

Reviewer's report

Title: The Manchester Foot Pain and Disability Index: A Rasch analysis

Version: 1 **Date:** 19 August 2009

Reviewer: Gabrielle van der Velde

Reviewer's report:

Reviewer's Assessment Report:

Thank you for the opportunity to review this manuscript. The authors are commended for wishing to promote good measurement practice in the research field of foot disability.

Major Compulsory Revisions:

The main limitation with this study is related to its conceptualization: 1) what are the justification, rationale, and evidence to support the validity of conducting an analysis of the three FDPDI subscales, and 2) how will these sub-scale scores be used by users such that fundamental measurement is fulfilled? What is the practical application of their findings?

1. Background on FDPDI requires more detail and should be summarized in a clearer fashion. For example:

a) The authors should explicitly describe the underlying construct(s) the FDPDI was designed to measure, and provide background on its development and the conceptual framework that was used to develop the instrument, and so forth. For example, when the FDPDI was originally developed, what was rationale for having 4 constructs for the measurement of foot disability? Why was 'personal appearance' conceptualized to be related to disability?

b) The authors should describe the scoring of the instrument, the range of possible scores, and the interpretation of scores, as originally proposed by Garrow, and how these were changed over time by other users of the FDPDI, and whether these changes were based on some statistical / measurement approach or just ad hoc.

c) The authors need to more clearly describe the evolution of the utilization and scoring of the FDPDI over the years, starting from Garrow, then Cook, etc. For example, how were 3 constructs 'confirmed' statistically and why was one 'construct' dropped? What was the rationale / basis for summing scores as did Waxman et al (RCT)?

d) Are the 4 'constructs' are in fact 'subscales' or 'factors' that are thought to or conceptualized to map onto the construct 'foot disability'?

Note: some of this information requested above could be included in the methods under a section title, for example, 'Manchester Foot Pain and Disability Index Description'

2. Background: Authors should present evidence to support statement that Waxman et

al. score is an ordinal score. A requirement for ordinal scoring is confirmation / evidence of unidimensionality of the FPDI (i.e., measures only one construct) through some form of statistical analysis (e.g., factor analysis, Rasch analysis, Mokken analysis). The authors state that the FPDI was originally designed to have 4 constructs; this statement suggests that the FPDI is not unidimensional, and therefore the score by Waxman et al. was not ordinal.

3. Background: The authors state that 'the only way to derive such a score from ordinal item responses' is through the use of the Rasch model. Actually, the intent of a Rasch analysis is first to determine whether a scale in question represents unidimensional, interval-level measurement, and if not, one can attempt to adapt the scale to determine whether adaptations to the scale can lead to unidimensional, interval-level scaling through analytic iterations that consist of adaptations (e.g., response option collapsed, items removed, etc.) followed by repeated Rasch analysis.

4. Objective: A clearer statement of the study objective would be helpful (presumably the last paragraph [2 sentences] of the Background section). The statement of objective is contradictory to the sentences that precede it. The preceding sentences discuss an RCT that used an overall score, and 'way to derive such a [single] score. So the reviewer is unclear whether the objective is it to determine whether the 3 subscales are unidimensional, interval-level scales (3 scores?) or the FPDI as a scale (single score)?

5. Study Sample: The reviewer suggests that the description of the study sample provided in 'Results' be synthesized with the description of the study sample in 'Methods' since there is some redundancy and results of the survey are not those of this Rasch analysis. The description of the sample should be provided in the Methods section only.

6. Methods:

a) As noted above, there should be a section that provides a description of the FPDI, its conceptual framework, development, validation, psychometric properties, etc.

b) Rasch analysis is specifically concerned with assessing the fit of data to the Rasch model, not with fitting the Rasch model to data. Yet the latter is suggested throughout the manuscript, for example, by the Results heading: 'Fit of the Rasch Model'.

c) The explanation and description of the principles of Rasch analysis and the methods are rather insufficient. While it is true that the Rasch model has been

described elsewhere, the current summary description of the model provided in the text is insufficient for the reader to understand the basic concept behind this model.

d) The Methods are not adequately reported. Here are examples. The authors should explain why the partial credit model is used. The explanations in the Methods section are unbalanced, where in some cases, concepts or methods are fully explained (e.g., method for testing unidimensionality) but virtually no explanation for other concepts (e.g., threshold plots and what they represent). Why did the authors expect the response categories to be hierarchically ordered? Why must a scale measure only one construct and be unidimensional? What was the correlation cut-off value used to establish response dependency? What considerations were made to determine whether the sample size was appropriate for the various analyses (e.g., fit to model, DIF, etc.)

7. Results: The results for testing for unidimensionality of the pain sub-scale do not suggest that it is unidimensional as 5% is not contained within its confident interval. See: Tennant A, Conaghan PG. The Rasch measurement model in rheumatology: what is it and why use it? When should it be applied, and what should one look for in a Rasch paper? *Arthritis Rheum* 2007;57:1358–62.

8. Results: The overall item fit is inadequate for the subscale appearance.

9. Results: Authors should describe graphical results of Item Characteristic Curve for each item.

10. Results: There is DIF noted, which is a breach of unidimensionality – this challenges the authors conclusion that that a summary score can calculated from the function subscale items, that the analysis confirms the unidimensionality of all three scales, and that an interval score is produced by the subscales.

11. Discussion: Many important statements in this section are not referenced, and ought to be, for example: statement that there was sufficient statistical power.

12. Discussion: Authors should discuss how these findings are to be applied.

Minor Essential Revisions:

1. The manuscript would benefit from general editing, for example, paragraphs should contain more than one sentence (e.g., Background, Methods), the authors should write in one tense (present or past), there ought to be consistent formatting (e.g., ‘Overall fit to the model’ in the Methods section: is this a sub-title?), and so forth.

Level of interest: An article whose findings are important to those with closely related research interests

Quality of written English: Acceptable

Statistical review: Yes, and I have assessed the statistics in my report.

Declaration of competing interests:

I declare that I have no competing interests