Author's response to reviews

Title: A Structural Equation Model of Impairment and Functional Limitation in Rheumatoid Arthritis

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Author's response to reviews: see over
RESPONSE TO REVIEWERS
Title: A Structural Model of Impairment and Functional Limitation in Rheumatoid Arthritis
Date: December 10, 2004

Dear Dr. Stucki and Dr. Callahan:
On behalf of my co-authors, I thank you for spending your valuable time to review our manuscript, and for your thoughtful comments to improve it. Our itemized list of responses, including references to the location of manuscript revisions, follow below.

Sincerely,

Agustin Escalante, M.D.

Reviewer: Dr. Stucki

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Major Compulsory Revisions (that the author must respond to before a decision on publication can be reached)

Comment 1. “It would be advisable to introduce a sentence or a paragraph on the requirements for using SEM in the Analysis section.”

Response: We have complied with this request by adding a comment in the analysis section that SEM is a theory-driven, not a data-driven technique. Please see first paragraph of Page 8. Also, we added to the discussion, recognizing as a potential limitation of this analysis the fact that not all of the variables used in this analysis display multivariate normality, one of the assumptions of structural equation modeling. Please see manuscript Pages 14-15.

Comment 2. “The fit statistics should be presented in the Results section of the paper. The reader has to understand why the authors came to the conclusion that the proposed model's fit to the empirical data was fair to good”.

Response: We have complied with this request. Please see bottom paragraph of manuscript Page 10 to top of Page 11.

Comment 3. “The WHO model of functioning, disability, and health approved in 2001 is a model that is gaining importance in medicine and that is starting to be used in rheumatology. Therefore, the results of this study should be discussed in relation to the WHO model.”

Response: We thank Dr. Stucki for bringing to our attention the important work contained in the ICF core set of measures for rheumatoid arthritis. We have added two full paragraphs and citations at the beginning of the discussion, regarding this. Please see manuscript Pages 11-12.
Reviewer: Dr. Callahan.

General Comment: “This manuscript tests a model of impairment and functional limitation based on the disablement process in a sample of data from rheumatoid arthritis patients. Overall, the manuscript does not do a good job of presenting a strong rationale of the model...”

Authors’ Response: The impairment→functional limitation model we tested here is a component, or segment of the broader disablement process model that we are using to guide our inquiry into the mechanisms and pathways of physical disability in RA. We have published the theoretical foundation of our full model in an earlier paper (Reference 10). The present manuscript provides an empirical basis for our definition of the disablement stage of impairment, which we have not previously described. In this paper we also provide evidence of the link between impairment and functional limitations, the next disablement stage. We have added considerable detail in the manuscript about our rationale, aiming to strengthen the description and rationale of the model tested here. Please see manuscript Pages 4-5.

Comment: “…and why it is important to know that the model with only a fair fit is important.”

Authors’ Response: Measurement of the fit of structural equation models is a subject of debate, and interpreting fit coefficients is subjective (i.e. different authors propose different interpretations). The best evidence for this is the multiplicity of fit indices available. Moreover, for each index, several different interpretation criteria have been proffered. Thus, the term “fair fit” used by one author for an RMSEA ≤ 0.08 becomes “reasonable” for a different author. In response to your comment, we have used the modification indices from our model to adjust it slightly, in the process lowering the RMSEA of our model to 0.059. (Modification in indices are pathways that, if specified in the model, would increase its fit to the data. They are part of the standard output of the Amos 5.0 structural equation modeling software). Here, it is important to understand that structural equation modeling is not meant to be a data-driven technique, rather, it is a theory-driven one. Because of this, in adjusting our model, we considered only paths that would not alter the basic impairment→functional limitation structure of our disablement theory. With the resulting CFI and NFI well over 0.95 and RMSEA of 0.059, we now describe the model’s fit as “acceptable” and “reasonable”. However, these are just subjective descriptors. Readers should focus on the pathways posited by the model, the size of their coefficients, the squared multiple correlations, and the values of the fit statistics. Please see manuscript Pages 8 and 10.

Major Compulsory Revisions (that the author must respond to before a decision on publication can be reached)
Comment 1: "The Background needs to explain more thoroughly the authors' definition of impairment and why it is important to understand its effect on functional limitation. They also need to explain the need for understanding their definition."

Response: Please see manuscript revisions in Pages 4, 5, 11, 12

Comment 2: "In the Patients and Methods Section, under the patients heading there needs to be a better description of the sample construction. Although the data are presented elsewhere, enough needs to be presented in this manuscript for the readers to have a sense of things without retrieving other manuscripts. For instance, where the patients consecutive? How many sites were included?"

Response: Requested information is now provided. Please see manuscript Pages 5 & 6.

Comment 3. “The authors should explain why they do not have a relationship between joint deformity and joint inflammation? Do they think there is a possible interaction or additive or multiplicative effect? Could inflamed joints lead to deformity? Could some type of relationship explain the fair fit?”

Response: We did not consider a joint inflammation → deformity path in our a priori model, because our disablement theory does not contemplate that such a causative relationship occurs at the impairment stage. (i.e. our model does not posit that joint pain, tenderness and swelling cause deformities). Rather, we believe that the inflammation → damage link occurs earlier, at the pathology stage (i.e. inflammation at the molecular and cellular level causes destruction of cartilage).

Nevertheless, in response to your request, we retested our model after adding a direct path from inflammation to deformity. This path was weak, and did not reach statistical significance. Thus, we omitted it from the model. Please see manuscript Pages 8, 11 & 13.

Comment 4. “The discussion does not really address why the fair fit of the model is important.”

Response: Please see the response to your general comment, above. Also, please see manuscript Pages 8 & 10, for a description of how we modified the model to improve fit indices.

Minor Essential Revisions (such as missing labels on figures, or the wrong use of a term, which the author can be trusted to correct)

Comment 1. “There are a number of typos throughout the manuscript.”
Response: We regret these errors, and in this revision have aimed to eliminate all typos.

Comment 2. “Figure 1 needs more information in the legend for joint deformity abbreviations and functional measures.”
Response: We have added acronyms for the three deformed joint measures. Please see Page 20.