Two Rotator Cuff Disease Specific Outcome Measures, The RC-QOL And the WORC Exhibit Similar Construct Validity And Responsiveness

Helen Razmjou 1,2, Andrea Bean 1,2, Varda van Osnabrugge 1,2, Joy C Mac Dermid 3,4,

1 Orthopaedic and Arthritic Institute, Sunnybrook & Women’s College Health Sciences Centre, Toronto, ON, Canada, M4Y 1H1

2 University of Toronto, Department of Physical Therapy

3 School of Rehabilitation Science, McMaster University, 1400 Main St West, Hamilton, ON, L8S 1C7

4 Hand and Upper Limb Centre, St. Joseph’s Health Care, London, ON, N6A 4L6

*Corresponding author

Email addresses:
HR: helen.razmjou@sw.ca
AB: andrea.bean@sw.ca
VVO: varda.vanosnabrugge@sw.ca
JMD: jmacderm@uwo.ca or macderj@mcmaster.ca
Abstract

Background

Disease-specific quality-of-life measures are devised to assess the specific impacts of a specific disease across a spectrum of important domains of life. The purpose of the present study was to compare the measurement properties of two newly developed rotator cuff disease quality-of-life measures, the Rotator Cuff Quality of Life Outcome Measure (RC-QOL) and the Western Ontario Rotator Cuff index (WORC), in patients with rotator cuff pathology.

Methods

Participants enrolled were consecutive patients who received physical therapy for management of impingement syndrome or received treatment following rotator cuff repair, acromioplasty or decompression surgeries. All subjects received physical therapy treatment and completed four outcome measures at 3 single points (Initial, interim, and final). Concurrent validity was assessed at each of the 3 time-points by correlating the WORC and RC-QOL’s to each other and to 2 alternative scales; a joint-specific scale, the American shoulder & Elbow Surgeons form (ASES), and a limb-specific measure, the Upper Extremity Functional Index (UEFI). Pearson’s correlation coefficients examined the association among these measures. The standardized response mean was used to examine sensitivity to change.

Results

Forty-one participants entered the study and their scores were compared at 3 cross sectional single points. The correlation coefficients among the 4 measures varied from 0.69 to 0.84; 0.76 to 0.88; and 0.62 to 0.91 respectively for the above time points. All
correlations were significant at the 2-tailed 0.01 level. The correlations between corresponding domains were also statistically significant (a =0.05 and 0.01) at all three time points. The final SRMs were (1.42), (1.43), (1.44), and (1.54) for the ASES, RCQOL, WORC, and UEFI respectively.

Conclusions

The results of this study indicate that the total and subtotal scores of the WORC and RC-QOL, two disease-specific shoulder questionnaires correlate closely and these two measures could be used interchangeably. Responsiveness was very closely matched across all 4 scales, with the UEFI having the highest sensitivity.
Background

The assessment of health-related quality of life is becoming increasingly important in evaluating the effectiveness of orthopaedic interventions. Generic health-related quality of life (QOL) instruments such as SF 36 have the ability to examine the extent of symptoms and disability among different diseases and conditions [1,2]. However, it has been shown that they are less responsive than disease or joint-specific measures[3], in particular for upper extremity disorders[4-6]. Limb and joint-specific QOL instruments are often used in orthopaedics because they focus on the particular anatomic area[6,7]. A recently developed limb-specific self-report measure is the Upper Extremity Functional Index (UEFI) [8]. The most commonly used subjective joint-specific measurement instrument is the Shoulder and Elbow Surgeons Standardized Shoulder Assessment Form (ASES) [9,10,11].

Obviously, a number of conditions such as osteoarthritis, instability, and rotator cuff disease could affect the function of the shoulder joint and each condition has a distinct feature that characterizes a unique pathology. Consequently, there has been a growing interest in studies that have examined specific aspects of quality of life affected by certain diseases of the shoulder joint [12-15]. The potential advantage of a disease specific instrument is that it can address symptoms, impairments or activity limitations that are specific to the pathology of interest. Disease specific scales focus on symptoms or a spectrum of domains of relevance to quality of life, the latter being the specific focus of our study. Generally, it is expected that the disease-specific measures would be more sensitive than more generic measures and this has been reported in pathologies involving wrist and hand [16].

Rotator cuff disease, is the most common pathology in the shoulder joint [17] and leads to a significant disability affecting daily activities, work and sports, thereby influencing the quality of life[18]. Currently, there are two rotator cuff disease-specific outcome measures: the Western Ontario Rotator Cuff Index (WORC) [13] and the Rotator Cuff Quality Of Life measure (RC-QOL) [12]. Although these questionnaires are designed to measure different domains of the QOL such as pain, physical, emotional, and social functioning, the original authors have not investigated
the dimensionality and structure of the domains or items via factor analysis. In terms of validity, the WORC questionnaire was reported [13] to correlate most strongly with the American Shoulder and Elbow Surgeons, (ASES) and the Disability of Arm Shoulder and Hand (DASH). As an evaluative instrument it correlated best with the ASES and the University of California Los Angeles (UCLA). The correlations of the WORC’s total score with the other instruments have been reported to range from 0.48 to 0.91 by other investigators. [19,20] Studies that have examined the responsiveness of the WORC by calculating the standardized response mean (SRM) in patients who have been measured before and after surgery have not reported noticeably different SRM from the comparative measures (Constant, SST and DASH) [19,20]. Holtby and Razmjou [19] had lower overall SRMs than MacDermid et al [20] who included only the responders in their calculations. Information on the RC-QOL is limited to one study [12] and there are no independent studies on this measure. This measure has demonstrated high test-retest reliability, face validity, and ability to discriminate between large and massive cuff tears as reported by the developers [12].

Although preliminary information on the validity and reliability of these measures has been reported, there are no independent studies investigating these properties in the same population. The purpose of this study was to examine the cross-sectional and longitudinal construct validity of the WORC and RC-QOL in relation to one another and in relation to other joint and limb specific measures in the same population of the patients suffering from rotator cuff pathology.

Methods

This prospective outcomes study (repeated-measures design) involved consecutive patients referred to the outpatient rehabilitation department of a tertiary care centre. These patients were referred by their family physicians or orthopedic surgeons for treatment of impingement syndrome or post-operative rehabilitation following rotator cuff-related surgeries. All patients completed ASES, WORC, RC-QOL, and UEFI outcome measures at the initial, and final visits. All measures except UEFI were collected at the interim visit. Patients with upper extremity fractures or systematic
inflammatory disease such as rheumatic arthritis were excluded from the study. Informed consent was obtained and the rights of human subjects were protected.

Description of the Quality Of Life Questionnaires
The Western Ontario Rotator Cuff Index (WORC) consists of 21 items representing five domains each with a visual analogue scale type response option [13]. The 5 domains include: 1) physical symptoms, 2) sports and recreation, 3) work, 4) social function, and 5) emotions. The WORC items are scored on a 100-point scale (0-100). The most symptomatic score is 2100 and the best or asymptomatic score is 0. In order to present this in a more clinically meaningful format, the score can be reported as a percentage of normal by subtracting the total score from 2100, dividing by 2100 and multiplying by 100. The final WORC scores can therefore vary from 0%, the lowest functional status level, to 100%, the highest functional status level. The Rotator Cuff Quality-of-Life measure (RC-QOL) was developed at the University of Calgary Sport Medicine Centre [12]. This measure consists of 34 items, representing five domains; 1) symptoms and physical complaints, 2) recreational activities, sports participation or competition, 3) work-related concerns, 4) lifestyle issues, and 5) social and emotional issues. Each item of the RC-QOL is scored with a 100-point visual analogue scale. The sum of all 34 items is divided by 34 to produce a total score out of 100. Questions that are not applicable do not need to be answered and will not be taken into account in the corresponding domains. Total final RC-QOL scores can therefore vary from 0, the highest functional status level, to 100, the lowest functional status level. The Upper Extremity Functional Index (UEFI) consists of 20 questions. Total score can vary from 0, the lowest functional status level, to 80, the highest functional status categorizing activities from no difficulty to extreme difficulty [8]. The American Shoulder and Elbow Surgeons (ASES) score was developed by the American Shoulder and Elbow Surgeons Committee for use in all types of shoulder problems [9]. The ASES is a 100-point standardized self-report form, 50 points of which are derived from patient self-report of pain on a visual analog scale and 50 points of which are computed from a formula using the cumulative score of 10 activities of daily living derived using a four-point ordinal scale. The higher scores of the ASES reflect less pain and better function. The superiority of the UEFI and the ASES is their practicality of being administered in and scored under 5 min.
Analysis

Convergent validity examines the extent to which the outcome of interest agrees with the result of another measure that is believed to be assessing the same attribute. The cross-sectional convergent validity was evaluated by investigating the WORC and RC-QOL’s ability to correlate with one another and other commonly used subjective measures, the ASES scores UEFI at a “single point in time”; initial, interim and final visits. It was hypothesized that the disease specific measures would have a higher correlation with the joint-specific measure, ASES than with the UEFI, which examines the entire upper extremity. In addition, it was hypothesized that the relevant domains of the WORC and RC-QOL would have a marked (r>0.60) or high degree (r >0.80) of correlation according to Hinkel et al’s [21] classification system. The following domains of the WORC were examined against the sections of the RC-QOL respectively: “physical symptoms” with “symptoms and physical complaints”, “work” with “work-related concerns”, “sports and recreation” with “recreational activities, sports participation or competition”, “life style” with “life style issues”, and “emotions” with “social and emotional issues”. The association between the total scores of all measures and the corresponding domains/sections of the WORC and RC-QOL was examined by the Pearson’s Correlation Coefficient.

As a measure of longitudinal construct validity, the standardized response mean (SRM) was calculated for all measures. The standardized response mean was calculated as the mean change scores divided by the standard deviation of the change scores. It was hypothesized that the WORC and RC-QOL would have a higher SRM due to their comprehensive nature and focus on impact of the disease.

Results

Forty-one patients (25 – 82, mean age: 57, SD:16, 23 females and 18 males) were included in the study and 123 scores were obtained for the WORC and RC-QOL at three time points. Twelve patients received conservative treatment and 29 had post-operative rehabilitation. Out of 29 surgical patients, 18 patients had acromioplasty and 12 had rotator cuff repair. One patient had both surgeries. The affected side was the
right in 27 patients and left in 12 patients. Three patients had bilateral problems in which the worst or the operated side was included in the study. The total scores of the scores correlated highly at a 0.01 level at all time points (Table 1). The correlations between the domains were all significant at 0.01 level at all time points except for the pre-operative physical symptoms (-.0391 at 0.05 level) (Table 2). Both WORC and the RC-QOL had a higher correlation with the ASES than with the UEFI (Table 1). The SRM obtained for the UEFI was the highest (1.54) with ASES being the lowest (1.42). The SRM was 1.43 and 1.44 for the RCQOL and WORC respectively (Table 3).

Discussion

This study suggests that 2 different rotator cuff QOL scales are highly concordant and display similar responsiveness in assessing change over time in patients suffering from rotator cuff problems. Alternatively, while shorter shoulder-specific or upper extremity-specific scales were less strongly correlated to the disease-specific measure, they also displayed similar responsiveness in detecting clinical change over time. The exponential growth of quality of life studies over the last three decades appears to be the cause of increased interest in rigorous evaluation of therapeutic interventions. Although recent evaluation of most disease or condition specific measures has failed to show a difference among total scores of the more lengthy measures and more generic ones [19, 20, 22], breaking down the domains may actually reveal some statistically significant differences between different subgroups of patients [23]. In the present study we examined the correlation between two self-report measures that are commonly used by the Canadian physical therapists or surgeons who are involved in multicentre trials. The goal was to explore if the measures were consistent in terms of documenting QOL in corresponding domains of life and the results confirmed that both measures are valid for use in patients with rotator cuff pathology. Analysis of our first hypothesis confirmed a higher correlation between a shoulder joint measure than with a limb specific measure (Table1). The second hypothesis was also proved to be true except for one case. Although statistically significant, the correlation between the domains of the physical symptoms between the two measures was considered low at
(r=0.39) at the initial visit. Interestingly, this increased to .071 and 0.83 at the follow-up visits. All other domains showed statistically significant correlations with one another at all points. The explanation for this inconsistency may be in the number of questions in section A of the RC-QOL (16 vs. 6) which encompass fairly strenuous activities such as mopping floor, vacuuming the rug, scrubbing pots/pans, cleaning bathtub/toilet, carrying a heavy briefcase or small suitcase and raking the lawn or shovelling snow. These activities are expected to be significantly affected in patients in acute post-operative phase. Our third hypothesis was not supported in that the disease-specific measures did not demonstrate greater responsiveness. However, the clinical importance of small differences needs to be further investigated.

High correlation of the disease-specific measures with much shorter self-report measures such as ASES and the UEFI may suggest a clinical advantage of the shorter measures as the respondent and clinician burden are lessened. It may be that because shoulder symptoms are such a predominant feature of the person’s quality of life [18], that shorter instruments that focus on shoulder/arm pain and disability may capture the overall impact of the disease. Overlapping of pain and disability as perceived by the patients has been reported in different populations [24,25] and may affect the structure and dimensionality of the questions and domains of the measures that did not have factor analysis as a part of initial validity analysis. Therefore, additional studies are needed to examine the role of the information that each domain of disease-specific measures provides to investigators. For example, it has not been explored to what extent these subscales might be used for prognosis or treatment planning. Additionally, rigorous factor and Rasch analysis of the WORC and RC-QOL or a new merged measure, may provide further insight into dimensionality and structure of the domains and produce a shorter version that is more suitable for busy clinical settings. Our results are preliminary given our sample size. Our own previous work [19, 20, 25] and that published by others [22] suggest that the role for disease-specific shoulder instruments needs to be evaluated.
Conclusions

Based on the results of this study, the WORC and RC-QOL total scores and sub-scores of the relevant domains could be used interchangeably as they relay the same information and document change correspondingly. Responsiveness was very closely matched across all 4 scales, with the UEFI having the highest sensitivity, indicating that the total scores of the disease-specific measures are not necessarily more sensitive to detecting change.
Competing interests
The authors have no competing interests.

Authors' contributions
HR proposed the study, developed the research protocol, managed the database, analysed the data, and wrote the first draft of the paper. AB, VV, and HR were involved in the grant proposal writing and patient recruitment. JM provided input on analysis and content of the first draft. All authors were involved in the preparation of the manuscript, and read and approved the final version.

Acknowledgements
This study was funded by the research funds of the Practice Based Research (PBR), Sunnybrook and Women’s College Health Sciences Centre. Joy MacDermid holds a New Investigator Award from the Canadian Institute for Health Research.

The authors wish to thank Terry Leeke, data management consultant at the Research Facilitation Office of the Centre for Research In Women’s Health for development of the PBR database, from which data for this study were extracted. We acknowledge Niki Travers, Dianne Penny, and Griffith Mercer for their input in the grant proposal writing.
<table>
<thead>
<tr>
<th></th>
<th>WORC</th>
<th>RCQOL</th>
<th>UEFI</th>
<th>ASES</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>WORC:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Initial</td>
<td>.790(**)</td>
<td>.670(**)</td>
<td>.835(**)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Sig. (2-tailed)</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
</tr>
<tr>
<td></td>
<td>N</td>
<td>41</td>
<td>40</td>
<td>40</td>
</tr>
<tr>
<td>Interim</td>
<td>.878(**)</td>
<td>.758(**)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Sig. (2-tailed)</td>
<td>.000</td>
<td>.000</td>
<td></td>
</tr>
<tr>
<td></td>
<td>N</td>
<td>41</td>
<td>41</td>
<td></td>
</tr>
<tr>
<td>Final</td>
<td>.907(**)</td>
<td>.721(**)</td>
<td>.809(**)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Sig. (2-tailed)</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
</tr>
<tr>
<td></td>
<td>N</td>
<td>40</td>
<td>39</td>
<td>41</td>
</tr>
<tr>
<td><strong>RCQOL:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Initial</td>
<td>.790(**)</td>
<td>.694(**)</td>
<td>.727(**)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Sig. (2-tailed)</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
</tr>
<tr>
<td></td>
<td>N</td>
<td>41</td>
<td>40</td>
<td>40</td>
</tr>
<tr>
<td>Interim</td>
<td>.878(**)</td>
<td></td>
<td>.822(**)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Sig. (2-tailed)</td>
<td>.000</td>
<td>.000</td>
<td></td>
</tr>
<tr>
<td></td>
<td>N</td>
<td>41</td>
<td>41</td>
<td></td>
</tr>
<tr>
<td>Final</td>
<td>.907(**)</td>
<td>.622(**)</td>
<td>.656(**)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Sig. (2-tailed)</td>
<td>.000</td>
<td>.001</td>
<td>.000</td>
</tr>
<tr>
<td></td>
<td>N</td>
<td>40</td>
<td>38</td>
<td>40</td>
</tr>
</tbody>
</table>

** Correlation is significant at the 0.01 level (2-tailed).
### Table 2: correlations between domains of RCQOL and WORC

<table>
<thead>
<tr>
<th></th>
<th>WORC PS</th>
<th>WORC W</th>
<th>WORC S</th>
<th>WORC L</th>
<th>WORC E</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>RCQOL (A)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Initial</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pearson</td>
<td>-.391*</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Correlation</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sig. (2-tailed)</td>
<td>.001</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>N</td>
<td>41</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Final</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pearson</td>
<td>-.830**</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Correlation</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sig. (2-tailed)</td>
<td>.000</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>N</td>
<td>40</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>RC-QOL (B)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Initial</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pearson</td>
<td>-.783**</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Correlation</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sig. (2-tailed)</td>
<td>.000</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>N</td>
<td>30</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Final</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pearson</td>
<td>-.851**</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Correlation</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sig. (2-tailed)</td>
<td>.000</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>N</td>
<td>30</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>RC-QOL (C)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Initial</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pearson</td>
<td>-.759**</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Correlation</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sig. (2-tailed)</td>
<td>.000</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>N</td>
<td>25</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Final</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pearson</td>
<td>-.673**</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Correlation</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sig. (2-tailed)</td>
<td>.000</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>N</td>
<td>25</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>RC-QOL (D)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Initial</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pearson</td>
<td>-.745**</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Correlation</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sig. (2-tailed)</td>
<td>.000</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>N</td>
<td>39</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Final</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pearson</td>
<td>-.669**</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Correlation</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sig. (2-tailed)</td>
<td>.000</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>N</td>
<td>40</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>RC-QOL (E)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Initial</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pearson</td>
<td>-.657**</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Correlation</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sig. (2-tailed)</td>
<td>.000</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>N</td>
<td>40</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Final</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pearson</td>
<td>-.760**</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Correlation</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sig. (2-tailed)</td>
<td>.000</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>N</td>
<td>40</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

** Correlation is significant at the 0.01 level (2-tailed).
* Correlation is significant at the 0.05 level (2-tailed).

Table 3: Descriptive statistics related to mean change and standard deviation of change

<table>
<thead>
<tr>
<th></th>
<th>Mean Change</th>
<th>SD of Change</th>
<th>SRM</th>
</tr>
</thead>
<tbody>
<tr>
<td>UEFI</td>
<td>30.526</td>
<td>19.801</td>
<td>1.54</td>
</tr>
<tr>
<td>WORC</td>
<td>28.487</td>
<td>19.739</td>
<td>1.44</td>
</tr>
<tr>
<td>RC-QOL</td>
<td>30.625</td>
<td>21.344</td>
<td>1.43</td>
</tr>
<tr>
<td>ASES</td>
<td>28.552</td>
<td>20.101</td>
<td>1.42</td>
</tr>
</tbody>
</table>
Reference List


