Author’s response to reviews

Title: Appraisal of the DIERS Method for Calculating Postural Measurements: An Observational Study

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Author’s response to reviews:

Dear Dr. Grivas,

We would like to thank the reviewers for their time and thoroughness in reviewing the manuscript (SCOL-D-16-00052) entitled: “Appraisal of the DIERS Method for Calculating Postural Measurements: An Observational Study.” Their comments were well reasoned and by addressing their comments, we know our manuscript has been improved. Below we have listed each of the reviewers’ comments followed by the authors’ responses. Changes made within the manuscript based on the reviewers’ comments have been underlined as instructed.

Reviewer Comment: Statistical analysis must be completed.

As each of the 30 participants were scanned 6 times consecutively before moving from the platform and thirty scans were completed for each participant over 5 days, what is the test-retest reproducibility?

Response: To our knowledge, no previous work has reported on the variability of the 12 images that are processed into the standard single-scan report. Because this data has not been previously examined and the amount of data and statistics involved in this manuscript is quite extensive, we feel that the data contained within this manuscript should stand alone as the focus of the manuscript. The test-retest reproducibility over the 5 days is the focus of manuscripts currently being drafted for future publications.
Reviewer Comment: Inter-method Reliability must be specified by internal consistency between DRV and SAV and between Mannequin and Human.

Response: We agree that this additional analysis will strengthen our manuscript. We have added measures of inter-method reliability to this manuscript.

Reviewer Comment: “Some references could be added, for instance:

Evaluation of the reproducibility of the formetric 4D measurements for scoliosis

Patrick Knott, Steven Mardjetko, Michelle Rollet, Scott Baute, Magdelina Riemenschneider and Laura Muncie

Scoliosis 2010 5(Suppl 1):O10”

Response: Because oral presentations are typically not held to the same standard as a peer-reviewed journal article, we question if it is appropriate to include the suggested reference. To address the content in the recommended reference, we have updated the reference section and cited 2 peer-reviewed manuscripts which align with the claims made in the suggested reference. If the reviewers and editor of the journal feel strongly about citing the suggested oral presentation, we are willing to add this reference as well.

Reviewer Comment: “Are there any significant differences depending on gender, skin color, age ...?”

Response: We agree with the reviewer regarding the value of reporting significant differences associated with gender, skin color, and age. We intend to report these in a future manuscript whose primary focus is looking at these differences. The focus of the current manuscript was to evaluate the inherent variability within the DIERS formetric 4D instrument and how that variability has the potential of influencing the clinical interpretation of each parameter value.

Reviewer Comment: “DIERS is not an acronym but a family name, it should be written in lower case Diers.”

Response: We acknowledge that Diers is a family name. We are happy to comply with the reviewer’s comment, but based on our analysis of the company’s marketing materials and articles published on the DIERS marketing website, we believe that capitalizing all letters of this word is appropriate.
Reviewer Comment: 1. In conclusions, the authors described, "Because within-scan variability is not reported with the DRV, the clinical usefulness of DRV if reported by itself is limited". Did the within-scan variability mean variability among the 12 images within a single scan? If so, because there is only one DRV value for each single scan, within-scan variability of the DRV seems meaningless.”

Response: We agree that the assessment of within-scan variability of DRV (DIERS-reported value) would be meaningless since the DRV is only 1 value for each measure. In this manuscript, we reported the within-scan variability for the SAV (standard average value). The SAV for each measure is directly calculated from 12 images (or data sets) that are collected during 1 scan. When considering these 12 images, within scan variability is meaningful because it provides clinicians further information about the precision of the instrument and the inherent variability due to measuring dynamic characteristics of a live, standing human form. Appreciating both the precision of the instrument and the inherent variability of the standing human is critical in determining any meaningful change in the measurements when scans are repeated over time. Because we have shown little difference between the DRV and SAV, either of the values could be used to represent the primary results from a scan, but the clinician needs further information about the variability from the 12 images to determine meaningful change in the numbers over time. Our premise is consistent with current standards for other instruments, where reference ranges are presented when providing a test result. It is exactly because of this nuance and the potential confusion readers may have of the data presented in this manuscript that we decided to keep the manuscript focused on the single-scan data set and not add broader data as suggested in other reviewers’ comments.

Reviewer Comment: “2. Moreover, conclusions in the abstract were less comprehensible than those in the main text. Could the authors unify their conclusions?”

Response: We appreciate and agree with the reviewer’s critique. The abstract’s conclusions section has been rewritten to be more consistent with the manuscript’s conclusions section. All changes are underlined in the updated document.

Reviewer Comment: “3. In the Results section, "The location of at least 1 of the landmarks had to be manually adjusted for at least 1 image for 399 (43.33%) of the scans (Table 2)."

It seemed more problematic to me.”

Response: We agree and understand your concern with the percentage of adjusted images, yet based on our experience, we do not believe that this is a big problem. This manuscript’s data set reports on 900 scans. Each scan includes 12 images and within each image there are 3 markers
(DL, DR, and VP) that can be manually adjusted. So for our data set, we have a total of 32,400 landmarks/data points that can be adjusted. Movement of a marker was documented for a scan if at least 1 marker on any of the 12 images was adjusted. In most cases, a single marker was moved in only 1 to 2 of the images within a scan to correct for obvious erroneous data produced by the instrument (this was not quantified but is our overall impression). If only 1 marker on 2 images from each of the 399 scans were adjusted, 798 of the 32,400 data points were adjusted. A reasonable, conservative estimate of the percentage of moved markers would be near 3%. Since the manufacturer acknowledges the need of periodically moving the DL, DR, and VP markers to the proper anatomical reference point and the infrequent rate of making such changes, we feel this rate of positional adjustment of the data points is reasonable. We have clarified this point within the text.

Again, we thank the editor and reviewers for their consideration and review of this manuscript. We hope that we have made changes that have addressed concerns and improved the manuscript. We look forward to hearing from you soon.