst 95% av alla<br>dagar) tillåter mig att arbeta eller ägna mig åt det jag vill."<br>O Instämmer helt<br>O Instämmer delvis<br>O Instämmer inte  | "I have in general good health (mental and physical) that almost always (more than 95% of days) allows<br>me to work or do what I want."<br>O Completely agree<br>O Partially agree<br>O Do not agree  |
| Nära relationer   | Social relations   |
| "Jag har tillgång till nära relationer (familj, vänner eller bekanta) som ger mig råd och stöd när jag<br>behöver."<br>O Instämmer helt<br>O Instämmer delvis<br>O Instämmer inte   | "I have access to close relations (family, friends, or acquaintances ) who give me advice and support<br>when I need"<br>O Completely agree<br>O Partially agree<br>O Do not agree   |
| Ekonomi och bostad  | Finance and housing  |
| <ul> <li>"Jag har en ekonomi (lön, annan inkomst eller besparingar) som alltid tillåter mig att ha en fast bostad och för det mesta (minst 8 gånger av 10) tillåter mig att köpa det jag tycker mig behöva."</li> <li>Instämmer helt</li> <li>Instämmer delvis</li> <li>Instämmer inte</li> </ul> | "I have a financial situation (salary, other incomes, savings) that always allows me to have a permanent housing, and mostly (at least 8 out of 10 times) buy what I think I need." <ul> <li>Completely agree</li> <li>Partially agree</li> <li>Do not agree</li> </ul>                        |
| Sysselsättning  | Occupation   |
| "Jag har ett arbete eller annan sysselsättning (studier, praktik, hemarbete, vård av anhörig, etc.) som jag<br>för det mesta är nöjd med. De senaste fem åren har jag minst 75% av tiden varit nöjd med det jag ägnat<br>mig åt."<br>Instammer helt<br>Instammer delvis<br>Instammer inte         | "I have an employment or another occupation (study ,internship, homework, care of relative) that I am<br>mostly satisfied with. During the last five years I have been satisfied with my occupation at least 75% of<br>the time."<br>O Completely agree<br>O Partially agree<br>O Do not agree |
| Säkerhet  | Security   |
| "Jag har en trygghet som gör att risk för våld eller annan kriminalitet inte påverkar mig i mitt arbete eller<br>i min fritid."<br>Instämmer helt<br>Instämmer delvis<br>Instämmer inte   | "I have a sense of security, and the risk of violence or other crime does not influence me in my work or<br>leisure activities."<br>O Completely agree<br>O Partially agree<br>O Do not agree  |
| Politiska och medborgerliga rättigheter   | Political and civil rights   |
| <ul> <li>"Jag litar på att våra rättigheter som medborgare, och vårt aktiva deltagande i det demokratiska systemet, gör det möjligt att påverka våra gemensamma livsvillkor."</li> <li>Instämmer helt</li> <li>Instämmer delvis</li> <li>Instämmer inte</li> </ul>                                | "I trust that our rights as citizens, and our active participation in the democratic processes makes it possible to shape our common living conditions." <ul> <li>Completely agree</li> <li>Partially agree</li> <li>Do not agree</li> </ul> Section Next section                              |
|   | Next settion   |

Fig S1. CAY-SWE statements and questions. Swedish left, English right (unofficial translation for this publication).

| Avsnitt 4 / 17 : Jämförelse av livskvalitet  | Section 4 / 17 : Quality of life comparison  |
|--|--|
| I frågan ser du två påhittade personer, A och B, som har olika nivåer av handlingsfrihet. Vi ber dig bedöma vem som<br>sammantaget lever ett bättre liv. Scrolla ner om du inte ser svarsalternativen.   | In the question you see two made-up persons, A and B, that have different capability levels. We ask you to judge who all in all lives a better life. Scroll down if you do not see the answer options. |
| Sysselsättning   | Social relations   |
| Jag har ett arbete eller annan sysselsättning (studier, praktik, hemarbete, vård av anhörig, etc.) som jag för det<br>mesta är nöjd med. De senaste fem åren har jag minst 75% av tiden varit nöjd med det jag ägnat mig åt.<br>A: Stämmer delvis<br>B: Stämmer helt | I have access to close relations (family, friends or acquaintances) that always give me advice and support when I<br>need it.<br>A: Not true at all B: Completely true                                 |
| Politiska och medborgerliga rättligheter   | Health   |
| Jag litar på att våra rättigheter som medborgare, och vårt aktiva deltagande i det demokratiska systemet, gör det<br>möjligt att påverka våra gemensamma livsvillkor.  | I have good general health (physical and mental) that allows me to work or to do what I want.<br>A: Partially true B: Completely true  |
| Ekonomi och boanda   | Security   |
| Jag har en ekonomi (lön, annan inkomst eller besparingar) som alltid tillåter mig att ha en fast bostad och för det  | Risk for violence or other crime does never affect me during my work or my leisure time.<br>A: Completely true B: Not true at all  |
| A: Stämmer helt B: Stämmer delvis  | Political and civil rights   |
| Säkerhet   | I trust that my rights as a citizen, and our active participation in the democratic system make it always possible to<br>influence our shared living conditions.                                       |
| Jag har en trygghet som gör att risk för våld eller annan kriminalitet inte påverkar mig i mitt arbete eller i min fritid.   | A: Completely true B: Partially true   |
| Nära relationer  | Financial situation and housing  |
| Jag har tillgång till nära relationer (familj, vänner eller bekanta) som ger mig råd och stöd när jag behöver.   | I have a financial situation (salary, other income, or savings) that always allows me to have a permanent housing and<br>to buy what I think I need.   |
| Hälsa  |  |
| Jag har ett bra allmänt hälsotillstånd (psykiskt och fysiskt) som nästan alltid (säg minst 95% av alla dagar) tillåter mig<br>att arheta eller ägna min åt det ign vill  | I have work or another occupation (studies, internship, household work, care of relatives etc. ) that I am always<br>satisfied with  |
| A: Stämmer Inte B: Stämmer helt  | A: Partially true B: Not true at all   |
| Person A   | Person A   |
| Stämmer helt<br>Nära relationer<br>Abla<br>Rentel<br>Ronomi & boende<br>Ronomi & boende<br>Ronomi & boende<br>Ronomi & boende  | Completely true<br>Partially true<br>Not true at all   |
| Person P   | Dercon R   |
|  | Completely true  |
| Stämmer delvis<br>Bokerhet<br>Stymmer inte<br>Sysselsdin<br>Stymmer inte   | Partially true<br>Not true at all  |
| Vem av personerna & eller B tycker du har ett hättre liv?  | Who of the persons A or B do you think has a better life?  |
| O Person A   | OPerson A  |
| O Person B   | O Person B   |
| Förra avsnittet  | <- Previous section >>   |

Fig S2. DCE question. Swedish left. English right (unofficial translation for this publication).



Fig S3. Screenshot TTO question. Left: Second learning state iteration. Right: Normal TTO iteration. Swedish on top. English on the bottom (unofficial translation for this publication).

| Avsnitt 17 / 17   | Section 17/17   |
|---|---|
|   |   |
| Är du kvinna eller man?   | Are you a man or a woman?   |
| O Kvinna  | O Woman   |
| O Man   | O Man   |
| O Annat   | O Other   |
| <ul> <li>Jag avstår från att besvara den här frågan</li> </ul>  | <ul> <li>I abstain from answering this question</li> </ul>  |
|   |   |
| Var är du född?   | Where are you born?   |
| <ul> <li>Sverige</li> </ul>   | O Sweden  |
| <ul> <li>Övriga Norden (Danmark, Finland, Island, Norge)</li> </ul>   | <ul> <li>Other Nordic (Denmark, Finland, Island, Norway)</li> </ul>                                   |
| 🔿 Europa (Västra)   | O Europe (West)   |
| O Europa (Östra)  | O Europe (East)   |
| O Europa (Södra)  | O Europe (South)  |
| Västra Asien / Mellanöstern (Syrien, Irak, Iran)  | O Western Asia / Middle East (Syria, Iraq, Iran)  |
| O Sydasien (Afghanistan, Indien, Pakistan, Bangladhesh, Nepal, Sri Lanka,)  | 🔘 South Asia (Afghanistan, India, Pakistan, Bangladhesh, Nepal, Sri Lanka,)                           |
| O Sydostasien (Thailand, Indonesien, Filippinerna, Vietnam, Myanmar, Malaysia,)                                       | O South East Asia (Thailand, Indonesia, Philippines, Vietnam, Myanmar, Malaysia,)                     |
| O Afrika  | O Africa  |
| O Nordamerika (USA, Kanada)   | <ul> <li>North America (USA, Canada)</li> </ul>   |
| O Latinamerika  | O Latin America   |
| 🔿 Ostasien (Kina, Japan, Korea)   | 🔿 East Asia (China, Japan, Korea)   |
| ○ Övriga världen  | Rest of the world   |
| 🔾 Jag avstår från att besvara den här frågan  | <ul> <li>I abstain from answering this question</li> </ul>  |
|   |   |
| Hur gammal är du?   | How old are you?  |
| 0   | 0   |
|   |   |
| Vilken är den högsta utbildning du avslutat?  | What is your highest finished level of education?   |
| O Mindre än 9 år i skolan   | <ul> <li>Less than 9 years scooling</li> </ul>  |
| <ul> <li>Avslutat grundskola eller motsvarande (9 år)</li> </ul>  | <ul> <li>Finished elementary schooling or equivalent(9 years)</li> </ul>                              |
| <ul> <li>Gymnasium eller yrkesskola (2 år)</li> </ul>   | <ul> <li>High school or voccational (2 years)</li> </ul>  |
| O Gymnasium (3-4 år)  | O High school(3-4 years)  |
| <ul> <li>Eftergymnasial utbildning (Universitet eller högskola, kortare än 3 år)</li> </ul>                           | <ul> <li>Tertiary education (University or college, shorter than 3 years)</li> </ul>                  |
| <ul> <li>Eftergymnasial utbildning (Universitet eller högskola, 3 år eller längre) eller forskarutbildning</li> </ul> | <ul> <li>Tertiary education (University or college, 3 years or more) or research education</li> </ul> |
| <ul> <li>Jag avstår från att besvara den här frågan</li> </ul>  | <ul> <li>I abstain from answering this question</li> </ul>  |
| Hur stor är din månadsinkomst föra skatt?   | How large is your monthly income before tayes?  |
|   |   |
| Million 24 000 kronor     Mallon 24 000 kronor  | Less than 24 000 krona     Retween 24 000 krona   |
|   | Between 27 000 and 27 000 know  |
|   | Between 27 000 and 30 000 krona   |
|   | O Mere then 50 000 and 50 000 krona   |
|   |   |
| Jag avstar fran att besvara den har fragan  | C Labstain from answering this question   |
| l vilken tvp av kommun bor du?  | In what type of municipality do you live?   |
| Storstad (Stockholm, Göteborg, Malmö) med över 300 000 invånare   | Big city (Stockholm, Gothenburg, Malmö) with over 300 000 inhabitants                                 |
| O Kommun med 100 000 invånare till 300 000 invånare   | O Municipality between 100 000 and 300 000 inhabitants  |
| O Kommun med 50 000 till 100 000 invånare   | O Municpality between 50 000 and 100 000 inhabitants  |
| O Kommun med 20 000 till 50 000 invånare  | O Municipality between 20 000 and 50 000 inhabitants  |
| Kommun med mindre än 20 000 invånare  | Municipality with fewer than 20 000 inhabitants   |
| O lag avstår från att besvara den här frågan  | Labstain from answering this question   |
| · /-8   |   |
| l vilken sorts bostad bor du? (Alternativen kan kombineras)   | In what kind of housing do you live? (The alternatives can be combined)                               |
| Jag hyr lägenhet eller hus  | I rent an appartement or a house  |
| <ul> <li>Jag äger lägenhet (bostadsrätt eller äganderätt)</li> </ul>  | I own an appartement (owning or condonium)  |
| <ul> <li>Jag äger hus (bostadsrätt eller äganderätt)</li> </ul>   | I own a house (owning or condonium)   |
| Mer eller mindre utan bostad  | More or less without housing  |
| Studentkorridor, kollektiv eller annat delad boende   | Student corridor, collective, or other type of shared housing   |
| Annat   | Other   |
| 🗌 Jag avstår från att besvara den här frågan  | □ I abstain from answering this question  |
|   |   |
| Hur bor du? (Minst hälften av tiden. Alternativen kan kombineras)   | How do you live? (At least half of the time. Alternatives can be combined)                            |
| Ensam   | Alone   |
| Med make/maka/sambo/partner   | With husband/sambo/partner  |
| Med barn (egna eller annnas)  | With children (own or others)   |
| Med föräldrar   | With parents  |
| Med syskon  | With sibblings  |
| Annat   | Other   |
| Jag avstår från att besvara den här frågan  | □ I abstain from answering this question  |
|   |   |
| < Förra avsnittet Nästa avsnitt >>  | << Previous section >>  |
|   |   |
|   |   |
|   |   |

Fig S4. Questions on background characteristics. Swedish left. English right (unofficial translation for this publication).

### TTO questions procedure

We designed the iteration procedure with the intention to reduce directional bias and to be optimized for online distribution. Participants may resolve to the same answer pattern each time to end the survey quickly. To that end we randomized year values that appeared in the TTO iteration procedure.

At the start of a TTO question and in each following iteration, a random bisection value was chosen while trying to avoid values at the bisection interval limits. Participants could choose 'Person A', 'Person B', or 'About equal'. Person A and B were randomized to correspond to either living in the full capability state with tradeable time, or to living in the limited capability state. Answering 'limited capability' would randomize the bisection point in the upper interval, defined by the current bisection point and the current upper interval, interval limit. Answering 'full capability' resulted in a random bisection in the lower interval, making the 'limited capability' state less attractive. Irrelevant answer alternatives were not displayed, for example if the bisection point was equal to the lower or upper limit.

'About equal' resulted in a random value in an interval with half of the current bisection interval centred around the current bisection point. Participants could also choose to restart the TTO question or to go back one iteration. This iterative procedure continued until the bisection interval contained just one possible value and then participants were prompted to confirm this point of indifference before continuing to the next TTO state. Reachable TTO answer values spanned from 1 to 10 years.

For the TTO questions, we replaced the radio buttons with three directly clickable submit buttons corresponding to each choice. The intent was to reduce the number of clicks needed for participants and make the iteration procedure less tedious.

#### TTO Learning state

Many participants may not read the TTO questions instructions thoroughly or watch the TTO instruction video, or they may not find them easy enough to understand. As an additional way to increase participants familiarity with the TTO question, we introduced a *learning* state, similar to the EQ-VT wheelchair example. Its purpose was to guide participants through the TTO iteration procedure in an applied way in the same visual environment as the later regular iterations. The 'learning' state consisted of three level 2 and three level 3 attributes.

The answers in the two first iterations of the learning state were predetermined, but participants still had to click on the answers while the other alternatives were greyed out. Pop-up banners informed participants about the reasoning and thought process behind choosing the answer.

The first iteration compared full capability, 333333, in 10 years with the learning state during 10 years. 333333 was the logically consistent choice compared to the learning state given that the duration in both was equal and that three capability attributes for

the learning state were on level 2, and the pop-up banner read "To start with an easy comparison: A has higher capability than B but both live during 20 years. We thus suggest that you chose A to continue". The second iteration compared 1 year with full capability and 10 years in learning state. Ten years in the learning state is likely to be preferred choice for most people as the capability impairment is not large enough to justify giving up 9 years of lifetime, and we displayed an according pop-up message. The iteration procedure continued normally after the two initial iterations but the two predetermined iterations reduced the range of reachable values to [0.2, 0.9].



### Results sample size simulation

Fig S5. Results sample size simulation. Different plots represent different configurations of number of TTO and DCE questions. Top row depicts the mean 95% CI width, the bottom row the Mean of mean absolute errors of generate weights vs weights used to populate the sample. Discrete Choice Experiments (DCE). Time-trade off (TTO). CI (Credible interval).