Reliability of the Canadian Occupational Performance Measure in Patients with Ankylosing Spondylitis

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ABSTRACT. ***Objective.*** The Canadian Occupational Performance Measure (COPM) is a client-centered measure, designed to detect changes in occupational performance over time. The main aim of our study was to examine the test-retest reliability of the Norwegian version of the COPM in patients with ankylosing spondylitis (AS) in 3 different retest modes of data collection.

Methods. A total of 119 patients with AS completed the baseline COPM interview before randomization into one of 3 modes of retest data collection performed 2 weeks later: by personal interview, telephone interview, or mailed questionnaire. Scores were computed for Performance and Satisfaction, and the 2 sets of scores were examined for reliability by intraclass correlations (ICC), and by the Bland-Altman procedure for calculation of smallest detectable difference (SDD).

Results. The ICC coefficients for Performance and Satisfaction were as follows: 0.92 and 0.93 (rescoring by personal interview), 0.73 and 0.73 (rescoring by telephone interview), and 0.90 and 0.90 (rescoring by mail). SDD for the Performance and Satisfaction scores were 1.47 and 1.80, respectively, for rescoring by personal interview; 3.14 and 4.00 for rescoring by telephone interview; and 2.20 and 2.41 for rescoring by mailed survey.

Conclusion. The results confirm that the COPM is a reliable instrument for use in clinical practice in patients with AS, and may serve as an instrument to promote a patient-centered approach in the planning and evaluation of rehabilitation programs. Mailed questionnaires may replace personal interview in followup examinations, while rescoring by telephone interview is less reliable. (J Rheumatol 2005;32:1503–9)

Key Indexing Terms:
OUTCOME RELIABILITY REHABILITATION
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The focus in rehabilitation is moving from emphasis on normalization and functional improvement to greater awareness of activity, participation, and fulfilment of life roles[1-3]. At the same time, the importance of including patient perspective in both the rehabilitation process and the research agenda has gained widespread recognition[4,5]. The demand to develop an evidence-based practice actualizes the need for models, methods, and instruments that capture and integrate these elements[6].

The Canadian Occupational Performance Measure (COPM) is an individualized instrument developed to describe and measure both the qualitative and quantitative aspects of occupational performance, life roles, environment, and the needs of the individual[2,7,8]. The COPM is theoretically based on the Canadian Model of Occupational Performance[9], in which occupational performance is defined as "consisting of self-care, productivity, and leisure; being influenced by the environment, one's social roles, and one's developmental level; being client-defined; and consisting of both a performance (objective) dimension and a satisfaction (subjective) dimension"[10]. Since its introduction the COPM has been used frequently as an outcome measure in rehabilitation of persons with chronic conditions, among them patients with rheumatic diseases[11-13].

Ankylosing spondylitis (AS) is a progressive rheumatic inflammatory disease, usually starting in early adulthood[14]. The disease process results in various degrees of impairment due to changes in the axial skeleton, stiffness, pain, and fatigue. This in turn may lead to activity limitation, such as difficulty performing self-care activities, and reduced participation in work and leisure time activities[15].

The OMERACT Filter for Outcome Measures in Rheumatology recommends that all outcome measures be evaluated according to the criteria of truth, discrimination, and feasibility[16]. The psychometric properties of the COPM

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have been established in many groups of patients, among them patients with chronic pain[13], disabled individuals living in the community[10], and adults with stroke or orthopedic disabilities[17]. Validation studies have also been performed in rheumatic diseases[18-20].

Several studies of feasibility report that patients and therapists in general find the administration of COPM easy. The interview and scoring process seems to identify a wide range of problems, which again may serve as a basis for establishing targeted outcomes, planning further intervention, and evaluating the outcome of treatment or rehabilitation[10,13,19,21-23].

The Norwegian version of the COPM has been tested for validity, responsiveness, and feasibility in a group of patients with osteoarthritis[24]. The study concludes that the COPM is a valid and responsive instrument for use in clinical practice. However, one-third of patients reported problems related to the scoring procedure. The most frequent reason given was that patients were not used to quantifying their situation and found scoring difficult given their fluctuating condition.

Since the COPM is designed also for evaluation in longitudinal studies, it is important to examine the test-retest reliability of the instrument[25]. In previous studies, retest reliability of rescoring by personal interview has been tested, with acceptable results[26-28]. However, as long travel distances and limited time and resources often are barriers to outcome evaluation and followup, the possibility of performing rescoring by telephone interview or by mail may increase the feasibility of the instrument.

The main aim of our study was to test the Norwegian version of the COPM for reliability in 3 retest situations: personal interview, telephone interview, and mailed questionnaire; retest followed on an initial baseline interview in a group of patients with AS. Further, we examined whether reliability was influenced by age and perceived scoring problems.

MATERIALS AND METHODS

Design. This study is part of a larger cross-sectional study aimed at describing functional consequences of AS and has been approved by the Regional Ethical Committee for Medical Research. Baseline data collection included registration of demographic data, comprehensive clinical examination by a physiotherapist, completion of several self-reported health status questionnaires, and COPM interview and scoring. An occupational therapist (IK) performed initial COPM interviews, addressing activity limitations and participation restrictions as perceived by the patients during the previous year. Following the interview, patients were asked to participate in testing reliability of the COPM by rescoring their prioritized problems 2 weeks later. Those consenting were immediately randomized into one of 3 groups for rescoring: by personal interview, telephone interview, or mail. The randomization was computer generated and stratified by sex; after obtaining informed consent, a sealed, opaque and numbered envelope containing the allocation of the patient was opened, and an appointment for rescoring was scheduled.

The second data collection comprised rescoring of the COPM, as well as a question concerning disease activity and one regarding perceived problems in the scoring procedure. The telephone interview was structured in the same way as the personal interview. Patients in the mail group received an envelope containing a written form on which the prioritized occupational problems were listed along with two 10-point scoring scales, a form with the 2 additional questions, and a preaddressed envelope for returning the forms. At the time of rescoring neither patients nor therapist had access to the baseline scores. The same assessor (IK) carried out all retest interviews, including telephone interviews.

Sample. Participants in the cross-sectional study were patients with AS according to New York classification criteria[29,30] recruited from a register from the Department of Rheumatology, Diakonhjemmet Hospital, Oslo. To be included in the reliability study, patients had to consent to participate and be able to perform rescoring of the COPM 2 weeks after the initial interview. Participants with no described or prioritized occupational performance problems in COPM and those with cognitive deficits affecting the interview or scoring process were excluded from the reliability study.

Instruments. The administration of the COPM is a stepwise procedure, starting with an interview where patients define their occupational performance problems within 3 areas of self-care, productivity, and leisure[7]. When the item list is completed, patients are asked to rate the importance of being able to perform the activities, by rating each problem for Importance on a scale from 1 (not important at all) to 10 (extremely important). Finally, patients rate the most important activities (up to 5) for Performance and Satisfaction with Performance on scales of 1 (not able to do, not satisfied at all) to 10 (able to do extremely well, extremely satisfied). Total Performance score and Satisfaction score are calculated by dividing the sum of the scores by the number of reported important activities. Change in Performance and Satisfaction scores may be measured by rescoring of the prioritized problems after an agreed period of time. According to the manual, a change of 2 or more is regarded as a clinically important change[7].

Problems related to scoring of the COPM were recorded after rescoring, by asking the patient how they experienced the scoring procedure and marking this on a 5-point scale ranging from very difficult to very easy.

Self-reported disease activity at baseline was recorded using the Bath Ankylosing Spondylitis Disease Activity Index (BASDAI)[31]. In the BASDAI the patient rates fatigue, spinal pain, joint pain, localized tenderness, morning stiffness, and duration of stiffness on six 10 cm visual analog scales (VAS) ranging from 0 (no problem) to 10 (severe problem). The mean score of the 6 scales is applied as an estimate of disease activity.

At the time of rescoring, perceived change in disease activity was recorded by asking patients to compare their current state to how they felt 2 weeks ago and to mark on a 5-point scale whether the disease had become much worse, slightly worse, unchanged, slightly better, or much better.

Functional ability was assessed using the Bath Ankylosing Spondylitis Functional Index (BASFI)[32,33]. BASFI consists of 8 specific questions regarding function, and 2 questions reflecting the patient's ability to cope with everyday life. The patients mark their ability to perform each activity on a VAS scale, and the mean score of the 10 items constitutes the final score.

Spinal and hip mobility was assessed by the Bath Ankylosing Spondylitis Metrology Index (BASMI)[34,35]. BASMI consists of 5 clinical measurements of spinal and hip mobility: cervical rotation, tragus-to-wall distance, lumbar and lateral flexion, and intermalleolar distance. The ratings are classified in categories from 0 (mild disease involvement) to 2 (severe disease involvement). The final BASMI score is the sum of the scores given for each measurement, and range between 0 and 10.

Data analysis and statistics. Independent samples t test, one-way analysis of variance, or chi-square analyses were used to test for differences between groups at baseline. The problems described and prioritized during initial COPM interviews were grouped and categorized according to occupational issues and visualized in a bar graph.

As recommended by Juniper, *et al*, intraclass correlations (ICC) were used to analyze test-retest reliability[36]. An ICC coefficient above 0.70 was

considered the minimum acceptable level of reliability, while coefficients above 0.90 were considered excellent[37,38]. To further examine the reproducibility of the COPM, Bland and Altman plots were used to provide a visual representation of the distribution of differences in Performance and Satisfaction scores, respectively, related to the mean score of test and retest values.

The smallest detectable difference (SDD) was assessed by examining limits of agreement of repeated measures, computed as ± 1.96 SD of the difference between baseline scores and retest scores for each mode of rescoring[39]. The results from patients who reported change in disease activity between baseline and rescoring were excluded from the analysis of test-retest reliability and SDD.

Pearson's correlation was used to examine associations between age, scoring problems, and mean differences in Performance and Satisfaction.

For statistical analysis, SPSS for Windows (version 11.0) was used. All p values below 0.05 were considered to be significant.

RESULTS

Sample. Of the 283 persons invited to participate in the larger cross-sectional study, 152 participants consented and attended the initial examination. Out of these, 5 were not able to perform rescoring due to traveling or hospitalization, 7 did not want to participate in the retesting, and 21 participants were excluded because they did not experience any occupational performance problems. The demographics and disease characteristics of the participants are presented in Table 1. Compared to the 119 participants in the test sample, the proportion of men was significantly higher among the 33 nonparticipants, self-rated disease activity was lower, functional ability was better, and a greater proportion was working.

The 119 final participants listed a total of 1495 occupational performance problems in the COPM interviews, and prioritized 569 of these (Figure 1). The most frequently prioritized problems were related to exercise and sports, sleeping, indoor mobility, and socializing. Of the total test group, 40 were randomized to rescoring by personal interview (personal group), 40 to rescoring by telephone interview (telephone group), and 39 to rescoring by mail (mail group). There were no significant differences at baseline between the 3 rescoring groups for demographic and disease characteristics (Table 1).

Of the 7 participants (6%) who did not complete reassessment by COPM, 6 were in the personal interview group and one in the mail group. Of the 112 participants who performed rescoring, 2 reported their condition as "much worse" compared to how they felt at the time of the initial interview, 21 as "slightly worse," 66 as "unchanged," 16 as "slightly better," and 7 as "much better." Of the 66 participants eligible for test-retest reliability analyses, 17 were in the personal interview group, 25 in the telephone group, and 24 in the mail group.

Reliability. The results of test-retest reliability are presented in Table 2 and in Figures 2 and 3. The ICC coefficients were excellent for rescoring by mail and personal interview.

The Bland-Altman plots (Figures 2 and 3) visualize that the differences between the initial scores and the rescores along the vertical axis were most widely distributed in the telephone group, while the values for the personal group all were within the broken lines, which indicates a clinically important difference as suggested in the COPM manual (score 2)[7]. There does not seem to be any relationship between the magnitude of the scores and the differences between test and retest scores, as the scores seem to distribute along the whole range of possible values at the horizontal axis for both the Performance and the Satisfaction scores.

Depending on the mode of rescoring, the smallest detectable difference varied from 1.5 to 3.1 for Performance, and 1.8 to 4.0 for Satisfaction (Table 2).

Regarding difficulties concerning the scoring procedure, a total of 39 participants reported such problems, 12 in the personal interview group, 13 in the telephone interview group, and 14 in the mail group.

Correlation coefficients between scoring problems and change in Performance and change in Satisfaction were 0.08 (p = 0.40), and 0.10 (p = 0.29), respectively. Correlation coefficient between age and perceived scoring problems was 0.08 (p = 0.42). There was no statistically significant correlation between age and change in Satisfaction (r = 0.16, p = 0.09). However, there was a positive statistically signif-

Table 1. Characteristics of patients. Values are means (SD) and percentages.

	Participants, n = 119	Nonparticipants, n = 33	p*	Rescoring by Personal Interview, n = 40	Rescoring by Telephone, n = 40	Rescoring by Mail, n = 39	p**
Males, %	53	77	0.01	52.5	50.0	53.8	0.94
Age, yrs	47.3 (12.8)	45.4 (14.0)	0.49	46.4 (12.8)	48.7 (13.3)	46.6 (12.5)	0.67
Disease duration, yrs	15.2 (12.0)	15.4 (13.5)	0.92	13.4 (10.5)	16.3 (14.5)	15.6 (10.6)	0.54
Comorbidity, %	43	36	0.34	35.1	50.0	43.2	0.43
Living alone, %	46	48	0.93	58.3	37.8	41.0	0.17
Still working, %	71	88	0.03	65.7	71.1	76.9	0.57
Disease activity, BASDAI	48.9 (22.0)	30.2 (22.5)	0.01	51.2 (18.8)	47.6 (20.1)	47.5 (25.9)	0.77
Spinal mobility, BASMI	2.7 (2.6)	2.5 (2.5)	0.58	2.5 (2.4)	3.1 (2.8)	2.8 (2.7)	0.69
Physical function, BASFI	36.6 (24.2)	14.6 (17.4)	0.01	35.0 (24.2)	36.8 (21.34)	37.3 (26.0)	0.84

* Difference between participants and nonparticipants (independent samples t test for means and chi-square for proportions). ** Difference between rescoring groups (ANOVA for means and chi-square for proportions).

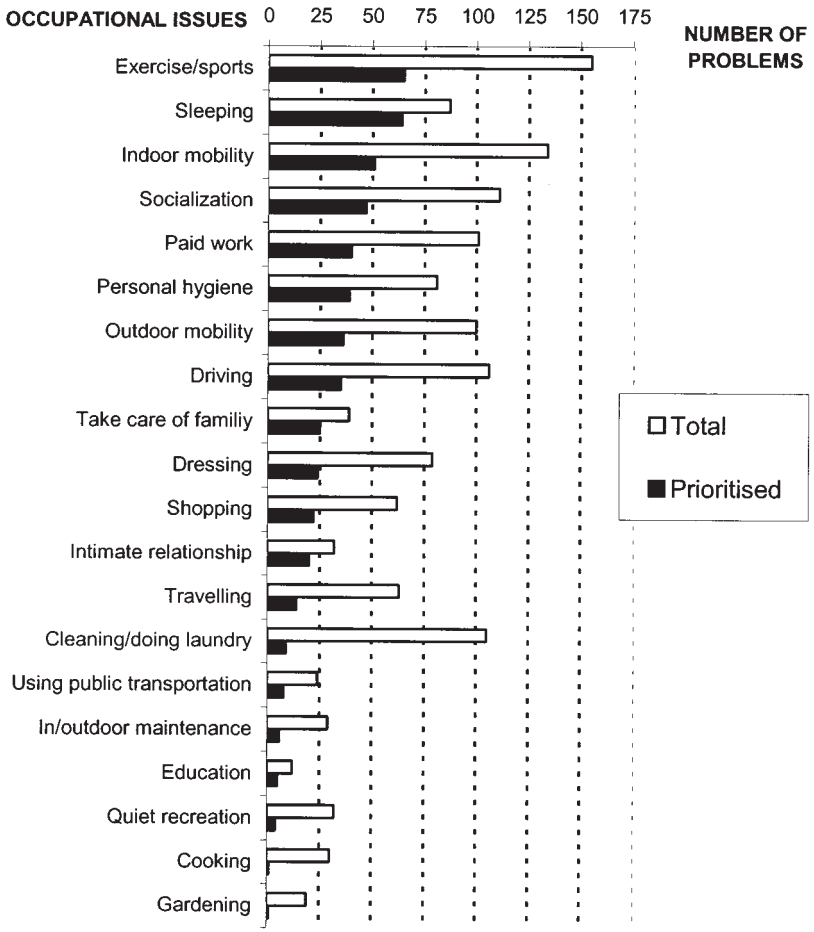

Figure 1. Total number of described and prioritized problems reported by patients in COPM interviews (n = 119), categorized in occupational issues and displayed in rank order from most often to least often prioritized.

Table 2. Initial scores, change score, test-retest correlations, and smallest detectable difference (SDD), in the 3 modes of rescoring (including limits of agreement). Values are means (standard deviations).

	Baseline	Change	ICC	95% CI of ICC	SDD* Limits of Agreement	SDD*
Performance scale						
Personal interview (n = 17)	5.91 (1.91)	–0.35 (0.75)	0.92	0.78, 0.97	–1.82, 1.12	1.47
Telephone interview (n = 25)	5.78 (2.20)	0.62 (1.6)	0.73	0.47, 0.87	–2.52, 3.76	3.14
Mail (n = 24)	4.88 (2.56)	0.21 (1.12)	0.90	0.78, 0.96	–1.99, 2.41	2.20
Difference between groups, p**	0.26					
Satisfaction scale						
Personal interview (n = 17)	5.30 (2.44)	0.18 (0.92)	0.93	0.83, 0.98	–1.62, 1.98	1.80
Telephone (n = 25)	4.53 (2.68)	0.17 (2.03)	0.73	0.48, 0.87	–3.81, 4.15	3.98
Mail (n = 24)	4.15 (2.81)	–0.15 (1.23)	0.90	0.79, 0.96	–2.56, 2.26	2.41
Difference between groups, p**	0.40					

* SDD were computed as 1.96 SD of the difference between baseline scores and retest scores. ** Differences between groups at baseline, independent sample t test.

icant correlation between higher age and change in Performance (r = 0.22, p = 0.02).

DISCUSSION

This study confirms that COPM is a reliable instrument for measuring occupational performance and satisfaction with performance in patients with AS. In analysis of test-retest reliability, an ICC coefficient above 0.90 is considered as excellent. The ICC coefficients for rescoring by personal interview and by mail both reached this level, a

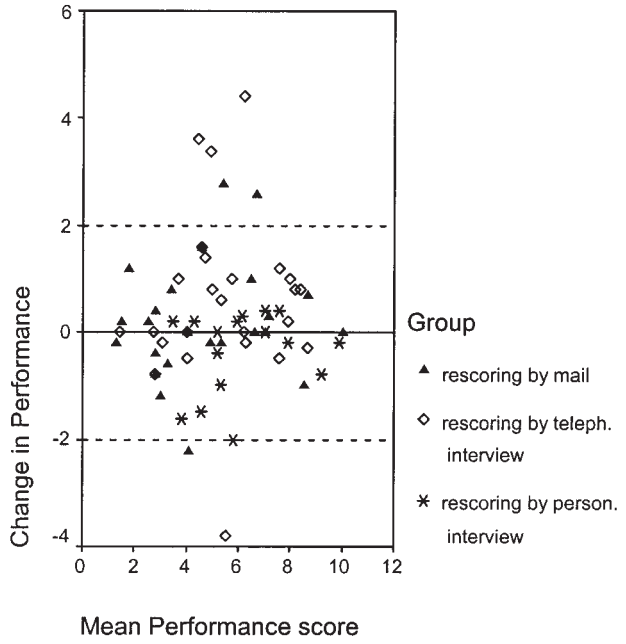

Figure 2. Change in Performance score vs mean Performance score (P1+P2/2) for patients reporting stable disease in the 2-week test-retest period (n = 66). Broken lines indicate clinically important change suggested in the COPM manual.

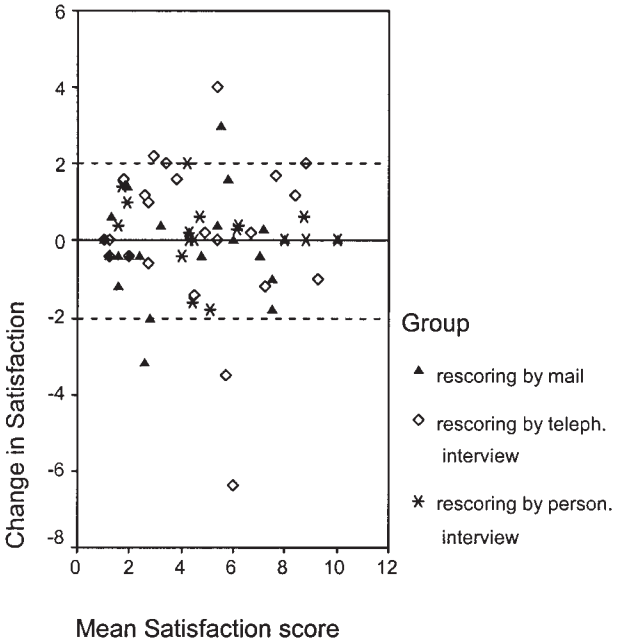

Figure 3. Change in Satisfaction score vs mean Satisfaction score (S1+S2/2) for patients reporting a stable disease in the 2-week test-retest period (n = 66). Broken lines indicate the clinically important change suggested in the COPM manual.

result that is consistent with findings from other studies[26,27].

As a consequence, followup may be easier to conduct in the future, as postal questionnaires appear to be a reliable substitute to rescoring by personal interview. This may improve the evaluation of interventions and the surveillance of patients in clinical practice; in turn, this may improve the quality of care to the individual.

Interestingly, test-retest reliability was weaker for rescoring by telephone than for the 2 other modes of rescoring. One reason for this may be the scoring procedure, in which patients are asked to compress complex phenomena such as occupational performance or satisfaction with performance into a single value. Access to written scoring scales could have made this process of abstraction easier, while the patients in the telephone group had to rely on their own imagination to visualize the scales. Another factor contributing to differences could be the rescoring situation. The patients who performed rescoring by personal interview or by mail had the opportunity to complete the task undisturbed. In contrast, rescoring by telephone, although prearranged, may have interrupted participants while they were busy, possibly influencing their concentration while performing the rescoring.

The dropout rate was highest among participants who performed rescoring by personal interview. One reason could be that motivation for contributing to research would need to be high in order for a participant to make the effort to come back in person, as there are no other rewards. If a patient is taking part in a rehabilitation program, perhaps the opportunity to provide feedback and, if necessary, continue rehabilitation would increase motivation for rescoring.

In our study there were no dropouts in the telephone group, and there was only one in the mail group. In a study evaluating post-discharge home-based occupational therapy, rescoring of the COPM was performed by postal questionnaire[40]. The authors claim that this way of rescoring has the advantage that the patients are not biased by the presence of the therapist. However, such written forms do not elicit additional important information that may be obtained in a personal interview. To combine a postal rescoring with a followup telephone interview might therefore be an alternative that merits testing, as this may spare both time and expense, possibly reducing the proportion of dropouts, while still allowing individual feedback and followup.

As visualized through the Bland-Altman plots, there does not seem to be any strong relationship between differences in test versus retest scores and levels of the scores. This indicates that the COPM is a reliable measure throughout the whole range of possible scores.

However, results of the calculation of SDD indicate that measurement error varies with the mode of rescoring. Although the least detectable difference lies within the estimate of 2 points when rescoring is performed as a personal interview, the measurement error connected to rescoring by mail or telephone interview clearly exceeded 2 points, with rescoring by telephone the least reliable mode. If possible, rescoring should be performed by a personal interview or by

a mailed survey. This finding may also be important to take into account when calculating sample sizes in future studies, or when interpreting results from studies where COPM is used as an outcome measure.

Most outcome measures used in rehabilitation have predefined items. In contrast, the problem list in COPM is generated by the individual patient. In our study, examination of retest reliability was based on a numeric rescoring of the same activities. Another aspect of reliability is the stability of the individual patient's list of important occupational performance problems, identified during the baseline COPM interview. In a previous study, stroke patients defined 3 of 5 problems as the same when they were interviewed twice with a mean interval of 8 days[26]. Whether these differences reflect a true change in the patients' functional abilities and experiences, i.e., some problems may have resolved and others developed, or are connected to the reliability of the COPM, needs further evaluation and discussion.

Many authors argue that patient satisfaction should be included to a greater extent in outcome measures, as satisfaction assessments more completely reflect individual consequences of living with a chronic disease[40,41]. As in other studies, variability is greater in the Satisfaction scores than in the Performance scores[42]. This may indicate that performance of an activity depends more on the physical ability of the individual and thus is more stable over time, while satisfaction may be influenced by more subjective experiences such as pain and mood, and therefore is more fluctuating.

Regarding difficulties related to the scoring procedure, one-third of the participants experienced such problems, a finding also recognized in other studies[10,20,21,24,42-44]. Difficulties with numeric scoring procedures are common, and are known to increase with older age[45,46]. Yet the low correlations between COPM changes and scoring problems indicate that even though the numeric scoring may be experienced as difficult, this does not seem to have any negative influence on the test-retest reliability. The hypothesis of a relationship between age and scoring problems was not supported, although higher age does seem to have some negative influence on the test-retest reliability, as there was a small, but significant, positive correlation between age and test-retest difference in the Performance score. A limitation to this study was that the majority (88%) of participants were younger than 65 years. Such associations should therefore be further investigated in samples with greater variation in age.

The results of our study indicate that COPM is a reliable instrument for clinical practice in patients with AS. The test-retest reliability was excellent for rescoring by personal interview and by mail. Although one-third of the patients experienced the scoring procedure as difficult, this did not influence the reliability of the instrument. The study confirms that the COPM may serve as a valuable tool to promote a client-centered approach in the planning and evaluation of rehabilitation programs, and that a mailed form can replace a personal interview in the followup of patients.

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