

Correspondence on "How can we estimate QALYs based on PHQ-9 scores? Equipercile linking analysis of PHQ-9 and EQ-5D" by Furukawa *et al*

Furukawa *et al*¹ posed the question: how can we estimate quality-adjusted life years (QALYs) based on Patient Health Questionnaire-9 (PHQ-9) scores? They recommend equipercile linking analysis between the depression severity PHQ-9 and preference-based EQ-5D three-level version (EQ-5D-3L; UK value set), the latter used to estimate utility data for QALYs.

Furukawa *et al*¹ refer to the process of 'cross-walking', whereby the practice of fitting a statistical model to health utility data has been referred to as 'mapping' and 'cross-walking'.² Furukawa *et al*¹ reference two mapping-related papers (their references 7 and 9); however, their analysis seems to have missed rigorous mapping methodology and previous studies which have used these mapping processes, alongside other conceptual considerations when wanting to 'cross-walk'/'map' from a non-preference-based (often condition-specific) measure such as the PHQ-9 to the preference-based EQ-5D-3L.

Clear guidance for mapping has been set out by Wailoo *et al*.² A case for equipercile linking for mapping has been made based on suggested limitations of the more commonly used regression methods³; the case for regression is described by Alava *et al*.⁴ A systematic review of mapping studies published in 2019 states: 'There were 180 papers with 233 mapping functions in total [identified]...The last 10 years has seen a substantial increase in the number of mapping studies and some evidence of advancement in methods with [...] greater reporting of predictive ability of mapping functions'.⁵ From this review, the majority of mapping functions were generated to obtain EQ-5D-3L/EQ-5D five-level version (EQ-5D-5L)/child-friendly EQ-5D version (EQ-5D-Y) scores (n=147) among other preference-based measure scores; eg, Short-Form Six-Dimension (SF-6D, n=45).

Furukawa *et al*¹ reference one study, which was also identified by Mukuria *et al*,⁵ which maps from the PHQ-9 to the SF-6D (not EQ-5D-3L), which concluded that: 'mapping from mental health condition-specific measures, such as the widely used PHQ-9, GAD [(Generalized Anxiety Disorder)] and HADS [(Hospital Anxiety and Depression Scale)], may not be an appropriate approach to generating EQ-5D and SF-6D scores as these measures focus on specific symptoms and not on the wider impact of mental health conditions' (their reference 7).

Furukawa *et al*¹ is mapping and therefore existing rigorous mapping methods should be used and compared with the suggested equipercile linking analysis. We recommend not using the suggested conversion table by Furukawa *et al*¹ until further conceptual and statistical analyses have been conducted, including reporting of performance statistics to allow method performance to be judged and compared against existing mapping studies in the empirical literature. We make this recommendation on the basis that Furukawa *et al*¹ currently provides no reported performance statistics or comparisons to suggest the potential predictive ability of using the conversion table; therefore there is no way to judge to what extent the conversion table could lead to biased, inaccurate, and imprecise QALY estimations which could lead to suboptimal decision-making.

Matthew Franklin , Tracey Young

Health Economics and Decision Science (HEDS), School of Health and Related Research (SCHARR), The University of Sheffield, Sheffield, UK

Correspondence to Dr Matthew Franklin, Health Economics and Decision Science (HEDS), School of Health and Related Research (SCHARR), The University of Sheffield, Sheffield S1 4DT, UK; matt.franklin@sheffield.ac.uk

Acknowledgements We would like to thank the School of Health and Related Research Outcomes group at the University of Sheffield for taking part in a discussion, which led to the writing of this letter.

Contributors MF and TY provided written contributions throughout the article and act as guarantors for the content of the manuscript.

Funding The writing of the article was part-funded by the National Institute for Health Research (NIHR) Applied Research Collaboration Yorkshire and Humber (NIHR ARC-YH). The views expressed are those of the author(s) and not necessarily those of the NIHR or the

Department of Health and Social Care. The funding agreement ensured the authors' independence in developing the purview of the manuscript, writing and publishing the manuscript.

Competing interests MF and TY are part funded by the National Institute for Health Research (NIHR) Applied Research Collaboration Yorkshire and Humber (NIHR ARC-YH). As part of the NIHR ARC-YH, we are exploring the potential to map from non-preference-based mental health focussed measures to preference-based measures which includes the Patient Health Questionnaire-9 (PHQ-9) to the EQ-5D three-level version (EQ-5D-3L) or EQ-5D five-level version (EQ-5D-5L).

Patient consent for publication Not required.

Provenance and peer review Not commissioned; externally peer reviewed.

© Author(s) (or their employer(s)) 2021. No commercial re-use. See rights and permissions. Published by BMJ.



To cite Franklin M, Young T. *Evid Based Ment Health* 2021;**24**:e5.

Received 27 March 2021

Revised 12 April 2021

Accepted 13 April 2021

Published Online First 26 April 2021



► <http://dx.doi.org/10.1136/ebmental-2021-300299>

Evid Based Ment Health 2021;**24**:e5. doi:10.1136/ebmental-2021-300265

ORCID iD

Matthew Franklin <http://orcid.org/0000-0002-2774-9439>

REFERENCES

- 1 Furukawa TA, Levine SZ, Buntrock C, *et al*. How can we estimate QALYs based on PHQ-9 scores? Equipercile linking analysis of PHQ-9 and EQ-5D. *Evid Based Ment Health* 2021;**24**:97–101.
- 2 Wailoo AJ, Hernandez-Alava M, Manca A, *et al*. Mapping to estimate Health-State utility from Non-Preference-Based outcome measures: an ISPOR good practices for outcomes research Task force report. *Value Health* 2017;**20**:18–27.
- 3 Fayers PM, Hays RD. Should linking replace regression when mapping from profile-based measures to preference-based measures? *Value Health* 2014;**17**:261–5.
- 4 Hernández Alava M, Wailoo A, Pudney S, *et al*. Mapping clinical outcomes to generic preference-based outcome measures: development and comparison of methods. *Health Technol Assess* 2020;**24**:1–68.
- 5 Mukuria C, Rowen D, Harman S, *et al*. An updated systematic review of studies mapping (or cross-walking) measures of health-related quality of life to generic preference-based measures to generate utility values. *Appl Health Econ Health Policy* 2019;**17**:295–313.