Factors associated with physical activity in Australians with hip or knee osteoarthritis

Heesch, Kristiann Corbusier; Ng, Norman; Brown, Wendy

Published in:
Journal of Physical Activity and Health

DOI:
10.1123/jpah.8.3.340

RUNNING HEAD: Physical Activity and Osteoarthritis

Factors Associated with Physical Activity in Australians with Hip or Knee Osteoarthritis

Type: Original Research

Key Words: determinants, exercise, arthritis self-management, psychological factors

Abstract word count: 200 words

Manuscript text word count: 4490

Date of resubmission: September 10, 2009

Abstract

Background: Physical activity (PA) is recommended for managing osteoarthritis (OA). However, few people with OA are physically active. Understanding the factors associated with PA is necessary to increase PA in this population. This cross-sectional study examined factors associated with leisure-time PA, stretching exercises, and strengthening exercises in people with OA. *Methods:* For a mail survey, 485 individuals, aged 68.0 y (*SD*=10.6) with hip or knee OA, were asked about factors that may influence PA participation, including use of non-PA OA management strategies and both psychological and physical health-related factors. Associations between factors and each PA outcome were examined in multivariable logistic regression models. *Results:* Non-PA management strategies were the main factors associated with the outcomes. Information/education courses, heat/cold treatments, and paracetamol were associated with stretching and strengthening exercises ($P<0.05$). Hydrotherapy and magnet therapy were associated with leisure-time PA; using orthotics and massage therapy, with stretching exercises; and occupational therapy, with strengthening exercises ($P<0.05$). Few psychological or health-related factors were associated with the outcomes. *Conclusions:* Some management strategies may make it easier for people with OA to be physically active, and could be promoted to encourage PA. Providers of strategies are potential avenues for recruiting people with OA into PA programs.

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Osteoarthritis (OA) is the most common form of arthritis. In Australia, it is the leading cause of pain and disability, affecting 1.6 million adults or 8% of the population.[1] Total health expenditure for OA was $2.3 billion in 2007, almost half the total expenditure for all arthritis.[1] Because the incidence and prevalence of OA increase with age,[1] more individuals will be at risk of developing OA, and the burden of this condition will continue to increase, as the proportion of older people in Australia continues to rise.

There is no known cure for OA. However, disease-related symptoms are amenable to intervention,[2] and evidence supports a central role for physical activity (PA) in the management of these symptoms.[3, 4] PA therapy aims to improve muscle strength, stability of joints, range of movement, and aerobic fitness. PA can also help maintain a healthy body weight, normalize metabolic consequences of obesity, and reduce the extent of other problems associated with OA-related disability.[5]

Evidence-based PA guidelines for the OA population recommend stretching exercises to improve flexibility, resistance training to improve strength, and moderate-intensity aerobic PA to improve endurance.[6, 7] Prevalence of these activities in people with OA is unknown, but the results from large cross-sectional studies in the US show low levels of PA in people diagnosed with any type of arthritis.[8-12] Only 37% of people with self-reported doctor-diagnosed arthritis are engaging in moderate-intensity PA for at least 30 min/d, 3 d/wk, in accordance with guidelines for this population,[6, 7] and only 20% are performing PA for improving and maintaining muscle strength and endurance. People with arthritis are significantly less likely to be meeting PA guidelines for the general adult population than are people without arthritis.[10, 13, 14] This indicates that disease-related factors may be hindering the ability or motivation of people with arthritis to meet guidelines.

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To better enable and support people with OA to do PA, an understanding of the factors that are associated with PA participation in this population is critical. A framework that can help in identifying these factors is the Chronic Care Model (CCM), which proposes that people with a chronic illness should develop a set of strategies to manage their illness and those who do so are more likely to adopt healthy behaviors, such as PA.[15] These strategies include support from both within the health care system (e.g., occupational therapists) and external to it (e.g., arthritis education courses), as well as therapies that people undertake as a result of these supportive relationships (e.g., non-pharmacological therapies, such as heat/cold treatments, and pharmacological therapies, such as oral analgesics). Although people with OA tend to try a number of strategies for managing OA symptoms,[16, 17] the relationships between PA as a management strategy and the use of other OA management strategies have not been explored. An examination of these relationships may uncover strategies that make PA more tolerable for people with OA symptoms, strategies that could be promoted to encourage people with OA to be physically active. This examination could also reveal potential sources of support for managing OA with PA and indicate avenues for recruiting people with OA into PA programs.

CCM also recognizes the influence of physical and psychological factors on illness-related behavior.[15] Understanding which of these are associated with PA behavior is important for developing PA programs tailored to people with OA. Physical symptoms, such as pain and stiffness, may deter people with OA from adopting or maintaining regular PA. A review of the correlates of PA in people with arthritis concluded that disease-related pain is a commonly-reported barrier to PA among people with OA, but the associations between physical factors, including pain, and PA have been inconsistent.[18] Findings from some of the reviewed studies indicate that disease-related pain decreases PA adherence; others have found no association or

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that greater pain is associated with more frequent PA in people with OA.[18] More recent studies provide further evidence that OA-related pain, as well as disease severity and longer disease duration, can negatively impact on PA participation.[19-21] The authors of the review noted that psychological factors, namely mental well-being, perceived benefits and barriers to PA, and self-efficacy toward PA, were the most commonly examined correlates of PA in people with arthritis, and most studies found these to be significant correlates of PA in people with OA.[18] Even so, findings of no association were common, and a more recent study found the only psychological factor to be associated with PA in people with arthritis was self-efficacy.[22]

As others have indicated,[18, 22] the inconsistency in findings across studies with arthritis populations can be explained in part by the use of different measurement tools, the lack of statistical power, and variations in the covariates included in modeling. In studies of people with OA specifically, samples have tended to be homogeneous, mostly older adults and mostly female, thereby increasing the possibility that a restriction in range could explain null findings.[18, 22] Studies have also varied in how they define PA, and no study has examined factors separately for leisure-time physical activity (LTPA), stretching exercises, and strength training exercises.

The primary aim of this study, therefore, was to examine OA management strategies and other modifiable factors associated with (1) meeting moderate-intensity LTPA recommendations for people with arthritis, (2) muscle strengthening exercises, and (3) stretching exercises, in men and women, across a broad age range, with hip or knee OA. Consistent with a CCM framework, the modifiable factors included physical and psychological factors that previous studies indicate may be correlates of PA in people with OA.[18] To understand the types of LTPA that are enjoyed by people with OA and thus to consider in promoting PA to this population, the secondary aim was to describe the PA of the sample.

Methods

The Sample

Data were collected from 485 people who participated in the Osteoarthritis in Queensland Study. This cross-sectional study collected demographic, physical health, and psychological data from members of Arthritis Queensland with hip or knee OA. In total, 2200 Arthritis Queensland members who reported to Arthritis Queensland that they had OA and whose residence was within a 100-km radius of Brisbane, Australia, were mailed the study questionnaire with a self-addressed reply paid envelope. Because there were more women than men in the database and because we wanted to receive a similar number of responses from men and women, slightly different methods of recruitment were used for men and women. The 1100 Brisbane-based women who were the most recent additions to the database were selected by Arthritis Queensland to receive the questionnaire. These newest members were more likely to be younger, to be in better health, and to have mild to moderate OA symptoms, than other Arthritis Queensland members; hence, they were more likely to participate in the study and to represent a range of PA levels. In order to recruit an equal number of men, Arthritis Queensland selected *all* its male members living in Brisbane and the newest male members living in the suburbs from which the women were selected. Three weeks after receiving the mailing, respondents were sent a reminder letter. Of the 658 who returned completed questionnaires (31% response rate), 80% reported hip or knee OA and thus were eligible for inclusion in these analyses. Fifteen respondents were excluded because they did not report their gender, and another 26 were excluded because they did not indicate that they had received a diagnosis of OA by a health professional. Questionnaire completion designated informed consent. The study was approved by The University of Queensland Medical Research Ethics Committee.

Physical Activity Measures

Physical Activities. Respondents were asked whether they had participated in 14 activities at least monthly over the previous year. The list included the most popular activities in the state.[23] Respondents could also list other activities performed at least monthly over the previous year.

Meeting Arthritis-Specific Leisure-Time Physical Activity Recommendations. LTPA was measured with the Active Australia questions, which are used in Australia for surveillance and have been found to be valid and reliable.[24, 25] Respondents reported frequency (times) and duration (min) in the previous week of walking briskly (*for recreation or exercise or to get to or from places*), of moderate-intensity LTPA (*like golf, social tennis, moderate exercise classes, recreational swimming, line dancing*), and of vigorous-intensity LTPA (*that makes you breathe harder or puff and pant, like aerobics, competitive sport, vigorous cycling, running, swimming*). Respondents were asked to report only activities lasting ≥10 min/session. To account for differences in energy expenditure of the three types of LTPA, a total score was calculated by multiplying min/wk in each LTPA by an assigned metabolic equivalent (MET) value (walking = 3.0 METs; moderate-intensity = 4.0 METs; vigorous-intensity = 7.5 METs), and summing the products to give a total min/wk score.[26] Due to the highly skewed distribution of the data, responses were dichotomized in accordance with recommendations calling for people with arthritis to participate in 30 min of moderate-intensity LTPA, at least 3 d/wk.[6, 7] The dichotomized categories were meeting recommendations (score ≥360 METs/wk; computed as ≥30 min x 4 METs x 3 times/wk) and not meeting recommendations (score <360 METs/wk).

Stretching and Strength Training. Respondents were asked about their current participation (*yes*, *no*) in (1) range of motion (stretching exercises) and (2) muscle strengthening exercises.

Measures of Physical Health, Psychological and Confounding Factors

Physical Health Factors. BMI (weight [kg]/height [m^2] was computed from self-reported height and weight and was categorized in accordance with World Health Organization guidelines.[27] The WOMAC Osteoarthritis Index Likert 3.1[28] was used to measure pain (5 items), stiffness (2 items), and physical function (17 items) associated with hip or knee OA. Response options were on a Likert scale (1=*none*, 2=*mild*, 3=*moderate*, 4=*severe*, 5=*extreme*). Subscale items were summed to created index scores. Higher scores indicated more pain, stiffness, or difficulty with daily activities, respectively. The index has been extensively validated internationally and widely used in studies of people with knee or hip OA.[29, 30]

Psychological Factors. Symptoms of anxiety and depression were measured with the 18-item Goldberg Anxiety and Depression Scale,[31] for which higher scores (possible scores=0–18) indicated more symptoms. The 5-item *Self-Efficacy for Physical Activity Scale* evaluated confidence in ability to participate in PA.[32] The 14-item *Benefits of Physical Activity Scale* determined whether participants were aware of the benefits of PA, and the 23-item *Barriers to Physical Activity Scale* identified factors that made PA participation difficult.[33]

Confounders. Factors that are not modifiable but that were hypothesized to confound the association between the predictor variables of interest in this study and PA were included in these analyses. These included demographic factors that had been previously associated with PA:[34] sex, age, country of birth (a measure of ethnicity), and highest educational level attained. Other variables examined were area of residence (*urban*; *suburban*), employment status, marital status, and health conditions other than OA. Respondents were asked whether they had been told by a doctor in the previous 3 y that they had any of 13 conditions, from a list adapted from the Australian 1989–1990 National Health Survey.[35] The conditions were arthritis other than OA, diabetes or impaired glucose tolerance, heart disease, hypertension, stroke, thrombosis, low iron

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level, asthma, bronchitis or emphysema, fibromyalgia, chronic fatigue syndrome, osteoporosis, and cancer. Categories of conditions (cardiovascular disease, respiratory disease) were also created. Last, respondents reported the number of years since their OA diagnosis (≤1 y; 2-3 y; 4-5 y; >5 y).

Measures of Osteoarthritis Management Strategies

Respondents were asked about their use of 21 non-pharmacological and 11 pharmacological therapies other than PA for managing OA. Although there is no generally-accepted core set of therapies recommended for people with OA,[36] those listed were commonly reported in the literature for managing hip and keen OA.[3, 16, 37-40] The non-pharmacological therapies included support and treatment from professionals within and external to the health care system (information/educational courses, phone counseling, occupational therapy, low-level laser therapy, transcutaneous electrical nerve stimulation, viscosupplementation, hydrotherapy, massage therapy, acupuncture, magnet therapy) and other therapies possibly resulting from supportive relationships (making efforts to lose weight; using walking sticks, canes, walkers or other objects to help with walking; taping of the patella, wearing shoes with shock-absorbing properties or with orthotics; using objects to help with daily living [e.g., sock aids, zipper pulls, elevated toilet seat, shower seat, non-slip mats]; herbal therapies [e.g., celery seeds, ginger, willow bark, avocado, soybean, turmeric]; megavitamins; heat/cold treatments). Response categories were *using* and *not using*. Composite variables were also created to indicate classes of therapies that could be examined together (hands-on care by a health practitioner, supportive counseling).

The pharmacological therapies were anti-inflammatory tablets or capsules; paracetamol (acetaminophen); paracetamol and codeine combinations; tramadol; topical anti-inflammatory

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gels or creams; glucosamine or chondroitin; steroid injections into joints; oral corticosteroids, hyaluronan injections; topical liniment rubs; and opioid oral medication. Response categories were *never tried*; *taking as needed*; *usually taking 1-3 days per week*; *usually taking 4-6 days per week*; and *usually taking every day*. Based on the distribution of responses and the researchers' interest in therapies taken regularly, responses were dichotomized as frequent use (≥4 d/wk) and infrequent/no use (<4 d/wk). Composite variables were created to indicate the use of classes of medications (oral analgesics, creams).

Statistical Analysis

With patterns of PA known to differ between the sexes,[34] the chi-square test was used to compare the percentage of men and women who were participating in each PA reported. To examine the factors associated with PA, binomial logistic regression models were computed using a three-stage process. All models included sex, age, country of birth (as a marker of ethnicity), and education (as a marker of socioeconomic status), given their consistent association with PA previously.[34] For the first stage, a series of models was computed to separately examine the association between each physical health, psychological and confounder factor and each PA variable. Significant factors ($P<.05$) were included in the next series of models, which were computed to separately examine the association between each non-PA management strategy and each PA outcome. For the third and final stage, a full model was computed to examine the association between all factors found to be significant during the previous two stages and each PA outcome. All factors were entered simultaneously as categorical variables except scores on the WOMAC Index, the Goldberg Anxiety and Depression Scale, the Self-Efficacy Scale, and the Perceived Benefits and Perceived Barriers Scales, which

were entered as continuous variables. The referent group in each model was the less active group.

Results

Characteristics of the sample are reported in Table 1. Overall, 63% of respondents were aged ≥65 y (*M* age=68 y, *SD*=11, range 27-95). Mean WOMAC pain scores (=11.4, *SD*=4.3), stiffness scores (=4.8, *SD*=1.9), and physical function scores (=38.2, *SD*=14.5) indicated mild to moderate symptoms of hip or knee OA. Scores on the Goldberg Anxiety and Depression Scale (*M*=8.5, *SD*=4.5) indicated a moderate level of anxiety and depressive symptoms, on average.

The most prevalent activities were low-impact (see Table 2) with walking being the most popular (63%). Fewer than 20% of respondents participated in any other single PA. Participation rates were similar between men and women, except that more women than men participated in aqua-aerobics classes/warm water exercises ($P<0.001$), aerobic/fitness classes ($P=0.033$), dancing ($P=0.004$), and yoga ($P=0.002$), and more men than women played golf ($P=0.012$).

Table 3 shows the results of modeling the factors associated with meeting arthritis-specific LTPA recommendations. In the final model, BMI and cardiovascular disease were significantly associated with meeting the recommendations. Four OA management strategies were also significant. Making efforts to lose weight, using hydrotherapy, and using magnet therapy were positively associated with meeting the recommendation, whereas using walking aids was negatively associated with meeting the recommendation.

Table 4 shows the final model of the factors associated with doing stretching exercises. Age, education, hypertension, and perceived benefits of PA were significant in the model, as were six OA management strategies: information/education courses, making efforts to lose

weight, shoes with shock-absorbing properties or with orthotics, heat/cold treatments, massage therapy, and oral paracetamol medication.

Table 5 displays the final modeling of the factors associated with doing strengthening exercises. Country of birth, osteoporosis, and perceived barriers to PA were significantly associated with the outcome, as were five OA management strategies: information/education course; making efforts to lose weight; occupational therapy; heat/cold treatment, and oral paracetamol medication.

Discussion

This study used CCM as a theoretical framework to examine factors associated with PA for people with hip or knee OA. LTPA, stretching exercises, and strengthening exercises were examined separately. The main factors associated with the PA outcomes were OA management strategies, which supports the CCM proposition that use of chronic illness management strategies are associated with health behaviors like PA.[15] Some of the strategies may make it easier for people with OA to be physically active, and could be promoted to encourage PA participation. Moreover, providers of these strategies are potential avenues for recruiting people with OA into PA programs. A few physical health and psychological factors were associated with the PA outcomes, and were also consistent with CCM. An understanding of these factors is essential for tailoring PA programs to the target population.

Only one strategy was associated with all three outcomes: *making efforts to lose weight*. Respondents who were making efforts to lose weight were more likely to be meeting arthritis-specific LTPA recommendations and to be performing stretching and strengthening exercises, than those who were not making these efforts. Weight loss is recommended for people with hip or knee OA as it can decrease the forces across the weight-bearing joints and thus improve OA

symptoms.[36, 41] The current findings may suggest that professional advice to lose weight is acting as an incentive for people with knee or hip OA to participate in PA that meets recommendations. Therefore, health professionals who encourage weight loss may be good avenues for recruiting people into PA programs.

Another finding was that respondents who were obese were less likely to be engaging in sufficient LTPA to meet recommendations, compared with normal-weight respondents. Findings from previous studies of an association between BMI and PA in people with arthritis have been inconsistent.[18] Some studies have failed to find an association between BMI and PA in arthritis patients,[12, 22] although in a population of patients with severe hip or knee OA, higher BMI was associated with greater PA.[19] Differences across studies may reflect differences in types of arthritis assessed, in the severity of the arthritis symptoms or in the measurement of PA. Our results may indicate that those most in need of losing weight are not doing sufficient PA to impact upon their OA symptoms. Thus, health professionals should be encouraged to counsel people with hip or knee OA who are obese on activities that meet PA guidelines.

Two other non-pharmacological therapies were positively associated with participation in sufficient LTPA: hydrotherapy and magnet therapy. Evidence from randomized trails indicates symptom relief from hydrotherapy and good compliance with this therapy.[38] This relief may make it tolerable for people with OA to perform moderate-intensity PA often and long enough to meet LTPA guidelines. Magnet therapy is not included in current recommendations for people with OA,[4] but a randomized controlled trial[42] provided evidence of this therapy's potential role in pain reduction. While the present study is only cross-sectional, our findings may suggest that encouraging the use of hydrotherapy, or possibly magnet therapy (given sufficient evidence of its effectiveness), could be helpful in efforts to promote LTPA to people with hip or knee OA.

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Providers of these therapies may be good avenues for promoting LTPA and thus efforts to encourage more of these providers to counsel clients on strategies for meeting PA recommendations may be warranted.

Three other therapies were positively associated with participation in stretching and strengthening exercises: information/education courses, heat/cold treatments, and paracetamol (acetaminophen) preparations. Patient education, thermal treatments, and paracetamol are included in recent recommendations for symptom relief in people with hip or knee OA.[36] The findings may indicate that information/education courses are supporting stretching and strengthening exercises and thus should be considered good avenues for recruiting people with hip or knee OA into stretching and strengthening programs. Heat/cold treatments and paracetamol preparations may be making participation in stretching and strengthening exercises tolerable and thus under appropriate health professional supervision, should be encouraged to help people with hip or knee OA engage in these exercises.

Shoes with shock-absorbing properties or with orthotics and massage therapy were only associated with stretching exercises, and occupational therapy was only associated with strengthening exercises. Corrective footwear is recommended for symptom relief in people with hip or knee OA[36] while evidence supporting massage therapy for OA management has not been strong enough for inclusion in the recommendations.[4] Occupational therapy is not included in these recommendations,[36, 41] although it is usually warranted for people with significantly lowered levels of functioning or with joint deformity.[43] Acknowledging the cross-sectional nature of the study, our findings may suggest that these therapies ease OA symptoms enough to allow for participation in stretching or strengthening exercises. They may also indicate that those who provide or recommend special shoes or orthotics, such as podiatrists, and those who provide

massage or occupational therapy could be appropriate avenues for recruiting people with hip or knee OA into exercise programs.

The only significant psychological factors in this study were the perceived benefits of PA, associated with participation in stretching exercises, and the perceived barriers to PA, negatively associated with strengthening exercises. These findings indicate the need to promote PA benefits to encourage people with hip or knee OA to do stretching exercises and to help people with hip or knee OA strategize ways to overcome difficulties they have with doing strengthening exercises. No physical health factor was significant in any full model. In their review, Wilcox et al.[18] concluded that three psychological factors, self-efficacy, perceived benefits, and perceived barriers, and one physical health factor, arthritis-related pain, garner the most consistent support as PA correlates for people with arthritis, although a number of studies have found no association between these factors and PA. Additional support for self-efficacy was found in a more recent study of adults with arthritis.[22] Differences between our findings and those of the review could reflect differences in PA outcomes, in measurement of factors, or in the other factors included in multivariable modeling. The current study's finding that pain and other symptoms of OA were not associated with the PA outcomes in multivariable modeling does not support the conclusions of the review authors. However, two more recent studies[19, 22] also found no association between arthritis symptoms and PA. A third[12] found that severe, but not moderate, joint pain was associated with physical inactivity. With few of our respondents reporting severe symptoms, the current study was not likely to be able to detect such a difference. Also of note is that only one other study[19] used the WOMAC as a measure of OA symptoms, as done in the current study, and differences among studies could reflect differences in measures of OA symptoms.

Another finding was that almost two-thirds of respondents were meeting the PA recommendation calling for people with arthritis to participate in at least 30 min of moderate-intensity LTPA on at least 3 d/wk.[6, 7] Over half were engaging in stretching exercises or muscle strengthening exercises. The most popular PA was walking for exercise. This finding supports national data from adults aged 55+ y in Australia, for whom walking is the most popular sport and recreational activity.[44] Likewise, the top 10 activities of respondents were within the top 15 for Australians in this age range.[44] These findings suggest that people with mild to moderate symptoms of hip or knee OA are still participating in activities enjoyed by the general population of adults of the same age and thus these activities are appropriate to promote to this population. Few differences were found between men and women, with exceptions reflecting meaningful differences between the sexes in participation of these activities nationally.[44]

The primary limitations of this study were the cross-sectional design and the reliance on self-reported data. However, standard measures with acceptable measurement properties were used whenever possible. The use of a self-report survey to ascertain the diagnosis of OA is of particular note. Members of Arthritis Queensland who had reported to that organization that they had OA were eligible to receive the survey. To decrease potential misclassification, we excluded from analyses data from respondents who did not specify that they had OA of the hip or knee, reported that they did not know when they were diagnosed with OA, or reported that they had not been diagnosed with OA. Although in Australia data on type of arthritis are regularly collected as part of surveillance,[45] the validity of such questions is not known. It is possible that respondents were misclassified as having hip or knee OA when they did not. To assess participation in stretching and strengthening exercises, respondents were asked whether they engaged in these PA. Information on frequency and duration of their participation were not asked

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and thus it was not possible to determine whether respondents were meeting recommendations for participation in these exercises. Also of note is that the 31% response rate was low compared to the 63%–82% response rates obtained in previous studies that mailed questionnaires to people with arthritis.[21, 46] However, comparisons with state and national data indicate that our sample was fairly representative of people with OA in this area. The proportion of men in our sample (40%) is comparable to the proportion of men in Queensland (39%) and in Australian (39%) with self-reported medically-diagnosed osteoarthritis,[1] although our sample was older (30% aged ≥75 y) than representative samples of people with OA (Queensland 20%; Australia 21%).[1] It is also likely that respondents were experiencing more symptoms of OA than was the general population of people with OA, given that nationally, 36% of people with arthritis report that they are taking actions for their condition,[45] whereas 99% of our sample reported using therapies to manage OA symptoms. These findings are not surprising given respondents were members of Arthritis Queensland, which people tend to join once they need support for their condition. Caution is warranted in generalizing the findings to other populations, particularly younger population of people with OA and to people experiencing few, if any, OA symptoms.

Conclusions

Acknowledging the limitations of the cross-sectional design, the findings indicate particular management strategies may ease OA symptoms sufficiently to make PA tolerable for people with hip or knee OA. Promoting these strategies may encourage people with OA to be physically active. The findings also suggest sources of support for engaging in PA and therefore indicate avenues for recruiting people with OA into PA programs. Last, the study adds to the growing body of literature on the correlates of PA for people with arthritis by indicating psychological factors associated with PA behavior in people with hip or knee OA, information that is important

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for developing PA programs tailored to this population. Additional research is required to duplicate these findings in other communities.

Acknowledgements

We are grateful to Bob Ungar, CEO of Arthritis Queensland, and the Arthritis Queensland staff for their help in administering the survey and to the Arthritis Queensland members who provided the survey data. We also thank Prof. Nicolas Bellamy, Director of the Centre of National Research on Disability and Rehabilitation Medicine, The University of Queensland School of Medicine, for the use of the WOMAC Index Likert 3.1 in this study.

Funding Source

This work was supported by a start-up grant to Dr. Heesch from The University of Queensland. Dr. Heesch was supported by a NHMRC program grant in physical activity and health (ID#301200) at The University of Queensland, School of Human Movement Studies. Norman Ng was supported by a University of Queensland postgraduate scholarship.

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Table 1 Demographic and Health-Related Characteristics of the Sample (*N* = 485)

Characteristic	*n*	%
Age (y)[a]		
<65	178	36.7
65-74	162	33.4
75+	145	29.9
Country of birth		
Australia	360	74.2
Other country	125	25.8
Area of residence		
Suburban	285	58.8
Urban	200	41.2
Marital status		
Married/common-law relationship	314	64.7
Never married/separated/divorced	90	18.6
Widowed	81	16.7
Education		
No high school degree	192	39.6
Completed high school	79	16.3
Trade certificate	127	26.2
University degree	87	17.9
Employment status		
Not employed/retired	380	78.4
Employed	105	21.6
Body mass index		
Normal-range weight (BMI < 25)	145	29.9
Overweight (BMI 25 to ≤30)	202	41.6
Obese (BMI > 30)	138	28.5
Number of chronic conditions		
0	74	15.3
1	98	20.2
2	107	22.1
3 or more	206	42.5
Years since osteoarthritis diagnosis		
≥ 5 y	325	67.0
4 to 5 y	65	13.4
≤ 3 y	95	19.6
Number of non-pharmacological therapies using		
0–1	94	19.4
2	90	18.6
3	77	15.9
4 or more	224	46.2
Number of pharmacological therapies using		
0	105	21.6
1	163	33.6
2	127	26.2

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≥3	90	18.61
Meeting physical activity recommendations		
No	174	35.92
Yes	311	64.1
Currently using stretching exercises		3
No	208	42.9
Yes	277	57.14
Currently using strengthening exercises		
No	239	49.35
Yes	246	50.7
		6

Table 2 Physical Activities of Respondents (*N* = 485)

Physical Activities	**Sample *N* = 485**		**Men *n* = 192**		**Women *n* = 293**	
	N	%	*n*	%	*n*	%
Walk for exercise	305	62.9	115	59.9	190	64.8
Aqua-aerobics classes/warm water exercises [a]	94	19.4	17	8.9	77	26.3
Swim	78	16.1	31	16.1	47	16.0
Aerobic/fitness classes [a]	71	14.6	20	10.4	51	17.4
Cycle	63	13.0	27	14.1	36	12.3
Golf [a]	50	10.3	28	14.6	22	7.5
Dance[a]	49	10.1	10	5.2	39	13.3
Yoga[a]	48	9.9	9	4.7	39	13.3
Racquet sports (tennis, squash)	41	8.5	15	7.8	26	8.9
Lawn bowls	39	8.0	17	8.9	22	7.5
Run/jog	30	6.2	12	6.2	18	6.1
Football (soccer, Australian rules, rugby)	24	4.9	8	4.2	16	5.5
Cricket	23	4.7	8	4.2	15	5.1
Basketball/netball	21	4.3	6	3.1	15	5.1
Other physical activities and sports*	11	2.3	3	1.6	8	2.7

*Participants listed bowling, kayaking, table tennis, field hockey, and softball as other activities that they did. [a] $P < 0.05$ for differences between men and women.

Table 3 Multivariable Logistic Regression Results for the Correlates of Meeting Arthritis-Specific Physical Activity Recommendation (*N* = 485)

Characteristics	% Meeting Recommendation	Odds ratio	(95% CI)	p-value
Gender				
Male	64.1%	1.00	(ref.)	
Female	64.2%	0.93	(0.60-1.46)	0.766
Age (y)				
<65	70.8%	1.00	(ref.)	
65-74	66.0%	0.95	(0.57-1.55)	0.804
75+	53.8%	0.75	(0.43-1.31)	0.311
Country of birth				
Australia	63.1%	1.00	(ref.)	
Other country	67.2%	1.14	(0.70-1.85)	0.594
Education				
No high school	58.9%	1.00	(ref.)	
Completed high school	63.3%	0.89	(0.49-1.63)	0.714
Trade certificate	68.5%	1.25	(0.73-2.15)	0.413
University degree	70.1%	0.93	(0.50-1.73)	0.815
PHYSICAL FACTOR				
Body mass index				
Normal-range (BMI<25)	71.7%	1.00	(ref.)	
Overweight (BMI 25 to ≤30)	63.9%	0.67	(0.40-1.13)	0.134
Obese (BMI>30)	56.5%	0.50	(0.27-0.92)	0.025
Cardiovascular disease				
No	74.6%	1.00	(ref.)	
Yes	56.2%	0.52	(0.34-0.81)	0.004
PSYCHOLOGICAL FACTOR				
Self-efficacy		1.15	(0.85-1.55)	0.369
Barriers to physical activity		0.78	(0.56-1.09)	0.147
0A MANAGEMENT				
Efforts to lose weight				
No	59.0%	1.00	(ref.)	
Yes	67.7%	1.84	(1.17-2.90)	0.008
Walking aids				
No	70.6%	1.00	(ref.)	
Yes	43.0%	0.41	(0.25-0.68)	0.001
Hydrotherapy				
No	61.4%	1.00	(ref.)	
Yes	77.8%	2.04	(1.10-3.77)	0.024
Magnet therapy				
No	62.1%	1.00	(ref.)	
Yes	72.3%	1.96	(1.13-3.42)	0.017

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Table 4 Multivariable Logistic Regression Results for the Correlates of Stretching Exercises (*N* = 485)

Characteristics	% Doing Stretching Exercises	Odds ratio	(95% CI)	p-value
Gender				
Male	52.1%	1.00	(ref.)	
Female	60.4%	1.00	(0.63-1.59)	0.986
Age (y)				
<65	59.0%	1.00	(ref.)	
65-74	56.2%	1.23	(0.75-2.02)	0.412
75+	55.9%	1.78	(1.03-3.08)	0.039
Country of birth				
Australia	55.6%	1.00	(ref.)	
Other country	61.6%	1.49	(0.92-2.41)	0.104
Education				
No high school	50.0%	1.00	(ref.)	
Completed high school	58.2%	1.14	(0.62-2.11)	0.676
Trade certificate	56.7%	1.13	(0.66-1.92)	0.664
University degree	72.4%	2.23	(1.16-4.29)	0.017
Hypertension				
No				
Yes		0.50	(0.33-0.77)	0.002
PHYSICAL FACTOR				
WOMAC pain		0.99	(0.94-1.05)	0.838
PSYCHOLOGICAL				
Self-efficacy for physical activity		1.33	(0.97-1.83)	0.075
Benefits to physical activity		1.62	(1.09-2.40)	0.016
0A MANAGEMENT				
Information/education course				
No	49.9%			
Yes	75.0%	1.88	(1.14-3.12)	0.014
Efforts to lose weight				
No	44.0%	1.00	(ref.)	
Yes	66.3%	2.28	(1.47-3.53)	<0.001
Shoes with shock-absorbing properties or orthotics				
No	48.9%	1.00	(ref.)	
Yes	68.1%	1.71	(1.0-2.65)	0.016
Occupational therapy				
No	55.3%	1.00	(ref.)	
Yes	80.0%	1.57	(0.59-4.17)	0.366
Hydrotherapy				

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No	53.2%	1.00	(ref.)	
Yes	76.5%	1.75	(0.91-3.34)	0.093
Transcutaneous electrical nerve stimulation (TENS)				
No	55.5%	1.00	(ref.)	
Yes	75.0%	1.08	(0.43-2.68)	0.873
Heat/cold treatment				
No	50.0%	1.00	(ref.)	
Yes	69.9%	2.04	(1.26-3.30)	0.004
Massage therapy				
No	53.3%	1.00	(ref.)	
Yes	78.4%	2.05	(1.03-4.08)	0.041
Paracetamol				
<4 d/wk	54.8%	1.00	(ref.)	
≥4 d/wk	66.0%	2.09	(1.20-3.65)	0.009

Table 5. Multivariable Logistic Regression Results for the Correlates of Strengthening Exercises (*N* = 485)

Characteristics	% Doing Strengthening Exercises	Odds ratio	(95% CI)	p-value
Gender				
Male	46.4%	1.00	(ref.)	
Female	53.6%	1.07	(0.67-1.72)	0.775
Age (y)				
<65	52.2%	1.00	(ref.)	
65-74	53.1%	1.16	(0.71-1.88)	0.553
75+	46.2%	1.01	(0.58-1.74)	0.982
Country of birth				
Australia	48.1%	1.00	(ref.)	
Other country	58.4%	1.77	(1.09-2.85)	0.020
Education				
No high school	44.8%	1.00	(ref.)	
Completed high school	46.8%	0.84	(0.45-1.54)	0.568
Trade certificate	54.3%	1.20	(0.70-2.04)	0.509
University degree	62.1%	1.53	(0.83-2.82)	0.177
Cancer				
No	54.5%			
Yes	46.1%	1.69	(0.82-3.50)	0.158
Osteoporosis				
No	47.6%	1.00	(ref.)	
Yes	60.9%	1.83	(1.11-3.04)	0.019
PSYCHOLOGICAL				
Self-efficacy for physical activity		1.26	(0.90-1.76)	0.185
Perceived benefits		1.29	(0.88-1.89)	0.192

Perceived barriers		0.69	(0.49-0.97)	0.035
0A MANAGEMENT				
Information/education course				
No	43.5%			
Yes	68.6%	1.84	(1.14-2.97)	0.013
Phone counseling				
No	49.7%			
Yes	77.8%	1.98	(0.56-6.94)	0.287
Efforts to lose weight				
No	35.5%	1.00	(ref.)	
Yes	61.4%	2.42	(1.58-3.70)	<0.001
Shoes with shock-absorbing properties or orthotics				
No	45.3%			
Yes	58.0%	1.21	(0.79-1.86)	0.377
Occupational therapy				
No	48.4%	1.00	(ref.)	
Yes	80.0%	2.75	(1.06-7.15)	0.038
Objects to help with daily living				
No	47.3%			
Yes	58.4%	1.07	(0.67-1.72)	0.777
Massage therapy				
No	47.2%			
Yes	70.3%	1.68	(0.88-3.22)	0.116
Heat/cold treatment				
No	44.6%	1.00	(ref.)	
Yes	61.8%	1.65	(1.05-2.61)	0.031
Hydrotherapy				
No	47.3%			
Yes	67.9%	1.33	(0.74-2.42)	0.343
Paracetamol				
<4 d/wk	48.8%	1.00	(ref.)	
≥4 d/wk	58.0%	1.84	(1.08-3.15)	0.026

1