

Rasch analysis of The Western Ontario Osteoarthritis of the Shoulder (WOOS) index – the Danish version

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Introduction: The Western Ontario Osteoarthritis of the Shoulder (WOOS) index is a disease-specific patient-reported 19-question survey that measures quality of life among osteoarthritis (OA) patients. WOOS is used for the evaluation of shoulder arthroplasty in patients reported to the Danish Shoulder Arthroplasty Register (DSR).

Objectives: The purpose of this study was to validate the Danish version of WOOS for OA patients and secondly for other diagnoses through modern test theory.

Methods: The study included 2416 arthroplasties in 2298 patients reported to DSR between 2006 and 2011. Five diagnoses were included: 100 rheumatoid arthritis; 847 osteoarthritis; 161 rotator cuff arthropathy; 1140 fracture; and 168 revisions.

We tested the fit of different diagnoses to the Rasch model. The dimensionality of WOOS was further examined with residual Principal Component Analysis (PCA). When validating WOOS it is important to confirm unidimensionality of the questionnaire since it is used as a linear rating scale with one total score between 0 and 1900. WOOS was regarded as dichotomous which means that a total WOOS score above 950 is considered a clinical failure whereas a score below 950 is regarded as a good outcome.

Results: A dichotomous scale was the best fit for the WOOS items (questions). The analysis of the OA patients had an acceptable reliability (item reliability of 0.98 and person reliability of 0.76) and showed adequate targeting and a good fit to the model with a person mean of -0.56 logits. The analysis of fracture (FR) patients showed an even better fit and a higher reliability. All of the WOOS items fitted well to the OA sample except from two items (item 5 regarding grinding in the shoulder and item 6 regarding weather). In addition, one of the misfitted items (item 6) showed signs of degrading the scale. Only item 6 showed misfit for FR patients and there was no sign of scale degradation. WOOS covered a wider range of quality of life in FR (item difficulty ranged from -3.95 to 2.11 logits) than in OA patient (item difficulty ranged from -2.36 to 1.40 logits). The residual PCA confirmed unidimensionality for FR patients but not for OA patients. However, the conformation of the first contrast of the residuals indicated that WOOS could be treated as a unidimensional scale for OA patients. Six items displayed clinically significant Differential Item Functioning (DIF) between OA and FR patients. The FR patients experienced more stiffness (item 4), more difficulty working or reaching above shoulder level (item 7) and more difficulty styling their hair (item 13) than OA patients. The OA patients were more affected by the weather (item 6), were more troubled by increasing pain after activities (item 11) and had more difficulty sleeping (item 12) than FR patients.

Conclusions: The Rasch analyses generally suggested that WOOS can be considered valid and representative for quality of life level of both OA and FR patients. Surprisingly, FR had the best fit to WOOS even though WOOS is originally made for OA. The PCA indicated that WOOS can be treated as a unidimensional scale for both OA and FR patients. DIF assessment showed variation in response pattern between OA and FR patients.