WELLBY-DALY conversions

Unjournal Workshop

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WELLBYs, DALYs, and differences

Wellbeing-Adjusted Life Year (WELLBY)

- Using a wellbeing approach with subjective wellbeing measures
- Quantifying wellbeing across time

What's this SD stuff?

Disability-Adjusted Life Year (DALY)

- Using a health approach with general public judgments of “healthiness”
- Quantifying health loss across time

DALYs = Years of Life Lost (YLLs) + Years Lived with Disability (YLDs)

Quantity YLLs = Deaths (ND) × Remaining life expectancy at death (LE)

Quality YLDs = Incidence (NC) × Disability Weight (DW) × Duration of case (LD)

IHME’s GDB (e.g., Vos et al., 2012; Solomon et al., 2015)

Comparing weights

DALYs = Cases (NC) × Disability Weight (DW) × Duration of case (LD)

WELLBYs = Incidence (NC) × Wellbeing Weight (WW) × Duration of case (LD)*

Things that are not necessarily differences:

- Quantity (YLLs): can do both in DALYs or WELLBYs, philosophical question about badness of death affects both (e.g., DALYs changed from age-discounting to deprivationism)
- Modelling: Can add spillovers to DALYs if need be, can have more sophisticated durations, can do “% of cases reduced” analyses with WELLBYs

Concept / Elicitation	**Health**	**Wellbeing**
Judgment/ prediction	**DALYs:** General public (don't necessarily have the condition) make pairwise health judgments that lead to 0 (perfect health) to 1 (death) weights "Paired comparison task that ask respondents to consider descriptions of two hypothetical people, each with a particular health state, and specify which person they regarded as being healthier than the other"	*General public predict wellbeing level of different conditions*
Self-report	*People with the condition reported their health state.*	**WELLBYs:** Self-reported answers on wellbeing scales from the people with the condition (e.g., "how satisfied are you with life" on a 0-10 scale).

- Differences will likely come from issues of **affective forecasting** and health being only one **determinant** of wellbeing.
- This will likely lead to different weighting of mental health problems.

Issues with DW: Issues with mental health

- Dolan and Metcalfe (2012) found that in QALYs, the general public trade-off moderate mobility issues and moderate mental health issues similarly, when on life satisfaction moderate mental health issues are 10x worse.

- Pyne et al. (2009) found that increased experience of depression reduced preferences for depressive states.

- Vigo et al. (2016, 2022; see also Arias et al., 2022) criticised the previous 2016 and 2019 waves for underestimating the DALY burden of mental health problems, in part because they did not account for mortality.

- Stan Pinset (2024) looked at increasing DALY values of depression for burden and relation to suicide.

Issues with DW: Strange undervaluing

One unintuitive result from DALYs is that they seem to suggest barely any benefit from medication during terminal cancer (our estimate for what DALYs would suggest for providing palliative care). Sharma et al. (2020) pointed out that 2010 GBD DALY weights only find a difference of 0.01 between 'terminal cancer' with (0.51) and without (0.52) medication. 2023 GBD DALY weights do not have these summary categories, but they do have weights for terminal liver cancer with (0.54, averaged over 4 weights) and without (0.57, 1 weight) medication, which also finds a small difference of -0.03.

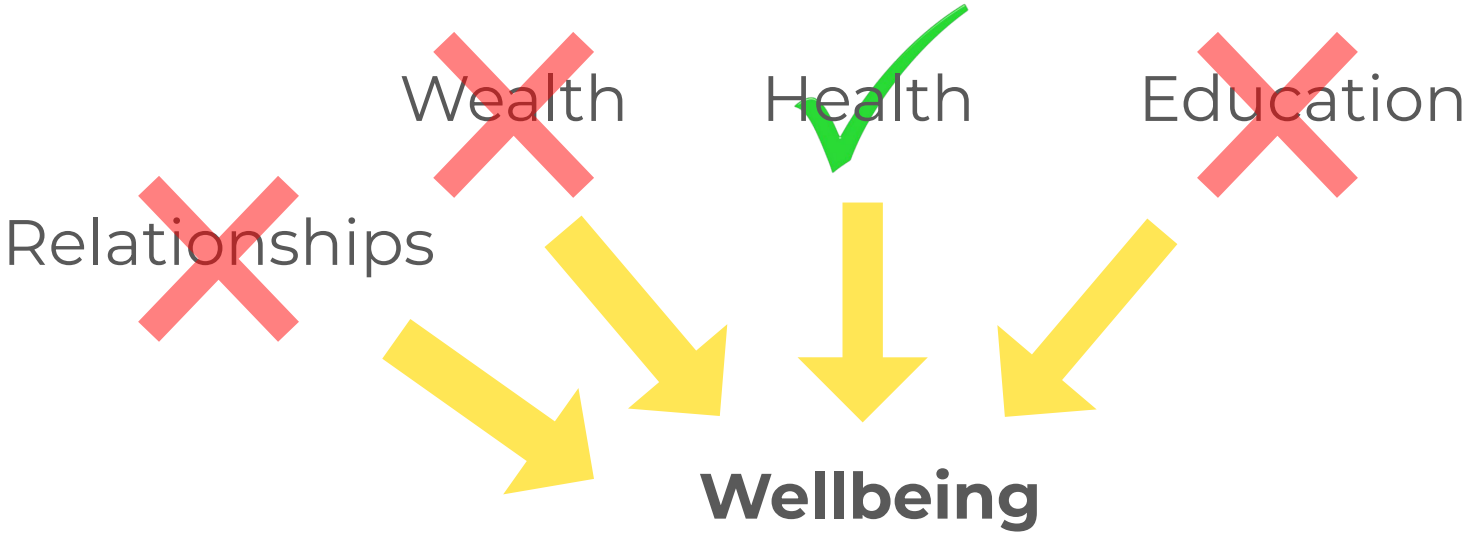
Examples of the disability weight are shown on the right. Some of these are "short term", and the long-term weights may be different.

The most noticeable change between the 2004 and 2010 figures for disability weights above are for blindness as it was considered the weights are a measure of health rather than well-being (or welfare) and a blind person is not considered to be ill. "In the GBD terminology, the term disability is used broadly to refer to departures from optimal health in any of the important domains of health."[8]

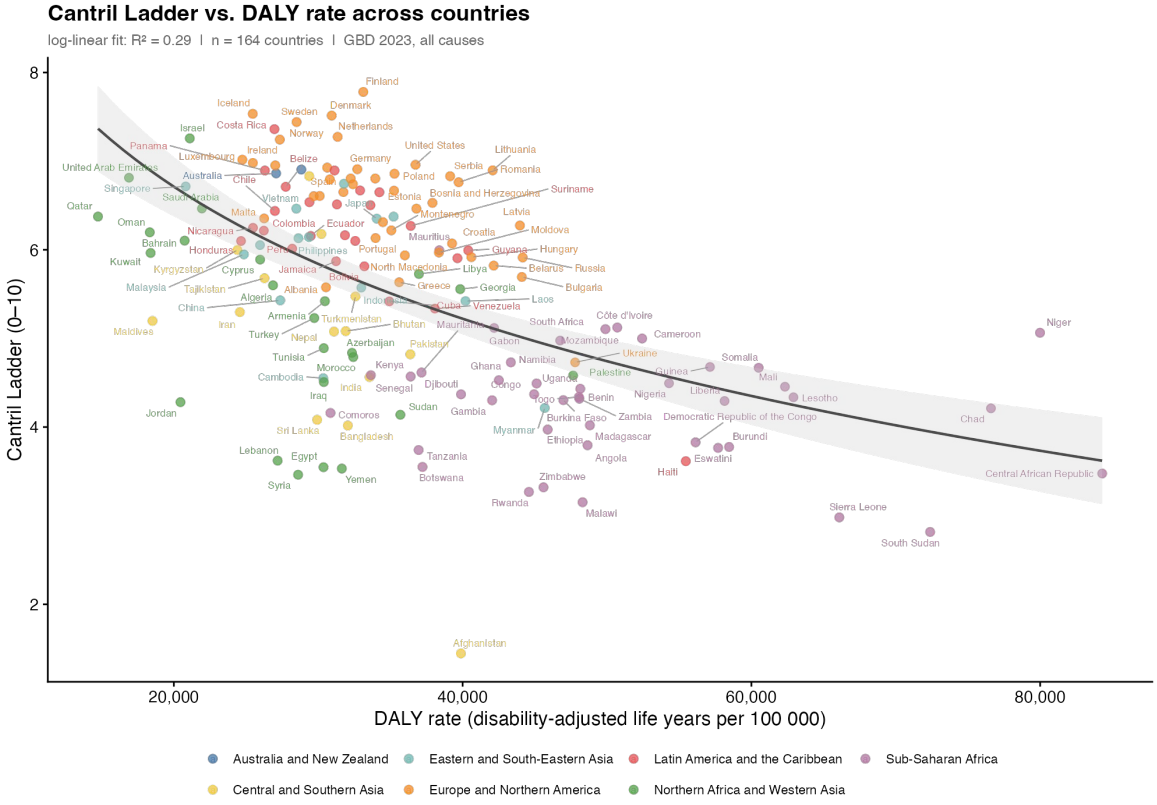
Examples of disability weight

Condition	DW 2004[6]	DW 2010[7]
Alzheimer's and other dementias	0.666	0.666
Blindness	0.594	0.195
Schizophrenia	0.528	0.576
AIDS, not on ART	0.505	0.547
Burns 20%–60% of body	0.441	0.438
Fractured femur	0.372	0.308

Issues with DW: Not capturing everything



Issues with DW: Not capturing everything



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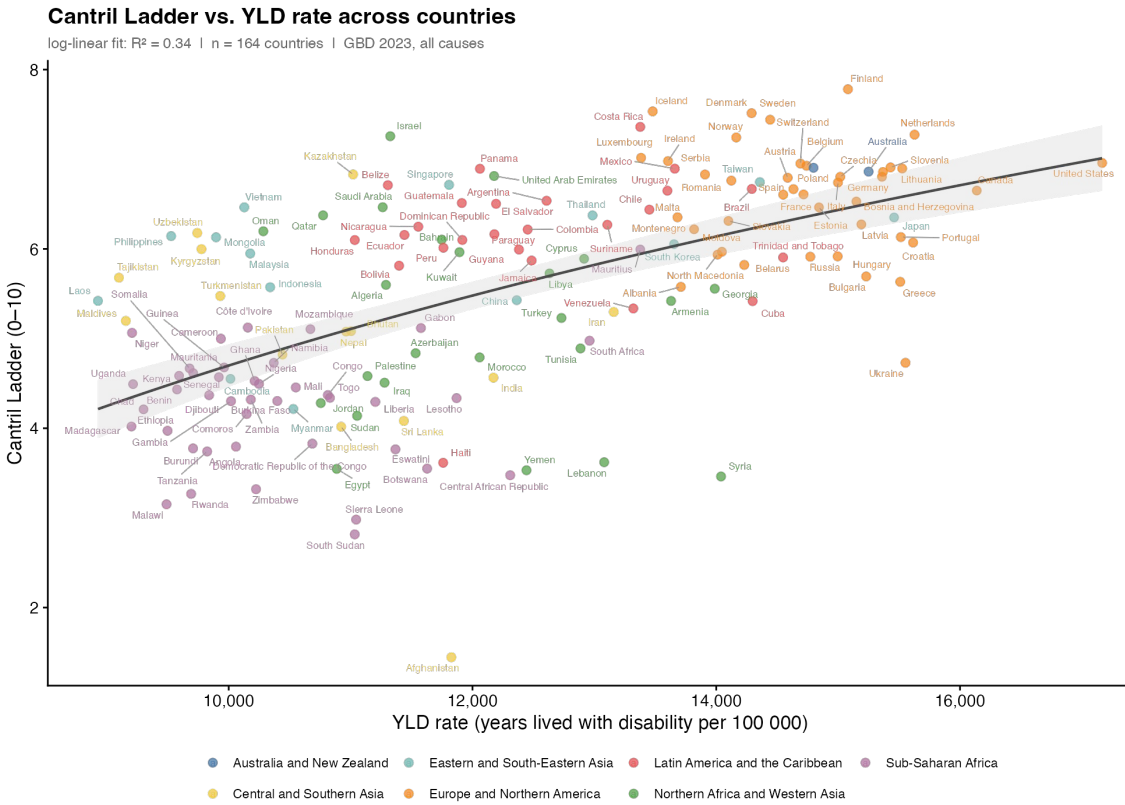


A potentially trivial difference

Disability Weight (DW)
0-1 for only negative health conditions

vs

Wellbeing Weight (WW)
Theoretical -10 to +10
Could assume it will only be negative, and so transform with *-0.1

Conversion

Other conversion efforts

- Founders Pledge's indirect WELLBY-DALY conversion, via a three-step chain of moral weights:
  - Income doubling to WELLBYs
  - Value of life in income doublings
  - Value of life to DALYs

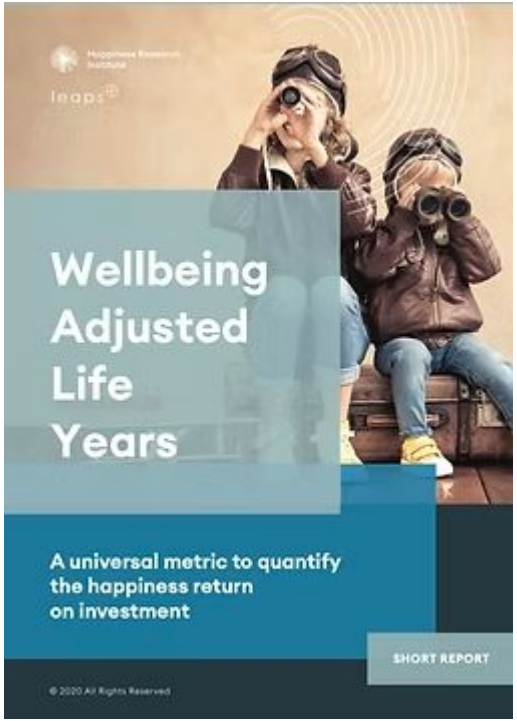
- Stan Pinset (2024) looked at SD-years of depression and DALYs.

- UK Treasury's anchoring of a DALY to the difference between full health LS and death LS

Our conversion

- The one place that has done some comparison of DALYs and wellbeing is HRI's 2020 report. They use the SHARE, "which provides detailed information about health status and subjective wellbeing for individuals over the age of 45 in 28 European countries" (p. 48). They obtain coefficients on a 0 to 10 life satisfaction scale for 16 health conditions.

- Don't directly use the Disability Weights but divide the YLD by cases so that the stratification across case badness works



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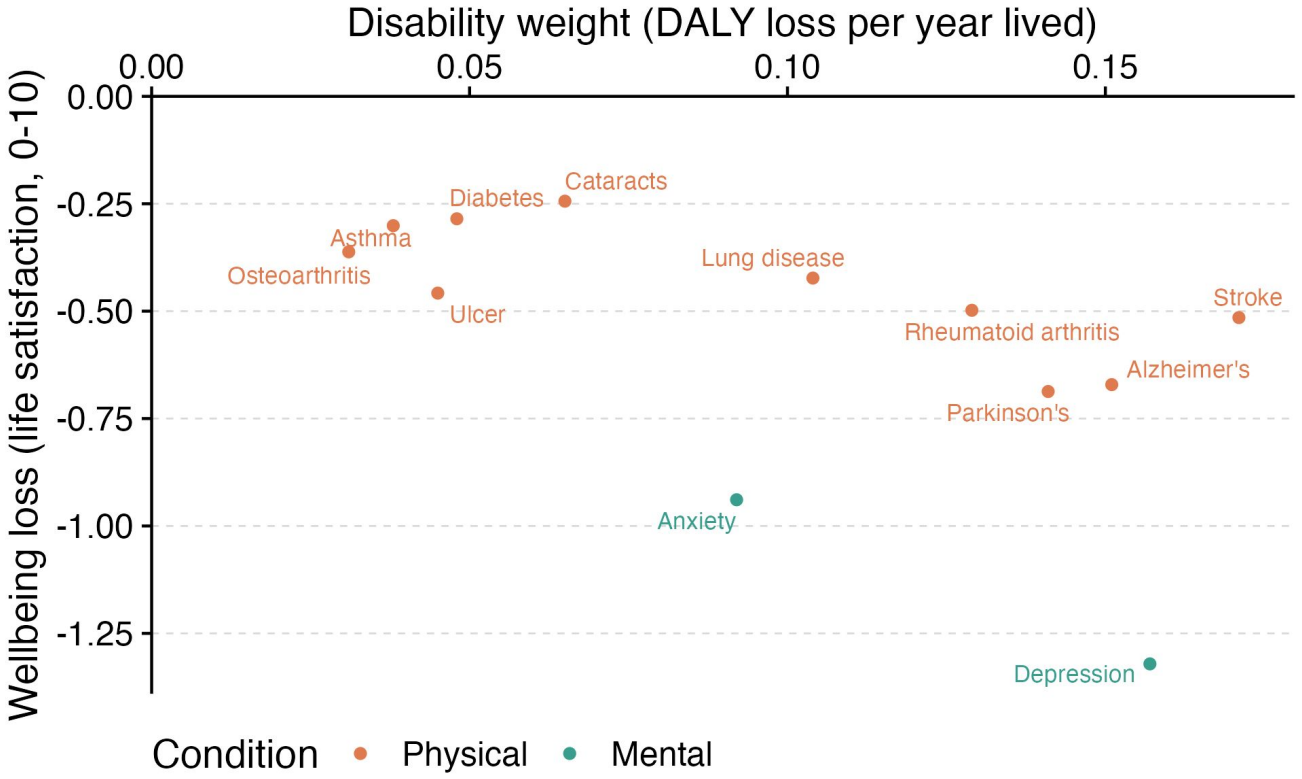
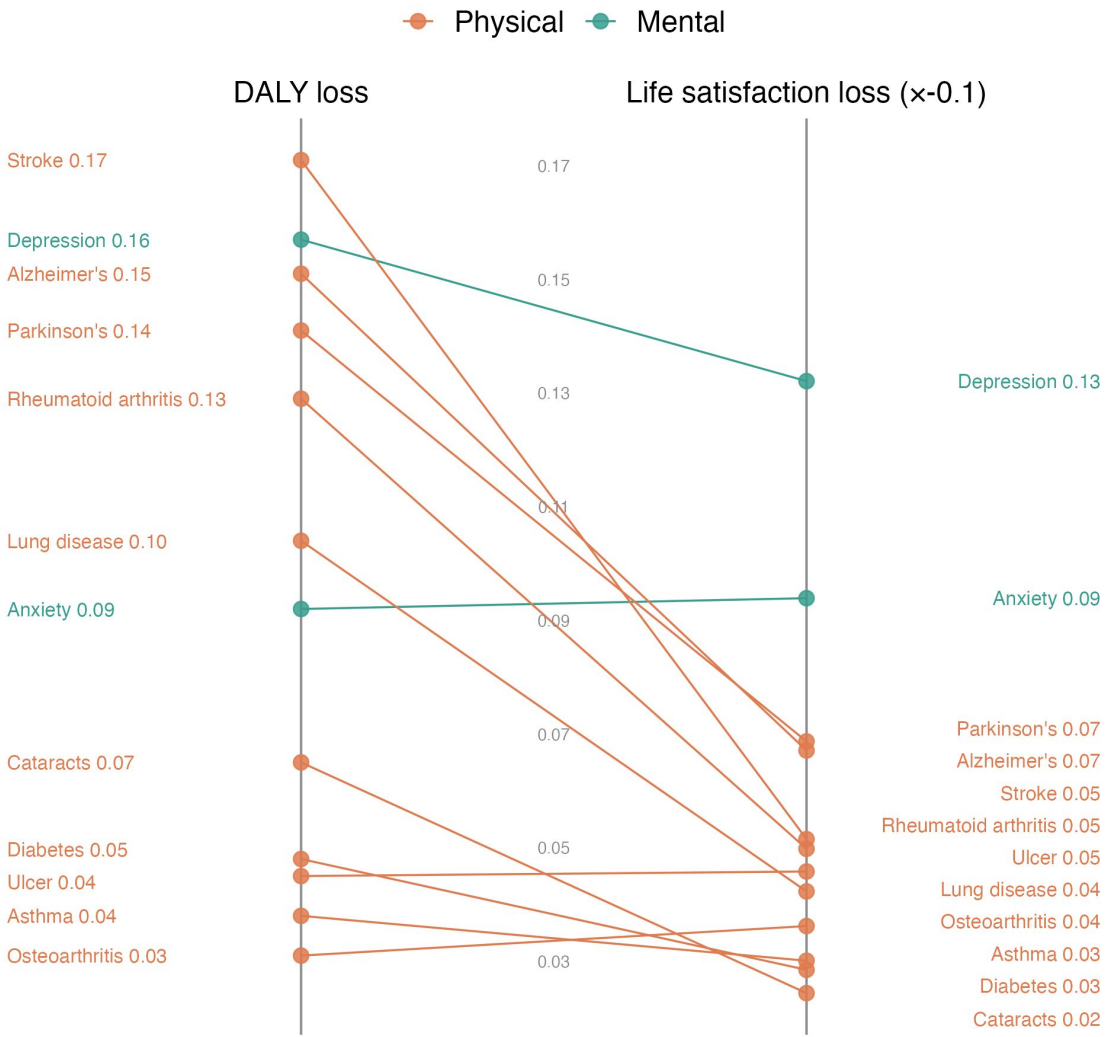
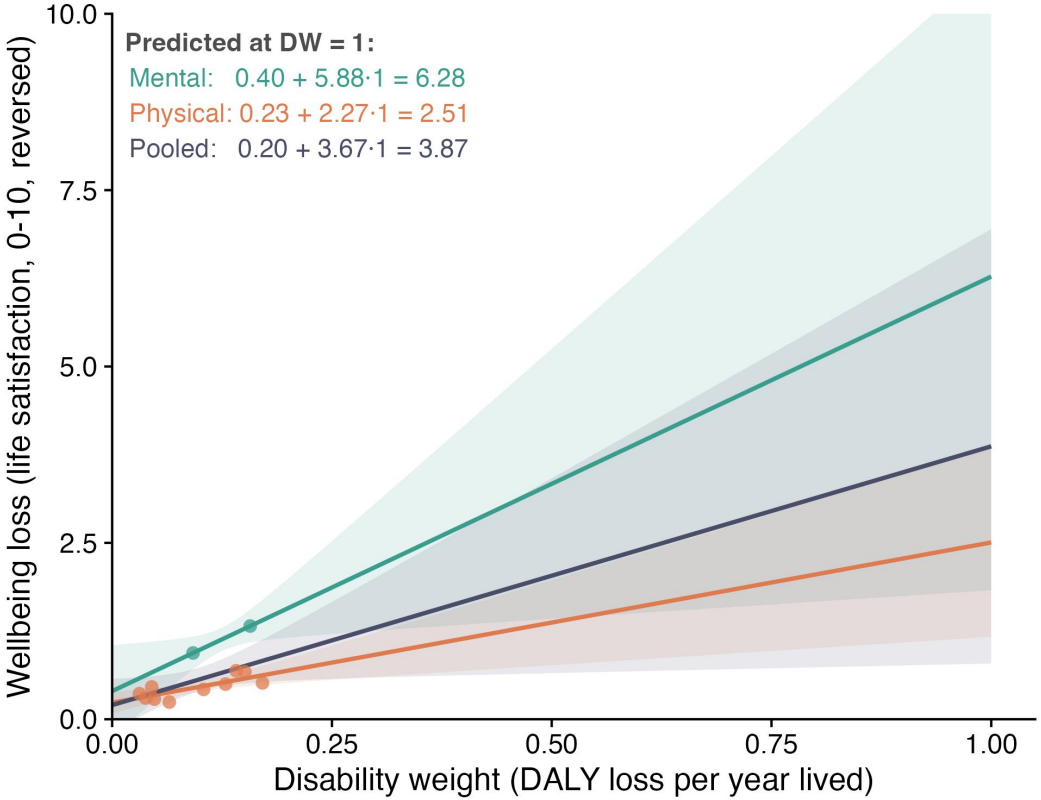


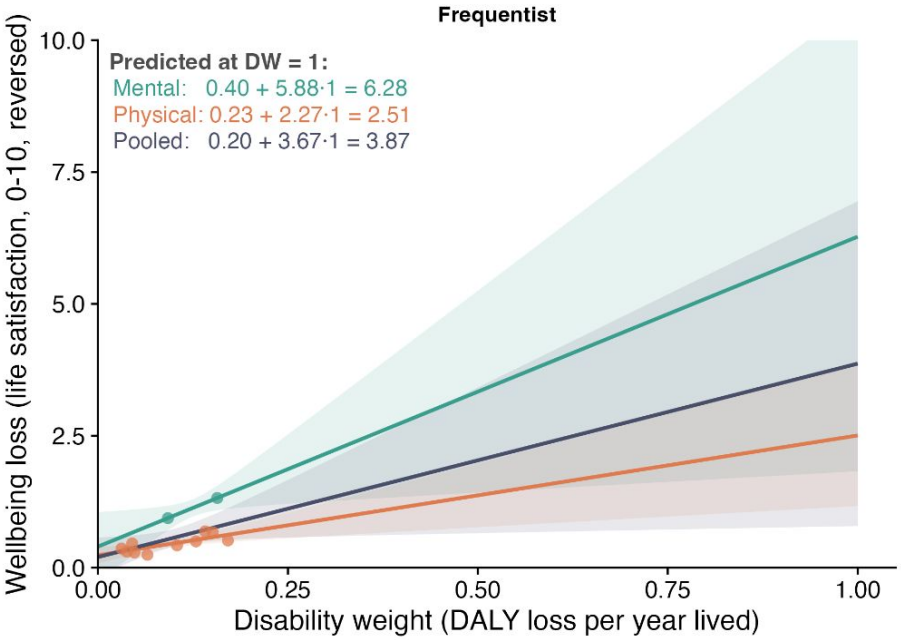

Physical
Mental
DALY loss
Life satisfaction loss (×-0.1)
Stroke 0.17
Depression 0.16
Alzheimer's 0.15
Parkinson's 0.14
Rheumatoid arthritis 0.13
Lung disease 0.10
Anxiety 0.09
Cataracts 0.07
Diabetes 0.05
Ulcer 0.04
Asthma 0.04
Osteoarthritis 0.03
0.17
0.15
0.13
0.11
0.09
0.07
0.05
0.03
Depression 0.13
Anxiety 0.09
Parkinson's 0.07
Alzheimer's 0.07
Stroke 0.05
Rheumatoid arthritis 0.05
Ulcer 0.05
Lung disease 0.04
Osteoarthritis 0.04
Asthma 0.03
Diabetes 0.03
Cataracts 0.02

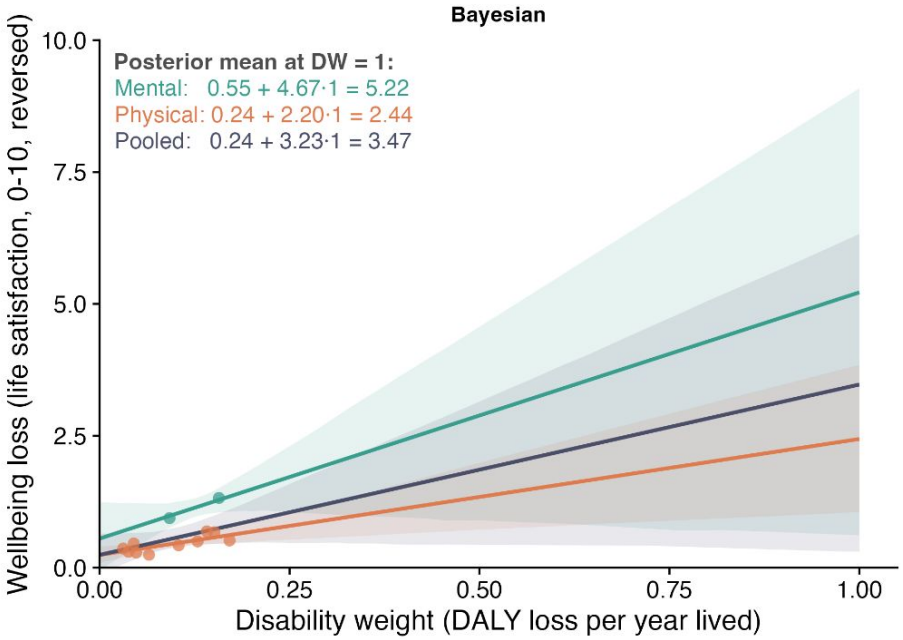
Our conversion



Our conversion

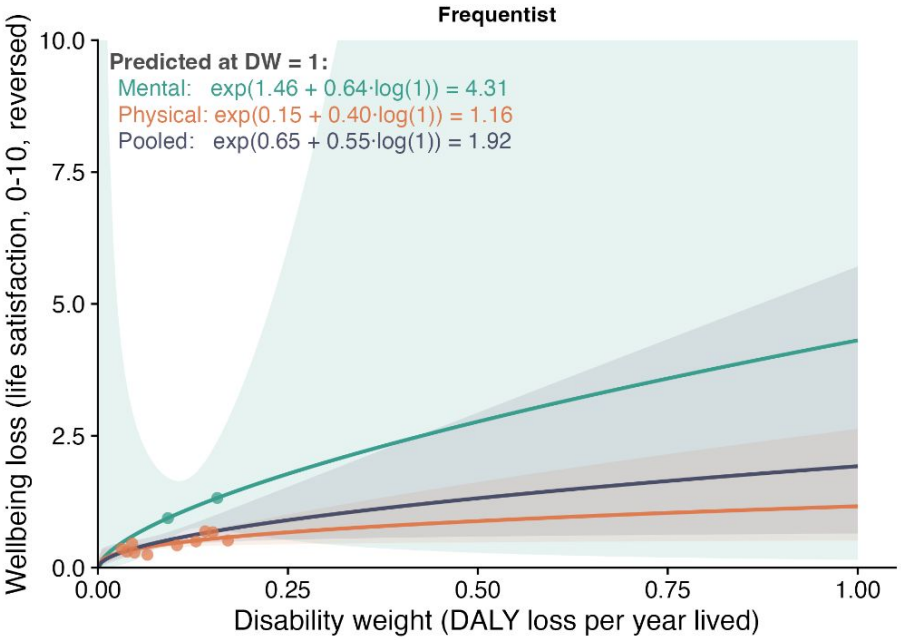
Linear model

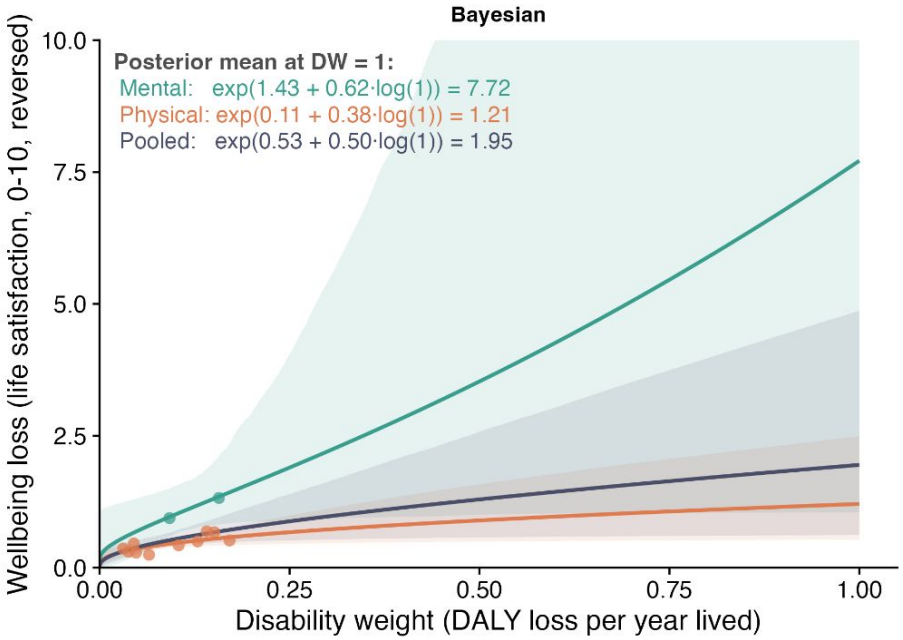




Our conversion

Power model





Conclusion

Conclusion

- Need to make sure we are discussing the right element
- Efforts of conversion are limited by a dearth of data
- DALYs underestimate the badness of mental health

From HLI's point of view

- Efforts for conversion are useful if we can unlock the whole GBD into WELLBYs
- More wellbeing data is really important
- WELLBYs capture what truly matters

Reserve: Differences between DALY and WELLBY

(1a) Not really about intervention modelling

An intervention is usually modelled with DALYs as:

DALYs prevented = % reduction in cases of condition c ×
DALY (health loss) of condition c

HLI typically directly models the impact of an intervention:

WELLBYs gained = change in wellbeing × time

We could just as well have a WELLBY (loss) value for a condition that is reduced:

WELLBYs gained = % reduction in cases of condition c ×
WELLBY (wellbeing loss) of condition c

(1a) Not really about intervention modelling

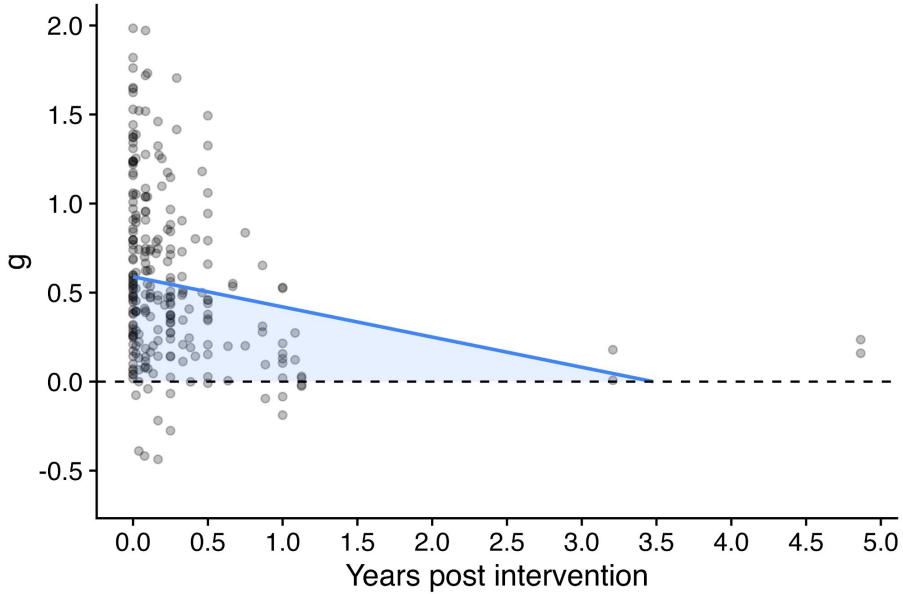
Psychotherapy's effect

DALYs prevented = % reduction in cases of depression ×
DALY (health loss) of depression

We could just as well have a WELLBY (loss) value for depression that is reduced:

WELLBYs gained = % reduction in cases depression ×
WELLBY (wellbeing loss) of depression

(1a) Not really about intervention modelling



(1b) Not really about intervention modelling

Often, analyses with DALYs are missing these, but that doesn't mean they can't have them.

Overall effect = Impact + time element + Spillovers + Adjustments + etc.

Not necessarily about death

DALYs =
Deaths (ND) × Remaining life expectancy at death (LE) +

Cases (NC) × Disability Weight (DW) × Duration of case (LD)

WELLBYs = Cases (NC) × Wellbeing Weight × Duration of case (LD)*

Not necessarily about death

DALYs =
Badness-of-death f(Deaths (ND) × Remaining life expectancy at death (LE)) +

Cases (NC) × Disability Weight (DW) × Duration of case (LD)

WELLBYs =
Badness-of-death f(
Deaths (ND) × Remaining life expectancy at death (LE) ×
Wellbeing level(W)-Neutral Point(NP)
) +

Cases (NC) × Wellbeing Weight (WW) × Duration of case (LD)*

Not necessarily about death

DALYs = *Badness-of-death f*(DN×LE) + NC × DW × LD

WELLBYs = *Badness-of-death f*(ND×LE×W-NP) + NC × WW × LD

- Philosophy applies to the DALYs too. They've changed from a TRIA to a deprivationist view at some point in time.
- We can set the same sort of assumptions as DALYs for WELLBYs (i.e., deprivationist + NP = 0).
- We can also set Epicureanism to DALYs by setting the badness of death function to 0.
- We can focus on primarily life-improving topics

A difference of weights

Disability Weight (DW)

vs

Wellbeing Weight (WW)

Wellbeing Weight

- Change on 0-10 wellbeing scale
- Statistically validated: **Reliable** (Tov et al., 2021) and **Valid** (Kahneman & Krueger, 2006)
- Not based on guesses from the general population, but direct reports from the individuals involved
- Should capture the impact of all relevant determinants

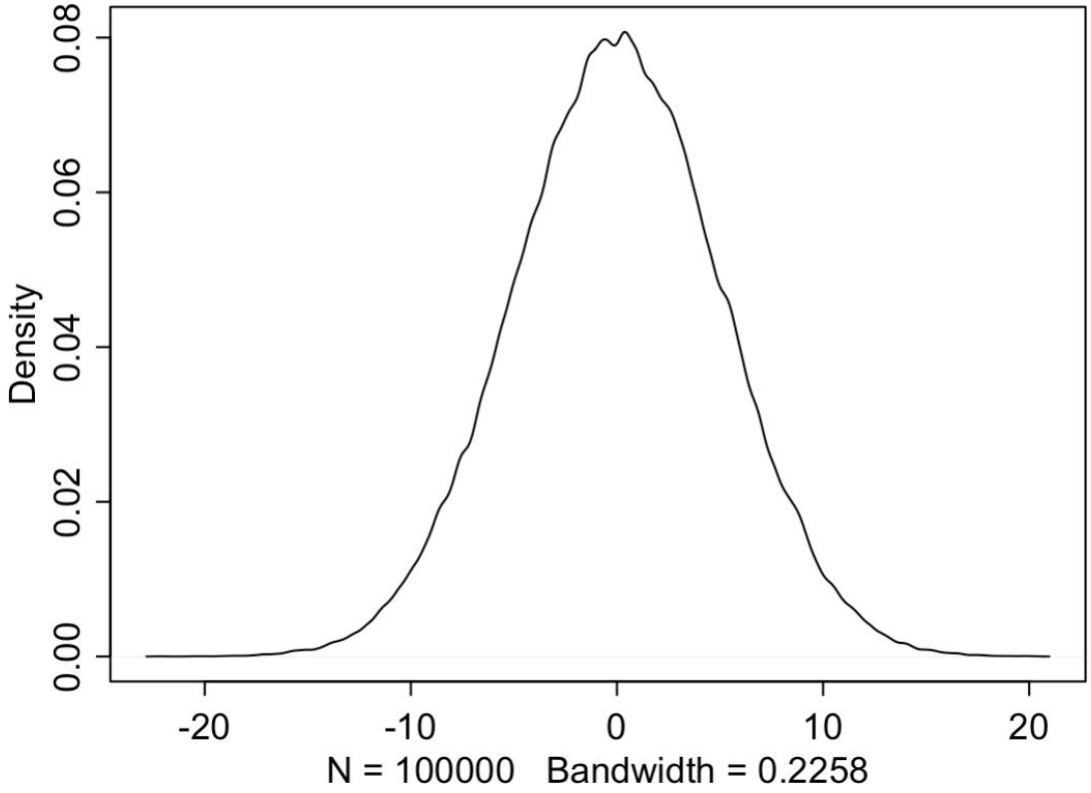
Other debates about wellbeing should be for the other sections of the workshop

Disability Weight

- 0 (perfect health) - 1 (death)
- General public (i.e., don’t necessarily have the health states)
- Making health judgments
- “Paired comparison task that ask respondents to consider descriptions of two hypothetical people, each with a particular health state, and specify which person they regarded as being healthier than the other”

Reserve: prior predictions

Our conversion



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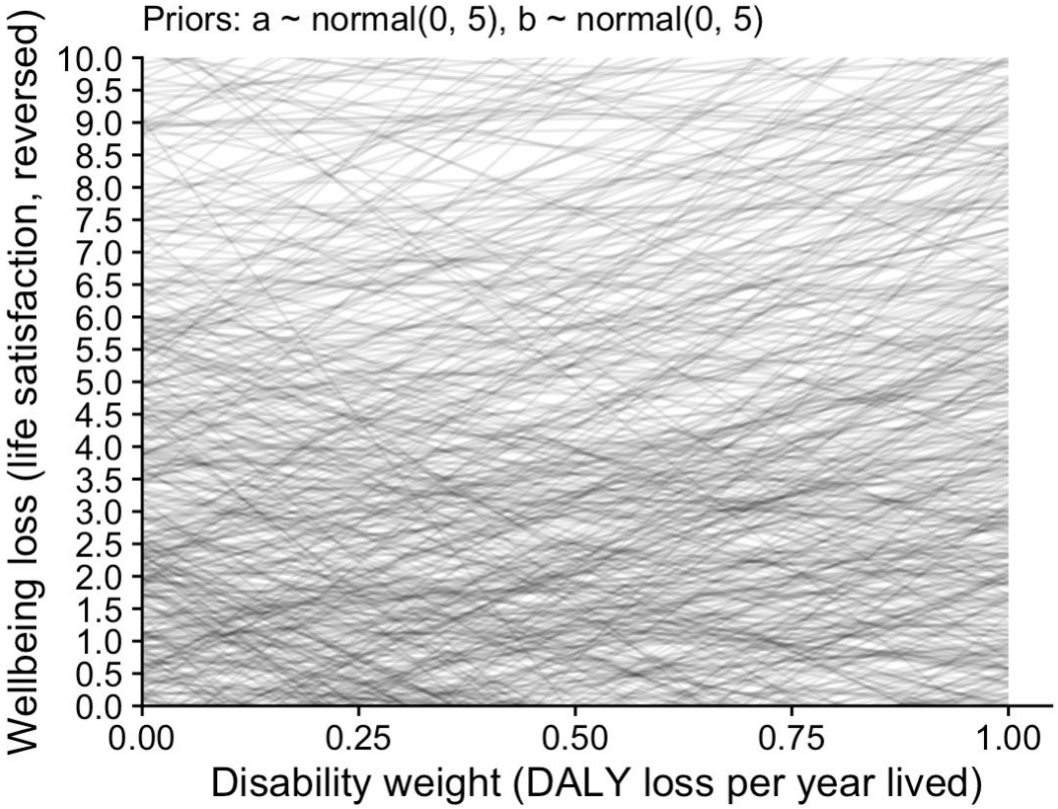

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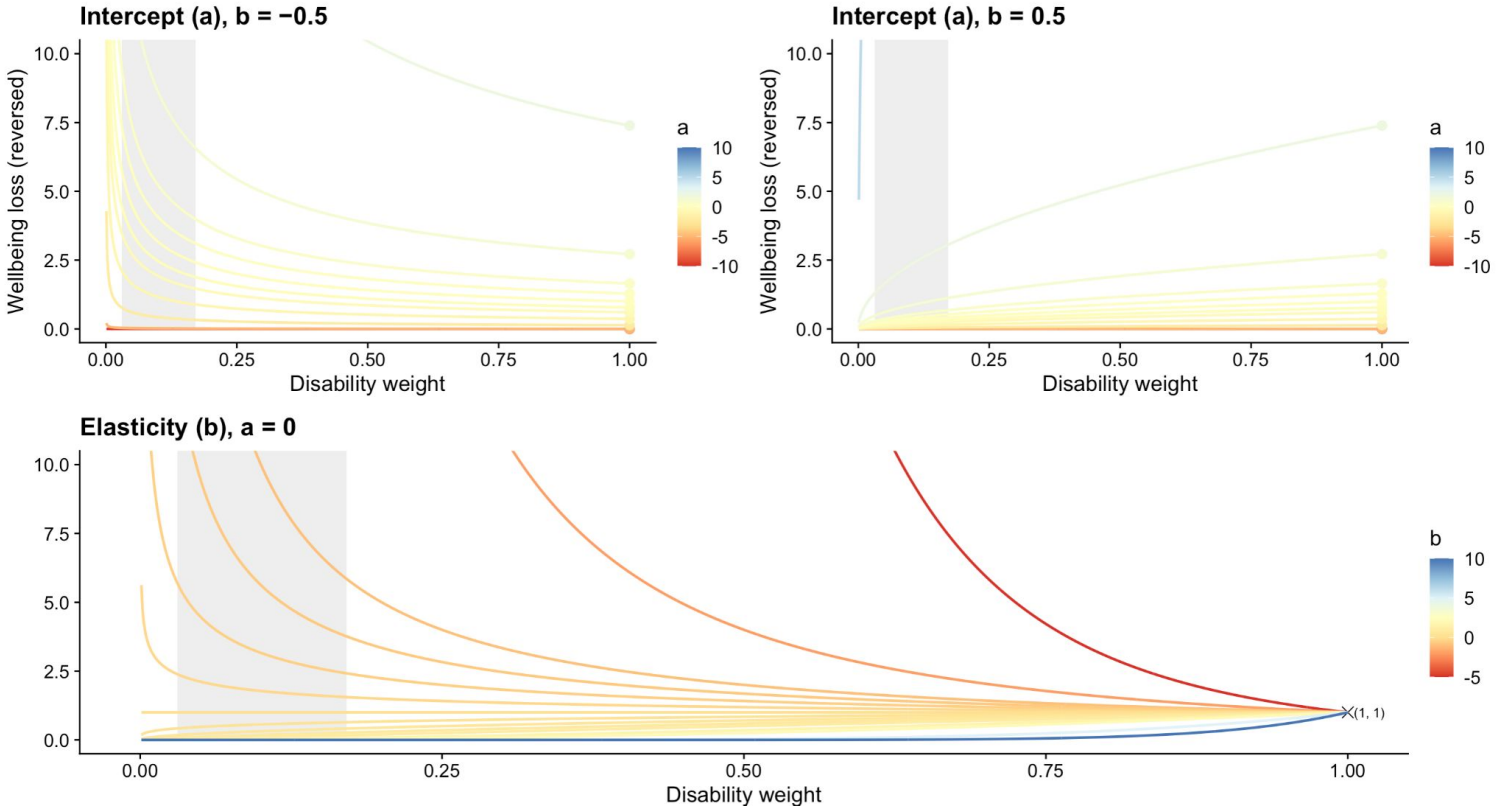

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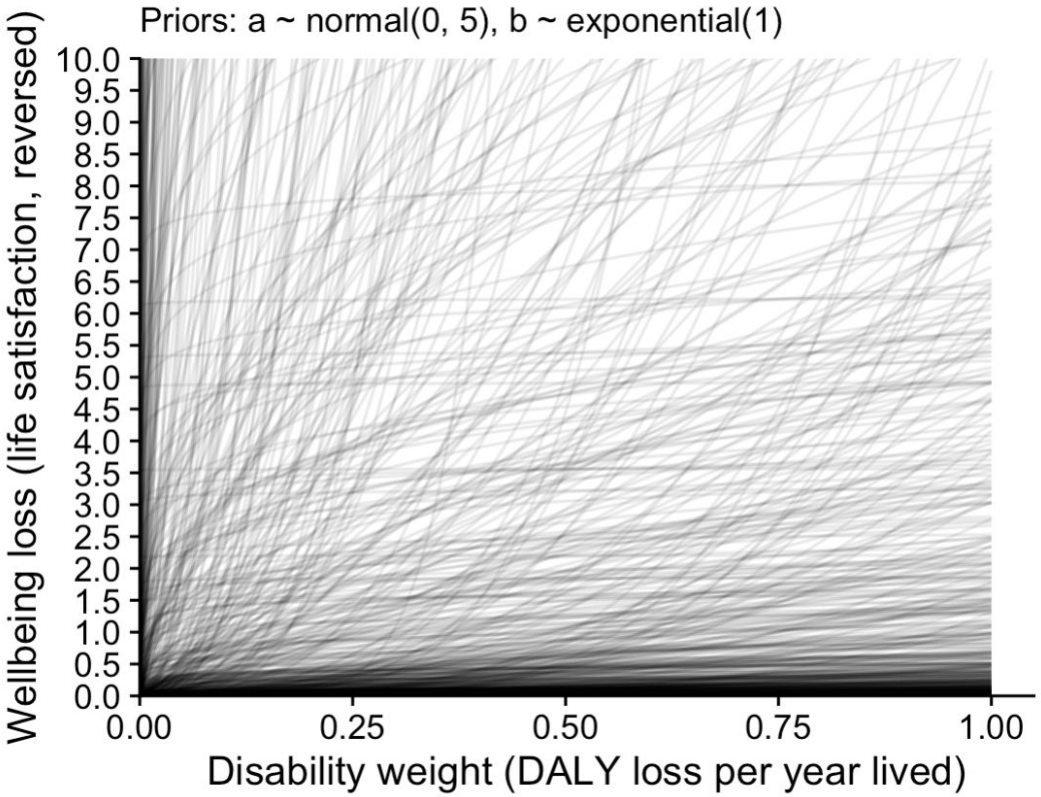


Reserve: explaining the conversion report

Converting MHa to SWB

- There is not a lot of SWB data out there about interventions in LMICs
- We can find data on affective mental health scales like depression scales
- Because of this dearth of data, and some theoretical relation between the two, we investigated whether we could use them together in practice.

Converting MHa to SWB

Affective Mental Health:

- Depression scales
- Anxiety scales

Ask questions about low mood

Typical Subjective Wellbeing:

- Life satisfaction
- Happiness

Have questions about determinants rather than outcomes like “issues sleeping”

Relates to *hedonia*

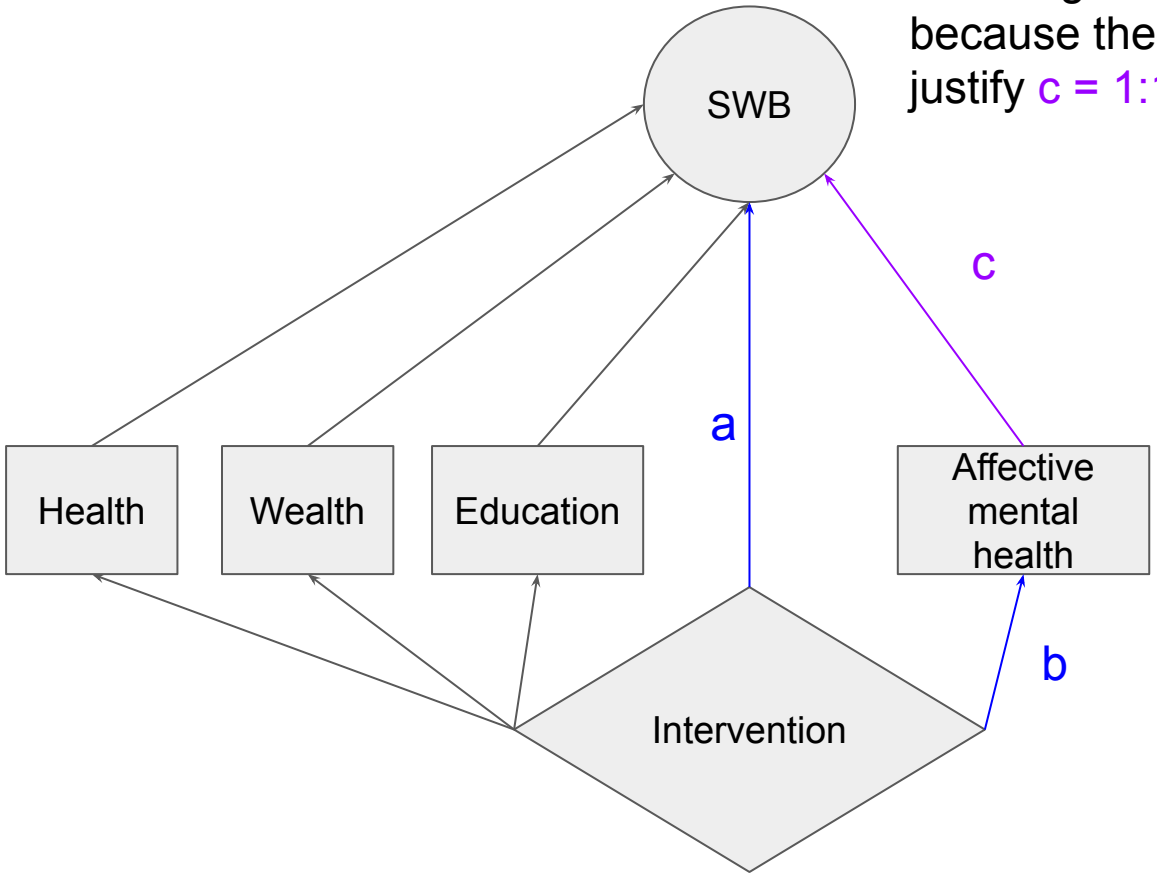
Converting MHa to SWB

Looking at RCTs of interventions on outcomes

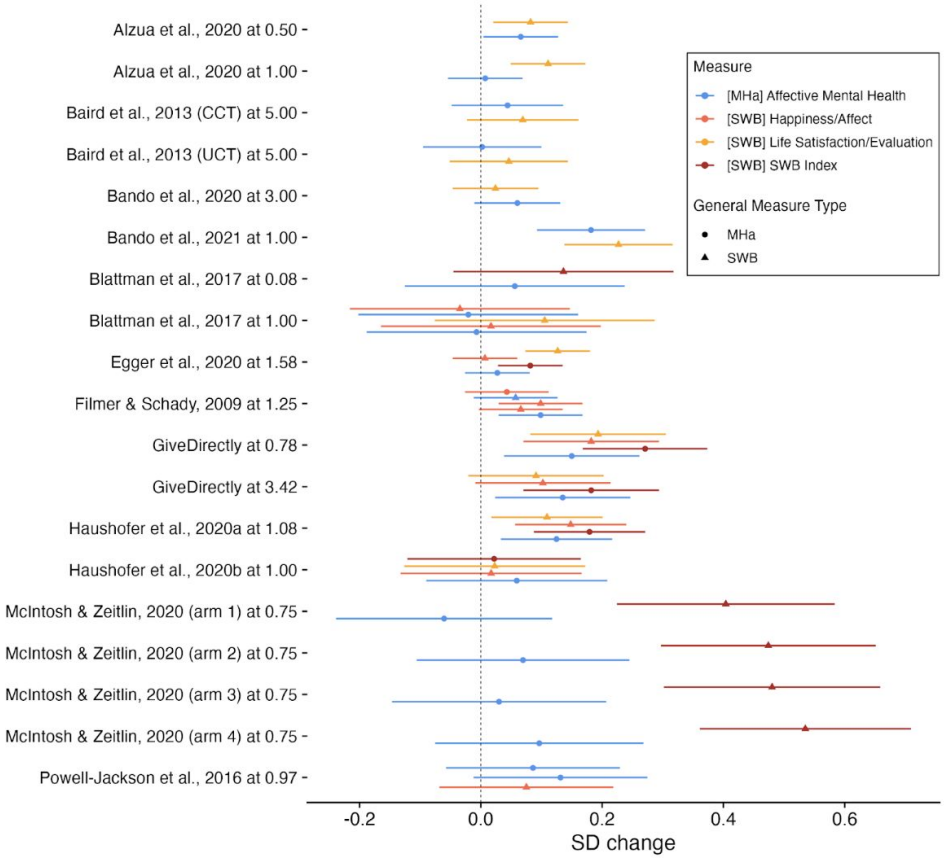
Not correlations in a cross-section or panel, but changes from intervention to outcome

Not constrained like correlation, more relevant to our work

If a >= b, then use them together because theoretically justify c = 1:1



Converting MHa to SWB



Converting MHa to SWB

source	note	How different SWB (vs MHa)	SE of difference	ratio	observations	weight
Our meta-analysis of psychotherapy in LMICs	Main model	0.07	0.03	1.18	26,026	19%
Boumparis et al., psychotherapy in HICs	Main model	-0.08	0.14	0.83	1,586	4%
Psychological interventions	Main model	-0.05	0.07	0.86	65,103	9%
Our meta-analysis of cash transfers in LMICs	Main model	0.03	0.02	1.39	109,903	32%
Our meta-analysis of cash transfers in LMICs	Remove McIntosh & Zeitlin, 2020	0.01	0.02	1.08	104,655	
Average		**0.02**		**1.22**		
Average (without McIntosh & Zeitlin, 2020 in cash transfers analysis)		**0.01**		**1.07**		

Reserve: other

Life-extending v life-improving

Two philosophical issues:

1. What is your account of the badness of death?
    - **Deprivationism** (wellbeing lost by the life that would have been lived)
    - **Time-relative interest account** (wellbeing lost … weighted by connection to future life)
    - **Epicureanism** (death isn't bad for the person who dies)
2. Where is the neutral point?

The Elephant in the Bednet - Plant et al. (2022)

App

https://tinyurl.com/hliapp