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Relationship of global assessment of change to AUSCAN and pinch and grip strength among individuals with hand osteoarthritis[1]

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Summary

Objective: This study assessed the utility and construct validity of a new patient global assessment of symptom change for hand osteoarthritis (OA) by examining its associations with change over time in grip strength, pinch strength, and AUStralian CANadian Osteoarthritis Hand Index (AUSCAN).

Methods: Participants ($N = 531$, 80% female, mean age = 68) were part of a study on the Genetics of Generalized Osteoarthritis (GOGO) and completed two assessments (average 4 years apart). At the second assessment, participants described change in their right and left hand pain, aching, and stiffness on a 15-point scale with descriptors ranging from "Great deal worse" to "Great deal better". Linear regression models examined associations of global change scores with changes in hand strength and AUSCAN, controlling for age, gender, number of hand joints with OA, and time between assessments.

Results: Both right and left hand global assessment of change scores were significantly associated with change in AUSCAN, grip strength, and right hand pinch strength ($P < 0.05$), and approached significance for left hand pinch strength ($P = 0.06$). The strongest associations were between global change scores and AUSCAN change (right hand: $\beta = 0.29$, $P < 0.001$; left hand: $\beta = 0.27$, $P < 0.001$). Associations of change scores with grip and pinch strength were stronger among participants with greater radiographic OA severity at baseline.

Conclusion: Results support the validity of this new global assessment of symptom change. This measure is particularly useful for assessing change over time when no baseline data are available. Additional research should examine this measure's responsiveness in the context of clinical trials.

Key words: Osteoarthritis, Hand, Outcome assessment.

Introduction

Although the hand is commonly affected by osteoarthritis (OA)[1,2] there have been considerably fewer epidemiological studies and clinical treatment trials regarding hand OA compared to the number of studies in OA of the hip and knee[3]. In addition, there is a lack of standardized outcome assessments for studies involving hand OA[4]. The Osteoarthritis Research Society International (OARSI) and the Outcome Measures in Rheumatology Clinical Trials group (OMERACT) recommend including patient global assessment as a key outcome in OA trials[5,6]. Others have also specifically recommended patient global assessment as a key outcome in the context of hand OA[7,8]. While clinical tests are important objective measures, it is also important to incorporate patients' perceptions of their OA symptoms, as well as changes in those symptoms.

Some OA studies, particularly clinical trials, have incorporated patient global assessments. However, these assessments are most often administered pre- and post-treatment and a change score calculated, similar to other scales[3,9]. Fewer OA studies have utilized measures that examine participants' perceived response to treatment or change in symptoms over time[10,11]. Furthermore, there is currently no validated patient global assessment of change measure for hand OA. This type of measure would have utility in the context of clinical trials, epidemiological studies, and clinical settings. The objective of this study was to examine a new

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measure of patient global assessment of change in symptoms in the context of a longitudinal study of familial hand OA. Specifically, we examined the construct validity of this measure by examining relationships of participants' perceived change in symptoms with changes in grip strength, pinch strength, and the AUStralian CANadian Osteoarthritis Hand Index (AUSCAN)[12,13].

Methods

SUBJECTS

All participants were enrolled in the Genetics of Generalized Osteoarthritis (GOGO) study. The primary objective of GOGO is to identify OA susceptibility genes through genotyping and linkage analysis of OA affected sibling pairs. GOGO involves a consortium of seven clinical research sites in the United States and United Kingdom[14,15]. Participants included in this analysis were from two GOGO sites: Duke University and the University of North Carolina at Chapel Hill.

All families recruited for the GOGO study had at least two siblings with bilateral hand OA defined as bony enlargement of at least one distal interphalangeal (DIP) joint, and bony enlargement of two or more other interphalangeal joints or carpometacarpal (CMC) joints. For these analyses, we also required participants to have radiographic evidence of Kellgren Lawrence (KL)[16] grade $\geq$2 OA in at least one DIP joint. We used this criterion because bony involvement of a DIP joint is a component of the American College of Rheumatology criteria for hand OA[17], and a single Heberden's node has been shown to be strongly inherited in a previous twin study[18]. All radiographs were read by a single reader (JBR). Participants were excluded if they had self-reported or x-ray evidence of arthritis from rheumatoid arthritis, systemic lupus erythematosis, psoriasis, or gout of the hands, hips or knees. Among 877 GOGO participants who met criteria for these analyses at baseline, 531 (61%) completed follow-up assessments. The average time between baseline and follow-up assessments was 4.1 years (SD = 1.1 years, range = 1.4–6.9 years).

AUSCAN

The AUSCAN is a 15-item scale measuring pain (5 items), stiffness (1 item) and function (9 items) during the preceding 48 h. All items are rated on a scale of 1 (none) to 5 (extreme), so that higher scores indicate worse symptoms and function. The AUSCAN was developed through an interactive process involving expert opinion from health care providers (rheumatologists, physiotherapists, and orthopedic surgeons) and interviews with patients. Items retained for this scale were those that had a prevalence >60% in the sample population and a mean importance rating >2.0 (on a scale of 1–5). Internal consistency of the subscales was excellent (Cronbach's alpha = 0.90–0.98). Test–retest reliability was also acceptable for each of the subscales (intraclass correlation coefficient = 0.70–0.86). Construct validity was confirmed against a variety of measures, including the Dreiser Index[19,20].

GRIP AND PINCH STRENGTH

Strength measures were performed on both hands. Grip strength was measured with a Jamar Hydraulic Hand Dynamometer (reported in kilograms), and pinch strength was measured with a Jamar Hydraulic Pinch Gauge (Bolingbrook, IL) (also reported in kilograms). One site (UNC) conducted three trials for grip and pinch strength measurements, and an average of the three trials was calculated. The other site (Duke) conducted one trial for each measure. There were no differences in mean grip strength measures between the sites, and results of study analyses did not differ between sites.

GLOBAL ASSESSMENT OF CHANGE QUESTIONS

At the follow-up visit, all participants were asked, ''Overall, has there been any change in your LEFT/RIGHT HAND symptoms (pain, aching or stiffness) since your last GOGO evaluation?'' This question was asked separately for right and left hands. Possible responses were: Worse, About the same, Better, and No symptoms at the first GOGO visit and still no symptoms. Participants who chose ''Worse'' were asked to describe how much worse, using the following seven options: Almost the same – hardly any worse at all; A little worse; Somewhat worse; Moderately worse; A good deal worse; A great deal worse; and A very great deal worse. Similarly, participants who chose ''Better'' were asked to describe how much better, using the same categories as for ''Worse'' but substituting the adjective ''Better''. These questions were patterned after a global assessment of change scale for assessing shortness of breath[21]. All participants who indicated their symptoms had not changed (in the first question) were given a score of 0. Participants who had worse symptoms were given a score between 1 and 7, based on the seven categories for the degree of worsening listed above. Participants whose symptoms were better were given a score of -1 to -7, based on the categories listed above. Therefore this change score encompassed 15 levels and ranged from -7 to $+7$ (including 0), with higher scores indicating worse symptoms and function.

STATISTICAL ANALYSES

First, we used analysis of variance (ANOVA) to examine differences in the mean change (between baseline and follow-up) in AUSCAN, grip strength, and pinch strength according to self-reported change category (''Same'', ''Worse'', or ''Never had symptoms''; the ''Better'' category was omitted from this analysis because of the small number of participants, $N = 13$, who chose this response). Distributions of AUSCAN, grip strength, and pinch strength change were inspected and did not appear to violate normality assumptions for use in ANOVA. We examined the overall significance level across categories for each of these variables, then we examined differences between each of the categories using Tukey's test for simple comparisons. These analyses were also adjusted for age, gender, total number of hand joints with KL $\geq$2 grade OA at baseline, and time between assessments. Next, we used linear regression models to examine relationships of self-reported change scores (-7 to $+7$) with the change in AUSCAN, grip strength, and pinch strength. These models also controlled for age, gender, number of hand joints with KL $\geq$2 grade OA, and time between assessments. We conducted separate regression models examining the relationship of self-reported change scores to AUSCAN and strength among men and women. These gender-specific models controlled for age, number of hand joints with KL $\geq$2 grade OA, and time between assessments. We were

also interested in assessing whether the performance of the global assessment of change questions differed according to overall baseline OA severity, as well as specific joint groups affected by OA. To examine overall radiographic severity, we conducted separate regression models according to the number of hand joints affected by OA (KL $\geq$2 grade) at baseline, using tertile categories (Tertile 1 = 1–7 joints, Tertile 2 = 8–15 joints, and Tertile 3 = 16–27 joints). We also conducted separate models for individuals with proximal interphalangeal (PIP) OA, metacarpophalangeal (MCP) OA, and CMC OA (at least one joint in the group with KL >2 grade OA). (All participants had DIP OA, so we did not conduct a separate analysis for this joint group.) All models stratified by radiographic severity and joint group controlled for age, gender, and time between assessments.

Results

The sample ($N = 531$) was 80% female and the mean age was 67.7 years (SD = 8.2). Eighty-five percent of the sample had PIP OA (77% right hand, 76% left hand), 27% had MCP OA (23% right hand, 16% left hand), and 53% had CMC OA (40% right hand, 47% left hand). Ninety-three percent of the sample were right-handed. When asked about the change in right hand symptoms, about half of participants indicated symptoms were Worse, 2.5% responded ''Better'', 36.5% responded ''Same'', and 12.2% ''Never had symptoms'' (Table I). For the left hand, a slightly lower proportion (43%) reported worsening symptoms and a slightly higher proportion (39.6%) reported ''Same'' symptoms. Women were more likely than men to report worsening symptoms (51% vs 42% for right hand, 46% vs 34% for left hand). For the total sample, the mean global assessment of change scores for the right and left hands were 1.7 and 1.4, respectively. This corresponds to a change between ''Almost the same'' and ''A little worse''. Global assessment of change scores was slightly higher for women than men, indicating women reported a greater degree of worsening in symptoms.

Among the total sample, there was an increase of about one point on the AUSCAN scale (which has a range of 15–75, with higher scores indicating worse symptoms; Table I) between assessments. The change in AUSCAN score was slightly higher for men than women. There were only small changes in both grip strength and pinch strength in the total sample (<1 kg), but these changes differed according to gender (Table I). Males had an average decrease in grip strength of 3.3 kg for both right and left hands, while women, on average, had a slight increase in grip strength.

For analyses examining mean changes in AUSCAN, grip strength, and pinch strength according to global assessment of change categories, we omitted the ''Better'' category because of the small number of participants who chose this category. There was an overall statistically significant difference in the mean AUSCAN change according to both right and left hand global assessment of change categories, controlling for age, gender, number of hand joints with OA, and time between assessments ($P < 0.001$; Table II). Participants reporting ''Worse'' symptoms had an increase in AUSCAN score over time, and those reporting ''Same'' symptoms had minimal change in AUSCAN. For both right and left hands, the AUSCAN change differed significantly between participants reporting ''Worse'' symptoms and those reporting ''Same'' symptoms or ''Never had symptoms'' ($P < 0.05$).

Table I
Baseline and follow-up values for global assessment of change, AUSCAN, and strength

	Total sample ($N = 531$)	Males ($N = 105$)	Females ($N = 426$)
Right hand global assessment of change			
Better (%)	2.5	1.0	2.8
Same (%)	36.5	41.0	35.5
Worse (%)	48.8	41.9	50.5
Never had symptoms (%)	12.2	16.1	11.3
Left hand global assessment of change			
Better (%)	3.4	1.0	4.0
Same (%)	39.6	46.7	37.8
Worse (%)	43.3	34.3	45.5
Never had symptoms (%)	13.8	18.1	12.7
	Mean (SD)		
Number of hand joints with OA	10.8 (5.7)	10.8 (5.7)	10.7 (6.0)
Right hand change score*	1.7 (2.3)	1.4 (1.9)	1.8 (2.4)
Left hand change score*	1.4 (2.3)	1.1 (1.7)	1.5 (2.4)
AUSCAN			
Baseline	34.0 (12.3)	29.7 (10.2)	35.0 (12.6)
Follow-up	35.3 (13.0)	31.4 (12.0)	36.2 (13.0)
Change	1.3 (10.4)	1.7 (10.5)	1.2 (10.4)
Right grip strength (kg)			
Baseline	50.0 (23.6)	79.3 (24.6)	43.2 (17.5)
Follow-up	50.0 (20.5)	75.1 (21.2)	43.3 (14.3)
Change	−0.4 (15.4)	−3.3 (18.7)	0.3 (14.4)
Left grip strength (kg)			
Baseline	46.9 (24.0)	79.6 (25.0)	39.6 (17.2)
Follow-up	47.5 (20.6)	73.4 (20.5)	40.6 (14.0)
Change	0.4 (16.3)	−3.3 (19.5)	1.3 (15.2)
Right pinch strength (kg)			
Baseline	12.3 (5.9)	16.3 (5.8)	11.3 (5.5)
Follow-up	12.0 (5.0)	16.5 (531)	10.8 (4.2)
Change	−0.4 (6.3)	−0.2 (6.3)	−0.4 (6.3)
Left pinch strength (kg)			
Baseline	12.0 (6.1)	16.1 (5.6)	11.0 (5.8)
Follow-up	11.4 (4.7)	16.6 (4.7)	10.0 (3.6)
Change	−0.7 (7.0)	1.2 (8.1)	−1.2 (6.5)

For AUSCAN, positive change score = worse. For strength, positive change score = better.

*Range = −7 (better) to +7 (worse).

There was an overall significant difference in grip strength change across right hand global assessment of change categories ($P < 0.001$) but not left hand categories ($P = 0.152$; Table II). For both hands, those reporting ''Worse'' symptoms had a decline in grip strength, whereas those reporting ''Same'' symptoms had an increase in grip strength. For the right hand, simple comparisons indicated that the change in grip strength differed significantly between those reporting ''Worse'' symptoms and those reporting ''Same'' symptoms ($P < 0.05$). For change in pinch strength, there was a significant difference according to left hand global assessment of change categories ($P = 0.020$), but the difference according to right hand categories did not reach statistical significance ($P = 0.084$). However, for both hands, those with ''Worse'' symptoms had a small decrease in pinch strength over time, and those with ''Same'' symptoms had a small increase in pinch strength. For the left hand, simple comparisons showed that the change in pinch strength differed significantly between those reporting ''Worse'' and ''Same'' symptoms ($P < 0.05$).

Table II
Changes in AUSCAN and strength values according to global assessment of change category

	Mean (SD)		
	AUSCAN change	Grip strength change	Pinch strength change
Right hand			
Same	−0.3 (9.1)	3.5 (15.1)	0.6 (6.8)
Worse	3.9 (10.6)	−3.7 (15.7)	−1.1 (6.2)
Never had symptoms	−3.9 (10.7)	−2.0 (11.6)	−0.6 (5.1)
Left hand			
Same	−0.4 (9.7)	2.3 (17.7)	1.3 (6.7)
Worse	4.3 (10.4)	−1.3 (16.5)	−0.3 (4.5)
Never had symptoms	−2.2 (10.6)	−0.4 (10.6)	2.0 (3.7)

Note: For AUSCAN, positive change score = worse. For strength, positive change score = better.

In adjusted regression models, both right and left hand global assessment of change scores (−7 to +7) were significantly associated with change in total AUSCAN score, grip strength, and right hand pinch strength, and approached significance for left hand pinch strength ($P = 0.06$; Table III). The associations were strongest for the change in AUSCAN score. There were significant associations of right and left hand global assessment of change scores with AUSCAN change for both men and women (Table IV). Associations of grip and pinch strength with change scores differed somewhat between men and women (Table IV). For men, there was a significant association of right hand global assessment of change score with right grip change but not left grip change. For women, there was a significant association for left hand grip change but not right hand grip change. The association between the global assessment of change score and right hand grip strength change among men ($\beta = -0.39$) was the largest of all relationships with right and left hand global assessment of change scores. Among women, there was a significant association between right hand pinch strength change and right hand global assessment of score, but there were no significant associations with pinch strength among men.

In models stratified according to the number of joints affected by OA at baseline, there were significant associations of right and left hand change scores with AUSCAN change for all three tertiles ($P < 0.05$, data not shown). However, there were differences among the groups with respect to grip and pinch change. For those in Tertile 1 (lowest number of joints affected by OA), there were no significant associations with right or left hand change scores with pinch or grip strength (Table V). For those in Tertile 2, the only significant association was between right hand change score and right hand grip strength change ($P < 0.05$). For those in Tertile 3, there were significant associations of change scores with all grip and pinch strength changes.

In models stratified according to joint group, there were significant associations of right and left hand change scores with AUSCAN change for participants with PIP OA and CMC OA ($P < 0.05$, data not shown). For MCP OA, there was a significant association between change score and AUSCAN change for the right hand but not the left hand ($\beta = -0.39$, $P = 0.218$). Similarly, there were significant associations of right and left hand change scores with grip strength change for participants with PIP and CMC OA, as well as for the right hand (but not the left hand) among those with MCP OA (Table VI). The strongest association between change score and grip strength change was among those with right MCP OA. For pinch strength, the only significant association with right and left hand change scores was among the group with PIP OA (Table VI).

Discussion

This study examined relationships of a new global assessment of symptom change for hand OA with changes in grip strength, pinch strength, and AUSCAN score. The study sample included individuals with familial hand OA who completed baseline and follow-up assessments approximately 4 years apart, on average. We observed relatively small changes over time in AUSCAN score and hand strength, and as a whole, the sample indicated at follow-up that their symptoms were between ''Almost the same'' and ''A little worse'' compared to the baseline visit. These results indicate that the global assessment of change measure provided a good reflection of the changes observed in the other measures across the entire sample.

Women in the sample were more likely than men to report that their symptoms were ''Worse'' since the baseline assessment. Women also had a slightly higher change score than men, indicating a greater magnitude of perceived worsening in symptoms. However, men had a greater increase in AUSCAN score and greater decline in grip strength than women. These results indicate there may be differences in the way men and women interpret and respond to this global assessment of change item. Men may be more reluctant than women to acknowledge an increase in symptoms over time[22]. There also may be differences in the way men and women recall prior symptoms, since this question asks individuals to compare current symptoms to those experienced at an earlier time point.

These analyses showed that for the full sample, the global assessment of change measure was significantly associated with the change in AUSCAN score, as well as grip and pinch strength. Although the sample as a whole displayed only small changes in AUSCAN and hand strength,

Table III
Relationships of global assessment of change scores with AUSCAN and strength change: results of regression models

	AUSCAN change			Grip strength change			Pinch strength change		
	b	β	*P*-value	*b*	β	*P*-value	*b*	β	*P*-value
Right change score	1.31	0.29	<0.001	−1.08	−0.16	0.003	−0.37	−0.13	0.022
Left change score	1.23	0.27	<0.001	−0.96	−0.13	0.015	−0.34	−0.11	0.060

Notes: b = non-standardized regression coefficient, and β = standardized coefficient. All models adjusted for age, gender, number of hand joints with OA, and time between assessments.

Table IV
Relationships of global assessment of change scores with AUSCAN and strength change according to gender

	AUSCAN change				Grip strength change				Pinch strength change			
	Males		Females		Males		Females		Males		Females	
	β	*P*-value	β	*P*-value	β	*P*-value	β	*P*-value	β	*P*-value	β	*P*-value
Right change score	0.35	<0.001	0.28	<0.001	−0.39	<0.001	−0.10	0.077	−0.05	0.700	−0.14	0.030
Left change score	0.25	0.013	0.28	<0.001	−0.06	0.638	−0.15	0.009	−0.08	0.549	−0.11	0.085

All models adjusted for age, number of hand joints with OA, and time between assessments.

participants who indicated having ''Worse'' symptoms (compared to baseline) had a markedly larger average increase in AUSCAN and decrease in hand strength over time. The global assessment of change score, when analyzed as a 15-point scale, was also significantly associated with AUSCAN and hand strength for the total sample. Furthermore, changes in global assessment were associated with clinically relevant differences in AUSCAN and hand strength. For example, those who reported ''Worse'' symptoms had 7.2 kg lower mean right hand grip strength, 3.6 kg lower mean left hand grip strength, and about a 4.5-point greater AUSCAN score (on a 60-point scale). Even a one-point difference on the 15-point global assessment of change scale was associated with about 1 kg difference in grip strength change and >1 point difference in AUSCAN. While there is no consensus definition for a clinically relevant difference in hand strength, the differences observed in this study are large enough to affect daily tasks. For example, one study showed that among older adults, the mean force applied when opening certain various types of containers ranged from 1.0 to 4.4 kg[23]. Therefore these results support both the validity and clinical utility of the global assessment of change measure.

While the global assessment of change measure was significantly associated with the change in AUSCAN score for both men and women, there were gender differences in the relationship with hand strength. The association of global change with pinch strength was somewhat stronger for women than men. The largest gender difference, however, was that the association of change score with right hand grip strength change was much stronger for men than for women. This is interesting, since the global assessment of change measure asks about pain, aching, and stiffness, but not strength or function. This stronger relationship among men may indicate that when men are asked to recall global changes in hand symptoms, hand strength (particularly in right hand, which is the dominant hand for most individuals) is an important factor in this assessment.

We also observed differences in the performance of the global assessment of change questions according to baseline severity of OA, defined as the number of hand joints affected by OA and grouped into tertiles. The two lower tertiles did not show significant associations between change scores and hand strength change (except for a marginally significant association for right hand grip strength in the middle tertile). These results suggest that the global assessment of change score may not be as sensitive a marker of hand strength change among those with lower radiographic OA severity. This may be due to the fact that individuals with less severe OA show smaller differences in hand strength over time, and these small changes in strength are not highly correlated with patients' global assessments of symptom change. In this sample, there was not a statistically significant difference in grip or pinch strength change according to tertiles of affected joints at baseline. However, there was a pattern for those in the highest tertile to show larger decreases in pinch and grip strength between assessments. There were significant associations between global assessment of change scores and AUSCAN change for all three tertiles of baseline OA severity. Therefore these results support the construct validity of the global assessment of change scores with respect to measuring changes in patients' self-reported pain, stiffness, and function, regardless of their baseline levels of OA severity.

We also found that global assessment of change scores were associated with AUSCAN change among participants with OA at each joint site (PIP, MCP, and CMC). This provides evidence that this measure is valid among individuals with OA in different joint sites. However, we did observe different patterns of associations between global assessment of change scores and hand strength across the joint groups. Specifically, the strongest association between global change score and grip strength was among those with right hand MCP OA, and the strongest association between global change score and pinch strength was among those

Table V
Relationships of global assessment of change scores with strength change according to number of hand joints with OA

	Grip strength change						Pinch strength change					
	# OA joints − Tertile 1		# OA joints − Tertile 2		# OA joints − Tertile 3		# OA joints − Tertile 1		# OA joints − Tertile 2		# OA joints − Tertile 3	
	β	*P*-value	β	*P*-value	β	*P*-value	β	*P*-value	β	*P*-value	β	*P*-value
Right change score	−0.08	0.418	−0.17	0.050	−0.21	0.017	−0.06	0.578	−0.08	0.079	−0.24	0.013
Left change score	−0.15	0.133	−0.04	0.656	−0.18	0.041	−0.04	0.670	−0.01	0.926	−0.23	0.012

All models adjusted for age, gender, and time between assessments. Tertile 1: 1−7 joints, Tertile 2: 8−15 joints, and Tertile 3: 16 or more joints.

Table VI
Relationships of global assessment of change scores with strength change according to joint group with OA

	Grip strength change						Pinch strength change					
	PIP OA		MCP OA		CMC OA		PIP OA		MCP OA		CMC OA	
	β	*P*-value	β	*P*-value	β	*P*-value	β	*P*-value	β	*P*-value	β	*P*-value
Right change score	−0.20	<0.001	−0.34	<0.001	−0.18	0.029	−0.14	0.027	−0.03	0.759	−0.11	0.234
Left change score	−0.17	0.005	−0.09	0.483	−0.20	0.008	−0.14	0.030	−0.11	0.427	−0.09	0.303

All models adjusted for age, gender, and time between assessments.

with PIP OA. These results indicate there may be differences in the specific types of hand strength changes (i.e., grip vs pinch) that drive patients' global assessments according to the joint site(s) affected by OA.

There are some limitations to measures that ask participants to assess response to treatment or changes in symptoms over time. First, these items require individuals to recall their symptom severity during an earlier time point. This may be difficult for some individuals, particularly if they are asked to assess change over a long duration. In addition, there may be recall bias associated with these measures. Some research suggests that assessments of change and prior symptoms may be influenced by the severity of present symptoms[24–27]. Additional research should assess whether associations of this global assessment of change measure with change in other measures (such as AUSCAN or strength) differ according to the severity of current symptoms.

There are also several important strengths and potential applications of this global assessment of change measure. First, this item asks individuals to recall change in a very specific aspect of health, and studies show that condition-specific measures are more sensitive to change than global measures of health status change[28,29]. Second, this item is administered at a single time point but assesses change in hand symptoms over a specified time interval. Therefore it may be useful for assessing symptom change when baseline data are not available. Third, this scale can be used to assess the minimal perceptible improvement associated with other scales related to hand symptoms[30]. Since this measure assesses change in symptoms on a 15-point scale, it can detect relatively small perceived changes. Fourth, because this is a relatively brief measure, it can be readily used in clinical settings to monitor patients' responses to new treatments.

In summary, this study showed that a global assessment of change measure was significantly associated with actual changes in both AUSCAN and hand strength. This provides support for the validity and utility of this measure. Additional research is needed to examine this measure in other patient samples, and it would be of particular value to assess the performance of this measure in the context of clinical trials. Patients' assessments of change and responses to treatment are an important component of outcome measurement in hand OA. This global assessment of change in hand symptoms can be a valuable tool for assessing participants perceived changes in the context of clinical trials and epidemiological studies of hand OA.

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