Determinants of outcome prior to and after total hip and knee arthroplasty

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Chapter VI

Are pain, functional limitations and quality of life associated with objectively measured physical activity in patients with end-stage osteoarthritis of the hip or knee?

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Abstract

Study Design: Cross-sectional cohort study.

Background: Physical activity is promoted in patients with hip or knee osteoarthritis (OA), yet little is known about its relationship with symptoms, functional limitations and Quality of Life (QoL).

Objectives: To examine if OA-associated pain, functional limitations and QoL are associated with objectively measured physical activity in end-stage hip/knee OA.

Methods: Patients scheduled for primary total hip/knee arthroplasty were included. Patients wore an accelerometer (Activ8) with physical activity assessed over waking hours, and expressed as number of activity daily counts (ADC) per hour, %time spent on physical activity i.e. walking, cycling or running (%PA), and %time spent sedentary (%SB). Pain, functional limitations and joint-specific and general QoL were assessed with the Hip disability/Knee Injury and Osteoarthritis Outcome Score (HOOS/KOOS) and the Short Form (SF)-12. Multivariate linear regression models with the three to Z-scores transformed parameters of physical activity as dependent variables and adjusted for confounding, were conducted.

Results: 49 hip and 48 knee OA patients were included. In hip and knee OA patients the mean number of ADC, %PA and %SB were 18.79±7.25 and 21.19±6.16, 14±6.4 and 15±5.0, and 66±10.5 and 68±8.7, respectively. In hip OA, better joint-specific and general QoL were associated with more ADC, (β0.028; 95%CI:0.007–0.048, β0.041; 95%CI:0.010–0.071). Also, better general QoL was associated with the %PA (β 0.040, 95%CI:0.007–0.073). No other associations were found.

Conclusion: Whereas QoL was associated with physical activity in hip OA, pain and functional limitations were not related to objectively measured physical activity in patients with end-stage hip or knee OA.

Introduction

Osteoarthritis (OA) of the hip or knee joint is among the most common musculoskeletal conditions in adults worldwide, in particular in the elderly. Given the associated pain and functional limitations in daily life, it is a major health problem for individuals as well as society (1). The impact of OA on patients' functioning is usually measured in terms of limitations in specific daily activities such as taking a shower, dressing oneself, or preparing meals or performance-based methods such as the 6-minute walk test (2), whereas less is known on how OA affects the amount of actual everyday physical activity. Physical activity is an important factor to maintain health and function as it contributes to the prevention of disease and has beneficial effects on bones, joints and muscles (3, 4)

Previously, it was suggested that patients with lower limb OA avoid physical activities due to the associated pain and pain cognitions (5, 6). Pain and pain cognitions were suggested to serve as an obstacle to engage in physical activity, even though such activities are important in managing pain and disability (6). Indeed, several previous studies showed that perceived hip and knee related pain was associated with perceived physical activity (7, 8). However, perceived physical activity may not correspond with objectively measured physical activity levels (9, 10). This was illustrated by a study in hip or knee OA patients, showing that perceived physical activity as measured by PASIPD (Physical Activity Scale for Individuals with Physical Disabilities), increased over 200% after surgery, whereas only minor improvements were seen with objectively measured physical activity (9). Whether perceived hip or knee related pain and physical functioning are associated with objectively measured physical activity has been investigated in a number of studies (11-21). These studies had contradictive outcomes, presumably due to the heterogeneity in study populations and the used physical activity outcome measures. Moreover, none of the studies investigated whether patients' perception of QoL was related to the actual amount of objectively measured physical activity. This is important, as in the general population, perceived QoL was found to be a facilitator and motivator for the perceived amount of physical activity (22-24). As such, QoL is a

potential target for interventions to maintain or improve physical activity in patients with severe hip or knee osteoarthritis.

Given the scarcity of knowledge and contradictive results, the aim of the present study was to examine to what extent OA-associated pain, functional limitations and joint-specific and general QoL are associated with objectively measured physical activity in end-stage hip/knee OA.

Methods

Study Design

The present cross-sectional analysis of data from a cohort study included a subgroup of participants of the Longitudinal Leiden Orthopaedics Outcomes of Osteo-Arthritis Study (LOAS) (Trial ID NTR3348). For the present analysis, only preoperative data were used. The LOAS started in 2012 and is an ongoing multicentre (7 hospitals) study on the long-term outcomes of Total Hip or Knee Arthroplasty (THA or TKA). The current study included study participants from the Leiden University Medical Center (LUMC), Leiden; the Alrijne Ziekenhuis, Leiderdorp; and the Albert Schweitzer Hospital, Dordrecht. Approval from the Medical Ethics Committee of the LUMC (ID 12.047) and all local research review boards was obtained for this physical activity study as part of the larger study. All patients provided written informed consent, both for the larger study and the physical activity study separately. Funding was received from the Dutch Arthritis Foundation (LLP13).

Patients

All patients scheduled for primary THA or TKA, who were physically and mentally able to complete questionnaires in Dutch and were 18 years or older, were eligible to participate in the LOAS study. Eligible patients were informed about the study by their treating medical specialist and, if they agreed, approached by the study coordinator. Between October 2013 and October 2014, all patients who (i) provided written informed consent for the LOAS study, (ii) were treated in one of the designated hospitals and (iii) were at least 2 weeks prior to surgery, were subsequently approached

for the physical activity study. Patients who agreed to participate and provided written informed consent for the physical activity study were sent an activity monitor (accelerometer, Activ8) together with material for attachment and instructions, an information leaflet, physical activity diary and a pre-stamped return envelope. Excluded were patients (1) who refused participation after receiving the activity monitor, (2) of whom the accelerometer data were unavailable due to measurement errors or empty batteries and (3) of whom the surgery was cancelled, mostly because of improvement of pain or being accidentally placed on the surgical list.

Assessments

Physical activity

Physical activity was measured using the Activ8 Professional accelerometer, Remedy Distribution Ltd, Valkenswaard, the Netherlands, which is a recently validated, three-axis accelerometer, able to register 6 different activity categories (lying down, sitting, standing, walking, cycling and running) and the levels of physical activity in activity counts (in total and per activity category) (Horemans et al, The Activ8 Activity Monitor: validation of posture and movement classification, submitted). Data are stored in 5-minute epochs showing the duration of time spent on each activity category (seconds), as well as the levels of physical activity per activity category expressed in activity counts. Patients were instructed to (a) place the device (20 gram, 30x30x10 mm) halfway the front side of the upper leg between the hip and the knee (fixated with Tegaderm waterproof transparent dressing), (b) wear the monitor 24 hours a day and (c) wear the monitor at least 5 and at most 7 consecutive days including two weekend days. In addition, patients were asked to complete an activity diary in which predefined activity categories (i.e. lying down, standing, sitting, walking, running, cycling) had to be filled in hourly for as long as they wore the activity monitor. The activity diary was used to determine sleeping periods to easily exclude data measured during night-time. Patients with insufficient data due to measurement errors, empty batteries, less than 5 measurement days or incomplete physical activity diaries were excluded from the analysis.

Data from the accelerometer were summarized into three outcome parameters, calculated over wake time periods:

1) Mean levels of physical activity per hour, defined as the mean amount of hourly activity daily counts (ADC)
2) Percentage time spent on physical activity, defined as the time spent in the categories walking, cycling or running (%PA).
3) Percentage time spent on sedentary behaviour, defined as the time spent lying down or sitting (%SB).

Patient characteristics, comorbidities and clinical characteristics
Patient characteristics, comorbidities and clinical characteristics were collected by means of questionnaires.

Patient characteristics
Patient characteristics included: age, sex, length and weight to calculate Body Mass Index (BMI) and use of pain medication (yes/no).

Comorbidities
Information on the presence of comorbidities in the previous year was gathered by a comorbidity questionnaire developed by the Dutch Central Bureau of Statistics (CBS) (25). These comorbidities were classified in two domains: musculoskeletal comorbidities (severe elbow, wrist or hand pain; back pain; other rheumatic diseases) and non-musculoskeletal comorbidities (chronic lung diseases; cardiac disorder or coronary disease; arteriosclerosis; hypertension; (consequences of) stroke; severe bowel disorder; diabetes mellitus; migraine; psoriasis; chronic eczema; cancer; incontinence of urine; hearing or vision impairments; dizziness in combination with falling) (25).

Pain, functional limitations and joint specific Quality of Life
The Hip disability and Osteoarthritis Outcome Score (HOOS) and Knee injury and Osteoarthritis Outcome Score (KOOS) are joint specific questionnaires (26, 27). 12A normalized score (100 indicating no symptoms and 0 indicating extreme symptoms) was calculated for each subscale (28). The pain, ADL and joint specific QoL subscales were used to assess pain, functional limitations and joint-specific quality of life.

Health related Quality of Life (QoL)
Quality of life (HrQoL) was assessed with the Short Form-12 (SF12) Physical Component Score (PCS) and Mental Component Score MCS) (29, 30).

Statistical Analysis
All analyses were done for patients with hip and knee OA separately. First, student's unpaired T-tests (continuous, normally distributed data), Mann-Whitney-U-tests (continuous, not normally distributed data) and Chi-squared tests (categorical data) were used to compare the patient characteristics, pain, functional limitations and QoL of included and non-included patients.

Univariate and multivariate (adjustment for age, gender, BMI, the presence of comorbidities) linear regression analyses were performed to examine the associations between pain, function, QoL and physical activity outcomes. The three physical activity outcomes (mean levels of physical activity (ADC), percentage of time spent on physical activity (%PA), percentage of time spent on sedentary behaviour (%SB) were standardized into z-scores to improve comparisons of outcomes. A z-score is a number representing the amount of standard deviations below or above the population mean. Z-scores range from -3 up to +3 standard deviations. The z-score formula is $z = (x - \mu) / \sigma$.

Results

Patients
Of the 408 patients who were eligible and invited for the physical activity study (192 Hip OA patients (47%) and 216 Knee OA patients (53%)), 121 patients (58 hip (30%) and 63 knee (29%)) were willing and able to participate. Due to measurement errors, empty batteries, subsequent refusal of participation or cancelled surgery, data from 97 patients (49 hip and 48 knee patients) were available (Figure 1).

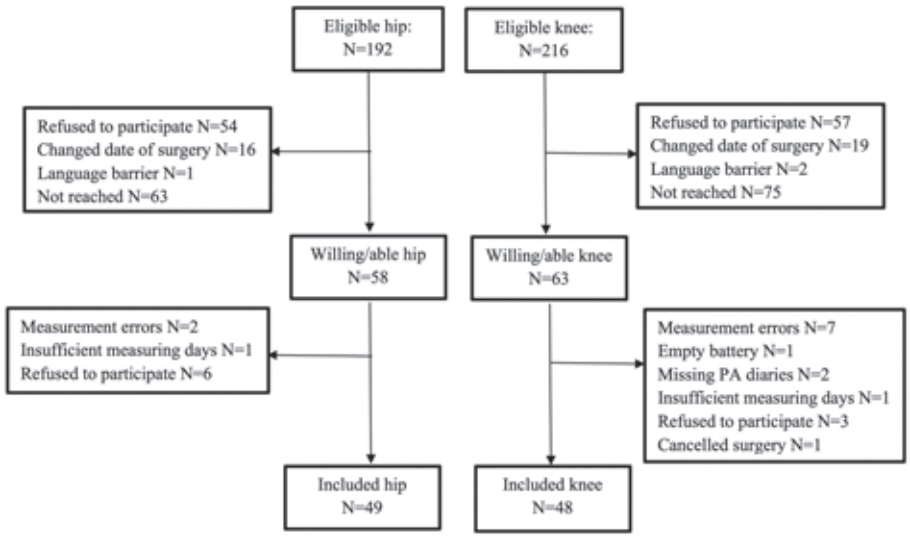

Figure 1. Flow chart of patient enrolment

Comparison of patient characteristics of eligible patients with participating patients showed no differences except that non-participating patients with hip OA reported more pain as compared to participating patients with hip OA (supplementary table).

The characteristics of the patients with hip and knee OA are described in Table 1. Hip and knee OA patients had a mean age of 66 (SD 9.1) and 68 (SD 7.3) years and most patients were female (approximately 63%).

Physical activity

Physical activity outcomes are shown in Table 2. For the total group (patients with hip and knee OA) the median number of days the accelerometer was worn was 6 (range 5-7). Hip and knee OA patients spent on average 14% (SD 6.4) and 15% (SD 5.0) of their time during waking hours on physical activity, respectively. Moreover, on average 66% (SD 10.5) and 68% (SD 8.7) of their time during waking hours was spent on sedentary behaviour, respectively. The remaining time during waking hours (approximately 20%) was spent on standing.

In patients with hip OA, HrQoL (SF12 PCS) was positively associated with levels of physical activity and percentage time spent on physical activity (table 3). In addition, joint specific QoL (KOOS QoL) was positively

associated with levels of physical activity. These effects remained after adjusting for age, sex, BMI and comorbidities in multivariate analysis. Pain and functional limitations were not associated with levels of physical activity, percentage time spent on physical activity nor with sedentary behaviour.

Table 1. Patient characteristics, hip and knee pain, functional limitations and quality of life (QoL) of all included patients and patients with hip and knee OA separately

	All patients (n=97)	**Hip OA (n=49)**	**Knee OA (n=48)**
Age, years; mean (SD)	67 (8.3)	66 (9.1)	68 (7.3)
Gender (n=94), male; n (%)	35 (37)	18 (38)	17 (37)
Body Mass Index (n=95); mean (SD)	29 (5.3)	28 (4.7)	30 (5.8)
Non-musculoskeletal comorbidities†; n (%)	80 (83)	39 (80)	41 (85)
Musculoskeletal comorbidities† (n=95); n (%)	53 (55)	19 (49)	34 (58)
Pain medication (n=95), n (%)	71 (73)	39 (81)	32 (68)
HOOS or KOOS; mean (SD)			
Pain (n=79)	38 (18.0)	33 (17.8)	43 (14.5)
Symptoms (n=80)	41 (16.9)	35 (16.0)	48 (14.9)
Functional limitations (n=86)	46 (22.2)	44 (24.8)	50 (18.0)
Sport/Recreation (n=90)	14 (15.2)	15 (16.9)	12 (13.2)
QoL (n=93)	26 (13.6)	25 (14.3)	28 (12.8)
SF12 Physical Component Score (n=90); mean (SD)	35 (9.7)	32 (9.3)	35 (10.0)
SF12 Mental Component Score (n=90); mean (SD)	56 (10.1)	56 (10.5)	56 (9.9)

† Presence of one or more co-morbidities as determined by a questionnaire including 22 comorbidities.
HOOS/KOOS = Hip disability and Osteoarthritis Outcome Score/Knee injury and Osteoarthritis Outcome Score
SF12 = Short-Form 12

Table 2. Physical activity of all patients and patients with hip and knee OA separately

	All patients (n=97)	**Hip OA (n=49)**	**Knee OA (n=48)**
Activity Monitor			
Hours that patients were awake/day; mean (SD)	15 (1.1)	15 (1.1)	15 (1.1)
Levels of physical activity/hours; mean (SD)	19978 (6807)	18787 (7247)	21193 (6164)
Percentage time spent on physical activity/ hours awake; mean% (SD)	15 (6.8)	14 (6.4)	15 (5.0)
Percentage time spent on sedentary behaviour/hours awake; mean% (SD)	67 (9.6)	66 (10.5)	68 (8.7)

OA = Osteoarthritis

In patients with knee OA, after adjusting for confounding factors no associations were found for pain, joint specific QoL or HrQOL with physical activity outcomes (table 3).

Table 3. Standardised@ accelerometer levels of activity and self-reported joint pain, functional limitations and QoL in end stage hip and knee OA patients.

	Levels physical activity; β (95% CI)		**Percentage time spent on physical activity ; β (95% CI)**		**Percentage time spent on sedentary behaviour; β (95% CI)**	
Hip OA	Univariate analyses	Multivariate analyses#	Univariate analyses	Multivariate analyses#	Univariate analyses	Multivariate analyses#
HOOS						
Pain	0.012 (-0.001 – 0.032)	0.016 (-0.003 – 0.036)	0.013 (-0.008 – 0.033)	0.018 (-0.003 – 0.039)	<0.0001 (-0.20 – 0.20)	-0.005 (-0.025 – 0.016)
Symptoms	0.009 (-0.012 – 0.031)	0.016 (-0.003 – 0.036)	0.009 (-0.013 – 0.032)	0.016 (-0.005 – 0.037)	-0.004 (-0.026 – 0.018)	-0.009 (-0.030 – 0.011)
Functional limitations	0.005 (-0.007 – 0.018)	0.008 (-0.004 – 0.021)	0.004 (-0.009 – 0.017)	0.007 (-0.007 – 0.020)	0.000 (-0.013 – 0.013)	-0.003 (-0.016 – 0.011)
Sport	0.001 (-0.018 – 0.021)	0.003 (-0.017 – 0.024)	0.001 (-0.019 – 0.021)	0.003 (-0.019 – 0.025)	-0.001 (-0.021 – 0.018)	-0.003 (-0.024 – 0.018)
QoL	0.023 (0.002 – 0.044)*	0.028 (0.007 – 0.048)*	0.014 (-0.009 – 0.037)	0.018 (-0.005 – 0.041)	-0.006 (-0.029 – 0.017)	-0.006 (-0.029 – 0.017)
SF-12 PCS	0.041 (0.009 – 0.073)*	0.041 (0.010 – 0.071)*	0.040 (0.007 – 0.073)*	0.040 (0.007 – 0.073)*	-0.029 (-0.064 – 0.005)	-0.032 (-0.065 – 0.000)
SF-12 MCS	0.012 (-0.018 – 0.043)	0.013 (-0.016 – 0.042)	0.023 (-0.008 – 0.053)	0.023 (-0.007 – 0.053)	-0.003 (-0.035 – 0.028)	-0.003 (-0.033 – 0.027)
Knee OA						
KOOS						
Pain	0.014 (-0.007 – 0.036)	-0.001 (-0.022 – 0.020)	0.007 (-0.014 – 0.028)	-0.007 (-0.029 – 0.014)	0.001 (-0.020 – 0.022)	0.009 (-0.013 – 0.032)
Symptoms	0.014 (-0.007 – 0.034)	0.001 (-0.020 – 0.021)	0.018 (-0.002 – 0.038)	0.008 (-0.013 – 0.028)	-0.004 (-0.024 – 0.017)	0.004 (-0.018 – 0.026)
Functional limitations	0.021 (0.005 – 0.037)*	0.004 (-0.016 – 0.023)	0.017 (0.001 – 0.033)*	0.002 (-0.018 – 0.022)	-0.006 (-0.023 – 0.011)	0.006 (-0.015 – 0.027)
Sport	0.018 (-0.003 – 0.039)	0.012 (-0.009 – 0.034)	0.010 (-0.011 – 0.031)	0.004 (-0.017 – 0.026)	-0.003 (-0.024 – 0.018)	-0.003 (-0.025 – 0.020)
QoL	0.017 (-0.004 – 0.038)	0.005 (-0.017 – 0.026)	0.013 (-0.008 – 0.033)	0.002 (-0.020 – 0.024)	-0.002 (-0.023 – 0.020)	0.006 (-0.016 – 0.028)
SF-12 PCS	0.027 (-0.001 – 0.054)	0.018 (-0.008 – 0.044)	0.018 (-0.009 – 0.045)	0.010 (-0.017 – 0.036)	-0.010 (-0.038 – 0.018)	-0.004 (-0.031 – 0.023)
SF-12 MCS	0.002 (-0.027 – 0.031)	-0.010 (-0.037 – 0.017)	0.003 (-0.025 – 0.031)	-0.008 (-0.035 – 0.020)	0.000 (-0.029 – 0.029)	0.011 (-0.017 – 0.039)

HOOS/KOOS = Hip disability and Osteoarthritis Outcome Score/Knee injury and Osteoarthritis Outcome Score
Levels physical activity = Mean amount of hourly activity counts during the hours patients were awake
Percentage time spent on physical activity = Time spent in the categories walking, cycling or running as a percentage of total wear time
Percentage time spent on sedentary behaviour = Time spent lying down or sitting as a percentage of total wear time
SF-12 = Short-Form 12; SF-12 PCS = Physical Component Score of the Short-Form 12; SF12-MCS = Mental Component Score of the Short-Form 12.
OA = Osteoarthritis
QoL = Quality of Life
@; Activity counts and percentages are standardised to z-scores ($z = (x - \mu) / \sigma$)
* = $P < 0.05$; # Adjusted for age, sex, BMI and comorbidities

Discussion

In this cross-sectional analysis of patients with end-stage hip and knee OA scheduled for THA or TKA, joint pain and functional limitations did not show any association with objectively measured physical activity; QoL was associated with accelerometer-measured parameters of physical activity only in hip OA patients.

The finding that joint-specific pain or functional limitations were not associated with physical activity as measured with an accelerometer in end-stage OA is in accordance with three previous studies (12, 16, 20), but is contradictory to one other study (31). The study that showed that patient-reported "more pain" was associated with reduced physical activity levels in patients with end-stage lower limb OA included selected patients (solely women with moderate pain who were highly educated) limiting the generalizability of conclusions (31). However, comparison with these previous studies is hampered due to different types of accelerometers used, varying accelerometer outcome measures and variation in the number of measured-days.

The absence of an association between joint pain or joint-related functional limitations with objectively measured physical activity may be related to physical activity being more related to a general lifestyle and overall health than to specific health problems. Indeed, previous studies in TKA patients as well as the general population showed that physical activity was associated with lifestyle, socioeconomic status, general health and health-related utility, the latter being closely related to QoL (12, 32, 33). Indeed, in our study physical activity was associated with QoL in THA patients, but not in TKA patients, although the association in the latter group pointed into the same direction.

Moreover, the absence of a relationship between pain or functional limitations and objectively measured physical activity could also be related to intentionally retained physical activity levels. Activities which are part of regular human behaviour like washing oneself, cleaning, cooking or shopping may still need to be performed despite symptoms

(20). In addition, international evidence-based guidelines for hip and knee OA recommend conservative treatment including physiotherapy, for hip and knee OA in general, or specifically prior to surgery, in order to improve functional recovery. Therefore, some patients with perceived severe pain and functional disability could have retained their physical activity levels in order to reduce their symptoms or improve their overall health to be optimally prepared for a surgical treatment (20, 34). This is supported by the time spent on sedentary behaviour in our population (on average 66-68% of waking hours/day), which is comparable with subjects of the same age in the general United States population (i.e. 60%), suggesting that in patients with end-stage OA time spent on sedentary behaviours is not increased (35). Besides, the observed variation in physical activity levels could be a result of the differences in physical activity due to a natural variation in daily physical behaviour. In the general population the amount of physical activity varies largely among individuals, due to several determinants and variation in daily physical behaviour (36). Lastly, the absence of an association may be caused by inaccurate outcome measures. The distribution of activities over the day, the momentary duration of activities or other activity-related measures such as step count and step length could be more affected by perceived pain and functional limitations than the total amount of physical activity or the percentages time spent on physical activity/sedentary behaviour. As such, patients with high perceived pain and functional limitations could have spent the same time on physical activity, yet accomplished fewer results as measured by step count or step length due to the pain and functional limitations.

The present study has several strengths and limitations. Strengths of our study are, that we differentiated between levels of physical activity and time spent on certain activities such as sedentary behaviour as outcome measures (16). Furthermore, we used a relatively small accelerometer with assumable little discomfort for the patients, measured physical activity 24 hours during a minimum of five days and included at least two weekend days which made our data representative for everyday life activities (37).

Limitations include the relatively small sample sizes of hip and knee OA patients, although the participating and non-participating patients were comparable with respect to baseline characteristics (supplementary table). Secondly, the used accelerometer expresses energy expenditure as ADC-counts, whereas a Metabolic Equivalent Task (MET) was more often used in previous studies, which makes our results more difficult to interpret (38, 39). In addition, differences in physical activity over time could not be identified due the cross-sectional design of the current study. Yet, over time, pain and functional limitations could still be associated with physical activity. Besides, objectively measured physical activity was found to increase less than expected after THA or TKA (9, 40, 41). Pain is among the most important reasons for patients to undergo surgery. As pain is not associated with physical activity levels, it is unlikely that the amount of physical activity increases after surgery. This is important to address in the preoperative consultation to improve expectations of postoperative physical activity levels (9).

Conclusion

In conclusion, joint pain and functional limitations were not associated with physical activity as measured with an accelerometer measured in neither hip nor knee OA patients. In hip OA patients QoL was associated with objectively measured physical activity. Our results emphasize that, as they appear to be different constructs, actual physical activity could be encouraged despite perceived pain or functional limitations. For that matter, our conclusions are important to address in the preoperative consultation. As pain and objective physical activity are not associated, it is not to be expected that physical activity levels increase after total hip or knee arthroplasty.

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Supplementary table. Patient characteristics, hip and knee pain, functional limitations and quality of life of all included patients and patients with hip and knee OA separately

	Included hip OA (N=49)	Non-participant hip OA (N=73)	p-value	Included knee OA (N=48)	Non-participant knee OA (N=75)	p-value
Age, years; mean (SD)	66 (9.1)	68 (10.4)	0.30	68 (7.3)	68 (8.6)	0.88
Gender, male; n (%)	18 (38)	32 (45)	0.39	17 (37)	31 (41)	0.42
Body Mass Index; mean (SD)	28 (4.7)	26 (3.4)	0.09	30 (5.8)	29 (4.5)	0.25
Non-musculoskeletal comorbidities; n (%)	39 (80)	41 (63)	0.21	41 (85)	31 (78)	0.87
Musculoskeletal comorbidities; n (%)	19 (49)	38 (60)	0.29	34 (58)	18 (49)	0.34
HOOS or KOOS; mean (SD)						
Pain	33 (17.8)	41 (18.0)	0.03*	43 (14.5)	40 (20.3)	0.51
Symptoms	35 (16.0)	41 (19.4)	0.10	48 (14.9)	51 (22.4)	0.30
Functional limitations	44 (24.8)	43 (20.8)	0.97	50 (18.0)	47 (21.1)	0.49
Sport/Rec	15 (16.9)	20 (22.0)	0.20	12 (13.2)	12 (18.1)	0.84
QoL	25 (14.3)	27 (15.5)	0.45	28 (12.8)	28 (16.4)	0.88
SF12 Physical Component Score; mean (SD)	32 (9.3)	32 (8.9)	0.79	35 (10.0)	34 (9.5)	0.74
SF12 Mental Component Score; mean (SD)	56 (10.5)	55 (10.1)	0.65	56 (9.9)	56 (8.9)	0.98

P-value is based on the difference between hip OA and knee OA
* Significance level < 0.1
HOOS/KOOS = Hip disability and Osteoarthritis Outcome Score/Knee injury and Osteoarthritis Outcome Score, range 0-100 points
SF 12 = Short-Form 12, range 0-100 points.