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# Valuation of depression co-occurring with a somatic condition: feasibility of the time trade-off task

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## Abstract

**Background** Health state valuations obtained from the general population are used for cost-utility analyses of health-care interventions. Currently, most studies have focused on valuations of somatic conditions, to a much lesser extent of mental states, that is, depression and even less on valuations of depression co-occurring with somatic conditions.

**Objective** We tested the feasibility of the time trade-off (TTO) task to elicit valuations for depression solitary or co-occurring with a somatic condition. Moreover, we explored person- and state-related factors that may affect valuations.

**Design** During semi-structured interviews, 10 individuals (five women, mean age: 36 years) used a TTO task to value vignettes describing mild and severe depression; and mild depression co-occurring with moderate and severe states of cancer, diabetes or heart disease. During valuations, participants were thinking aloud. Feasibility criteria were successful completion and difficulty/concentration (1–10); logical consistency of values; and comprehension of the TTO, based on qualitative analysis of think aloud data. Factors influencing valuations were generated from think aloud data.

**Results** Participants reported satisfactory levels of difficulty (mean: 1.9) and concentration (mean: 8.3) and assigned consistent values. Qualitative analysis revealed difficulties with imagining: living with depression for lifetime (*n* = 4); reaching the age of 80 (*n* = 6); and living with a somatic condition and mentally healthy (*n* = 6). Person- and state-related factors, for example perceived susceptibility to depression (*n* = 4), appeared to affect valuations.

**Conclusion** Quantitative findings supported feasibility of the valuation protocol, yet qualitative findings indicated that certain task aspects should be readdressed. Factors influencing valuations can be explored to better understand valuations.

Patients with a chronic somatic condition experience elevated levels of depression, compared to the general population.[1,2] Co-occurring depression with a somatic condition has been related to a worse health-related quality of life (HRQoL) and medical outcomes.[3–5] As such, depression may impose a great burden on the patient.

Depression can be assessed by different types of measures; most frequently self-report symptom scales are used. An alternative type of the assessment of depression includes the use of health state valuations (else called 'utility values', 'utilities'): a HRQoL indicator appropriate for use in economic evaluations of health-care interventions (i.e. cost-utility analyses).[6] In valuation methodology, a health state (i.e. depression) is first described based on a standardized classification system which includes several relevant HRQoL domains and then assigned a value that represents the preference for living in this health state, in a scale from 0, representing a state equivalent to death (in other words, a very low HRQoL associated with the health state), to 1, representing a state equivalent to perfect health. These values can then be used in cost-utility analyses to calculate the number of quality-adjusted life years gained by a health-care intervention, as a means for resource allocation decision-making. Valuations can be elicited by either patients who experience the health state or by the general population imagining it. Official guidelines suggest the use of the population perspective in cost-utility analyses, as these are the ones who are paying for the health-care interventions.[7]

Previous studies have generated valuations of depression, both in patients with depression and in the general population.[8–10] Values for depression have been found to range substantially based on the severity of the depression state. For example, in a study of Bennett *et al.*,[8] mild depression, as described based on the McSad depression specific classification system, was valued more or less halfway the score range (0.59), whereas severe chronic depression was valued very close to death (0.04).

Little is known about the valuation of depression co-occurring with a medical condition, as most studies so far focused on the valuation of a somatic condition or of a mental condition, such as depression. It might be that depression is valued differently when it co-occurs with a somatic condition. For example, the impact of depression on HRQoL might be larger for a person who copes with cancer than for a somatically healthy person, as the cancer might negatively interact and magnify the impact of depression. The opposite could also be hypothesized, that is that the impact of depression might be underestimated by the cancer patient, who might be focusing on the impact of cancer and its treatment. Based on the large prevalence of depression co-occurring with a medical condition, the potential influence of somatic conditions on valuations of depression needs to be examined and taken into account when using depression valuations in cost-utility analyses of psychological interventions offered to somatic patients.

To elicit valuations, different methods can be applied. The time trade-off (TTO) is considered a reliable and valid valuation method,[11] yet complex and cognitively demanding.[12] In the majority of valuation studies, difficulties related to the TTO have been reported. Potential difficulties related to the feasibility of the TTO protocol can be subdivided into three levels. First, some participants might experience major difficulties with the task and even fail to complete it on the whole, or within a reasonable time period. Second, a number of participants might be able to complete the task, but assign values in a pattern that appears logically inconsistent. Some respondents appear to have difficulties discerning between two states, that is assign more favourable values to the one that is obviously more severe.[13] Third, even participants who are able to complete the task and assign consistent values might in fact comprehend or interpret aspects of the valuation task inappropriately. For example, an earlier study using the TTO demonstrates that participants are able to provide responses even for scenarios they consider implausible, which implies that they somehow reinterpret these scenarios.[14] Whereas the first

two aspects are usually considered to assess feasibility of TTO protocols, the third aspect has been given much less attention. In the case of mental health state valuations, additional challenges have been reported, for example, regarding discriminative ability,[9] and it is reasonable to assume such challenges to be more profound when the co-occurring states are concerned.

Our understanding of how co-occurring depression is valued can further advance by looking into factors that affect valuations of depression. For example, individuals might consider that the consequences of depression, for example financial and on the family, are pronounced when a somatic condition is also present and thus value co-occurring depression worse than depression as a solitary state. Up to now, limited attention has been put on exploring factors that affect valuations from the perspective of the individuals. Demographic factors such as age, gender, marital status[15] and experience with the condition[16] have been shown to affect valuations,[17] but evidence is inconsistent.[18] Regarding valuations of mental health states, specific factors, such as stigma, have been proposed,[10] but have not been studied so far. With this study, we aimed to gain more insight into the ways a somatic condition might potentially affect valuations of depression and explore other factors that might affect valuations.

Therefore, we pilot tested TTO-based valuations of depression co-occurring with a somatic condition. Our first aim was to test the feasibility of the valuation protocol and identify potential obstacles. Feasibility was based on three criteria: (i) how many participants are able to complete the task, how much time is required, and how participants rate their experienced difficulty and concentration; (ii) to what degree values are logically consistent; and (iii) how accurately participants comprehend and interpret the valuation task. The first two aspects were assessed based on a quantitative approach. We considered the valuation protocol successful when almost all of the participants were able to complete the task and rated their experienced difficulty low (mean < 3, on a scale from 0 to

10) and their concentration high (mean > 7, on a scale from 0 to 10). An in-depth qualitative approach was employed to examine the comprehension and interpretation of the valuation task. Specifically, our aim was to make sure that participants could accurately comprehend the valuation task according to the instructions provided and interpret it appropriately. Our second aim was to explore factors that participants take into account during their valuations, also based on a qualitative approach.

## Methods

### Participants

Participants were volunteers, recruited via informal networks and were interviewed in the period of January to March 2011. Invitations to partake in this study were handed to employees of the Health Psychology Department of the University Medical Center Groningen with the request to pass it to their networks outside of the UMCG. In the invitation, information was provided of the general aim of the study, the interview procedure (i.e. approximate time required, UMCG setting) and contact information for the ones interested to partake. A quota sampling approach was used to ensure variance with regard to age, gender and educational background. Inclusion criteria were the following: age older than 18 years and younger than 70 years, Dutch nationality, fluency in Dutch or English language, and not being professionally involved in patient health care or research.

As participants were not approached on behalf of the University Medical Center Groningen, no approval from the Medical Ethical Committee was required.

### Interview procedure

The interview consisted of three phases. During the introductory phase, participants provided background information and learned about the general aim of the study. Next, the use of vignettes describing hypothetical health states

was explained. Then, the think aloud method (TAM) was introduced and practiced on an irrelevant topic (relationship satisfaction) (more information on the TAM provided below). In the main part, participants were introduced to the TTO task and valued six vignettes describing depression either as a solitary state ('Depression – Solitary') or co-occurring with a somatic condition ('Depression – Co-occurring'). In the final part, participants evaluated the tasks and answered additional questions. Interviews were performed by two of the authors (KP, FRML) in a quiet setting and were tape-recorded. Paper cards with the vignettes, the TTO instructions and a scale representing life years were used.

## Vignettes

Eight vignettes were developed, of which two described 'Depression – Solitary' and six described 'Depression – Co-occurring'. The two 'Depression – Solitary' vignettes described depression health states corresponding to either a mild or a severe level. These descriptions were developed based on the McSad depression specific utility measure,[19] previously validated in Dutch in patients with somatic conditions.[20] The 'Depression – Co-occurring' vignettes described health states of mild depression co-occurring with cancer, diabetes or heart disease (three types of somatic conditions), of either moderate or severe level of dysfunctioning (two severity levels), resulting in six ($2 \times 3$) different vignettes of 'Depression – Co-occurring'. These three specific types of somatic conditions were chosen as they commonly co-occur with depression.[21–23] Descriptions of somatic conditions were based on relevant condition-specific HRQoL measures.[24–26] An example of a vignette describing mild depression co-occurring with moderate cancer can be found in Table 1. The two 'Depression – Solitary' vignettes were presented to all participants. Furthermore, each participant was presented with four of the 'Depression – Co-occurring' vignettes, describing both severity levels for two of the three somatic conditions. Thus, each participant valued six vignettes in total.

**Table 1** Example of a vignette describing depression (mild) co-occurring with cancer (moderate)

Imagine that you are a patient with cancer.
- Quite regularly, you have some physical reactions, especially moderate pain and nausea.
- You also feel tired sometimes.
- You feel somewhat physically restricted and find it relatively difficult to perform your social or family activities.

In addition to the symptoms of cancer, you experience symptoms that constitute a diagnosis of depression.
- You feel more down and don't enjoy things as usual.
- Sometimes, you don't feel very good about yourself and see the down-side of everything.
- You have some trouble concentrating and remembering, and it seems harder to make decisions.
- Things are more of a chore and at times you feel sluggish or agitated.
- You are able to function okay at work, home, school or with friends but often don't enjoy what you are doing or feel more withdrawn lately.

## Measures

### Time trade-off valuation protocol

The TTO task involves asking participants to imagine living in an adverse health condition for a certain amount of years ($x$) and then die ('Option A'). Then, participants are asked to imagine that they could recover from the adverse state, but this would mean that they would need to give up a number ($y$) of their life years ($x$) ('Option B'). For participants who are willing to trade years (choose Option B), the number of years to trade ($y$) varies, until the maximum is reached ($y_{max}$). Based on their answer, the value for the relevant state is then calculated as $1 - (y_{max}/x)$, ranging from 0 (equivalent to death) to 1 (equivalent to perfect health), with lower values representing worse valuations.

For the purposes of this study, participants were asked to imagine living with depression ('Depression – Solitary' or 'Depression – Co-occurring') for the rest of their life, assuming they will reach the general life expectancy of 80 (http://statline.cbs.nl) ('Option A'). Then, they were asked whether they would trade any years to live in a healthy mental state ('Option B'). A ping-pong titration method[27] was employed

to reach the maximum number of years participants would trade, by means of a scale representing life years (range from 18 to 80). In the case of 'Depression – Co-occurring' vignettes, it was made clear that life years would be traded to live in a healthy mental state, but with the somatic condition. In that way, we aimed to assess the burden of depression in the presence of a somatic condition.

### Questionnaires

Prior to the valuations, participants answered questions regarding their age, occupation, family status and educational background. Following the valuations, they reported experience, either personal or via a close person, with cancer, diabetes, heart disease or depression; and rated first, difficulty of understanding the task (0: *not difficult at all* – 10: *very difficult)*, and second, their concentration during the task (0: *not concentrated at all* – 10: *very much concentrated*).

### Think aloud method

The TAM was used as it is considered the appropriate method to gain in-depth information concerning participants' comprehension and interpretation of the valuation task and factors that affect valuations, which may not be available otherwise.[28,29] During the TTO tasks, participants were verbalizing all their thoughts without commenting upon them.[30] The interviewer avoided interrupting or answering questions, but occasionally used motivational probes to encourage thinking aloud, for example 'How did you reach this answer?' or 'What are you thinking now?'

### Analysis

The sample was described with regard to their demographic characteristics. The number of participants who were able to complete the task and the time required for six valuations were considered to assess the first feasibility criterion. Quantitative analyses were used to examine the second feasibility criterion regarding logical consistency of values. First, we calculated values based on the proportion of $y_{max}/x$, where $y_{max}$ represents the maximum number of years a person was willing to trade and $x$ represents the total number of years available (80 – age). Then, we examined whether valuations fulfil two fundamental hypotheses; first, mild depression should be valued similarly or higher when compared to severe depression; and second, mild depression should be valued similarly or higher when it co-occurs with a moderate rather than a severe state of a somatic condition.

Qualitative analyses of think aloud data were used to examine the third criterion of feasibility regarding how appropriately participants comprehend and interpret the valuation task, as well as to answer our second research question regarding factors that affect valuations. We used an explicit and systematic three-step qualitative analysis, based on the principles of grounded theory.[31] In the first step, interview recordings were transcribed and read several times, so that frequent or significant themes were extracted in the form of quotes. Quotes were investigated and grouped into a coding frame. During the second step, the nine quotes that were developed in the first phase were compared for similarities or differences. This resulted in revising the coding scheme in three constructs regarding comprehensibility of the valuation task and one construct regarding factors that people consider during valuations (six subconstructs). In the third step, quotes were recoded to the final coding scheme. Interpretation of the result was based on the final coding scheme. Two of the authors who conducted the interviews (KP, FRML) also independently carried out each of those three steps. Initial differences were resolved after discussion.

## Results

### Participants

Participants were five men and five women, aged between 21 and 53 years (mean = 35); all participants had at least high school education, and three had postgraduate education; three

were students, whereas the rest had various types of paid work; none had personal experience with any of the health conditions of interest, but all were familiar with at least one of the conditions via a close person. One extra interview was ceased before completion because it was interrupted by a third person, so it is not included in the analyses.

## Feasibility

All 10 participants found the valuation task acceptable and were able to complete it based on the standardized instructions. One participant reported finding the task unusual, but was nevertheless able to complete it. One participant was temporarily confused regarding the TTO task in the case of 'Depression – Co-occurring', assuming that years would be traded for curing both depression and the somatic condition. However, the participant was able to resolve this confusion soon without additional explanations. Mean duration for the six valuation tasks, while thinking aloud was 45 min. Difficulty to understand the valuation task was minimal (mean: 1.9; range: 1–3) and below the criterion of 3. Concentration was rated high (mean: 8.3; range: 7–9) and above the criterion of 7. Therefore, the feasibility criteria were supported by the quantitative data.

Criteria of logical consistency of valuations were met (see Table 2). On average, but also per participant, a higher value was attached to 'Depression – Solitary' *mild* (mean: 0.74), compared to *severe* (mean: 0.36). Furthermore, on average and per participant, 'Depression – Co-occurring' was valued higher when representing a moderate rather than a severe level of the somatic condition. The only exception was participant 2 who assigned a higher value to 'Depression – Co-occurring' when representing the moderate rather than the severe level (0.56 and 0.49 accordingly), but the difference was small and only found in the case of heart disease.

Based on qualitative analysis of think aloud data, we identified three issues related how accurately participants comprehend and interpret the valuation protocol. Examples quotes are provided in Table 3.

- Difficulty to imagine that one can continue living with depression for the rest of life.

For 'Depression – Solitary' valuations, participants were instructed to imagine living with depression for the rest of their life years (TTO 'Option A'). However, four participants mentioned that they could not imagine that. Instead, they hoped that depression would become better (participants 2, 4, 8 and

**Table 2** Participants' values per state

| | Depression – Solitary | | Depression (mild) co-occurring with | | | | | |
| | | | Cancer | | Diabetes | | Heart disease | |
| Part | Mild | Severe | Moderate | Severe | Moderate | Severe | Moderate | Severe |
|---|---|---|---|---|---|---|---|---|
| 1 | 0.77 | 0.30 | | | 0.77 | 0.77 | 0.77 | 0.77 |
| 2 | 0.91 | 0.41 | | | 0.93 | 0.65 | 0.49 | 0.56 |
| 3 | 0.10 | 0.00 | | | 0.23 | 0.09 | 0.18 | 0.06 |
| 4 | 0.35 | 0.17 | 0.26 | 0.17 | | | 0.45 | 0.08 |
| 5 | 0.75 | 0.54 | 0.75 | 0.75 | | | 0.83 | 0.66 |
| 6 | 0.75 | 0.58 | 0.83 | 0.58 | | | 0.83 | 0.58 |
| 7 | 0.91 | 0.64 | 0.86 | 0.78 | | | 0.87 | 0.82 |
| 8 | 0.82 | 0.27 | 0.46 | 0.36 | 0.41 | 0.13 | | |
| 9 | 1.00 | 0.26 | 0.37 | 0.30 | 1.00 | 0.74 | | |
| 10 | 1.00 | 0.43 | 1.00 | 0.20 | 0.43 | 0.43 | | |
| Mean | 0.74 | 0.36 | 0.65 | 0.45 | 0.63 | 0.47 | 0.63 | 0.59 |

10). Two participants (participants 9 and 10) assumed that if they were to live with depression, they might commit suicide.

- Difficulty to imagine that one who lives with depression and cancer/diabetes/heart disease will reach the age of 80.

  For the valuation of 'Depression – Co-occurring', participants were asked to imagine living with depression and the somatic condition for the rest of their life, expected to be 80 years (TTO 'Option A'). Six participants reported the life expectancy was unrealistically high (*participant*s 1, 4, 5, 7, 9 and 10). For 'Depression – Solitary', this was the case for one participant (*participant* 8).

- Difficulty to imagine that one who lives with cancer/diabetes/heart disease can be mentally healthy.

  For 'Depression – Co-occurring', participants were asked about life years they would be willing to trade to live in a healthy mental state, but with the somatic condition (TTO 'Option B'). However, three participants mentioned that they expected to feel depressed when they would have a somatic disease (*participants* 5, 6 and 10). Moreover, three others mentioned that they cannot see the benefits of trading years to cure depression, as it is not possible for someone who experiences the somatic condition not to be depressed (*participants* 4, 8 and 9).

### Factors that affect valuations

During thinking aloud, participants explicitly referred to certain factors that they took into account while completing the TTO task. Examples quotes are provided in Table 3.

*State-related factor*
- Compare the burden of the depression to the burden of the somatic condition

  To value 'Depression – Co-occurring' states, participants were asked to reach their TTO decisions by comparing living with depression and a somatic condition to living in a healthy mental state and a somatic condition. However, some participants seemed to change their comparison standards and compared depression to the somatic conditions (and not to its absence, as implied by the task) (*participants* 3, 4, 7, 8 and 9). This usually resulted in more hesitancy to trade years for depression, when depression was considered less bad a condition than the somatic condition.

*Person-related factors*
While completing the TTO tasks, participants referred to the following factors. Example quotes can be found in Table 3.

- Experience with the condition(s)

  Nine of the participants referred to their experiences, either personal or via a close person, with the depression or the somatic condition (*participants* 1, 2, 3, 4, 5, 6, 7, 9 and 10).

- Significant others

  Half of the participants (*participants* 4, 5, 6, 8 and 9) referred to their family members. Consideration of significant others for some encouraged, whereas for others discouraged the trade-off of life years.

- Religion

  Two participants (*participants* 5 and 9) referred to their religious beliefs. In one case, religion was related to reluctance to trade years, while the opposite held for the other case.

- Perceived susceptibility

  Four participants referred to their estimated possibility of themselves actually experiencing depression. Three participants mentioned that they consider themselves not susceptible for depression (*participants* 2, 5, 9 and 10), while one of them (*participant* 10) reported that everyone can be susceptible to cancer, in contrast to depression.

**Table 3** Qualitative analysis example quotes

| | |
|---|---|
| Comprehension/interpretation of the valuation protocol | |
|    Difficulty to imagine that one can continue living with depression for the rest of life | |
|      • 'then I will always hope that in the years to come I will heal myself' | Part 2 |
|      • 'If I wouldn't take that medicine, I would probably kill myself' | Part 9 |
|    Difficulty to imagine that one who lives with depression and cancer/diabetes/ heart disease will reach the age of 80 | |
|      • 'I think I would be dead anyway within 10 years' | Part 9 |
|      • 'I think I will never be 80 with this, because I don't have an interest in food' | Part 8 |
|    Difficulty to imagine that one who lives with cancer/diabetes/heart disease can be mentally healthy | |
|      • 'I think that the physical symptoms will make you depressed anyway' | Part 6 |
|      • 'I can't see the positive thing that depression will take away, because I think I'll also feel depressed because I can't do anything' | Part 8 |
| Factors that affect valuations | |
|    Compare the burden of the depression to the burden of the somatic condition | |
|      • 'Depression feels more difficult to handle than the diabetes' | Part 8 |
|      • 'the bottom symptoms (i.e. depression) really disappear for me compared to the top ones (i.e. cancer)' | Part 7 |
|    Experience with the condition(s) | |
|      • 'I felt a little bit depressed last year' | Part 2 |
|      • 'A friend of mine is at this stage depressed, so I can imagine that it is possible' | Part 1 |
|    Significant others | |
|      • 'I don't want to do that to my family, that they have to see so long that I'm full of pain and can't do anything with them' | Part 8 Part 4 |
|      • 'you can't see your kids completely grow up, so it's kind of selfish the decision to die' | |
|    Religion | |
|      • 'I am raised like Calvinist and that means that the things that burden you, you have to face it and go on…' | Part 9 |
|      • 'I am a Christian, so I am expecting a life after this' | Part 5 |
|    Perceived susceptibility | |
|      • 'I am a very active coping person, depression doesn't belong to me' | Part 5 |
|      • 'while with depression I am quite confident, this (i.e. cancer) is something that could happen' | Part 10 |
|    Age of retirement | |
|      • '65 is the age which you stop working in Holland' | Part 5 |
|      • 'you still have been able to enjoy being retired' | Part 7 |

• Age of retirement

Two participants (*participants* 5 and 7) considered retirement age.

## Discussion

Our first aim was to examine the feasibility of a TTO-based protocol to elicit valuations of depression, as either a solitary state or co-occurring with a somatic condition. Overall, our quantitative data suggest that the criteria concerning the completion rate, time required,

self-reports of task difficulty and concentration, and logical consistency of valuations have been met, and thus, feasibility of the valuation protocol is supported. Nevertheless, our qualitative data did indicate that certain aspects of the protocol impose challenges related to the comprehension and the interpretation of the valuation task. First, some participants found it difficult to imagine living until 80 years old as suggested by the TTO. Such a contrast between subjective life expectancy and the life expectancy as described in the TTO health states has been previously reported.[32,33] Furthermore,

some participants faced difficulties in imagining that they would be depressed for the rest of their life. Difficulties were also encountered with imagining living with a somatic condition and at the same time being mentally healthy and not depressed. We also identified several factors that may affect valuations of depression, including personal experience with the health condition, perceived susceptibility to the health state and considerations of the impact of the health state of significant others.

This was the first in-depth study of the feasibility of using the TTO task in valuations of depression in the case of depression co-occurring with a somatic condition. The results showed that, when testing the feasibility of the valuation task, it is crucial to examine both task completion and accuracy of comprehension and interpretation. So far, only few studies have examined how participants actually interpret the valuation task.[34] In the case of depression, no in-depth study of the TTO feasibility has been performed, although challenges have been reported.[9] One key finding of the current study is that participants tend to misinterpret certain aspects of the valuation protocol (e.g. imagine living with a somatic condition but mentally healthy), when these aspects are in contrast to their own subjective beliefs (e.g. beliefs that one who is somatically ill cannot be free of depression). By identifying such challenges, we took an important first step towards improving the feasibility of our protocol and enhancing the validity of valuation outcomes. The extent to which such challenges influence valuations of depression or other mental states should be further explored. Furthermore, with this study, we examined the TTO protocol when valuing one health state in the presence of a co-occurring different state. This has been rarely reported in previous literature,[35,36] as the majority of studies on co-occurring health states have focused on predicting values for joint health states from single health states.[37,38]

In the light of our findings, certain aspects of the TTO valuation protocol can be readdressed. Concerning the TTO time frame, we used a general life expectancy time frame,

previously used in TTO protocols for depression[39] and other mental[40,41] and somatic conditions.[32,42,43] One could argue that for some participants, reaching an age 80 might be a very short life expectancy; for others, it may be long, also based upon age when providing the valuation. Yet valuations are computed based on the percentage of the years traded out of the total life years and the time frame is subject to choice. The 80 years life expectancy time frame appeared acceptable for solitary depression, but imposed challenges for co-occurring depression, for which the also commonly used time frame of 10 years' time frame might be more appropriate.[44] Undoubtedly, the choice of a time frame appropriate for depression both as a solitary and as a co-occurring state is a challenging one. Difficulty to imagine that depression will remain for the rest of the life could be explained given the episodic nature of depression and subjective perceptions regarding the nature and course of depression. One approach could be to inform participants that during lifetime, depressive episodes will alternate with periods of remission. Difficulty to imagine living with a somatic condition but remaining mentally healthy could be explained by lay perceptions that a somatic condition automatically induces depression. This could be partly addressed by providing participants with some background information that it is only a minority of chronic somatic patients who actually experience depression.[1] Such information might also be appropriate when valuing other conditions often met co-occurring, for example obesity and diabetes. The clinical implications of the assessment and subsequent refinement of the valuation protocol for co-occurring depression, as proposed by this study, are also worth discussing. By ensuring that valuations of depression, either co-occurring or solitary, can be elicited using the same method (i.e. the TTO), as suggested by the current study, the next step is to examine how a somatic condition might affect how the impact of depression is perceived. By taking this potential effect into account, we can more validly assess the effectiveness of psychological

interventions when offered to somatically healthy or unhealthy individuals, and even comprehend possible differences.

As a first attempt to explore factors that affect valuation of – co-occurring – depression, the think aloud method proved to be of great value. In the case of 'Depression – Co-occurring' vignettes, participants were asked to imagine living with depression and a somatic condition and then trade years to live without depression but with the somatic condition. In other words, participants had to value co-occurring depression by comparing the presence of depression to its absence, always in the presence of a somatic condition. Yet, it seemed that, despite TTO instructions, some adopted another strategy to value co-occurring depression. Specifically, to value co-occurring depression, some participants compared it to the somatic condition (e.g. 'depression feels more difficult to handle than the diabetes'). This finding implies that the impact of depression might be underestimated when the focus is turned to the somatic condition. Our study adds to previous findings regarding the possible role of religion and beliefs about life[45,46] and marital status,[15] by highlighting the important role of significant others, that is, how living with depression and/or deciding to trade years would affect one's children and partners. In addition to previous results concerning effect of personal experience on valuations,[47,48] we pointed out the role of experience via other persons and that of perceived susceptibility for depression on valuations of depression, which have not been previously studied. The identification of such factors that may influence valuations allows us to gain more insight into the reasons why depression might be perceived as more or less burdensome by different individuals, which appears valuable also from a clinical perspective. For example, our finding that how burdensome individuals with somatic condition perceive depression depends, among others, on how they compare it to the somatic condition should possibly be taken into account in designing effective psychological interventions.

Certain limitations of the study need to be discussed. Given the pilot purpose and the specificity of the research questions, our sample size was limited to 10 interviews. Although we aimed at its representativeness with regard to gender, age and educational background, the limited sample size allows only for strictly exploratory interpretations of quantitative data. For the qualitative analysis, though, we did estimate the saturation level within this sample as satisfactory. Concerning descriptions of the somatic conditions, these were based on reviews and existing measures and participants reported no difficulties. However, inclusion of patients or clinicians in their development and psychometric testing is necessary to establish their representativeness. Besides, given the limited number of participants and limited number of states that they could be asked to value, we decided to focus on two depressive states varying in severity, as well as only mild depression state co-occurring with a medical condition varying in severity. More combinations are possible and interesting, for instance, also severe depression states with the two types of severe medical conditions. However, we decided this to not be feasible for the current study; otherwise, interviews would have become too long for participants.

Finally, TTO-related biases,[46,49,50] not related to task comprehension, such as loss aversion and scale compatibility, were not considered when analysing think aloud data.

Overall, use of both quantitative and qualitative data to examine the valuation protocol proved useful to identify validity threats and to understand underlying mechanisms and can be suggested for valuation research. The extent to which our findings can be generalized to other conditions (e.g. somatic conditions) and populations (e.g. patients) remains to be explored.

## Conclusions

As a first step towards valuations of depression co-occurring with a somatic condition, we tested the feasibility of a TTO-based valuation protocol. Quantitative findings supported

feasibility, although potential challenges were identified, by means of qualitative data. Factors that seem to affect valuations were identified, for example, perceived susceptibility to depression and considerations of significant others. Therefore, we suggest certain adjustments in the valuation protocol and further investigation of currently unexplored factors.

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