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Version: Accepted Version

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

**Short title: Estimating QALYs based on PHQ-9 scores? Correspondence**

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**Key words:** PHQ-9, EQ-5D, mapping, cross-walking, utility, preference-based, mental health

**Letter**

Furukawa, et al. [1] posed the question: how can we estimate QALYs based on PHQ-9 scores? They recommend equipercentile 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 & 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 like 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 equipercentile linking for mapping has been made based on suggested limitations of the more commonly used regression methods [3]; 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-5L/EQ-5D-Y (n=147) among other preference-based measure scores (e.g. 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 and HADS, 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 to the suggested equipercentile 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.

**References**

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