OA Go Away: Development and Preliminary Validation of a Self-Management Tool to Promote Adherence to Exercise and Physical Activity for People with Osteoarthritis of the Hip or Knee

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ABSTRACT

Purpose: To determine the face and content validity, construct validity, and test–retest reliability of the OA Go Away (OGA), a personalized self-management tool to promote adherence to exercise and physical activity for people with osteoarthritis (OA) of the hip or knee. **Methods:** The face and content validity of OGA version 1.0 were determined via interviews with 10 people with OA of the hip or knee and 10 clinicians. A revised OGA version 2.0 was then tested for construct validity and test–retest reliability with a new sample of 50 people with OA of the hip or knee by comparing key items in the OGA journal with validated outcome measures assessing similar health outcomes and comparing scores on key items of the journal 4–7 days apart. Face and content validity were then confirmed with a new sample of 5 people with OA of the hip or knee and 5 clinicians. **Results:** Eighteen of 30 items from the OGA version 1.0 and 41 of 43 items from the OGA version 2.0 journal, goals and action plan, and exercise log had adequate content validity. Construct validity and test–retest reliability were acceptable for the main items of the OGA version 2.0 journal. The OGA underwent modifications based on results and participant feedback. **Conclusion:** The OGA is a novel self-management intervention and assessment tool for people with OA of the hip or knee that shows adequate preliminary measurement properties.

Key Words: exercise; hip; knee; osteoarthritis; patient compliance.

RÉSUMÉ

Objectif : Déterminer l'apparence et la validité de contenu, la validité de concept et la fiabilité test-retest de l'outil OA Go Away (OGA), un outil personnalisé d'autogestion visant à promouvoir l'observance aux exercices et à l'activité physique chez les personnes qui ont de l'arthrose de la hanche ou du genou.

Méthodes : L'apparence et la validité de contenu de l'outil OGA version 1.0 ont été déterminées au moyen d'entrevues menées auprès de 10 personnes vivant avec l'arthrose de la hanche ou du genou et de 10 cliniciens. Une version révisée 2.0 a ensuite fait l'objet de tests visant à déterminer la validité de concept et la fiabilité test-retest au moyen d'un nouvel échantillon de 50 personnes vivant avec l'arthrose de la hanche ou du genou en comparant des éléments clés du journal de l'outil OGA avec des mesures de résultats validées évaluant des éléments semblables et comparant les scores attribués à des éléments clés du journal à des intervalles de 4 à 7 jours. On a ensuite confirmé l'apparence et la validité de contenu en utilisant un nouvel échantillon de cinq personnes vivant avec l'arthrose de la hanche ou du genou et de cinq cliniciens. **Résultats :** Dix-huit des 30 questions de la version 1.0 de l'outil OGA et 41 des 43 questions de la version 2.0 du Journal, Buts, Plan d'action et Registre des exercices présentaient un contenu d'une validité adéquate. La validité de concept et la fiabilité test-retest étaient acceptables pour les principaux éléments de la version 2.0 du Journal de l'outil OGA. L'outil OGA a subi des modifications basées sur les résultats et les commentaires des participants. **Conclusion :** L'outil OGA est un nouvel outil d'intervention et d'évaluation en autogestion qui s'adresse aux personnes atteintes d'arthrose de la hanche ou du genou et qui affiche des caractéristiques de propriétés métrologiques préliminaires adéquates.

Recent clinical practice guidelines for the management of osteoarthritis (OA) of the hip and knee^{1,2} have strongly recommended that people with OA exercise regularly, based on evidence that aerobic and strength-

ening programmes improve pain, function, and quality of life; facilitate weight management; and may slow the progression of the disease.^{3,4} However, these benefits are only realized if exercise and physical activity (PA)

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are practised consistently and become a lifelong habit.^{5–7} Unfortunately, adherence to prescribed exercise is low among the OA population,^{6,8} and the majority of people with OA of the hip or knee do not meet the Health Canada–recommended guidelines for weekly PA for adults: at least 150 minutes of moderate or 75 minutes of vigorous aerobic PA per week (which can be split into 10-minute segments); strengthening exercises on at least 2 days per week; and PA to enhance balance and prevent falls for those older than age 65 years with poorer mobility.^{9–11} This lack of PA increases the potential for disease progression and greater morbidity and mortality.^{8,12}

Physiotherapists who simply prescribe exercise or PA to their clients with OA of the hip or knee seldom achieve lasting changes in behaviour, especially in clients discharged to independent home exercise programmes.¹³ Additional motivational interventions for behaviour change need to be adopted to help bridge the gap between good intentions and behaviour.^{2,3,8,14–16} Although some qualitative research has examined the factors that influence the decision to adopt and maintain a regular exercise programme, the evidence is scant for interventions to promote adherence to exercise for people with OA.

We identified 2 recent review articles^{6,8} that reviewed a total of 13 studies that included adherence among their evaluation criteria and 1 subsequent study⁷ that specifically tested an intervention to promote adherence to exercise for people with OA of the hip or knee. The adherence interventions studied, used alone or in combination, were exercise logs, goal setting, telephone calls, booster sessions, pedometers, video-assisted exercises, and self-evaluation tools. Only trials that included booster sessions in combination with goal setting, exercise logs, or telephone calls showed increased adherence after 6 months, and even in these trials, rates declined over time.^{7,17} These multi-component interventions were supported in part by aspects of self-regulation theory (SRT),^{18,19} which posits that behaviour is goal directed and that by taking an active rather than a passive role in managing a chronic condition, patients can create their own pathways to goal attainment through personal goal setting, action planning, self-monitoring, feedback, and relapse prevention. SRT suggests that self-efficacy may be increased because people perceive that they are able to control or influence various aspects of their chronic disease. The stronger one's perceived self-efficacy, the stronger and more proactive and persistent one's efforts will be.¹⁸ Self-regulation strategies have been shown to promote weight loss,²⁰ increase PA in people with rheumatoid arthritis,²¹ and increase adherence to exercise in the general population.^{22,23}

Although the use of goal setting and exercise logs is supported by SRT, the use of booster sessions may not be, because autonomous feedback (self-directed) is preferred over feedback from an external source (physiotherapist).²⁴ Booster sessions are also very resource intensive, and many people have limited access to these

services. Ravaud and colleagues²⁵ investigated a self-evaluation tool for people with OA of the hip or knee that included the use of an exercise log, a weekly self-administered visual analogue scale, and the Western Ontario and McMaster Universities Osteoarthritis (disability) Index to monitor symptoms during a trial of home exercise. Adherence to exercise at 6 months was very low, perhaps because the standardized assessment measures did not always evaluate the specific outcomes most relevant or important to each participant.

The two primary authors (GP, KTA) decided to create the OA Go Away (OGA), a self-regulation intervention that includes an exercise log, goal setting, and a personalized rather than standardized self-assessment measure, whereby individuals decide which OA symptoms or outcomes are most problematic for them. Qualitative studies have suggested that self-regulation efforts that assess personally meaningful health status outcomes at intervals encourage people with OA to maintain exercise behaviour.^{8,26,27} The OGA is intended for people to use independently at home, after brief coaching from a physiotherapist. The OGA version 1.0 was developed after performing a systematic search of the literature to identify relevant health outcomes for people with OA and obtaining feedback from 10 people with OA of the hip or knee in clinical practice at the Arthritis Society office in Ottawa.

To our knowledge, the OGA is the first personalized adherence intervention incorporating SRT elements for people with OA of the hip or knee to be validated. This article describes the three phases in the preliminary development and validation of the OGA and their respective results.

METHODS

Design

Our three-phase study was guided by standard approaches to instrument validation²⁸ and followed the COSMIN (Consensus-based Standards for the selection of health Measurement INstruments) checklist.²⁹ In phase 1, we determined the face and content validity of OGA version 1.0, then revised it on the basis of these results to create OGA version 2.0. Phase 2 established the construct validity and test–retest reliability of OGA version 2.0. In phase 3, we tested OGA version 2.0 for content validity and then made further modifications to generate OGA version 3.0. All participants in each phase provided informed consent, and our study protocol was reviewed and approved by the Ottawa Health Science Network Research Ethics Board.

Phase 1: face and content validity of OA Go Away version 1.0

Participants

We recruited a convenience sample of 10 people with OA of the hip or knee from Ottawa rheumatology clinics and the Arthritis Society's Ottawa office via an information poster that invited volunteers to phone the research

assistant (RA). Participants were eligible if they had OA of the hip or knee and could communicate in English. We also recruited a purposive sample of 10 rheumatology clinicians from the Canadian Arthritis Network (a national centre of excellence) and from Ottawa rheumatology practices. Clinicians who were judged by the research team to be experts in OA or self-management were invited by the research team to participate via email.

Data collection

The RA conducted in-person semi-structured qualitative interviews of participants with OA of the hip or knee; clinicians were interviewed by phone by one of two research team members (GP or KTA). Participants completed a socio-demographic form and then reviewed the OGA version 1.0 journal and exercise log; their answers to the questions on the face and content validity rating form were recorded.

Measures

Socio-demographic form. Used in all three phases of the study, this form gathered information on the clinician's profession and years of experience and the percentage of OA clients in the clinician's practice; for participants with OA, it elicited age, gender, ethnicity, level of education, and location and duration of OA (hip or knee and other joints).

OA Go Away version 1.0 (see Appendix 1 online). The OGA version 1.0 monthly journal assessed the following outcomes, using scales for level of difficulty or quality and level of importance, as well as space for a personal description of "challenges in my daily activities," sleep, mood, and energy. Other measures collected were "things I am not doing because of my OA," "I also notice" (other symptoms), pain, use of medications and other treatments, food habits, score on the F.I.T. (a fitness measure adapted by clinicians from Karsi's³⁰ F.I.T. index that computes a fitness score based on the frequency, intensity, and time of aerobic activity per week), resting heart rate, weight, waist circumference, body mass index (BMI), and goals. The weekly exercise log monitored daily frequency, time, and intensity of exercise; use of medications; and OA treatments.

Face and content validity rating form. This form asked participants to rate the relevance of each item on a three-item nominal scale (*essential, useful but not essential, or not necessary*). They were asked to suggest other relevant items and to provide feedback on comprehensiveness and clarity.

Data analysis

To quantify the relevance of the items included in OGA version 1.0, we calculated the content validity ratio (CVR).³¹ CVR scores range from -1.0 to 1.0; a higher score indicates a higher percentage of raters who rated the item as essential. The minimum acceptable CVR value for 20 participants is 0.42.

Phase 2: construct validity and test-retest reliability of OA Go Away version 2.0

Participants

Using posters at Ottawa rheumatology offices and the Arthritis Society's Ottawa office that invited volunteers to phone the RA, we recruited a new convenience sample of 50 people with OA of the hip or knee for phase 2. Inclusion and exclusion criteria were the same as for phase 1.

Data collection

Participants completed a socio-demographic form, the Short-Form Health Survey (SF-36), the Pittsburgh Sleep Quality Index (PSQI), and an Intermittent and Constant Osteoarthritis Pain (ICOAP) questionnaire at the Arthritis Society's Ottawa office. They also completed the OGA version 2.0 journal at baseline and were given a blank journal page with instructions to complete it at home 4–7 days later and return it by mail in a self-addressed sealed envelope.

Measures

OA Go Away version 2.0 (see Appendix 2 online). This version of the OGA contained a monthly journal, monthly goals and action plan, and a weekly exercise log whose appearance and content were modified from version 1.0 on the basis of the phase 1 results.

SF-36. The SF-36 is a patient-based measure of general health status validated for chronic diseases, including OA. It assesses health-related quality of life and yields component scores for Physical Functioning, Role-Physical, Bodily Pain, General Health, Vitality, Social Functioning, Role-Emotional, and Mental Health subscales.³²

ICOAP. The ICOAP is a multidimensional OA-specific measure designed to comprehensively evaluate the pain experience of people with hip or knee OA—including pain intensity; pain frequency; and impact on mood, sleep, and quality of life—independent of the effect of pain on physical function.³³

PSQI. The PSQI, a measure of sleep quality and disturbances over 1 month, identifies good and poor sleepers in the general medical population; it consists of 19 self-rated items, which are combined to form seven component scores.³⁴

Data analysis

To determine construct validity, we calculated Pearson (for data with approximately normal distributions) or Spearman (for data with non-normal distributions) correlation coefficients to determine the direction and strength of the association between OGA scores (function, pain, sleep, mood, and energy) and the relevant SF-36 subscale, ICOAP, and PSQI scores. A correlation of 0.80–1.0 was considered very strong; 0.60–0.79, strong; 0.40–0.59, moderate; 0.20–0.39, weak; and 0.00–0.19, very weak.³⁵

To determine test–retest reliability, we compared OGA journal scores from baseline to time 2 (4–7 days later) using κ coefficients for categorical data (stiffness and swelling) and intra-class correlation coefficients (ICCs) for continuous data (function, sleep, mood, energy, pain, F.I.T., weight, waist circumference, BMI). The Rehabilitation Measures Index recommends that instruments for individual decision making show excellent agreement (i.e., ICC > 0.90; κ > 0.81).³⁶

Phase 3: face and content validity of OA Go Away version 2.0

Participants

We recruited 5 new participants with hip or knee OA, using the same eligibility criteria as in phase 1, from Ottawa rheumatology clinics and the Arthritis Society's Ottawa office via an information poster that invited them to phone the RA; we also recruited 5 of the original clinicians via email.

Data collection, measures, and analysis

All phase 1 procedures were repeated in phase 3. We used the face and content validity rating form from Phase 1, with OGA version 2.0 items inserted. The minimum acceptable CVR value for 10 participants is 0.62.

RESULTS

Phase 1: face and content validity of OA Go Away version 1.0

Baseline characteristics

All 10 people with hip or knee OA who contacted the RA were eligible to participate. Participants had a mean age of 60 years and mean disease duration of 14 years; 60% were female (see Table 1). We sent email invitations to 20 clinicians, 10 of whom responded and participated in the study. Clinician participants, who reported a mean 30 years' experience, were 2 rheumatologists, 3 physiotherapy researchers, 2 physiotherapy clinicians, 1 occupational therapy clinician, 1 social work researcher, and 1 nurse clinician.

All 20 participants completed the face and content validity rating form, on which there were 10 missing values from eight different questions: One clinician did not answer one question; 5 participants with OA did not answer one to three questions each; and "Mood level of importance" and "Energy level of quality" each had 2 missing values, with 18 of 20 answers. We calculated averages for each item using all available scores.

Face validity of OA Go Away version 1.0

All participants understood the purpose of the OGA. Some participants with hip or knee OA commented that they intended to share their OGA with their health care provider as evidence of their status and their self-management efforts.

Content validity of OA Go Away version 1.0

Table 2 shows CVR scores, which were adequate for

Table 1 Participant and Clinician Demographics

Characteristic	No. (%) of participants with OA of hip or knee*		
	Phase 1 (n = 10)	Phase 2 (n = 50)	Phase 3 (n = 5)
Sex, female	6 (60)	39 (78)	4 (80)
Age, y, mean (SD)	59.5 (8.1)	65.81 (10.0)	71.4 (6.2)
Location of OA			
Knee	4 (40)	25 (50)	3 (60)
Hip	3 (30)	7 (14)	1 (20)
Both hip and knee	3 (30)	18 (36)	1 (20)
Duration of OA, y, mean (SD)	13.8 (12.0)	9.31 (7.2)	12.4 (15.6)
Self-reported ethnic origin			
Canadian	9 (90)	38 (76)	4 (80)
European	1 (10)	4 (8)	0
Haitian	0	3 (6)	1 (20)
Asian	0	5 (10)	0
Level of education			
University graduate	7 (70)	28 (56)	3 (60)
College graduate	0	10 (20)	2 (40)
High school graduate	1 (10)	10 (20)	0
<High school graduate	2 (20)	2 (4)	0

Characteristic	No. (%) of clinicians*	
	Phase 1 (n = 10)	Phase 3 (n = 5)
Profession		
Rheumatologist	2 (20)	1 (20)
PT researcher	3 (30)	1 (20)
PT clinician	2 (20)	1 (20)
OT clinician	1 (10)	1 (20)
SW researcher	1 (10)	1 (20)
RN clinician	1 (10)	
Time in practice, mean (SD) y	30 (7.4)	26 (6.0)
Clients with OA > 50% of practice	7 (70)	4 (80)

* Except where otherwise indicated.

OA = osteoarthritis; PT = physiotherapy; OT = occupational therapy; SW = social work; RN = registered nurse.

18 of 30 items. On the basis of CVR results and comments from participants, we revised OGA version 1.0 to create OGA version 2.0. Items with a CVR less than 0.42 were removed or modified to represent participants' views; for example, the "I also notice" category was replaced with "my stiffness" and "my swelling." If participants with OA and clinician participants showed significant discrepancies in the items they identified as essential, our decision to exclude or modify an item favoured the priorities of participants with OA, along with a team consensus based on available information and the purpose of the tool. For example, most participants with OA but few clinicians felt that food habits was an essential item to include in the journal; we decided to remove this item because it was not the main goal of the PA intervention. Similarly, the item "Things I am not doing because of my OA" was rated as essential by the majority of participants with OA but not by clinicians, who offered comments such as "Patients do not need reminders of the activities they can no longer do, especially if it is unlikely they will resume these activities." We therefore removed this item and integrated

Table 2 Face and Content Validity of OA Go Away Version 1.0

Item from OA Go Away version 1.0	No. of participants with OA who rated it as essential	No. of clinicians who rated it as essential	CVR total (n = 20)
OA Go Away journal			
Challenges	10	10	1.0
LOD	9	10	0.90
LOI	9	9	0.80
Things I am not doing	9	3	0.20
Sleep	10	10	1.0
LOQ	9	9	0.80
LOI	8	4	0.20
Mood	8	10	0.89
LOQ	7	8	0.57
LOI	7	3	-0.29
Energy	8	8	0.68
LOQ	6	8	0.55
LOI	6	4	0
I also notice	7	5	0.20
Pain	10	10	1.0
Meds	10	9	0.90
Other treatment	10	7	0.70
Food habits	9	0	-0.10
F.I.T. score	6	6	0.20
Resting HR	4	5	-0.10
Weight	9	9	0.80
BMI	4	5	-0.10
Waist	8	9	0.70
Goals	7	10	0.70
OA Go Away ex log			
Ex/activity	10	10	1.0
Min/int.	10	10	1.0
Meds	6	2	-0.20
Other treatment	6	1	-0.30
Comments	8	10	0.80
Ex routine log	2	6	-0.10

OA = osteoarthritis; CVR = content validity ratio; LOD = level of difficulty; LOI = level of importance; LOQ = level of quality; F.I.T. = frequency/intensity/time measure of fitness; HR = heart rate; BMI = body mass index; Ex = exercise; Int. = intensity.

it as a possibility in the instructions for “top 3 difficult activities.”

The OGA version 2.0 journal was reorganized into four domains: “top 3 activities that are difficult due to my OA that I would like to improve,” “other possible impacts of my OA” (sleep, mood, energy, pain, stiffness, swelling), “my fitness and weight measures” (F.I.T., BMI, weight, waist), and “treatment for my OA pain” (medications, other treatments). Most participants considered it essential to include goals, but they preferred a separate goals and action plan, which we therefore created, with space to record three goals (related to functional difficulties), an exercise action plan, barriers, plans to overcome barriers, and a confidence scale. We reorganized the

OGA exercise log into the different types of exercise and removed medications and other treatment categories.

Phase 2: construct validity and test–retest reliability of OA Go Away version 2.0

Baseline characteristics

Of 51 people with hip or knee OA who contacted the RA, 1 was ineligible to participate because of an inability to communicate in English. The 50 participants had a mean age of 66 years and mean disease duration of 9 years; 78% were female (Table 1). All 50 participants completed all outcome measures and the OGA version 2.0 journal at baseline, but 4 participants (8%) did not return their second journal, leaving 46 participants for the analysis of test–retest reliability. Participants took an average of 30 minutes to complete their first OGA journal with help from the RA.

Construct validity of OA Go Away version 2.0

The results of the construct validity analysis are shown in Table 3. OGA version 2.0 pain scores were moderately to strongly associated with SF-36 Bodily Pain sub-scale scores and ICOAP total pain scores (Pearson *rs* ranged from 0.55 to 0.75) and showed weak to moderate correlations with ICOAP intermittent or constant pain scores (Pearson *rs* ranged from 0.36 to 0.45). OGA version 2.0 sleep, mood, and energy scores were strongly correlated with their respective PSQI and SF-36 sub-scale comparators (Pearson *rs* ranged from 0.66 to 0.69 and Spearman ρ was 0.78). OGA version 2.0 function scores showed weak correlations with all SF-36 subscales (Pearson *rs* ranged from 0.25 to 0.38).

Test–retest reliability of OA Go Away version 2.0

Table 4 shows the results of the test–retest analysis. Only one item (weight) had an ICC or κ value more than 0.90; seven (energy, function, pain knee and hip, sleep, waist, stiff knee) had values between 0.70 and 0.90, and three (mood, stiff hip, swelling) had values between 0.40 and 0.70. Two items (BMI, F.I.T.) with ICCs below 0.20 were removed; the mean ICC or κ of all remaining items was 0.72.

Because most participants considered it essential to include a simple fitness measure in the journal, we added the Health Canada guidelines for aerobic PA and strengthening exercises, to be used as exercise targets for users. We also added reminders of these targets to the exercise log to help participants track their exercise toward these targets.

Phase 3: face and content validity of OA Go Away version 2.0

Baseline characteristics

All 5 people with hip or knee OA who contacted the RA were eligible to participate; they had a mean age of 71 years and mean disease duration of 12 years, and 80% were female (Table 1). Of the 7 original clinicians

Table 3 Construct Validity Correlation Coefficients of OA Go Away Version 2.0 ($n = 50$)

Constructs	Pearson r (95% CI)
OGA pain knee vs ICOAP total knee	0.75 (0.58, 0.86)
OGA pain knee vs ICOAP constant knee	0.45 (0.17, 0.67)
OGA pain knee vs ICOAP intermittent knee	0.41 (0.12, 0.64)
OGA pain hip vs ICOAP total hip	0.64 (0.33, 0.83)
OGA pain hip vs ICOAP constant hip	0.44 (0.05, 0.71)
OGA pain hip vs ICOAP intermittent hip	0.36 (−0.07, 0.67)
OGA pain knee vs SF-36 Bodily Pain	−0.65 (−0.44, −0.80)
OGA pain hip vs SF-36 Bodily Pain	−0.55 (−0.20, −0.78)
OGA sleep vs PSQI total	0.66 (0.46, 0.79)
OGA mood vs SF-36 Mental Health sub-scale	−0.69 (−0.51, −0.81)
OGA function vs SF-36 Physical Component summary measure	−0.25 (−0.50, 0.03)
OGA function vs SF-36 Physical Functioning sub-scale	−0.38 (−0.60, −0.11)
OGA function vs SF-36 Social Functioning sub-scale	−0.27 (−0.51, 0.02)
	Spearman ρ (95% CI)
OGA energy vs SF-36 Vitality sub-scale	−0.78 (−0.87, −0.64)

OGA = OA Go Away; ICOAP = Intermittent and Constant Osteoarthritis Pain questionnaire; SF-36 = Short-form Health Survey; PSQI = Pittsburgh Sleep Quality Index.

Table 4 Test-Retest Reliability of OA Go Away Version 2.0 ($n = 46$)

Item from OA Go Away version 2.0	ICC or κ (95% CI)
Energy*	0.73 (0.57, 0.84)
Function*	0.75 (0.57, 0.86)
Mood*	0.67 (0.47, 0.80)
Pain knee*	0.70 (0.50, 0.83)
Pain hip*	0.81 (0.59, 0.91)
Sleep*	0.85 (0.75, 0.92)
F.I.T. score	0.02 (−0.30, 0.34)
Weight*	0.94 (0.90, 0.97)
Waist*	0.72 (0.52, 0.85)
BMI	0.10 (−0.22, 0.41)
Stiff hip†	0.53 (0.14, 0.78)
Stiff knee*	0.74 (0.56, 0.86)
Swelling	0.47 (−0.90, 1.00)

* $p < 0.001$.

† $p < 0.01$.

ICC = intra-class correlation coefficient; F.I.T. = frequency/intensity/time measure of fitness; BMI = body mass index

who were invited to participate, 5 responded; they had a mean 26 years' experience. All 10 participants completed all questions on the face and content validity rating form.

Content validity of OA Go Away version 2.0

CVR was adequate (ranging from 0.80 to 1.0) for 41 of 43 items (see Appendix 1 online). We made the following changes to create OGA version 3.0 (see Appendix 3 online): For the journal, we added a light aerobic activity category to the fitness measure to encourage people who are inactive to take more realistic intermediate steps toward the Health Canada moderate or vigorous exercise targets. Even though traditional goal and action plan setting includes the list of barriers and a confidence

scale, we removed these two items from the OGA version 2.0 goals and action plan because the majority of participants with OA felt that both elements would invite negative affect; listing barriers would foster excuses for not being active, whereas a confidence scale would imply that they would not take action. However, participants also noted that a confidence scale may be useful for health care providers to identify people who may have set unrealistic goals. We therefore replaced both "barriers" and "ways to overcome barriers" with "how will I make sure I follow my plan?" and added instructions for users to think about possible barriers and focus on ways to overcome them. Intention to adopt a new behaviour (as indicated on a confidence scale) has been shown to be far less powerful in predicting actual behaviour change than implementation intentions.¹⁸ An "other" category was added for people who plan to do other things to help their OA in addition to exercise, such as losing weight. We made minor changes to the exercise log, adding descriptors for the different types of exercise.

DISCUSSION

Most people with hip or knee OA are sedentary and do not adhere to prescribed home exercise programmes, especially after discharge from active physiotherapist-supervised intervention.^{15,37} The OGA was developed to facilitate this transition to active independent self-management. Our overall goal in this study was to create a valid and reliable version of the OGA.

A major strength of this validation study is that it followed the COSMIN checklist, a valid tool to rate studies reporting measurement properties of health status measurement instruments. Another strength is that the OGA was developed and validated with the help of

national health care experts in the field of OA from a wide variety of disciplines: rheumatology, research, physiotherapy, occupational therapy, social work, and nursing. Participants with hip or knee OA were somewhat representative of the OA population in Canada. According to a 2010 Health Canada survey,³⁸ 66% of Canadians with OA are female, and 60% are younger than age 65 years; in our sample, 75% were female, and the mean age was 66 years. Our sample was not very diverse, however, because 77% of participants were college or university educated, and only 14% identified themselves as being of another ethnic origin (European, Asian, Haitian). Thus, the validity of this tool may differ when used with other or more diverse populations.

Construct validity scores comparing key items on the OGA journal with validated outcome measures assessing similar health outcomes varied from weak to strong correlations. The weak association between OGA difficult activity (function) scores and SF-36 sub-scales was expected, and we therefore did not remove this item; the journal is intended to focus on functional difficulties, and the weak correlation simply supports the hypothesis that difficulties encountered in a single activity requiring hip or knee integrity do not correlate well with the cumulative score of several different general functions, as measured by the SF-36. An interesting finding was that OGA pain scores showed either moderate or strong correlations with SF-36 Bodily Pain sub-scale scores and ICOAP total pain scores but were moderately or weakly correlated with ICOAP intermittent pain and constant pain scores. The contrast between the two sets of correlations may be explained by the fact that the OGA pain score stems from one item representing the total pain experience (thus similar to the total ICOAP score and SF-36), whereas the ICOAP intermittent and constant pain scores evaluate two distinct aspects of the pain experience.

The test–retest scores ranged from 0.02 to 0.94; 8 of the 13 items yielded scores greater than 0.70. According to experts,^{36,39} ICC scores should be 0.90 or higher and κ scores should be 0.81 or higher to ensure sufficient instrument stability for individual clinical decision making, although an ICC of 0.70 or more and a κ of 0.61 or more are adequate for between-groups research studies.⁴⁰ In our study, only one score (weight; ICC = 0.94) was higher than 0.90 or 0.81. We removed the two items with the lowest scores (BMI and F.I.T., ICCs = 0.10 and 0.02, respectively) but retained sleep, pain, function, stiffness, swelling, mood, and energy (ICC or κ = 0.40–0.85) because participants considered these items essential. We also argue that because OA symptoms can be highly variable from one day to the next, participants may have experienced changes in their disease and symptoms during the 4- to 7-day period between the baseline assessment and the completion of the second OGA.

After each phase of the study, we revised the OGA on the basis of measurement properties, results, and feedback from participants. OGA version 3.0 includes multiple components that reflect the basic tenets of the SRT. Adherence to PA and exercise may be promoted through enhanced self-efficacy, which is the most powerful predictor of initiation and maintenance of health behaviour change in healthy populations¹⁸ and possibly in the OA population as well.⁴¹

OGA version 3.0 may be a useful clinical tool tailored to people with OA who are motivated to become active through interaction with a physiotherapist who teaches them about the potential benefits of PA and prescribes individually tailored, evidence-based approaches to adopting a physically active lifestyle regardless of their chronic condition. We hypothesize that if a physiotherapist coaches them to use the OGA, they will learn the skills to autonomously self-regulate and will subsequently maintain exercise behaviour. The OGA journal will enable them, through self-observation, to create a personal synopsis of how OA is currently affecting their life in terms of altered function, sleep, mood, energy, pain, stiffness, swelling, fitness, weight, and use of medications and other treatments (with both personal descriptions and ratings).

After completing the journal, users are invited to self-reflect and to use this information to establish realistic goals of personal importance and to internalize advice from the physiotherapist into a personal action plan. This plan may include self-evaluation of their current exercise behaviour (fitness measure) relative to the current Health Canada guidelines. When completing the goals and action plan, they should decide on specific, measurable, achievable, realistic, and timely (SMART) goals that are linked with their altered function and create a personal action plan (with specifics as to what, how often, how much or how long, when, and where). They should reflect on possible barriers to their action plan and identify ways to overcome these barriers by documenting strategies to make sure they carry out their plan. The journal will then help them self-monitor the physical activities they have listed in the exercise log. Using the journal every month will help users to think about their gains and losses in outcomes and to determine which physical activities are the most beneficial to them. Expecting better outcomes may motivate them to stay active.¹⁸

Our study has several limitations. First, the face and content validity results may not be generalizable to other people with hip or knee OA or may vary when patients use the OGA for a period at home. Because participants viewed the tool only briefly before rating it, their perception of the different items may not reflect perceived relevance to daily life over time. A second weakness, according to the COSMIN checklist, is that the environments in which the two measures of test–retest reliability were

performed were not the same: Participants completed the OGA first at the Arthritis Society's Ottawa office and then at home, which may have led to lower estimates of test-retest reliability. This was a pragmatic decision to teach participants to use the tool (during their first visit) but not inconvenience them by requiring them to return to the office a few days later. Third, the test-retest interval may have been too long; changes in status may have affected reliability.

The final version 3.0 of the OGA contains new items (fitness measures for aerobic and strengthening activities) that have not yet been assessed for test-retest reliability. Additional psychometric testing of these items is necessary to determine their reliability and to refine the tool to enhance its stability in measuring change for people with OA of the hip or knee in clinical practice. As well, future studies may lead to further improvements of the OGA by determining whether it fulfils its purpose of improving exercise adherence, if it has acceptable respondent burden, and if it is feasible for an extended period.

CONCLUSION

The OGA is a novel self-management tool for people with OA of the hip or knee that combines a personalized monthly self-evaluation outcome measure with tailored goals and an action plan and a weekly exercise log, developed and validated in collaboration with people with OA (the target population) and expert clinicians involved in their care. The OGA shows adequate face, content, and construct validity. On the basis of this initial sample, the OGA is not sufficiently reliable to measure clinical outcomes,^{36,39} but it does have potential value as a low-cost self-management intervention for physiotherapists to use with clients with hip or knee OA, to help fill the critical gap in promoting exercise adherence by enabling people with OA to identify which exercises can help make their personally relevant OA symptoms go away.

KEY MESSAGES

What is already known on this topic

The numerous health benefits of exercise and physical activity (PA) programmes for people with hip or knee osteoarthritis (OA) are directly connected to adherence to those programmes, but how to motivate people with hip or knee OA to stay active long after discharge from physiotherapy programmes is not known. Qualitative studies have suggested that a combination of strategies that reflect the self-regulation theory, including a self-evaluation component, may be effective at promoting long-term adherence to exercise and PA.

What this study adds

This study introduces a novel intervention for people with OA of the hip or knee that combines a personalized self-evaluation component with goal setting, action plan-

ning, and an exercise log and has the potential to improve adherence to exercise.

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