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## TITLE PAGE

**Short Title:** Who seeks physiotherapy or exercise treatment for hip and knee osteoarthritis? A cross-sectional analysis of the English Longitudinal Study of Ageing cohort.

**Running Title:** Uptake of physiotherapy for hip and knee OA

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**Data Statement:** All data is available through the UK Datalink. Access to the dataset used in this analysis can be sought through the corresponding author via the UK Datalink service.

## **ABSTRACT**

**OBJECTIVES:** To determine the characteristics of individuals with hip and/or knee osteoarthritis who are recommended to seek physiotherapy or exercise treatment, and to explore which people are more or less likely to follow such recommendations.

**METHODS:** All data were obtained from Wave 4 of the English Longitudinal Study of (ELSA) cohort (2008-2009), a prospectively collected community-based dataset. Eligibility was justified by a patient-reported diagnosis of hip and/or knee osteoarthritis with a visual analogue scale (VAS) pain score of one or above. Data were collected from a self-completed questionnaire and nurse assessment visit. Prevalence of being recommended to physiotherapy or exercise (or not) and then the actioning of this recommendation (or not) were calculated and presented as 95% confidence intervals (CI). Data on characteristics of those recommended (or not) were explored using univariate analyses and then a forward selection logistic regression model.

**RESULTS:** In total, 1262 and 1877 individuals with hip and/or knee osteoarthritis pain were analysed. This included 41% (95% CI: 0.38 to 0.44) who had been recommended to seek physiotherapy or exercise treatment. Subsequently, 83% of those recommended sought these treatments. Individuals who presented with isolated knee pain, those who reported 'fair' self-reported general health and were younger had a greater chance of being recommended for physiotherapy or exercise treatment respectively ( $P \leq 0.02$ ).

**CONCLUSION:** Encouragement should be given to formal and informal care providers of older people to highlight this inequality. This may then improve current and future access to evidence-based treatments for this population.

**KEYWORDS:** Degenerative joint; rehabilitation; exercise therapy; non-surgical; referral patterns; access

## INTRODUCTION

Osteoarthritis is a disabling musculoskeletal disease which poses a significant impact on those who have the disease and society.<sup>1</sup> It is associated with pain, reduced function, independence and decreased quality of life.<sup>2</sup> In developed countries, the resultant socioeconomic burden has been estimated to be between 1% and 2.5% of gross domestic product.<sup>3</sup> Current recommendations for treatment are centred on education and exercise, pharmacological support and weight loss if overweight or obese, with end-stage management being joint replacement.<sup>4,5,6</sup> Exercise should be a core component of non-pharmacological management in combination with information and education on osteoarthritis.<sup>4,6</sup>

Little research has been presented exploring the factors associated with who is referred or recommended to seek physiotherapy for chronic musculoskeletal conditions. Previous data has indicated that a number of variables are significantly associated with patient adherence to physiotherapy once treatment has commenced. Opseth et al<sup>7</sup> reported that patient perception of their own poor general health was significantly associated with regular attendance to physiotherapy, but reported that factors such as age, gender, education and employment status were not associated with adherence in physiotherapy. Similarly, Al-Eisa's<sup>8</sup> clinical audit of physiotherapy attendance for individuals with low back pain reported that older age, higher initial pain intensity and subjective reports of importance to their condition were significant factors to repeat adherence to physiotherapy. Lyngcolm et al<sup>9</sup> reported that subjective and objective indicators for improvement in hand function were also significant predictors to attend hand therapy in people following distal radius fracture.

Given the current and projected burden which osteoarthritis has on primary and secondary care services,<sup>3</sup> opportunities to improve the management for this population have relevance for both patients and service providers. Understanding the characteristics of people who are and are not recommended to seek physiotherapy treatment is important to provide opportunities for individuals to maintain or increase independence and quality of life. Such analyses have not been previously reported in the literature.

The purpose of this study was therefore primarily to determine the characteristics of individuals with hip and/or knee osteoarthritis who are recommended to seek physiotherapy or exercise treatment

compared to those who are not, and secondly to explore which people are more or less likely to follow such recommendations and seek physiotherapy or exercise treatment.

## **METHODS**

This cross-sectional study has been reported in accordance with the Strengthening the Reporting of Observational studies in Epidemiology (STROBE) reporting guidelines.<sup>10</sup>

### Cohort

Data were taken from the English Longitudinal Study of Ageing (ELSA). This is a nationally representative, prospective, population-based cohort study consisting of 11,391 adults aged 50 years and older living in England.<sup>11</sup> The cohort commenced in 2002 and has been subsequently followed every two years.

Ethical approval was obtained from the London Multi-Centre Research Ethics Service (MREC/01/2/91) and written informed consent obtained from all participants. The UK Data Service provided anonymised unlinked data for this study.

### Participants

Participants were eligible if they reported a diagnosis of hip and/or knee osteoarthritis with a visual analogue scale (VAS) pain score of one or more and responded to the question as to whether physiotherapy or exercise had been recommended for their osteoarthritic symptoms.

### Data Collection

All data were obtained from Wave 4 of the ELSA cohort (2008-2009). Data were collected from a self-completed questionnaire and nurse assessment visit where objective measures of anthropometric characteristics and physical function.

### Dependent variables

To assess whether participants were recommended physiotherapy, the question 'has physiotherapy or exercise treatment been recommended to you for your hip or knee osteoarthritis' was assessed. Participants were also asked whether they had taken-up these treatment recommendations and sought advice from a physiotherapist or exercise professional.

### Covariates

Covariates included were: participant age, gender, ethnic classification (defined in ELSA as: white/non-white), whether participants were in paid work or not, whether they had access to a car and National Statistics-Socio-Economic Classification scheme status (NS-SEC) which is a validated measure of an individual's social position determined using the nature of their employment.<sup>12</sup> Self-reported health status was also recorded.

Pain measurements included: hip and knee VAS pain score, duration of hip and/or knee osteoarthritis. Location of osteoarthritis was categorised as isolated hip, isolated knee or hip and knee osteoarthritis.

Physical activity participation was determined using the self-reported ELSA physical activity questionnaire (ELSA-PAQ) where participants were asked how often they engaged in vigorous, moderate or mild physical activity.<sup>13,14</sup> This valid method has been previously used to determine the level of physical activity participation undertaken by older people.<sup>13,14,15</sup>

Cognitive status was evaluated using the ELSA index of executive function.<sup>11</sup> This is based on two brief tests of executive function: verbal fluency and letter cancellation. These have demonstrated reliability and validity in assessing executive function.<sup>16,17,18</sup>

Objectively measured physical function was assessed during the nurse assessment visit. These included data on gait speed with an eight-foot (2.4 m) walking test performed at normal walking pace and timed chair raises to complete five and 10 chair raises.

Impairment of activities of daily living was assessed when participants were asked to report the level of impairment for 18 personal and extended activities of daily living<sup>11</sup> as itemised in **Table 1**.

### Data Analysis

Demographic characteristics were reported with mean and standard deviation values and frequencies for whether physiotherapy or exercise treatment were recommended to participants and up-take was determined. Initially, the frequency and characteristics of those who were recommended to attend physiotherapy or exercise therapy and those who were not were compared. The prevalence for not being recommended for physiotherapy or exercise treatment and for not following this recommendation was calculated with 95% confidence intervals (CI).

Data were analysed for the model using a forward selection logistic regression model. Firstly, data distribution was assessed using the Shapiro-Wilks test. This indicated normality for each analysis undertaken. An assessment for potential association between candidate variables comparing whether individuals were recommended to attend physiotherapy or not was determined using a univariate analysis. Using these results, candidate variables which demonstrated a  $P \leq 0.10$  were selected for inclusion in a binary logistic regression analyses. Data were presented as odds ratio (OR) and 95% CI and p-values. For the final logistic regression model, cases of  $P < 0.05$  denoted statistical significance. All analyses were performed in STATA version 13.0 (StataCorp LLC, Texas, USA).

## RESULTS

As presented in **Figure 1**, 11,391 participants from Wave 4 of the ELSA cohort were screened for initial data on an osteoarthritis diagnosis and pain status. Consequently, 9057 participants were excluded where there were no data. Where there were data, 1262 and 1877 reported hip and knee osteoarthritis pain respectively. From this cohort, 947 participants reported whether they had been recommended physiotherapy or exercise treatment or not. This included 387 (40.9%; 95% CI: 0.378 to 0.440) who had been recommended to seek physiotherapy or exercise, and 560 (59.1%; 95% CI: 0.560 to 0.622) who were not recommended physiotherapy or exercise. Subsequently, 83% of those who were recommended to seek physiotherapy or exercise therapy reported that they acted on this recommendation (**Table 1**).

The characteristics of the two groups are presented in **Table 1**. As this demonstrates, those recommended to physiotherapy or exercise treatment were younger (64.6 years versus 68.6 years;  $p < 0.001$ ), less frequently female (65.6% versus 72.5%;  $p < 0.001$ ) and a greater proportion had isolated

knee osteoarthritis (71.3% versus 54.6%;  $p < 0.001$ ). There was a greater proportion of patients recommended for physiotherapy in managerial and professional occupations (25.8% versus 22.9%;  $p = 0.060$ ), but a smaller proportion employed by small employers or in own account work (self-employed) (8.8% versus 11.4%;  $p = 0.003$ ), lower supervisory and technical occupations (10.1% versus 10.4%;  $p = 0.055$ ) or semi-routine and routine occupations (38.8% versus 41.4%;  $p < 0.001$ ).

Patients who were recommended for physiotherapy or exercise had a greater frequency of 'fair' self-reported health (37.7% versus 34.5%;  $p = 0.002$ ). A greater proportion of patients recommended for physiotherapy had a duration of hip osteoarthritis equal or longer than 12 months (96.4% versus 90.9%;  $p = 0.073$ ). There was a greater proportion of patients recommended for physiotherapy with a duration of knee osteoarthritis from six to 12 months (0.9% versus 5.6%;  $p = 0.055$ ); this was not statistically significant for any other time-point. The only activities of daily living which were reported as impaired to a different frequency between the groups were stooping, kneeling or crouching (39.3% versus 34.5%;  $p = 0.130$ ) and dressing ability (15.0% versus 11.3%;  $p = 0.090$ ). There was no significant difference between the groups for any other variable (**Table 1**).

When these variables were included in the logistic regression model (**Table 2**), age, location of osteoarthritis and self-reported health were significant factors determining whether people were recommended to physiotherapy or exercise or not. Those who were younger had a 5% greater chance of being recommended for physiotherapy or exercise (OR: 1.05; 95% CI: 1.03 to 1.07). Those with isolated knee pain had a 65% greater chance of being recommended physiotherapy (OR: 1.65; 95% CI: 1.39 to 1.96). Those with lower self-reported general health had a 55% greater chance of being recommended for physiotherapy or exercise (OR: 0.45; 95% CI: 0.23 to 0.87) compared to those with greater self-reported health. There was no significant relationship between gender, ethnicity, NC-SEC 5 category, duration of hip or knee pain or inability to stoop, kneel or crouch or dress, between those who were recommended compared to those who were not recommended to physiotherapy or exercise (**Table 2**).

## DISCUSSION

These findings indicate that of people who have a clinical indication for physiotherapy or exercise treatment with hip and/or knee osteoarthritis, only 41% of individuals are recommended these interventions. Those who were more likely to be recommended to physiotherapy or exercise



treatment were younger individuals, those with isolated knee pain and those with poorer self-reported general health. There is therefore a health inequality where those who are older, have multiple joint pain but better self-reported health, are less likely to be recommended physiotherapy or exercise treatment regarding their hip or knee osteoarthritis. This is the first paper to report the frequency and characteristics of individuals recommended to physiotherapy and whether they action this or not. Accordingly highlighting this inequality and addressing this challenge through increased awareness and publication across primary and secondary care services is warranted.

Perceptions and health beliefs towards osteoarthritis should be considered when interpreting these findings. Previous literature has suggested that some people with osteoarthritis have negative perceptions to non-operative management, feeling that their symptoms are part of the 'ageing' process and that non-operative interventions such as physiotherapy are of little benefit.<sup>19</sup> With such a health belief, recommendations and subsequent action to seek physiotherapy may be perceived as less important, which may account in part for some of these findings. Health professionals should therefore be encouraged to provide education and information on the value of evidence-based exercise and physiotherapy interventions to patients with osteoarthritis. Should a recommendation may help increase the awareness of potentially beneficial interventions to patients and also increase the likelihood of acting such recommendations once a patients has left such a consultation.

It was possible to analyse a variety of different forms of functional impairment, where both objective measurements of gait and strength were evaluated in addition to self-reported difficulties across a number of activities of daily living (**Table 2**). There was no evidence that level of impairment was an important predictor to whether people were recommended to physiotherapy. This may be regarded as surprising given that it may be inherent that individuals should be advised to seek physiotherapy for impairments in activities which are meaningful to them.<sup>20</sup> Based on these data, factors such as overall general health may be more meaningful to individuals which may indirectly be influenced by their musculoskeletal disabilities.

These results provide an indication as to which individuals are recommended to seek physiotherapy or exercise treatment. Based on this, older people, those with multiple joint pain and those with better self-reported health are less likely to be recommended physiotherapy. Given that physiotherapy has been shown to improve symptom management for those with hip and knee osteoarthritis,<sup>4</sup> targeting this subgroup of the population, through increased education and knowledge, to reduce this

inequality is recommended. These findings therefore have relevance for health professionals who frequently see people with osteoarthritis, including: rheumatologists, physiotherapists, general practitioners, nurse practitioners, community nurses and other allied health professionals. However, equally important, these findings should be communicated to day centre staff and community workers, gym and exercise leaders and other providers of formal and informal care who may support this population. Through this broader approach, this inequality in recommending physiotherapy to those who could benefit, may be addressed at a national level through appropriate educational initiatives with patients and care providers to improve the health and wellbeing of these individuals.

An encouraging finding was that 83% of those who were recommended to seek physiotherapy or exercise treatment acted on this. Therefore, when the recommendation is made, there was a high adherence to carrying this out. However, it remains unclear why the remaining 17% did not action on this recommendation. Further exploration around the consultation and first-contact when such a recommendation is made would provide insightful findings on the approach, narrative and overall experience of this consultation on motivating people to attend physiotherapy or not. Given that Deutscher et al<sup>21</sup> reported that those who attend physiotherapy are more likely to experience a positive clinical outcomes, strategies to reduce this 17% to a lower proportion is a key area for further exploration.

This study presented with three key limitations. Firstly, the data were collected through a nurse-led interview. Consequently, with responses being self-reported (for example, VAS pain, duration of symptoms, recommendation and up-take of physiotherapy or exercise treatment, impairment and general health), there remains a risk that responses were confounded with both respondent and experimenter bias potentially leading a reduction in the internal validity of the results. Given that the ELSA cohort consists of anonymised participant records, it was not possible to validate the data using secondary approaches such as medical notes of physiotherapy recommendation or attendance. Nonetheless, such veracity analyses may be valuable from other databases to provide evidence to support or refute these findings without such biases impacting. Secondly, whilst participants were asked whether they were recommended to seek physiotherapy or exercise treatment, there were no data as to who made such a recommendation and in what context, or whether this was physiotherapy or exercise treatment from a professional who was not a physiotherapist. Such data would be valuable to better understand the mechanisms of this first-contact to conceptualise the settings and circumstances in which individuals are, or are not recommended for physiotherapy. Osteoarthritis has a complex biopsychosocial presentation for patients and for healthcare professionals to assess and

develop management plans.<sup>19</sup> Future research aimed at understanding the complex clinical reasoning strategies undertaken by healthcare professionals when making management decisions will further support high quality treatment. Finally, participants were asked to report whether they had been recommended to seek treatment on physiotherapy or exercise. Whilst exercise is a core component to physiotherapy management for this population, it is not the only intervention.<sup>4</sup> Similarly participants may seek advice on exercise treatment either formally through physiotherapy, sport and exercise clinicians or more informally through gym instructors, walking group leaders or online forum. Due to the nature of the questions posed, it is not possible to differentiate this, but would prove useful context for future recommendation on treatment provision and decision-making options in managing osteoarthritis in the real-world.

## **CONCLUSION**

The minority (41%) of people with hip and/or knee osteoarthritis are recommended to seek physiotherapy or exercise treatment. Older people, with multi-joint pain and better self-reported health status are less likely to be recommended to seek physiotherapy or exercise treatment. Strategies are now required to identify such subgroups within society and provide them with opportunity to improve symptom management. This will provide a major benefit in reducing healthcare inequalities in people with hip and knee osteoarthritis.

## FIGURE AND TABLE LEGENDS

**Figure 1:** Flow-chart illustrating participant entry and loss into the analysis from the Wave 4 cohort.

**Table 1:** Demographic characteristics of individuals who reported being recommended to those not being recommend to physiotherapy for hip and/or knee osteoarthritis.

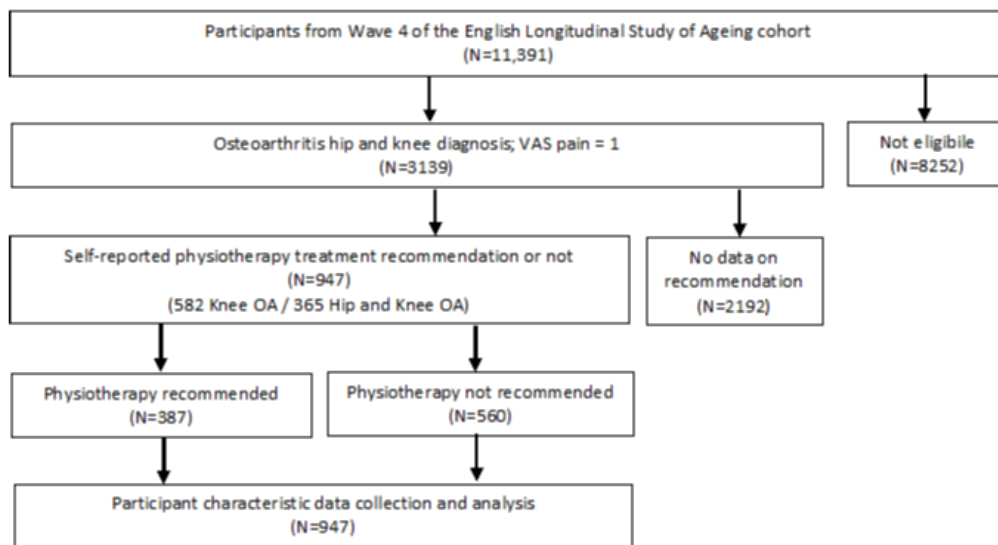
**Table 2:** Results of the logistic regression analysis to determine whether there is an association with candidate variables and the probability of people taking the recommendation to attend physiotherapy or not.

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**Figure 1:** Flow-chart illustrating participant entry and loss into the analysis from the Wave 4 cohort.



**Table 1:** Demographic characteristics of individuals who reported being recommended to those not being recommend to physiotherapy for hip and/or knee osteoarthritis.

	Physiotherapy Recommendation (N=387)	No Physiotherapy Recommendation (N=560)	P-value
Uptake of physiotherapy recommendation (yes; %)	321 (82.9)	N/A	N/A
Mean Age (SD)	64.6 (8.84)	68.58 (9.75)	<0.001
<b>Gender</b>			
Male	133 (34.37)	154 (27.5)	0.216
Female	254 (65.63)	406 (72.5)	<0.001
<b>Ethnicity</b>			
White	375 (96.90)	540 (96.4)	0.491
Non-white	12 (3.10)	20 (3.6)	0.162
In paid work (yes; %)	89 (25.9)	160 (32.1)	0.699
<b>NS-SEC 5 Category</b>			
Managerial and professional occupations	100 (25.84)	128 (22.86)	0.060
Intermediate occupations	48 (12.40)	60 (10.71)	0.249
Small employers and own account workers	34 (8.79)	64 (11.43)	0.003
Lower supervisory and technical occupations	39 (10.08)	58 (10.36)	0.055
Semi-routine and routine occupations	150 (38.76)	232 (41.43)	<0.001
Not classified	16 (4.13)	18 (3.21)	N/A
Access to Car (yes; %)	296 (86.0)	431 (86.5)	0.839
<b>Self-Reported Health</b>			
Excellent	10 (2.58)	7 (1.3)	0.119
Very Good	40 (10.34)	46 (8.2)	0.271
Good	85 (21.96)	183 (32.7)	0.799
Fair	146 (37.73)	193 (34.5)	0.002
Poor	106 (27.39)	130 (23.3)	0.661
Not Reported	0	1 (0.2)	N/A
Mean Fluency Executive Function score (SD)	5.23 (2.24)	5.25 (2.22)	0.892
<b>Physical Activity Participation</b>			
Low	130 (33.59)	201 (36.0)	0.699
Moderate	154 (39.79)	224 (40.1)	0.520
High	52 (13.44)	62 (11.1)	0.236
Not Reported	51 (13.18)	73 (12.9)	0.350
<b>Location of Osteoarthritis</b>			
Hip osteoarthritis (yes; %)	0	0	N/A
Knee osteoarthritis (yes; %)	276 (71.3)	306 (54.6)	<0.001
Hip and knee osteoarthritis (yes; %)	111 (28.7)	254 (45.4)	0.539
<b>Pain</b>			
Mean Hip VAS (SD)	5.96 (2.42)	6.12 (2.42)	0.426
Mean Knee VAS (SD)	4.95 (2.66)	4.74 (2.80)	0.922
<b>Duration of hip pain</b>			
	(N=110)	(N=252)	
< 3 months	1 (0.9)	2 (0.8)	0.209
≥3 < 6 months	2 (1.8)	7 (2.8)	0.950
≥6 months < 12 months	1 (0.9)	14 (5.6)	0.552
≥ 12 months	106 (96.4)	229 (90.9)	0.073
<b>Duration of knee pain (N=387)</b>			
	(N=387)	(N=560)	
< 3 months	0	0	N/A
≥3 < 6 months	7 (1.8)	15 (2.7)	0.349



≥6 months < 12 months	15 (3.9)	38 (6.8)	0.552
≥ 12 months	365 (94.3)	507 (90.5)	0.073
<b>Functional Capability</b>			
Mean time to complete 5 chair raises in seconds (SD)	13.54 (5.88)	12.43 (4.49)	0.344
Mean time to complete 10 chair raises in seconds (SD)	25.28 (8.76)	24.65 (8.13)	0.475
Mean gait speed (SD)	0.74 (0.30)	0.74 (0.28)	0.953
<b>Self-Reported ADL Impairment (yes; %)</b>			
Walking 100 yards	48 (12.4)	68 (12.1)	0.904
Sitting for two hours	50 (12.9)	67 (12.0)	0.660
Getting up from a chair	104 (26.9)	133 (23.8)	0.275
Ascending several flight of stairs	139 (35.9)	192 (34.3)	0.605
Ascending one flight of stairs without resting	58 (15.0)	71 (12.7)	0.309
Stooping, kneeling or crouching	152 (39.3)	193 (34.5)	0.130
Reaching to lift something above shoulder level	46 (11.9)	64 (11.4)	0.829
Pushing or pushing large objects	76 (19.6)	98 (17.5)	0.404
Carrying a weight of over 10 pounds	85 (22.0)	131 (23.4)	0.606
Picking 5 pence coin from a table	25 (6.5)	31 (5.5)	0.553
Dressing including putting shoes and socks on	58 (15.0)	63 (11.3)	0.090
Walking across a room	15 (3.9)	18 (3.2)	0.585
Bathing or showering	47 (12.1)	50 (8.9)	0.109
Eating including cutting up food	8 (2.1)	7 (1.3)	0.322
Getting in and out of bed	16 (4.1)	25 (4.5)	0.806
Toileting including getting up or down	18 (4.7)	16 (2.9)	0.145
Shopping for groceries	36 (9.3)	54 (9.6)	0.861
Doing work around the house or garden	62 (16.0)	80 (14.3)	0.462

ADL – Activity of Daily Living; Kg – kilograms; N – number of participants; N/A - Not Applicable; NS-SEC - National Statistics-Socio-Economic Classification scheme; SD – standard deviation; VAS – visual analogue scale

**Table 2:** Results of the logistic regression analysis to determine whether there is an association with candidate variables and the probability of people taking the recommendation to attend physiotherapy or not.

Variable	OR	95% CI	P-value	B	Wald
Gender	1.772	0.067-2.440	0.096	0.572	2.775
Age	1.046	1.026-1.065	<0.001	0.045	21.881
Ethnicity	0.403	0.067-2.440	0.323	-0.908	0.978
NS-SEC 5 Catagory	3.078	0.146-64.676	0.469	1.124	0.524
Location of Osteoarthritis	1.652	1.391-1.962	<0.001	0.502	32.754
Duration Knee Pain	0.290	0.030-2.821	0.286	-1.239	1.138
Duration Hip Pain	0.202	0.022-1.840	0.156	-1.599	2.013
Self-Reported Health	0.449	0.230-0.874	0.019	-0.801	5.548
Stooping, kneeling or crouching	0.888	0.636-1.242	0.488	-0.118	0.480
Dressing including putting shoes and socks on	0.767	0.480-1.226	0.268	-0.265	1.228

Classification – percentage correct: 64.9%

B – unstandardized regression weight; CI – confidence intervals; OR – Odds ratio