University of Southampton

Faculty of Medicine

Human Development and Health

Return to Work following Lower Limb Arthroplasty

by

Lisa Jane Savage-Shipway

Thesis for the degree of Doctor of Philosophy

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University of Southampton

Abstract

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Osteoarthritis causes significant problems in the working age population. Total hip and knee replacements are successful operations and consequently are increasingly offered at younger ages. Moreover, people are being encouraged to work to older ages so that these operations are increasingly likely to occur during a person's working life with the recipient needing to return to work post-operatively. Currently, there is no evidence-based guidance for when and how people can expect to return to different types of work after surgery. The aims of this thesis were to identify factors which impact the time it takes to return to work, and explore the lived experiences of working-aged individuals undergoing lower limb arthroplasty.

We used a mixed methodology approach: a systematic review; a prospective cohort study; and a qualitative study.

In the systematic review, we found 23 studies suitable for inclusion. However, there was marked heterogeneity of how return to work was measured, ranging from mean or median times, or proportions of patients returning by a fixed time point. Consequently, lack of comparable data prevented data synthesis. However, we found that most people are able to return to work after lower limb arthroplasty. There was some evidence to suggest that earlier RTW was associated with: younger age at time of surgery; possibly male gender; higher levels of educational attainment; (possibly) returning to work that is less physically demanding; (possibly) being self-employed; some surgical techniques; unrestricted post-operative rehabilitation and not being off sick pre-operatively.

Benefitting from an existing cohort study of outcomes after lower limb arthroplasty (COASt), we set up a new prospective cohort study (RTW-COASt). Our aim was to recruit people pre-operatively who wished to return to work after their operation and to follow their journey at several time points until 6 months post-operatively. We recruited 53 participants to the prospective cohort study, amongst whom 47 (89%) returned to work within 6 months of surgery. Median time to RTW was 60 days (IQR 44-74): 62 days (range 10-165) after hip arthroplasty; and 55.5 days (range 19-174) after knee arthroplasty. Six individuals (11%) returned to work within 30 days and 16 within 7 weeks. Factors associated with earlier time to return to work were: younger

age; better score for EQ-5D usual activities pre-operatively; not needing to stand/walk at work for > 2 hours day and; and expecting to be able to return to work within 7 weeks. There was no indication of harm after returning to work early, either within 30 days or 49 days of surgery.

The lived experiences of RTW-COASt participants were then investigated through qualitative research. Everyone recruited to RTW-COASt was eligible for the qualitative study providing that they had reached the 6-month post-operative milestone. In total, 13 of RTW-COASt participants took part. We chose to use semi-structured interviews to explore what was important to them when deciding when to RTW. Four key themes were identified: trust that the replaced joint has healed; self-efficacy to achieve a successful RTW; the importance of appropriate healthcare support within a positive patient-healthcare professional partnership; and support from the workplace to which the patient needs to return. These themes were inter-related and reciprocal. In particular, we found that healthcare professionals can have an important influence directly and indirectly on timing of return to work, by enhancing confidence in the replaced joint, creating positive expectations about return to work, increasing the patient's self-efficacy but also by being perceived as available if needed post-operatively. Employers too had an important role in supporting the return to work journey. More research is needed to understand why some people had the impression that they needed to be 100% healed before they could return to work.

In conclusion, a large multi-site long term study is needed to address the important issues highlighted in this thesis. The routine collection of a standardised set of RTW variables is recommended in research and clinical settings. The impact of beliefs and expectations on RTW times warrants further investigation, and if confirmed, allows the potential for healthcare professionals to intervene and improve RTW outcomes for patients.

Author's contribution to each study within the thesis:

Lisa Savage-Shipway took responsibility for all of the original work presented in this thesis.

The original idea for this project came from Professor David Coggon. Questionnaires for the cohort study were developed collaboratively with support from the wider research group. Statistical support for the cohort study analysis was provided by Stefania D'Angelo and Dr Holly Syddall. Interpretation of the data was led by Lisa Savage-Shipway with the support of the supervisory team and statisticians.

For the systematic review, Lisa Savage-Shipway conducted the original systematic searches, screened all titles and abstracts, extracted all relevant data and carried out the assessment of bias but was supported in these by Dr Cathy Linaker and Professor Karen Walker-Bone.

Lisa Savage-Shipway conducted all the qualitative interviews and analysed the subsequent transcripts. Dr Elaine Wainwright provided academic support for the analysis.

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Research Thesis: Declaration of Authorship

Print name: LISA SAVAGE-SHIPWAY

Title of thesis: Return to Work following Lower Limb Arthroplasty

I declare that this thesis and the work presented in it are my own and has been generated by me as the result of my own original research.

I confirm that:

1. This work was done wholly or mainly while in candidature for a research degree at this University;
2. Where any part of this thesis has previously been submitted for a degree or any other qualification at this University or any other institution, this has been clearly stated;
3. Where I have consulted the published work of others, this is always clearly attributed;
4. Where I have quoted from the work of others, the source is always given. With the exception of such quotations, this thesis is entirely my own work;
5. I have acknowledged all main sources of help;
6. Where the thesis is based on work done by myself jointly with others, I have made clear exactly what was done by others and what I have contributed myself;
7. None of this work has been published before submission.

Signature: Lisa Savage-Shipway Date: 18th October 2021

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I would like to thank my husband Phil, and children Ben, Ella and Ruby for all your support and encouragement throughout, along with all my family, especially my brothers John, David and Mark, and friends, especially Carol, Jane and Jane.

I would like to take this opportunity to add an extra special note of thanks to Karen Walker-Bone, and to say how much I appreciate the continuous patience, encouragement and support you provided to make this possible.

And finally I would like to dedicate this work to my Mum and Dad, Pam and Derek Savage.

Definitions and Abbreviations

ACR.....American College of Rheumatology

Ab-P.....Aberdeen Impairment, Activity Limitation and Participation Restriction Measure: Participation Section Only

ARUK .....Arthritis Research UK

AS .....Ankylosing Spondylitis

BMI.....Body mass index

COASt .....Clinical Outcomes in Arthroplasty Study

COX2.....Inhibitors (a type of NSAID that directly targets cyclooxygenase-2)

DWP .....Department for Work & Pensions

DXA.....Dual energy X-ray absorptiometry

EQ-5D .....EuroQol-5 Dimensions

E-RTW.....Early return to work

ESR .....Erythrocyte sedimentation rate

EU.....European Union

FWL .....Fuller Working Lives

GCP.....Good Clinical Practice

GP.....General Practitioner

HADS .....Hospital Anxiety and Depression Scale

ICH-GCP .....International Conference on Harmonisation-Good Clinical Practice

IR .....Incidence rate

NICE.....National Institute for Health and Clinical Excellence

NHS.....National Health Service

NIHR .....National Institute for Health Research

NJR .....National Joint Registry

NSAIDS .....Non-steroidal anti-inflammatory drugs

NOC.....Nuffield Orthopaedic Centre

OA .....Osteoarthritis

OARSI .....Osteoarthritis Research Society International

OHS .....Oxford Hip Score

OKS.....Oxford Knee Score

OMB .....Oxford Musculoskeletal Biobank

OMERACT.....Outcome Measures in Rheumatology

OUH.....Oxford University Hospital

PIS.....Patient Information Sheet

PICO.....Population Intervention Comparator Outcome

Definitions and Abbreviations

PROM ..... Patient reported outcome measure

RA..... Rheumatoid arthritis

RF ..... Rheumatoid factor

RTW ..... Return to work

RTW-COASt ..... Return to work – Clinical Outcomes in Arthroplasty Study

SF-12 ..... 12-Item Short Form Survey

TA..... Thematic analysis

TJR..... Total joint replacement

THA ..... Total hip arthroplasty

TKA..... Total knee arthroplasty

TJA..... Total joint arthroplasty

TUC ..... Trades Union Congress (if I use that headline or mention elsewhere)

UHS ..... Southampton University Hospital

VE-RTW ..... Very early return to work

WHO ..... World Health Organization

WOMAC ..... Western Ontario and McMaster Universities Osteoarthritis Index

WPAI:SHP..... Work Productivity and Activity Impairment Questionnaire: Specific Health Problem

UK ..... United Kingdom

Abbreviations of names

KWB ..... Karen Walker-Bone

DC..... David Coggon

KP ..... Keith Palmer

CL ..... Cathy Linaker

EW..... Elaine Wainwright

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Oral presentations:

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Return to work after lower limb arthroplasty

Health, Work & Wellbeing, March 2020 (NEC, Birmingham)

Working after lower limb arthroplasty (oral) – heard by Editor of Occupational Medicine who invited submission of the manuscripts on systematic review and cohort study (under preparation)

MRC Versus Arthritis Centre for Musculoskeletal health and Work 3rd Annual Scientific Meeting, Southampton, Feb 2017

Return to work after lower limb arthroplasty

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Working after lower limb arthroplasty

Poster presentations:

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Return to work after lower limb arthroplasty

Dissemination: Posters, prizes and publications

MRC Lifecourse Epidemiology Unit Quinquennial review, Southampton, October 2018

Working after lower limb arthroplasty

MRC Versus Arthritis Centre for Musculoskeletal Health and Work Site Review Visit, October 2017

A systematic review of the evidence about determinants of return to work after lower limb arthroplasty

Chapter 1 Introduction

1.1 Background to thesis

This thesis considers the factors which affect, and patients' experiences of, returning to work after lower limb arthroplasty of the hip or knee. An arthroplasty is a surgical procedure in which all or part of a joint is repaired or replaced. When there is complete replacement of the articulating surfaces, the operation is termed a total joint arthroplasty (TJA) or total joint replacement (TJR). As we shall see, these procedures have been amongst the most successful developments in healthcare over the past century and are therefore offered increasingly commonly to people with severe pain and/or functional limitation of their hip or knee joints. Historically, the surgery has mostly been performed amongst people in their seventh decade of life or beyond. However, because of their success, and as confidence has grown in their longevity, more operations are being offered at younger ages so that the fastest growing group of arthroplasty recipients are those aged < 60 years. Simultaneously, because of demographic changes, there is a steady increase in the age at which people retire from paid work and, as a result of changes in government policy, there is a significant drive to encourage more people to work into their late 60s or 70s. Thus, these two apparently coincidental sets of events have led to a growing need for healthcare providers to consider the return to work wishes of their patients undergoing arthroplasty and to provide high-quality evidence about factors which enable smooth, uncomplicated transitions into work without causing additional post-operative complications.

1.1.1 Indications for arthroplasty

Arthroplasty is offered by orthopaedic surgeons to patients with complete failure of the hip or knee joint (usually as a consequence of arthritis). Symptoms include pain, stiffness and/or functional limitation (difficulties with, for example, walking, climbing stairs, performing household tasks) in the hip or in the knee [4]. The diagnosis of joint failure is made from a clinical history and examination and radiographic assessment [5]; Data from the UK National Joint registry shows that osteoarthritis is the underlying diagnosis in 90% of hip arthroplasties and 98% of knee arthroplasties [6].

1.1.2 Osteoarthritis

Recognised to be the most common form of arthritis worldwide [7], osteoarthritis can affect any joint in the body. In a normal healthy synovial joint (Figure 1), cartilage covers the articulating surfaces and the joint capsule contains viscous synovial fluid which lubricates gliding movement of the bones facilitated and controlled by the supporting ligaments and muscles. Our original understanding of OA was centred on observed changes in the articular cartilage, which were thought to be the primary event, undergoing damage and degeneration, considered an inevitable consequence of "wear and tear". However, this concept has evolved [8, 9] and OA is now considered a more dynamic syndrome or disease in which local and systemic factors affect all the tissues in and around the joint (Figure 3) [10]. The currently accepted definition of OA is as "a group of distinct, but overlapping diseases, which may have different aetiologies, but similar biological, morphological, and clinical outcomes" [11] affecting the articular joint system. OA may represent the final common pathway of a number of pathologic processes [12].

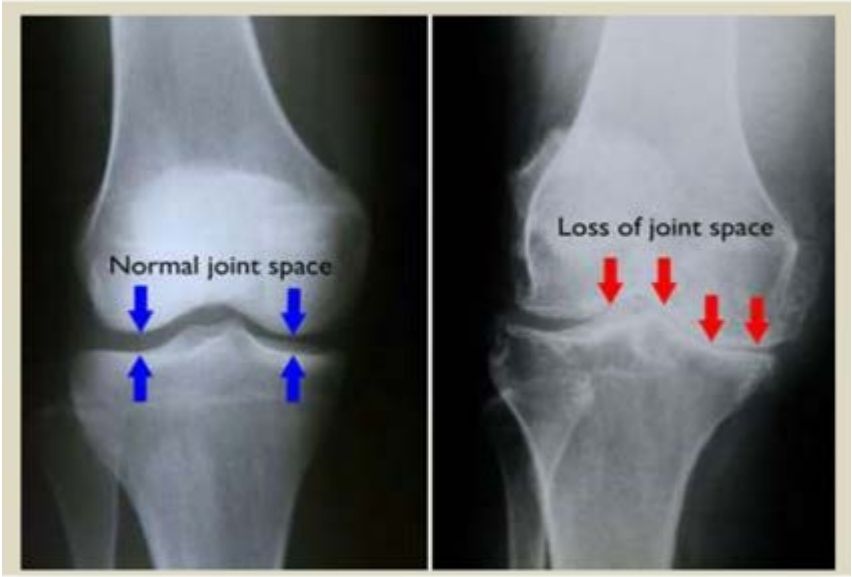

Figure 1. Effects of OA on a synovial joint [3]

1.1.3 OA Pathophysiology

As described above, OA is now described as a musculoskeletal disorder affecting the whole joint, involving structural alterations in the articular cartilage, subchondral bone, ligaments, capsule, synovial membrane, and peri-articular muscles [13]. Rather than a passive response to "wear and tear", OA is now considered to be a dynamic reaction pattern of a joint in response to insult or injury [14]. According to our current understanding, the mechanisms are complex, involving a range of metabolic, mechanical and inflammatory processes that are both local and systemic. At a cellular and molecular level, there is activation of osteoblasts and osteoclasts, increased vascular infiltration, macrophage activation, chondrocyte hypertrophy and apoptosis and synovial fibrosis [10]. The processes appear to represent an imbalance between the normal processes of repair and destruction. It has been observed that the composition of the cartilage changes, making it more vulnerable to the effects of physical stress on the joint surface. Initially, the vulnerability is

observed superficially where erosions develop but, as the process progresses, fissures deepen through to the sub-chondral bone. The response from the chondrocytes (cartilage cells) is to hypertrophy, attempting to repair, but this response also increases matrix metalloproteinases and activates pro-inflammatory cytokines, which in turn, impact the surrounding synovium so that synoviocytes become activated. Synoviocyte activation leads in turn to further activation of pro-inflammatory responses, and increased vascular permeability. Within the sub-chondral bone, the effect is to activate bone turnover speeding up resorption and bone formation with activation of osteoclasts and osteoblasts respectively. Osteophyte formation at the joint margin is stimulated by the pro-inflammatory factors, activation of endochondral ossification and effects of changed patterns of loading and biomechanics of the joint.

Although the pathological processes start within individual tissues, eventually the whole joint becomes involved because of the close structural and functional relationship between all the elements, ultimately leading to progressive cartilage loss, and clinically-evident OA [15]. It is now believed that osteoarthritis is less a disease than a syndrome in which a range of pathways can lead to similar outcomes of destruction with the end-stage of OA resulting in failure of the joint [8]. It is postulated that different mechanistic pathways may underlie for example OA occurring in an older aged adult, as compared with early OA post-injury in a young patient. There may be a number of different mechanistic phenotypes [10]. As a result, it is now proposed that OA should be reclassified as a systemic musculoskeletal disease rather than being considered a focal disorder of synovial joints [16].

Table 1. Prevalence of OA in European studies using radiographic, clinical or self-reported diagnosis by anatomical site (summarised from [13])

		Country	Age group studied	Prevalence (women)	Prevalence (men)
Knee	**Radiographic**	**Europe**	**≥22 years**	**14%**	**12%**
	Radiographic	**Europe**	**≥45 years and ≥55 years**	**10% and 29%**	**4 and 16%**
	Symptomatic	**Europe**	**≥ 60 years**	**15%**	**9%**
Hip	**Radiographic**	**Europe**	**≥ 60 years**	**5%**	**11%**
Hand	**Radiographic**	**Europe**	**≥ 30 years**	**48%**	**44%**
	Self-reported	**Europe**	**≥20 years and 24-76 years**	**10% and 6%**	**2% and 3%**

Osteoarthritis causes pain, stiffness and/or functional limitation in the joint(s) affected. Patients may present with a single joint affected or with multiple joints (polyarticular). Osteoarthritis can affect any synovial joint in the body but the most commonly affected joints tend to be the knee, hip, hand, spine and foot joints (Table 1) [3]. Typically, as summarised from Hunter et al [13] the pattern of joint involvement is symmetrical and, when involved, the most common sites of OA causing significant disability are the knees and hips [17], particularly when both knees and both hips are affected. The pain of OA is typically aggravated by use of the joint and worse at the end of the day (after a period of activity) rather than at the beginning. Night pain is common. Patients may also report swelling of the joints, and crepitus, and some may report feeling "weak" in the affected joint if the muscles have undergone localised wasting (Figure 2). People may develop a noticeable limp because of their symptoms, causing a typical "antalgic gait" amongst patients with hip OA. Stiffness may occur but will typically last only a few minutes (< 15 minutes) in the morning but may worsen later in the day. Functional effects will depend upon the number and type of joints involved but lower limb joint involvement causes impaired mobility and difficulties with activities such as climbing the stairs or basic household tasks. In contrast, thumb-base OA (affecting the first carpo-metacarpophalangeal joint) may cause pain on gripping small objects, a weak grip, tendency to drop things and difficulty opening lids on bottle or jars.

Figure 2. Bilateral muscle wastage of the knees

1.1.4 Diagnosis of Osteoarthritis

In practice, many of the diagnoses that are made of osteoarthritis, at least in the UK, are made in primary care and are based upon the classical history and examination features. The National Institute for Health and Clinical Excellence (NICE) guidance for Osteoarthritis: care and management [18] states that patients can be diagnosed with OA clinically without further investigation if a person meets the following 3 criteria: is 45 or over; has activity-related joint pain; and has either no morning joint-related stiffness or morning stiffness that lasts no longer than 30 minutes. Occasionally, blood tests will be arranged to exclude other diagnostic possibilities (e.g. inflammatory markers or serum urate to differentiate inflammatory arthritis or gout). The most widely used supportive diagnostic test is X-ray of the affected joints as

the radiographic features of osteoarthritis are well-described and can be diagnostic, including sclerosis, joint space narrowing, osteophyte formation, bone cysts and possibly chondrocalcinosis. Radiographic changes are so well characterised that systems have been devised by which to "score" the severity of the radiographic change. The most widely used system in practice is that of Kellgren and Lawrence (K&L) [19]. The K&L score defines radiographic OA in five grades (0, normal to 4, severe) based on the combination and severity of the radiological signs of OA within the joint. However, importantly, it is well-recognised that the severity of the radiographic features and clinical symptoms are not well correlated and that patients may report severe pain and stiffness with fairly low-grade radiographic change and vice versa. While patients with the most pain have a tendency to have the highest K&L grades, the association is weak [20] and substantial discordance is found in population studies between radiographic OA versus reported joint pain [21]. Therefore, a patient must always be assessed holistically with respect to their quality of life and function and radiographic changes are never treated in isolation.

Diagnosis of knee OA

A pan-European multidisciplinary taskforce of the European League Against Rheumatism (EULAR) agreed evidence-based recommendations for the diagnosis of knee OA [58]. They used a Delphi consensus approach in order to generate 10 key propositions for the primary purpose of clinically diagnosing OA of the knee. The recommendations include the definition of knee OA, its risk factors, typical symptoms and lab tests (Figure 3).

According to their recommendations, the diagnosis of knee OA can be made based on the background risk (population prevalence) of knee OA; the patient's risk factors for OA (e.g. age, gender, BMI, occupation); their symptoms (persistent knee pain, brief morning stiffness and functional limitation); and an adequate physical examination (crepitus, restricted movement and bony enlargement). Radiographic changes are also included in the EULAR definition, but these tests are not necessary for a diagnosis of knee OA. The more positive results a patient has within this model, the more likely the diagnosis of knee OA.

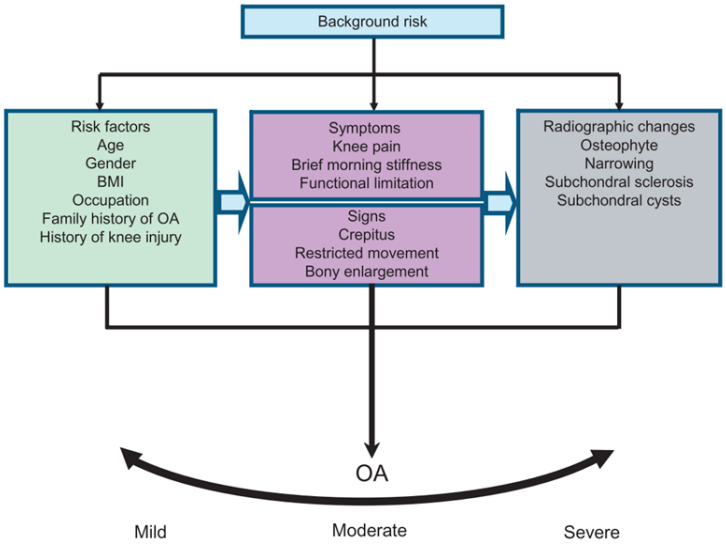

Figure 3. Major components in the diagnosis of knee OA [1]

Differential diagnosis of OA

Any atypical features (for example, a history of trauma, prolonged morning joint-related stiffness, rapid worsening of symptoms or the presence of a hot swollen joint) may indicate alternative or additional diagnoses. Important differential diagnoses include gout, septic arthritis and malignancy (bone pain), or forms of inflammatory arthritis (e.g. RA).

1.1.5 Classification of OA

Although diagnosis of OA in practice is often quite straightforward, research to better understand causation and develop strategies for treatment relies upon clear systems of classification of patients with OA into sub-groups based upon, for example, severity or pattern of involvement of the joints in order to compare the prognosis or response to treatment of people with disease as similar as possible at the beginning. One system of classification differentiates primary OA (no other underlying cause) from secondary (in which the OA has clearly arisen as a result of another metabolic or physical condition that is known to lead to osteoarthritis). OA can also be classified by the number of affected joints and when three or more joints are affected, is often regarded to be “generalised OA” and classical “familial” patterns of OA are seen in some families.

Beyond the above, It is recognised that reliable diagnostic tools are important aids for clinicians in the diagnosis of OA, and can help inform about the prognosis of the illness and aid decision making for preventive or therapeutic options for a patient [22]. However, diagnoses are generally made in a particular clinical setting between two individuals (physician and patient) with their unique experiences, knowledge and expertise all informing the diagnosis of OA in that clinical setting [22]. Nevertheless, there is a need for internationally recognised validated classification tools for confirmation of the diagnosis of OA at various anatomical sites to help define cases in clinical settings and to aid comparison of outcomes in research trials [23]. Such tools also serve to differentiate OA from other forms of arthritis, such as rheumatoid arthritis (RA).

Given the lack of understanding of the pathophysiology of OA, there is currently no generally agreed “gold standard” [24] or international consensus regarding how to classify OA of the hip or knee and a range of approaches are in current use. For illustration purposes, Table 2 presents the criteria published by the NICE, EULAR and the ACR for making a diagnosis of knee OA on the basis of clinical features:

Table 2. Classification criteria for making a diagnosis of knee OA on clinical grounds [1, 25]

NICE – "clinical OA"	**EULAR**	**ACR**
• is 45 years old or older AND • has activity-related joint pain AND has no morning joint stiffness or morning stiffness that lasts no longer than 30 minutes.	Is >40 years old and has: 1. Usage-related joint pain 2. Short-lived morning stiffness 3. Functional limitation AND Has one or more of the following exam findings: 4. Joint crepitus 5. Restricted joint movement 6. Bony enlargement	Has knee pain AND at least three of the following criteria: 1. Age >50 years 2. Morning stiffness <30 minutes 3. Crepitus on active movements 4. Tenderness of the bony margins of the joint 5. Bony enlargement **6.** No palpable warmth

As might be expected, use of different classification criteria results in markedly different estimates of prevalence of OA. For example, Skou and colleagues found that use of these three different sets of criteria amongst 13,459 patients with knee symptoms or functional limitations associated with OA from primary care showed that 39% fulfilled all three sets of criteria, 48% fulfilled the EULAR criteria, 52% fulfilled the ACR criteria and 89% fulfilled the NICE criteria [26].

Moreover, some studies include the use of radiographic criteria alongside clinical ones, which can also affect the rates of occurrence reported.

1.1.6 Rates of occurrence of knee and hip OA

It is unsurprising, given the range of diagnostic and classification criteria that were described above, that the estimated rates of incidence and prevalence of OA can be highly variable depending upon which case definition is applied. For example population surveys of radiographic OA will produce widely different estimates of prevalence as compared with surveys based upon primary care databases reliant upon a clinical diagnosis of OA having been recorded and coded [27]. Likewise, where different systems of classification are applied, some will have higher sensitivity and lower specificity and vice versa. Moreover, different estimated rates of occurrence have been reported depending upon the age, sex and geographical area studied.

1.1.7 Incidence of OA

The first population-based estimates of clinical hip, knee and hand OA incidence [28] were based on primary care records for >3 million people aged ≥40 years from Catalonia (Spain).

Incidence rates (IRs) of knee OA were found to be 6.5/1000 person-years overall (8.3/1000 women; 4.6/1000 men). For hip OA, overall IRs were 2.1 (2.4 women; 1.7 men). Age and gender-specific IRs for hip, knee (and hand) OA are shown in Figure 4. Although their definition of OA was based on clinical diagnosis, IRs for hip and knee OA were comparable to those reported in earlier studies from the USA (Framingham Knee OA study is a population-based study examining the prevalence of radiographic and symptomatic knee OA.), Finland (prospective cohort study of visits to physicians in region of Finland for symptomatic knee OA) [29], Norway (prospective cohort on musculoskeletal pain in a Norwegian municipality [30] and Japan (a nationwide longitudinal population based cohort study in Japan of incidence and risk factors for radiographic knee OA and knee pain [28, 31].

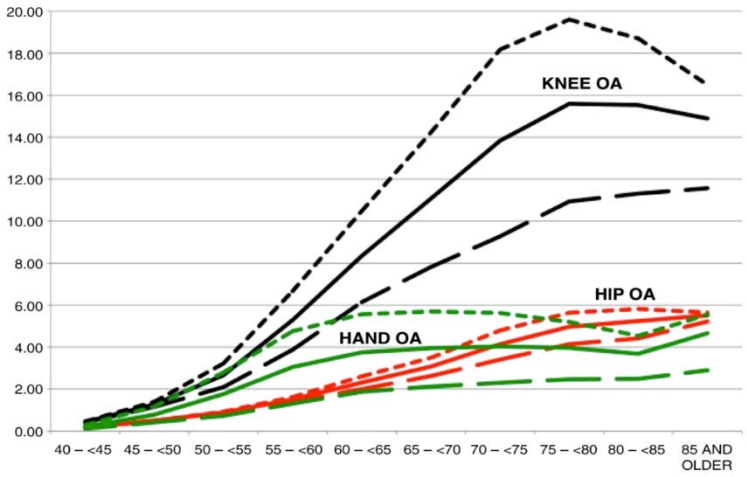

Figure 4. Age and gender-specific OA incidence rates (/1000) person-years) for knee (black), hip (red) and hand (green). Solid, all population; short dash line, women; long dash line, men [2]

1.1.8 Prevalence of radiographic OA

Much of the information on the prevalence of OA comes from radiographic surveys [32]. It should be borne in mind that use of radiographic criteria for the case definition of OA tends to result in the highest reported prevalence rates [33]. Figure 5 summarises the rates of prevalence of radiographic OA affecting the knee and hip from large Dutch population sample [3]. Interestingly, where

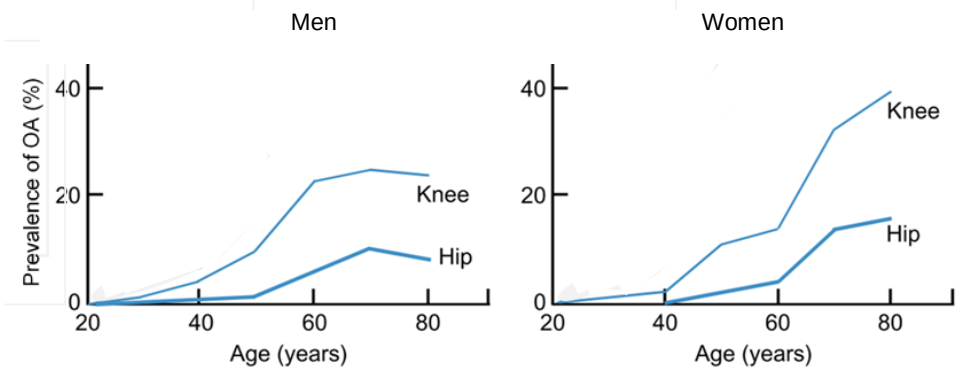

Figure 5. Estimates for the prevalence of radiographic OA affecting the hip and knee (Original data from [3], graph adapted from [6])

radiographic data are available from US and European studies, comparable prevalence rates have been found [32]. The prevalence increases with age at all joint sites. Knee OA is more common than hip OA in these surveys, and women are affected more commonly than men, although the female-to-male ratio varies between studies.

1.1.9 Prevalence of OA diagnosed in primary care

Data from the UK about the prevalence of symptomatic OA diagnosed in primary care [5] were analysed on anonymised patient data collected over a 7 year period from a validated database [58] which contains all recorded consultations from a subset of general practices in North Staffordshire since 1998. Data about the number of people consulting their GP with OA were then used to estimate the number of people living with this condition nationally. It was estimated that 8.75 million people had sought treatment for OA in the UK, equating to one third of people aged >45 years. The rates of diagnosed OA increased most sharply between the ages of 45 and 75 years. Women were more likely than men to have sought OA treatment from their general practitioner (GP). The likelihood of having OA increased with age for both men and women. The rates of consultation prevalence (proportion of people within a defined population who consult a GP about their condition) of OA is shown graphically in Figure 6.

This same survey provided information about the prevalence of men and women who had presented in primary care with symptoms predominantly affecting the knee and hip, which are of course the main focus of this thesis and therefore, these are summarised below.

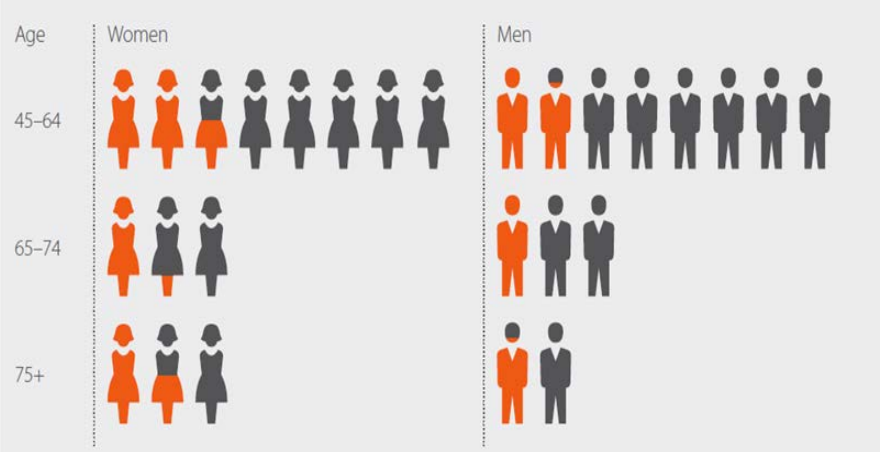

Figure 6. Estimated number of people in the UK who have sought treatment for hip OA by gender and age group [3]

(a) Hip osteoarthritis

According to these UK data [5], 8% equivalent to (2.12 million) of people in the UK aged 45 and over had sought treatment for OA of the hip (Figure 7). In total, these made up just under a quarter of all patients who had sought treatment for OA and were more commonly women than men.

Figure 7. The number of people with OA in the UK related the age and size of the population. Each figure represents 1 million people, the orange figures represent people with OA [3].

(b) Knee OA

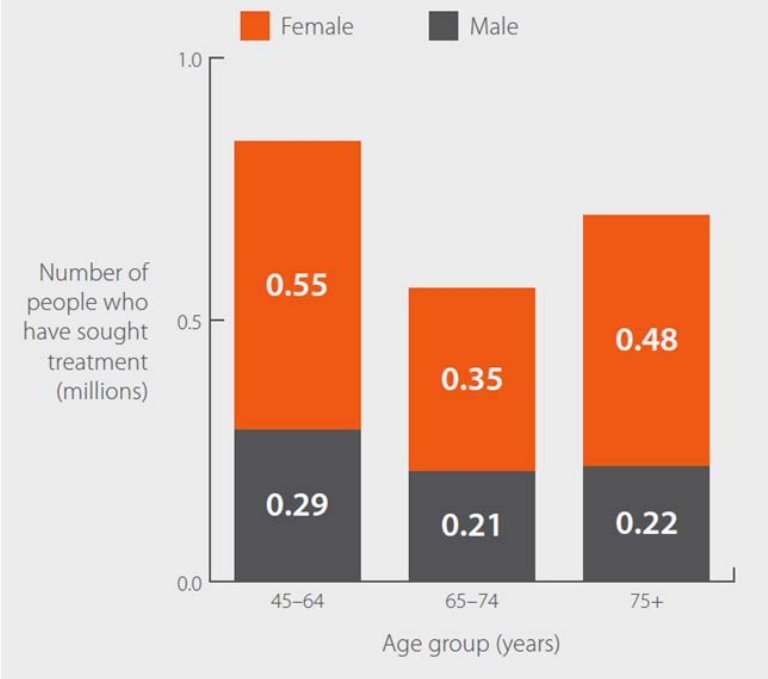

Figure 8. Estimated number of people in the UK who have sought treatment for knee OA by gender and age group [3]

In comparison, rates of consultation with knee OA were considerably higher, equivalent to a prevalence of 18% (4.71 million people aged >45 years) [5]. More than half of the people who consulted their GP with OA had knee involvement. Once again, women were slightly more likely than men to have consulted for knee OA (Figure 8).

1.2 Aetiology and cause of OA

1.2.1 OA: Causes and risk factors

The causes of OA are not yet fully understood. However, a range of factors which increase the risk of osteoarthritis are recognised, and often there are a combination of factors that lead to the development and progression of the condition [8]. Although a number of risk factors have been identified for the development of OA, far fewer have been linked with the progression of OA [33]. The risk factors for OA can be divided into those that act at the level of individual susceptibility (Table 3 systemic risk factors) and those that alter the biomechanical stability (Table 4 mechanical risk factors) of individual joints.

Table 3. Person level risk factors for osteoarthritis

Person level risk factors for primary osteoarthritis (Systemic factors)	
Age	OA is more common in people aged 40 years and above and the risk of developing OA increases with age.
Sex	OA is more common in women than in men for most joints. The difference is most apparent for hand and knee OA and over the age of 50 years. A third of women and almost a quarter of men between 45 and 64 years have sought treatment for OA [3].
Genetics	Genetic factors are a key risk factor for OA of the hands and hips, but appear to play a smaller role in OA of the knee. The genes involved are as yet not fully explored/understood. It has been estimated that genetic factors account for 60% of hand and hip OA and 40% of knee OA [34].
Ethnicity	Rates of hip and knee joint replacement differ amongst different ethnic groups [35]. Whether these represent the different nature of severity of OA at various joint sites between ethnic groups, or differences in access to, or patient preferences to medical care, or other factors are unclear.
Bone density	High bone density, as measured by dual-energy X-ray absorptiometry (DEXA) is a risk factor for the development of knee, hand and hip OA. Low bone density is linked to rapid progression of knee and hip OA [36].

Table 4. Joint level risk factors for osteoarthritis

Joint level risk factors for secondary osteoarthritis (Mechanical factors)	
Obesity	People who are overweight or obese are approximately between 2.5 and 4.6 times more likely to develop knee osteoarthritis than those of normal body weight [37]. The average BMI of hip and knee replacement patients in 2015 was 28.7 (overweight) and 30.9 (obese) respectively [6].
Injury or disease	Injury to a joint, joint surgery or other types of joint disease (including RA or gout) or OA at another anatomical site are associated with OA.
Joint misalignment (congenital or acquired)	OA can result from abnormal development of joints (e.g. congenital dislocation of the hip).
Rare diseases, e.g. hypermobility, alkaptonuria and ochronosis, Forestier's, Acromegaly etc.	Hypermobility syndrome, a condition characterised by abnormally increased mobility of the joints, can increase the risk of OA which tends to occur at younger ages. Alkaptonuria (ochronosis) is an extremely rare metabolic condition resulting in widespread OA.
Repetitive joint loading	Occupations (e.g. farming) which are physically demanding may increase the risk of OA in some joints [38].

The risk factors for OA appear to impact across anatomical sites, however, much as the development and progression of OA at different joint sites varies, the relative contribution of each risk factor (e.g. obesity, gender) to the onset of OA appears to be joint specific [39].

Although the primary aim of this thesis is to explore return to paid work after arthroplasty, it is important to acknowledge that some occupational factors are recognised risk factors for the occurrence of primary OA (see Table 4). These will be described in the next section:

Epidemiological studies have suggested that some occupational activities are importantly associated with an increased risk of osteoarthritis at certain anatomical sites [40, 41]. The associated risks vary between studies, and one study reported an association with occupations involving exposure to heavy physical loads with hip OA for male, but not female, workers [42]. In contrast for knee OA, a greater risk of occupation for female workers has been found compared to male workers [43]. However, in the UK, based on the balance of available evidence, OA of the hip and knee have been added to the list of prescribed diseases covered by the Industrial Injuries

Disability Benefit (IIDB). The Industrial Injuries Advisory Council (IIAC) recommended that compensation should be awarded to farmers disabled by hip osteoarthritis, and to coal miners and carpet fitters and layers disabled by knee osteoarthritis on the basis of a body of evidence that the risks of these conditions were more than doubled in these occupations.

1.2.2 Impact of OA

Individual Impact of OA

For individuals, the pain and disability caused by OA can substantially negatively impact quality of life [81,82]. The main clinical symptom for most people is pain and this, of itself, can make a major negative impact [5]. However, in combination with effects on mobility, it can lead to numerous limitations in functional, psychological and social aspects of a patient's life [83]. A study of OA patients on waiting lists for lower limb arthroplasty at three Finnish hospitals [84] compared health-related quality of life with matched (for age, gender and housing) controls from population registers. Consistently worse health-related quality of life scores were found for OA patients in the dimensions of moving, sleeping, sexual activity, vitality, usual activities, discomfort and symptoms, depression and distress. Depression has been found to be four times more common among people who report persistent pain compared to those without pain [85].

Morbidity

According to the World Health Organization (WHO) Global Burden of Disease Study 2010, OA was the 11th highest cause of years lived with disability (YLD) worldwide [44], and the global morbidity burden was increasing such that OA had risen from 15th place in 1990. OA causes: activity limitations including difficulties in walking; carrying objects; difficulties in dressing; and contributes to the need for assistance from others (either family members of health services) [45]. Musculoskeletal disorders as a whole remain the leading cause of YLDs in the UK in 2015 [44] and more than half of all working age (16-64 years) disabled people in the UK experience musculoskeletal conditions [46].

Mortality

The results from a population-based cohort study of 1163 male and female patients aged 35 years or over with symptomatic OA of the hip and knee found patients with OA had excess all-cause mortality compared with the general population [47]. Patients with OA were at higher risk of death compared to the general population for all disease-specific causes of death (standardised mortality ratio 1.55, 95% confidence interval 1.41 to 1.70), and particularly for cardiovascular (standardised mortality ratio 1.71) and dementia (1.99) related mortality. Comorbidities (history

of diabetes, cancer or cardiovascular disease) and walking disability (the more severe the walking disability, the higher the risk of death) were found to be major risk factors in this cohort. Although the causal pathway is unclear, the authors posited two possible explanations for the increased risk of mortality for patients with OA: reduced physical activity due to OA may lead to reduced protection against cardiovascular disease [48]; or that patients with OA may have a chronic low-grade systemic inflammation which may be causally involved in various chronic conditions, such as cardiovascular disease, neurodegenerative disease, cancer or diabetes [49]. A population-based cohort study of middle-aged women also reported a significantly increased risk of all-cause and cardiovascular disease mortality in women experiencing knee pain, with or without radiographic OA, but not radiographic OA only [50] and interestingly, they did not find a relationship between hand OA and mortality risk.

1.2.3 Costs of OA

Much of the cost burden of OA falls on individuals and their families. Many patients seek treatment from complementary therapists and find benefit from non-medical therapies including nutriceuticals, acupuncture, massage, and over-the-counter medication [51]. Where costs have been estimated, it is the "medical costs", which have been measured in various high-income countries. In such studies, the estimated costs amount to between 1% and 2·5% of the gross domestic product of these countries [13]. The vast majority of this costs burden is associated with surgical interventions [52] - hip and knee arthroplasties.

1.2.4 OA Outcome measures

For research in any topic, it is vital to have an agreed set of outcome measures which are sensitive to change with effective treatment but are reliable to re-measure when no major change has occurred. Recently, an international consensus standard set of outcome measures for patients with hip or knee osteoarthritis attending for care across the range of healthcare settings has been defined [53]. The eight outcome domains include: joint pain; physical functioning; health related quality of life; work status; mortality; reoperations; readmissions; and overall satisfaction with treatment effects. This standard set of outcome measures was defined for monitoring the care of people with clinically diagnosed hip or knee OA across healthcare settings.

1.2.5 OA: management

Most patients with OA are managed in primary care, and while there has been a marked increase in therapeutic options for managing OA, most available treatments are symptomatic [54]. In the

vast majority of cases, patients seek treatment for the joint pain arising from the osteoarthritic joints and it is advocated that this should be assessed within a biopsychosocial model [55]. Several management guidelines have been developed which include recommendations for the use of non-pharmacologic and pharmacologic interventions [56-58]. Non-pharmacological interventions recommended for both hip and knee OA patients comprise: weight loss; exercise programmes that involve muscle strengthening followed by aerobic exercise; lifestyle change to avoid stress on the joints (such as pacing the amount of activity undertaken); and use of joint supports and assistive devices [3]. Pharmacological interventions are principally aimed at pain relief; disease-modifying drugs are not yet available [59]. First-line treatment options include topical non-steroidal anti-inflammatory drugs (NSAIDs) and paracetamol, followed by (among others) oral NSAIDs, COX2 inhibitors (a type of NSAID that directly targets cyclooxygenase-2) and opioids.

A therapeutic model of treatment options for OA (Figure 9) has been recommended within the National Institute for Health and Care Excellence (NICE) national clinical guidelines (CG177) [18]. Treatment options should be offered working from the centre outwards, starting with non-pharmacological approaches and only if these approaches fail should more invasive options be recommended. Options in the middle circle should not be considered before those in the core, and options in the outer circle should not be considered before those in the middle circle. Treatment options should be decided in conjunction with patients (so called “shared decision making”), taking into account their individual risk factors, needs and preferences and the patient’s

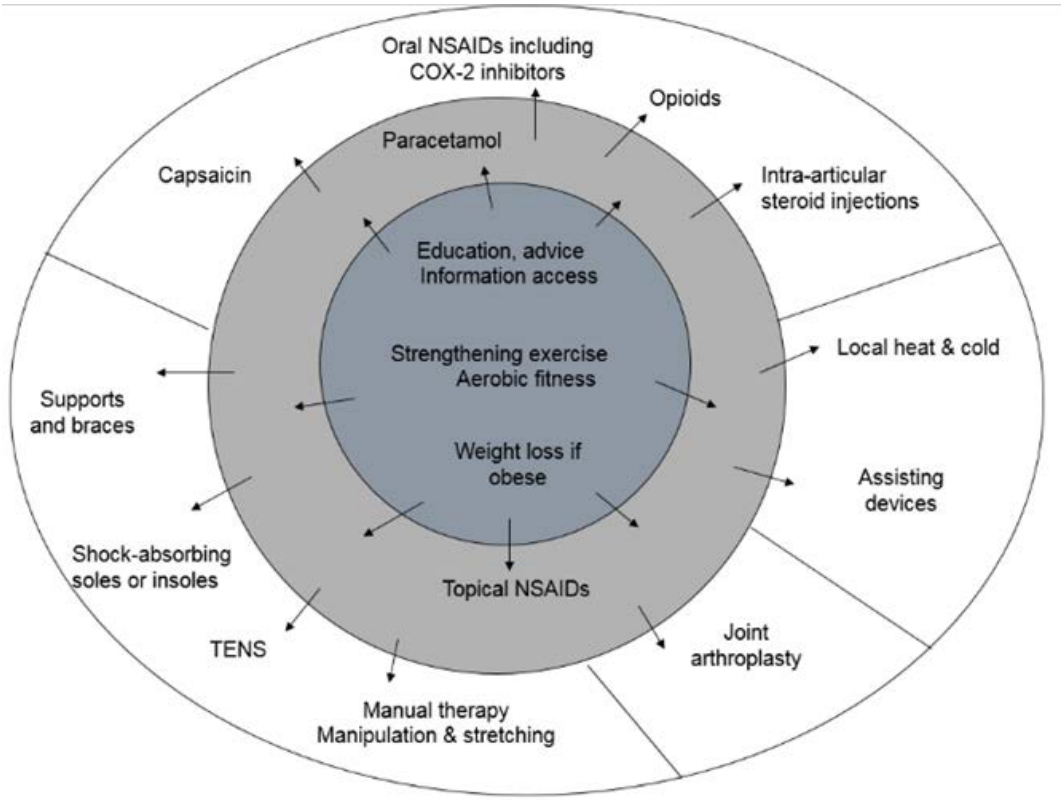

Figure 9. Treatments for OA in adults. Starting at the centre and working outwards, the treatments are arranged in the order in which they should be considered [4]

attitude to physical exercise needs to be assessed. The emphasis is on self-management and empowerment of the individual and their carers [60].

As the NICE guidance suggests, surgical options are considered only after a trial of conservative measures has failed and then is indicated for people with severe symptoms and restriction of function associated with joint failure. Decisions about surgery will be discussed in the "arthroplasty" section.

1.2.6 Other indications for arthroplasty (non-OA)

As discussed previously, the indication for arthroplasty in the vast majority of patients is osteoarthritis. Therefore, a detailed discussion of other indications is outside the scope of this thesis. However, arthroplasty is performed for a number of other clinical conditions that have caused joint failure. At the hip, femoral neck fracture, avascular necrosis, inflammatory arthritis (particularly spondyloarthropathy) and developmental dysplasia are all indications for arthroplasty. At the knee, traumatic joint failure or inflammatory arthritis (particularly rheumatoid arthritis) are other indications for knee arthroplasty.

1.3 Arthroplasty

1.3.1 History of arthroplasty surgery

History of total hip arthroplasty

Professor Gluck of Germany is recorded as attempting the first ever hip replacement surgery as long ago as 1891 when he inserted ivory to replace the femoral heads of patients in whom tuberculosis had destroyed the joint [61]. Over the next few years, surgeons experimented using a range of human and animal tissues (skin, fascia lata) within the articulation between the femoral head and acetabulum. The next major milestone was reported in USA in 1925 when Marius Smith-Petersen created a mould arthroplasty which could fit over the femoral head and create a smooth articulation but the material that he used was glass, which could unfortunately not withstand the forces necessary and therefore shattered in situ [62]. Working in conjunction with Wiles, Smith-Petersen then developed a similar mould arthroplasty using stainless steel which was fitted to the bones with screws and bolts.

In the UK, George McKee initiated the use of metal-on-metal prostheses in 1953. He started from the Thompson stem (a cemented hemi-arthroplasty used for femoral fractures) and created an acetabulum from cobalt and chrome. However, it was in the 1960s that Sir John Charnley initiated

the low-friction arthroplasty on which the modern surgery is based, using a stem made of metal, a socket made of polyethylene and an acrylic bone cement. Total hip replacements have been regularly performed in the UK since the 1960s [95].

Figure 10. X-ray scan image of hip joints with total hip replacement [2]

Figure 10 shows an X-ray scan image of hip joints with total hip replacement on right side.

History of knee arthroplasty

Once again, Gluck of Germany is credited with undertaking the earliest recorded knee arthroplasty procedures, using primitive hinge joints made of ivory back in 1860. However, further development does not appear to have been made until 1951 when the Walldius hinge joint was developed [63]. Originally made from acrylic, it was then made from cobalt and chrome but both materials were found to fail. Much as Charnley's development of hip prostheses marked a step-change in knee arthroplasty, it was a colleague of Charnley's, Frank Gunston, who developed the first knee prosthesis with condylar components which was initially unhinged [64]. The condylar components allowed preservation of the cruciate and collateral ligaments which allowed for improved biomechanics of the replaced joint. A metal-on-polyethylene design with condylar components was used throughout the 1970s. Since then, refinements in geometry, component materials, fixation, ability to size, and instrumentation [96,97] have all allowed a steady improvement in the range of motion and improved survivorship of the arthroplasty. As a result, knee arthroplasty has been performed routinely now for the last 40 years [13].

1.3.2 Epidemiology of arthroplasty

Hip

Ordinarily, each year, more than 1 million THRs are performed worldwide, almost 100,000 of which are done in the UK [65]. Rates continue to increase with an estimated 37% increase in the numbers performed between 2008 and 2017. By far the majority of THAs are performed for OA (90%) and the remaining 10% are undertake for fracture, avascular necrosis, developmental

dysplasia and inflammatory arthritis. The median age at which THR is performed in the UK is 69 years and nearly one-third (32%) are aged <65 years at the time of THR. THR is more commonly performed in women than men with a ratio of 1.5:1, mirroring the higher prevalence of hip OA amongst women, as compared with men.

Knee

The use of TKA as a treatment for knee arthritis continues to increase. More than 100,000 TKAs are performed in the UK annually. Given the frequency of knee OA, all current predictions suggest that TKA rates are set to continue to increase [66]. Data from the UK Clinical Research Practice Datalink database suggest that at the age of 50 years, the lifetime risk of undergoing total knee replacement surgery is 10·8% for women and 8·1% for men [67]. Matching the epidemiology of knee OA, women are more commonly treated with arthroplasty than men. Rates of TKA are increasing as rates of knee OA are increasing. The average age at which patients undergo TKA is in the mid-60s but a growing proportion of TKAs are undertaken amongst individuals who are below aged 60 years, who now make up 15% of the population of patients who undergo TKA [68].

1.3.3 Decision making for surgery (hip and knee)

NICE guidance [18] for clinicians with responsibility for referring a person with OA for consideration of TJR recommend that the clinician should ensure that the person has previously been offered at least the core (non-surgical) treatment options (see section 1.2.5 above). The guidance states that, “referral for joint replacement surgery should be considered for people with OA who experience joint symptoms that have a substantial impact on their quality of life and are refractory to non-surgical treatment”, and that patient-specific factors (including age, sex, smoking, obesity and comorbidities) should not be barriers to referral for joint surgery.

The principal clinical indication for surgery is end-stage arthritis which is clinically manifest when the pain and malalignment of the joint severely impacts several aspects of daily living. According to patient information provided on the NHS website [69], patients may be offered arthroplasty if: they have severe pain, swelling and stiffness in the joint and mobility is reduced; joint pain is so severe that it interferes with quality of life and sleep; everyday tasks, such as shopping or getting out of the bath are difficult or impossible; feeling depressed because of the pain and lack of mobility; unable to work or have a normal social life. For some, arthroplasty may be the only option for reduced pain and recovery of function of their joint.

Decisions about surgery should be shared, made at a consultation between surgeon and patient and should include discussion of: the risks and benefits of surgery; possible outcomes including

complications; and planning for post-operative return to normal function, including employment. A discussion of post-operative rehabilitation and return to work will follow later in this chapter.

1.3.4 Arthroplasty complications (hip and knee)

The majority of arthroplasty patients report substantial improvement in joint pain, function, quality of life and health status, as well as satisfaction with the results of surgery, at 6 months post-operatively [102]. However, some patients will experience complications early in their post-operative recovery, and others report enduring problems with post-operative pain and joint stiffness many months after the operation. In rare cases, an early revision operation may be required due to post-operative complications.

Following lower limb arthroplasty, all patients will need a period of recovery and rehabilitation. Patients are encouraged to mobilise (with the use of walking aids) as early as the day of or day after their operation and to walk as much as is comfortable every day thereafter. However the joint is likely to be sore and swollen for the first few days after surgery and pain management may well be required for the first couple of weeks post-operatively, although this can be considerably longer for some [103].

Early post-operative complications can include blood clots that form as deep vein thrombosis in the leg, or in a very small number of cases, the blood clot can travel to the lungs resulting in a pulmonary embolism. As with all operations, there is a small risk that the wound will become infected. There is also a small risk that the ligaments, arteries or nerves will be damaged during surgery and this will usually improve gradually in time, but can lead to further surgery to repair the damage. A wound haematoma (collection of blood under the skin causing a swelling) can also develop, this can either discharge itself or may require a smaller second operation to remove it.

For most people, pain gradually subsides during the first few months after surgery. However, some experience ongoing pain or develop new types of pain post-operatively and it has been found that approximately 10% of THA patients and 20% of TKA patients report moderate or severe pain between 3 months and 5 years after surgery [104]. Some people experience continuing or increasing stiffness after surgery, although this may be resolved with exercise and as the swelling reduces.

Aseptic loosening occurs when the hip or knee implant has moved out of position. The friction of the joint surfaces rubbing together as the joints move can cause the implant to wear, which weakens the joint and can cause the bone to fracture or lose contact with the implant. If this occurs, joint revision surgery may be required to resolve it.

A study which evaluated the indications for revision hip arthroplasty reviewed all revision hip arthroplasties at two institutions in the USA between January 1996 and December 2004 [105]. They found that the mode of failure of the hip implant was dependent on the time between the index and revision surgeries. In early failures (defined as less than 5 years after primary surgery) instability (30.5%), aseptic loosing (27.10%), and deep infection (19.60%) were the most important causes with pain (14.40%), peri-prosthetic fracture (5.90%) and component failure (2.50%) accounting for the remaining causes of early failures. In contrast, aseptic loosening was the cause for the majority (80.70%) of revision surgeries performed five years or more after primary hip replacement.

Population-based estimates for the risk of revision following TJR of the hip and knee have been calculated using survival analysis methods [106]. They found that one year after THR the incidence of revision was 0.6% for females and 0.7% for males; for TKR the incidence was 0.3% females and 0.4% males. Cumulative incidence of revision at 15 years after THR was 6.0% for females and 8.3% for males; and 4.4% for females and 7.1% for males after TKR.

Cumulative incidence rates of revision were higher for men than for women, and higher after hips than knees. Age, gender and BMI were estimated to be significant predictors of time to revision. Severely obese patients undergoing THR were observed to have a higher risk of revision surgery during the first year following hip replacement, but the same effect was not observed for knee replacement.

One measure of success of both hip and knee arthroplasty is the increasing frequency with which they are being performed. The National Joint Registry (NJR) [17] has collected information about hip and knee replacement procedures since April 2003, and monitors the performance of joint replacement implants. The NJR collects data on all hip, knee, ankle, elbow and shoulder joint replacements across the NHS and independent healthcare sector in the UK (England, Wales, Northern Ireland and the Isle of Man). The most recent Annual report (14th NJR Annual report published in 2017) [6] showed that the number of lower limb arthroplasties was continuing to increase year on year. Specifically, the total number of hip replacement procedures performed increased by 3.5% from 98,211 in 2015, to 101,651 in 2016 (60% female). Knee replacement procedures increased by 3.8% from 104,695 in 2015, to 108,713 in 2016 (56% female). Within this, the number of primary hip and knee replacements in 2016 were 87,733 and 98,147 respectively.

The trend of increasing frequency of hip and knee arthroplasty is reported across Europe [98,99] and the USA [100] with rates forecast to continue to rise. A study published in the UK [101] used age, gender, and BMI incidence rates (between 1991 and 2010) from a population-based cohort

study applied to population growth forecasts, to estimate that the number of primary arthroplasties performed by 2035 would be 95,877 (THA) and 118,666 (TKA). For comparison, they also used a model that extrapolated historical rates of arthroplasty, and this approach resulted in estimates of 439,097 (THA) and 1,219,362 (TKA). The authors suggest that the lower estimates could be seen as underestimates, however the much higher estimates (based on the approach that included historical rates of arthroplasty) are neither 'plausible or sustainable' within NHS provision, and the answer is likely to be between the two different approach estimates.

1.4 The relationship between work and health

Employment, if it is good employment, is important to human lives [70]. In addition to providing financial stability, it creates structure and meaning for individuals and gives them social contact and status in society. It has a considerable effect on our health, quality of life and life expectancy. Moreover, generational effects are observed such that the children of adults who do not work are more likely to have mental ill-health and less likely to have employment in their own futures [70].

Unemployment is associated with poorer physical and mental health, increased levels of pain, and more healthcare consultations. People who are unemployed have a reduced life expectancy, dying on average 7-10 years earlier than their employed counter-parts. Additionally, the financial consequences of unemployment lead to depression and other mental health conditions, lead to a doubled risk of suicide and self-harm and are associated with indebtedness, which in itself increases the mental ill-health.

There is a substantial body of evidence demonstrating how work contributes to health inequalities [71] and, in particular, that unemployment and poor quality work are linked to worse health outcomes. Therefore, improving access to good work for all is an important public health concern [72].

Given that a person's work, and their ability to do their work, is a key determinant of their physical, psychological, economic and social outcomes [73], it is surprising that patients are not routinely asked about their work status, the nature of their current or previous work, and how their medical condition impacts on their work, and vice versa. The systematic collection of work outcomes at any point of contact with health professionals would make it possible to track work outcomes for patients with different medical conditions, and provide a useful resource for linking employment and health outcomes, as well as being able to evaluate the impact of medical treatments (including surgery) on patients' ability to work.

Since Marmot pointed to the important relationship between inequalities and health [74] and Burton and Waddell published their data on the relationship between (good) work and health [75] there has been a growing call for work to become a health outcome in the UK. In general, the effectiveness of healthcare is measured by its impact on mortality and morbidity. The National Institute for Health and Care Excellence (NICE) advises healthcare providers about the effectiveness and cost-effectiveness of new medicines and health technologies based upon the impact of the intervention on Quality-Adjusted Life Years (QALYs), which take into account the impact on health outcomes (pain, function, quality of life) but take no account of productivity in terms of ability to be able to work or be financially independent. However, in a society in which healthcare is free at the point of delivery, paid for by central government resources (drawn from taxpayers' revenue) and which the majority of social care and welfare costs are also met from the same financial resource, there is a compelling case for at least considering the impact of healthcare on an individual's ability to be economically independent or at least require less social or welfare support in the longer term. It is likely that many health interventions (such as e.g. arthroplasty surgery) would be more cost-effective if their effect on financial independence were taken into consideration.

Not only does healthcare have an important role to play in enabling work participation in the UK, but also, healthcare providers are frequently involved in decision-making around sickness absence and fitness for work. Since its inception in the 1950s, it was decided that Occupational Health services should be paid for and provided by employers and not by the NHS. Larger employing organisations are compelled to provide at least some occupational health provision, although that provision has increasingly been outsourced to private providers and may in fact involve quite rudimentary telephone-based support. In practice, however, much of the UK's workforce are employed in small and medium-sized enterprises (SMEs) and therefore are not offered any Occupational Health support in the workplace. Much of the deficit in Occupational Health services is picked up in primary care by General Practitioners (GPs) but, in many cases, this is reluctantly, as GPs report that they feel inadequately trained to provide these services, lack sufficient time in consultations and find that this role conflicts with their role as patient advocates.

1.4.1 Sickness absence

Over the past decade, following on from Professor Dames Carol Black's report [70], the traditional sick note has been superseded by the new Fitnote [18]. The intention of this was to encourage the doctor certifying a worker's fitness to work to think about what duties the patient could provide rather than automatically deeming them "unable to work". Although their introduction was supported by a training package, and the aim was that Fitnotes would also be provided by doctors in all specialities [76] to support GPs, unfortunately, the evidence suggests that Fitnotes are being used as old-fashioned sick notes in 90% of cases and that, once again, the burden is falling predominantly in primary care. This matters because research shows that the longer a person is absent from work, the less likely they are to return with key milestones at 6 months and 12 months of sickness absence at which point 50% of people will ever return and <10% of people will ever return respectively (Figure 11) [75, 77]. Therefore, the doctor certifying sickness for the first time may be starting a patient on their journey towards long-term sick leave (four weeks or more) and ultimately to total disability for work and unemployment, with all the adverse consequences described above. According to a recent report by the Academy of Medical Royal Colleges and Faculty of Occupational Medicine [78], the aspiration is to equip all healthcare professionals with the tools and techniques to have supportive conversations with patients about the relationship between work and health and ensuring that healthcare services function to provide support of those who need additional help and rehabilitation to return to their work.

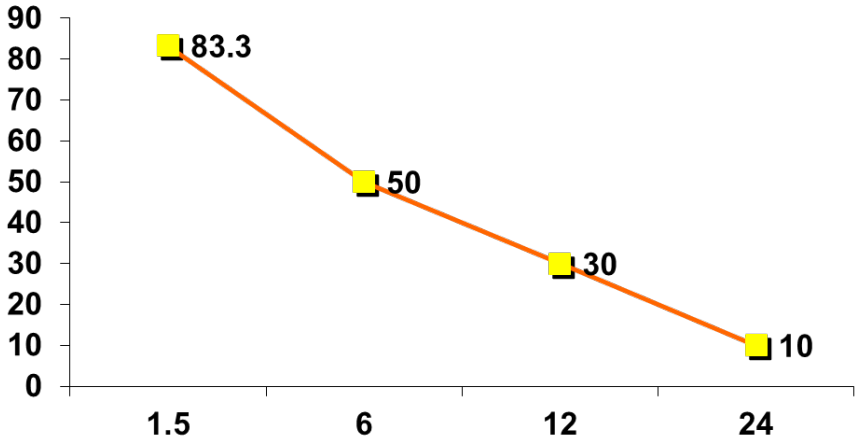

Figure 11. Rate of return to work after sickness absence

1.4.2 Working to older ages

In 2016 the UK population reached 65.6 million and is projected to increase to over 75 million by 2039 [79]. Much of the population growth is attributable to steadily increasing life expectancy: people in the UK are living longer. However, the shape of the population is also changing (Figure 12) due to declining birth rates which mean that the most rapidly growing proportion of the population is the group aged 65 years and over. Currently,18% of the UK population are aged 65

and over, It has been projected that by 2039 over a quarter of the UK population will be aged 65 or over [79].

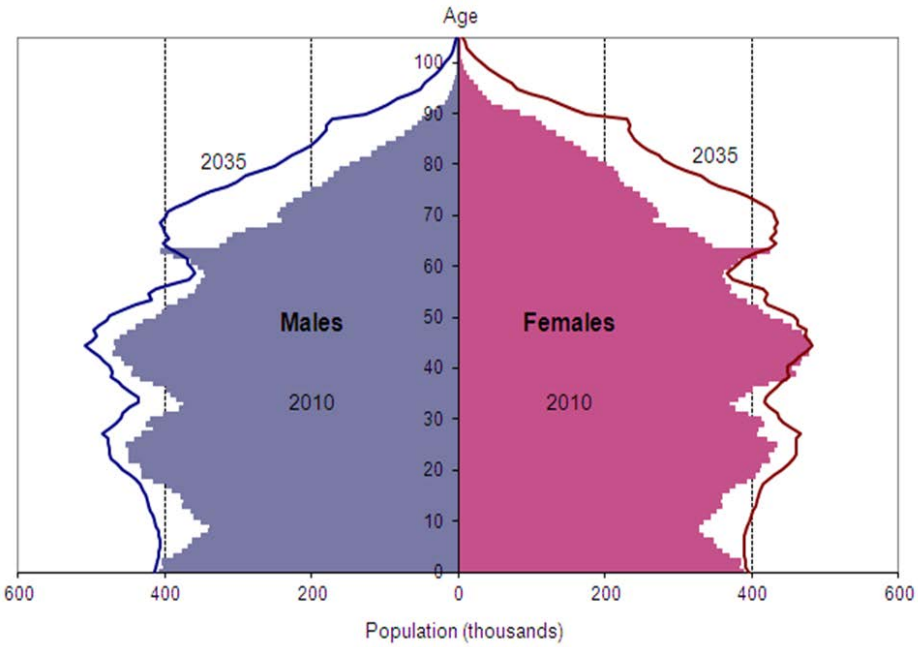

Figure 12. Population pyramid showing projected changes by 2035 [49]

Traditionally, the legal retirement age in the UK was 65 years for men and 60 years for women. The entitlement to be able to draw a state pension coincided with these legal retirement ages. The increase in life expectancy in the UK and changing population distributions (Figure 12) have far-reaching social, economic and health implications and led to the first substantial change to UK pension rights in fifty years. The Pensions Act 1995 detailed plans to increase the state pension age to 65 years for women, so that by 2020, both men and women would be eligible to receive a UK state pension after their 65th birthday. It was later argued that even with the proposed changes, the existing pension system would not be economically viable and making no further changes would risk the sustainability of the state pension system [80]. The timetable was subsequently accelerated (Pensions Act 2011) so that by 2018 the pension age for both men and women would be 65 years, followed by increases in the state pension age for both to reach 66 years by 2020, and 67 years by 2028. In July 2017, the UK government announced its intention to accept the key recommendation from an independent review of the state pension age [81] to further raise the state pension age to 68 years by 2039. There is a trend of increasing state pension ages globally, with the USA [82], Australia [83], Spain [84] and the Netherlands [85] all planning to increase the state pension age to 67 years by the end of 2027.

There is evidence that the legislative changes are taking effect and that people are increasingly working to older ages [8][86]. This change in the age distribution towards older workers is reported from most developed countries and is expected to accelerate [87]. Over the past

decade, the proportion of those aged 65 and over and registered as employed in the UK has risen from 6.6% (609,000) of the total population in 2006, to 10.4% (1.19 million) in 2016. The average age of exiting the workforce has been increasing for over two decades [88]. For men, the average age of retirement has risen by 1.9 years (from 63.2 years in 1997 to 65.1 in 2017). An even greater increase (2.8 years) has occurred in the female population (60.8-63.6 between 1997 and 2017).

Changes in employment ages have largely occurred as a result of the increase in the age of entitlement to the UK state pension. Other government policies have been developed to encourage older workers to remain in the workforce. The passing of the Equality Act 2010 and the abolition of the Default Retirement Age in 2011 mean that employers can no longer make recruitment or retirement decisions based on an individual's age.

1.4.3 Ageing UK workforce

Impacts of working to older ages

Newspaper headlines often report the changes in state pension age negatively, with headlines such as "shock for millions" and "having to work an extra year" (Figure 13).

While many workers with retirement in sight will look forward to leaving the workforce as early as possible, as we have seen, there is good evidence demonstrating the many benefits of having a paid job [75], at least for those of 'working age' (traditionally between 16-65 years). As well as the financial and wider economic benefits of maintaining a working income, other benefits for the individual include a sense of self-worth, of contributing/participating, maintaining social status, and the potential for social contact, engagement, and support from within the workplace.

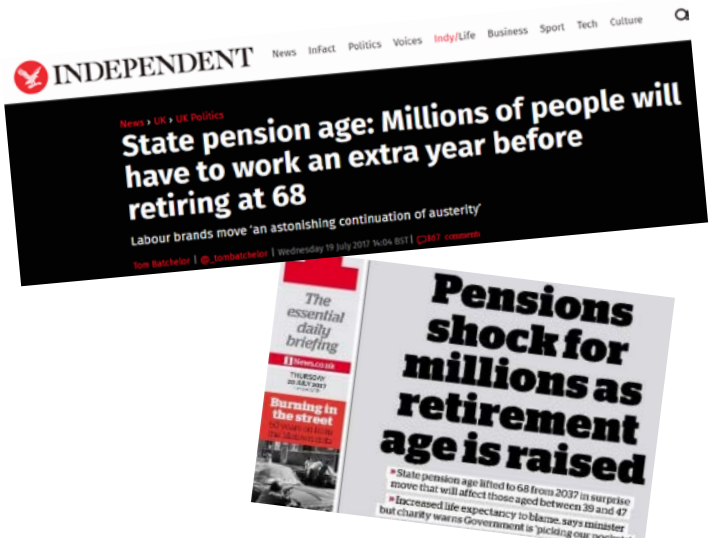

Figure 13. UK newspaper headlines following the most recent changes to state pension announced in June 2017

Therefore, it could be equally true that these announcements about pension arrangements should be welcomed [89] because as well as reflecting an increase in life expectancy in the UK, these pension changes will encourage more people to work to older ages, which could benefit individuals, businesses, society and the economy [90].

The Chief Medical Officer's annual report (2015) on the health of people

aged 50 to 70 years [72] highlighted the health benefits gained from remaining in 'good quality work' at older ages, and indeed, emphasised the role that employers need to play to facilitate this. Waddell and Burton's independent review, commissioned by the Department for Work & Pensions (DWP), of the evidence on the relationship between work, health and well-being [75] also emphasised that the health benefits of work depend on the quality of the work undertaken.

While most might agree that having the choice to remain in good quality work to any age is desirable, the element of choice, or indeed of securing 'good quality' work, will not be available to all in the UK's current jobs market. Additionally, the evidence of benefits from work were based on findings from workers aged less than 65 years [75]. Additional evidence is needed in order to explore outcomes from older workers as the workforce ages.

Cross-sectional studies of mental and physical wellbeing have found that it is those who are retired, rather than those remaining in work, who are more likely to report an increase in overall mental wellbeing [91, 92]. This age discontinuity was found between those who were retired and those in work, with marked improvements reported in subjective mental health and wellbeing for those beyond statutory retirement age [93]. However, these differences were not seen for physical health scores, where there is a similar pattern of increasing health problems associated with increasing age between both those employed and those who are retired. A large prospective occupational cohort study in France [94] followed people from 7 years before to 7 years after they retired and found similar results around physical health. They found no difference in the risk of major chronic diseases (including diabetes, respiratory disease, coronary heart disease and stroke) between people in employment and those who had retired, however retirement was linked with a substantial increase in mental and physical fatigue and depressive symptoms, especially for individuals with chronic diseases (Figure 14).

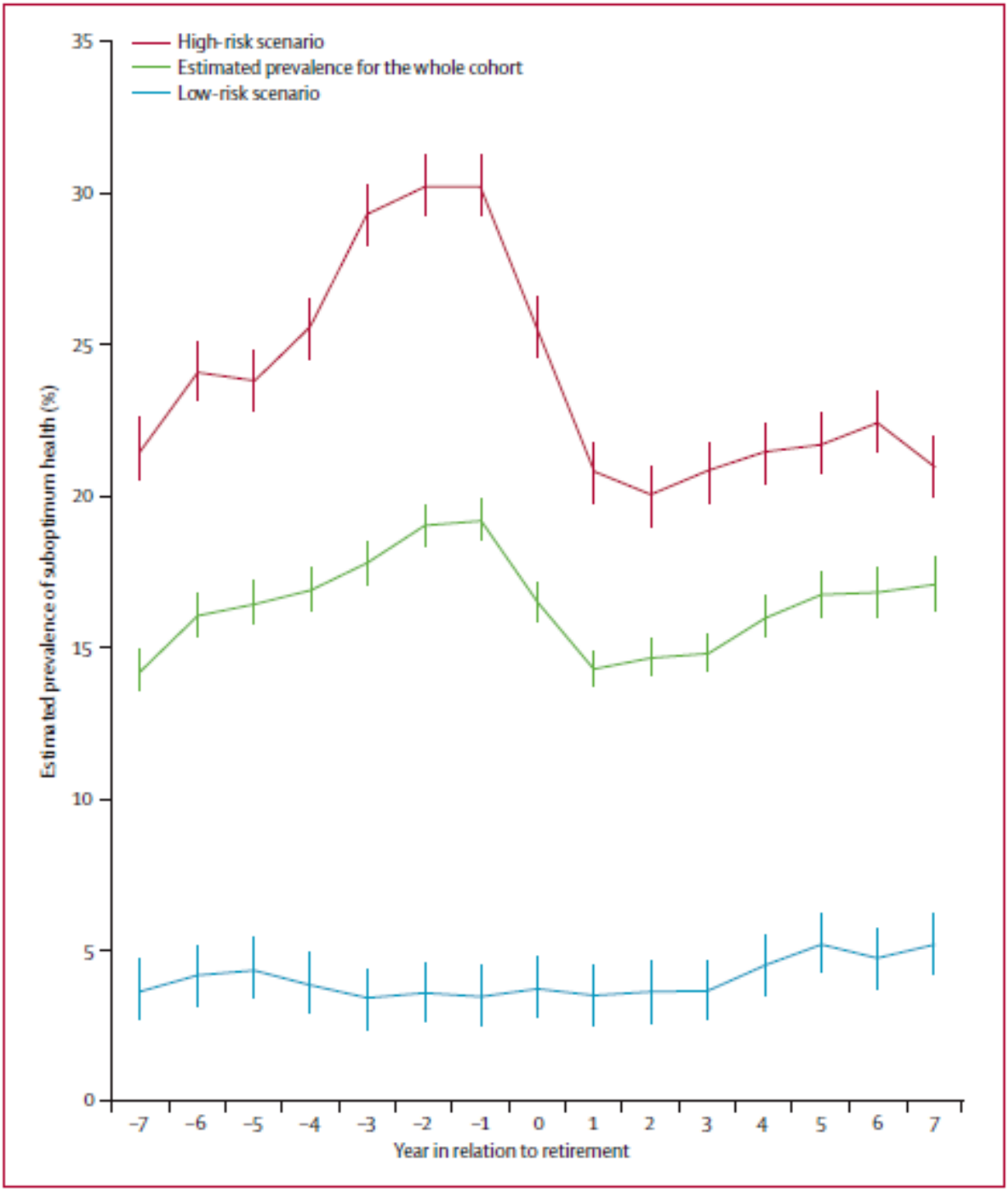

Figure 14. Trajectories of health in relation to retirement. Shows estimated prevalence of suboptimum health (%) by year (year 0 is year of retirement) [94]

Nevertheless, for many, the option to retire prior to receiving a state pension, and perhaps beyond, will not be available due to reduced returns on pensions and savings, plus increased indebtedness faced by many [95].

With an ageing workforce, an increasing number of employees will need to manage their work duties alongside managing a long term health condition. Almost one fifth of adults aged 18-24

years have at least one long-term health condition and this increases to 45% of adults aged between 50 years and state pension age [72].

There is a pressing need for future studies to explore outcomes for older workers generally but also to capture the experience of older workers who experience chronic and/or age-related health conditions, such as OA.

Women are most affected by the recent pension reforms since they have seen the biggest increase in the age at which they will be able to receive a state pension. At the same time, conditions such as OA are more common in women [17]. This is likely to result in a substantial increase in the female workforce in the UK managing their work alongside chronic health conditions. Financial factors may also limit a female worker's option to retire. Currently in the UK, women retire with on average 40% less pension income than men [96] a deficit which can be mainly attributed to the gender pay gap between women and men.

However, those with OA and other chronic health conditions who are able to continue to work may still gain from the benefits of being in paid employment [75] if they are able to access good quality work environments that accommodate and adapt to employees' health conditions and which promote health and well-being amongst their workforce [97].

In order to achieve this, individuals need to be able to access good quality work. The Fuller Working Lives (FWL) UK government policy paper [90] sets out to explain the benefits of working longer, and illustrates a framework to promote the economic benefits of retaining, retraining and recruiting older workers. The FWL strategy aims to support individuals aged 50 years and over to remain in and return to the labour market, and tackle any barriers that exist to prevent doing so.

In the previous sections, we have considered the prevalence of, risk factors for and impact of osteoarthritis, particularly at older ages. We have also described the relevance of work to health and seen that, as life expectancy has risen, so has there been a trend for people to work to older ages and that governments are pushing people towards this by making legislative changes and increasing the age of eligibility for state pension. In the next sections, we will explore the impact of osteoarthritis on work, the potential for arthroplasty to facilitate continued working and what is currently known about return to work after arthroplasty surgery.

1.5 Work as a Health Outcome

1.5.1 Lower limb osteoarthritis and its impact on work

In the past, OA has been rather dismissively regarded as a disease of the "elderly" but there is growing evidence that OA causes significant problems in the working-age population and can have a major effect on quality of life [81] and employment status [72,86,87]. According to data from the UK Department for Work and Pensions, the annual costs of OA amount to £3.2 billion in productivity.

A questionnaire study examining employment characteristics and job loss in patients on the waiting list for surgery to the hip or knee [86] found that both physical activity at work and the size of the employer were associated with job retention in those with advanced OA. One third of patients who were in work when their joint problem began stated they had left their original job mainly or partly because of their joint disorder. Job loss was more common for those employed in very small businesses (with less than 10 employees) and whose duties involved standing for more than two hours each day.

As we have seen, symptoms of OA can have an enduring impact on an individual's ability to work [40, 98] and while the majority of patients' symptoms can be managed non-surgically, total joint arthroplasty (TJA) is considered when the degenerative joint disorder has not responded to other treatments and when the pain and disability significantly interferes with a person's quality of life. Indeed, the main indication for TJA is OA [99] and TJA has been found to be effective at improving pain and function for working-age people [100, 101].

The combination of an ageing workforce and the increased frequency of hip and knee TJR being carried out at younger ages, means a growing number of people will need to return to work, and indeed, to remain at work for longer, following their surgery. Currently there is a limited scientific evidence base upon which to advise patients about returning to work after lower limb arthroplasty.

1.5.2 Benefits of arthroplasty on work

Both total hip and knee arthroplasty are considered successful operations, in fact they are often described as one of the most effective health interventions of the twentieth century. This is because of their remarkable effectiveness at improving pain and function [100, 101].

Given the limitations that severe lower limb OA produces on mobility and quality of life, joint replacement surgery may prevent some of the impact of OA on work and thus enable patients to

continue working [102]. Indeed, patients report that the impact of problems with joint pain and function on their employment is an important factor driving them to proceed with joint replacement surgery [109,110]. For maximum benefit however, it is important patients are operated at the "right" phase of the disease, i.e. before the OA has been allowed to cause job loss. A questionnaire study of 278 patients who were in work when their joint problem began [103], found that by the time they were entered onto the waiting list for hip or knee surgery, 82 patients (29%) had already left their original job mainly or partly due to the joint problem. It has been suggested that operating on patients before their osteoarthritis forces them to leave work is likely to improve their chances of being able to return to work [104].

1.5.3 Do patients RTW after surgery?

The annual publication of PROMs released by NHS Digital indicates that the vast majority of hip and knee arthroplasty patients report improvements 6 months after their operation in measures of general health (EuroQol-5 Dimensions [EQ-5D]) and specific condition (Oxford Hip Score/Oxford Knee Score) patient reported outcome measures (PROMs) [105]. However, the link between health outcomes and work outcomes is not always consistent [106] and there is a need to collect work outcomes to assess the impact of arthroplasty on work, rather than equating improvements in pain and function to improvements in work outcomes.

It has only been relatively recently that arthroplasty studies have considered work as an outcome, and then, usually it is only as a secondary outcome [107]. However, there has been one recent systematic review that synthesised the available studies on work status and time to return to work after hip and knee arthroplasty. The authors could only identify a small number of studies which included relevant work data and described them as of "moderate to low methodological quality". They also found considerably less studies which had considered employment after TKR, as compared with THA. Despite these limitations, they found sufficient evidence to suggest that lower limb TJR improves work outcomes for the majority of patients [112]. Most patients who were able to work pre-operatively were able to RTW after hip and knee replacement surgery. Of the 7 studies included that described work status following THA, between 25% and 95% of people returned to work between 1-12 months after surgery. Only two studies provided data about return to work after TKA and these suggested that 71%-83% of patients were able to return to work between 3-6 months after their TKA.

1.5.4 Who does not go back to work after lower limb arthroplasty?

Whilst it appears that the majority of patients who wish to return to work post-operatively achieve this (68%–95% following THA; 71%–83% after TKA) [107], a substantial number of patients do not return to work. From the available research, there appear to be a number of risk factors for non-return to work after arthroplasty, which are described below:

Pre-operative sickness absence

Where data are available, it appears that the ability of a patient to work up until the time of their surgery is important in post-operative return to work. Those who have taken pre-operative sickness absence have been shown to be less likely to make a return post-operatively, although it is not currently clear if this is because of the severity of their OA, the emotional/psychological effect of having been off sick, or different outcomes from the surgery [100, 108, 109].

A recent prospective study from the Netherlands of lower limb arthroplasty patients between 2010 and 2012 aged <65 years found 7% (5/67) and 11% (6/56) of those working pre-operatively had not RTW 1 year after surgery [110]. Pre-operative absence from work due to hip or knee complaints was associated with (a) not returning to work post-operatively and (b) returning to work but for fewer hours/week than pre-operatively for both hip and knee patients. No other determinants measured in their study significantly affected RTW status for TKA patients

Age

Perhaps not surprisingly, the age of the patient at the time of their operation has been found to influence likelihood of return to work post-operatively. A recent prospective study of 261 TKA patients aged ≤65 years [111] reported a RTW rate of 40%. Age was found to be significantly associated with RTW in this study: of those aged <50 years, 100% (15/15) returned to any work; of those aged 50-54 years 60% (18/30) RTW; at ages 55-59 years 50% (39/78) RTW; and 24% (34/139) of those aged between 60-65 years RTW. Importantly, those aged <50 years returned to work despite their pre-operative health scores and/or the physical nature of the work.

Pre-operative function

In one study, it was shown that, after THA, having better pre-operative activities of daily living scores was independently associated with an improved chance of successful RTW [115]. Similarly in a prospective study of TKA patients, pre-operative activity levels were associated with better chance of RTW, but only amongst those returning to heavy manual work [116].

Comorbidities

One prospective study of TKA patients found that depression and other comorbidities were associated with a poorer chance of RTW post-surgery among those aged 50-60 years but not amongst those at younger ages [116].

Employment type

Self-employed people were more likely to make a successful return to work after hip arthroplasty in one prospective study in the Netherlands [115].

In a prospective study of TKA patients, of the 28 people aged 50-60 years who were unemployed at the time of surgery, none went on to make a successful RTW.

Physical demands of work

Given that heavy lifting and kneeling and squatting have been reported as risk factors for the development and progression of osteoarthritis [38, 112, 113] it could be hypothesised that returning to heavy physical occupations may prove more challenging after TJA. However, the evidence appears to be conflicting. One prospective study of TKA patients found that those aged 50-60 years (but not those aged < 50 years) were less likely to RTW in more strenuous occupations [111]. In contrast most other studies reported no difference in the likelihood of returning to work based on the type of occupation. For example, one retrospective study of 494 TKA patients [114] found that 98% of patients employed in the 3 months before their operation RTW after surgery. The RTW rate by physical demand of the job was: sedentary 95%; light 91%; medium 100%; heavy 98%; and very heavy 97%. A study of hip replacement patients who completed a questionnaire 1 year after surgery [102] found that of the 44 patients working pre-operatively, 38 (86%) were working 1 year after surgery. Those who returned to work post-operatively had better pain and physical function scores compared with those not returning to work. However, there were no differences in the physical job demands between those returning to work after THR and those who did not. Although a recent study from the Finnish Public Sector (FPS) cohort [115] reported the risk factors for successful RTW were having higher occupational status in the job. They also found having a BMI <30, and having taken less than 30 days sickness absence in the year leading up to their surgery, were important risk factors for successful RTW.

1.5.5 How long does it take to RTW after lower limb arthroplasty?

As described above, there is a limited evidence base available about work outcomes and in particular, we found that timing of RTW after surgery was rarely a priority of the investigators. Where data exist, it was collected in a range of different ways (sometimes relying upon recall several months later), it was summarised in either days or weeks or months after surgery, preventing amalgamation of results and rarely was information reported about whether the return was to full or modified duties. Moreover, RTW times are usually skewed in their distribution and yet most researchers report a mean, rather than median, time to RTW for their population and a wide variation in the times taken for people to RTW post-operatively are reported. Despite this, Tilbury and colleagues [112] recently undertook a systematic review of this literature. They identified 15 studies of THA with a range of 1-14 weeks in the average (mean) time taken to RTW. They included 4 studies that investigated RTW after TKA and reported average (mean) RTW times between 8-12 weeks.

In addition to the methodological issues described above, another source of the variation of RTW times between studies can be explained by heterogeneity [107]. These studies vary in terms of: age of participants; number of participants eligible to RTW; operative indications; pre-operative functional capabilities; type of surgery performed; inclusion criteria; and follow-up periods at which RTW was assessed.

Importantly, when data about RTW are reported at all, most researchers report the average time taken to RTW. This masks the range of times to RTW and fails to capture the even greater differences found in the time patients take to RTW within cohorts, and where any variation in findings cannot be attributed to methodological differences. For example, in a UK study of THA patients [116] the time taken to RTW after THA ranged from 1 week to 1 year. In 2015, a study carried out in the USA of hip and knee patients [117] reported a range of between 1-40 weeks for THA and 1-36 weeks for TKA. In a recently published cohort study [115] the time taken to RTW after THA ranged from 10-354 days and they reported the mean average of 103 days to RTW after THA.

These wide ranges of RTW times are reflected across studies (with the notable exception of a minimally invasive THR and accelerated rehabilitation protocol [118] where all patients had RTW within 2 weeks of their operation) and the use of average RTW reporting has reduced the opportunity to exploit the variations in individuals RTW within studies and between studies.

1.5.6 Factors reported to be associated with timing of RTW

A number of studies reported whether age was important in timing to RTW post-arthroplasty. Most, but not all [121] reported that younger patients RTW earlier [102, 111, 119]. The influence of gender on time to RTW is less clear. Some studies report that males RTW sooner than females after lower limb arthroplasty [101, 120, 121], while one found that women had earlier RTW [106]; and others found no difference between genders [114]. BMI may have an impact on time to RTW with four studies finding that patients with higher BMI take longer to RTW [116, 120, 121] but this was not consistent in all studies [117]. Two studies found earlier RTW amongst people with a higher level of educational attainment [101, 104] although of course, different levels of educational attainment feed into different types of employment opportunities.

Fitness to work in the months prior to surgery has been consistently reported to impact on the timing of RTW following both hip and knee arthroplasty and is important in explaining the likely success of RTW [102, 104, 109, 122, 123]. Those with the greatest sickness absence from work before surgery have been found to take the longest time to RTW after surgery. In line with this, patients who were unemployed before their operation took longer to RTW after arthroplasty compared with those who were at work pre-operatively [100, 109]. Health around the time of the operation does seem important as better pre-operative physical and mental health scores [102, 106]; better post-operative physical and mental health scores [124]; and fewer comorbidities [102, 111] have all been shown to be associated with earlier RTW. However, one study reported that those with more comorbidities returned to work earlier [106].

The role of work factors on time to RTW has been rather less studied. The results of several studies suggested that those who were self-employed RTW (at least on a part-time basis) earlier than those who work for an employer, [106, 109]. Another factor found to be associated with reduced time taken off work after surgery was having an accessible workplace [106]. The most evidence about work factors pertains to physically-demanding versus sedentary work. It seems that patients needing to return to more physically demanding roles (notably farming) are found to take longer to RTW when compared to those with lighter workloads [101, 104, 114, 125]. Interestingly however, one study which assessed patient's motivation to RTW after TKA [106] found that although patients with higher physical demands took slightly longer to RTW, a patient's 'sense of urgency' about returning to work was the most important predictor of RTW. Importantly however, another study of "motivation" did not find an effect on timing of RTW [111].

1.6 Methodological limitations and gaps in arthroplasty and work research

Comparison of rates and timing of RTW between studies are limited by a lack of standardisation of methodology. It is clear that there is a need for further prospective evidence to help to define the factors associated with safe and effective RTW following arthroplasty [104].

A systematic review which included 19 studies (14 hip, 4 knee, 1 both) of both prospective (8 studies) and retrospective (11 studies) design identified many heterogeneous methodological limitations of studies of RTW outcomes after lower limb arthroplasty [107]. These included: a wide range of follow-up periods, from 6 weeks to 11 years; the average age of patients ranged from 46.9 years to 79.7 years; there were differences in how RTW times were measured, approximately half of studies recorded the date when individuals returned to work, whereas the rest measured work status at different (and varying) time points, thus reducing time sensitivity with the latter; also, some reported time to RTW when they returned to any work, whereas others reported RTW when they had returned to 'full' duties.

Given this heterogeneity therefore, the current evidence is not robust enough to be able to advise the optimal time for an individual to return to work after lower limb arthroplasty. More evidence is needed to be able to more fully understand the key determinants to facilitate optimum return to work.

1.7 Return to work advice

Therefore, with an increasing proportion of patients who need to work and remain in work for longer following hip and knee arthroplasty, there is a clear need for information about when and how patients can safely return to different types of work post-operatively. Unfortunately, as we have seen above, there is not currently enough high-quality evidence from the literature for surgeons to be reliably able to advise patients about when and how to return to work, let alone give advice tailored to specific types of work.

As well as it becoming increasingly necessary to be able to provide evidence-based return to work advice for patients and employers, it is also important to establish the optimal time in the care pathway when such advice should be given, and in what form, and who is best placed in the healthcare team to provide this information. Importantly also, it needs to be that any advice given is consistent from all members of the primary and secondary healthcare teams who come into contact with the patient before and after the surgery.

An influential, and largely unexplored, factor worthy of consideration is the effect of any information and advice people receive from clinicians about returning to work after their operation. A recent qualitative study of patient-reported factors influencing RTW after joint replacement [126] found that many patients stated that they received no advice about RTW either pre- or post-operatively from healthcare professionals, and reported that the information about post-operative function that they were given appeared to be aimed at older, retired people. Despite this finding, when asked, patients reported a general expectation that they should take a minimum of three months off work following arthroplasty.

A retrospective study [127] of patients undergoing either benign abdominal hysterectomy (BAH) or Birmingham hip resurfacing (BHR) found that participants received inconsistent advice about the time they would need to take off work after their operation. Advice about when to RTW ranged from within 3 weeks to more than 15 weeks for both BAH and BHR. It was found that the advice they received from healthcare professionals had the greatest impact on RTW times as patients generally adhered to the professional advice, irrespective of what it specified. Similarly, a retrospective study of patients undergoing carpal tunnel release surgery [128] found that the surgeons' recommendations were the strongest predictor of time to RTW.

As well as any advice patients receive about RTW from healthcare professionals, they are likely to research other sources (e.g. internet resources) to find out about what to expect after their operation. Examples of current recommendations available about time taken to RTW after arthroplasty in the UK show that there is currently a wide range of advice about how long a patient will need to be off work after their operation (Figure 15).

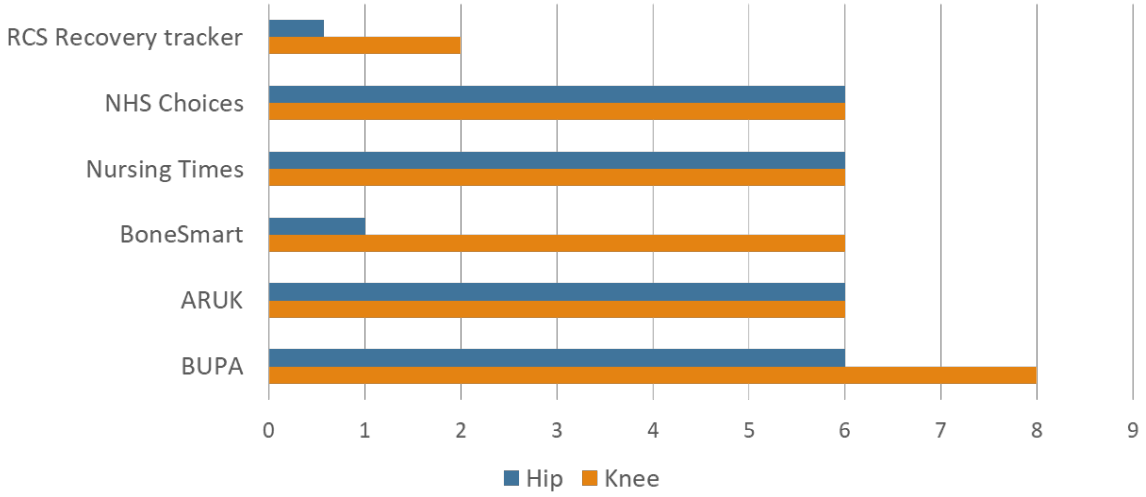

Figure 15. Recommended number of weeks between arthroplasty and return to any type of work

We also found that, surprisingly, there is quite different advice for patients depending on which hospital's website is accessed.

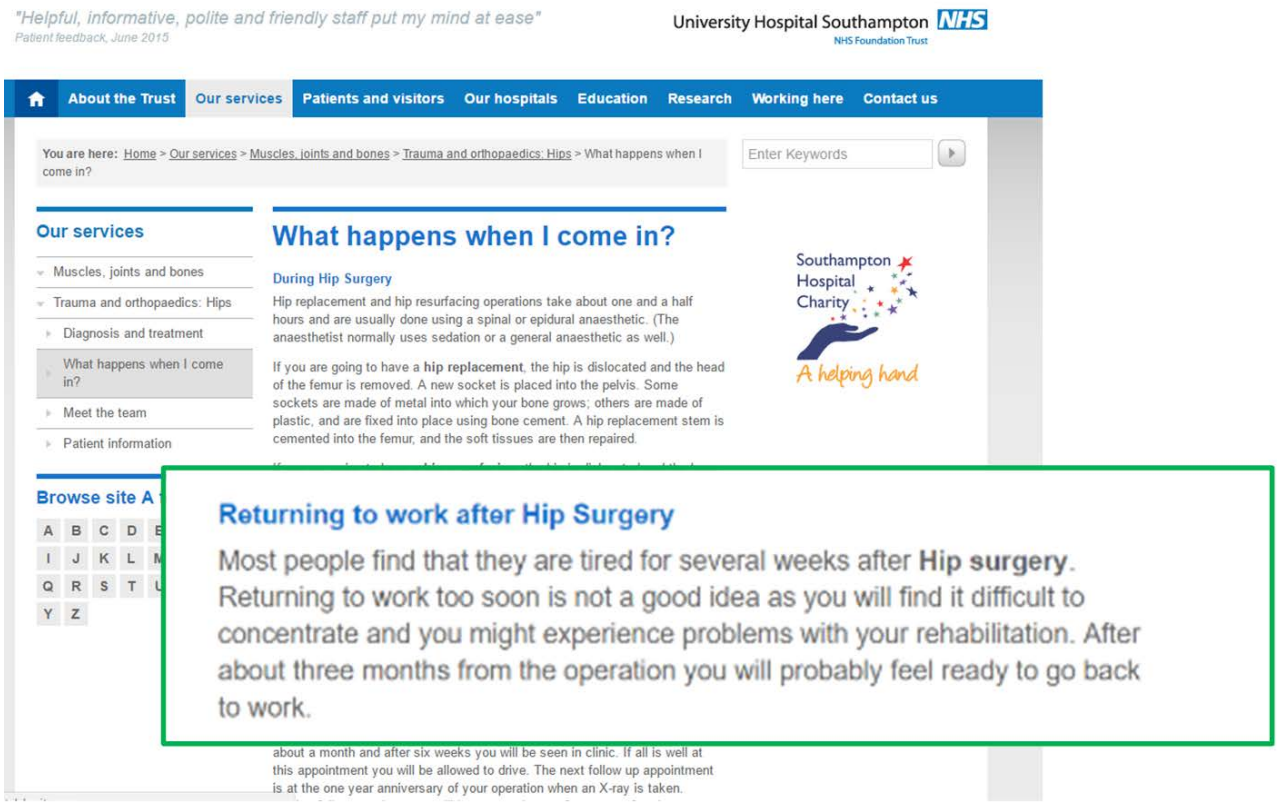

Figure 16. Online patient information provided by UHS

The information available online provided by University Hospital Southampton (UHS) on the 'What happens when I come in?' page for hip surgery (Figure 16) states: "Most people find that they are tired for several weeks after Hip surgery. Returning to work too soon is not a good idea as you will find it difficult to concentrate and you might experience problems with your rehabilitation. After about three months from the operation you will probably feel ready to go back to work." However, alternative information is provided by UHS in the Patient information and advice booklet for Total hip replacement which is also available online and states: "You can return to work after six weeks, but if you are in a manual job or do a lot of driving, you may need to discuss this with your consultant before you consider going back".

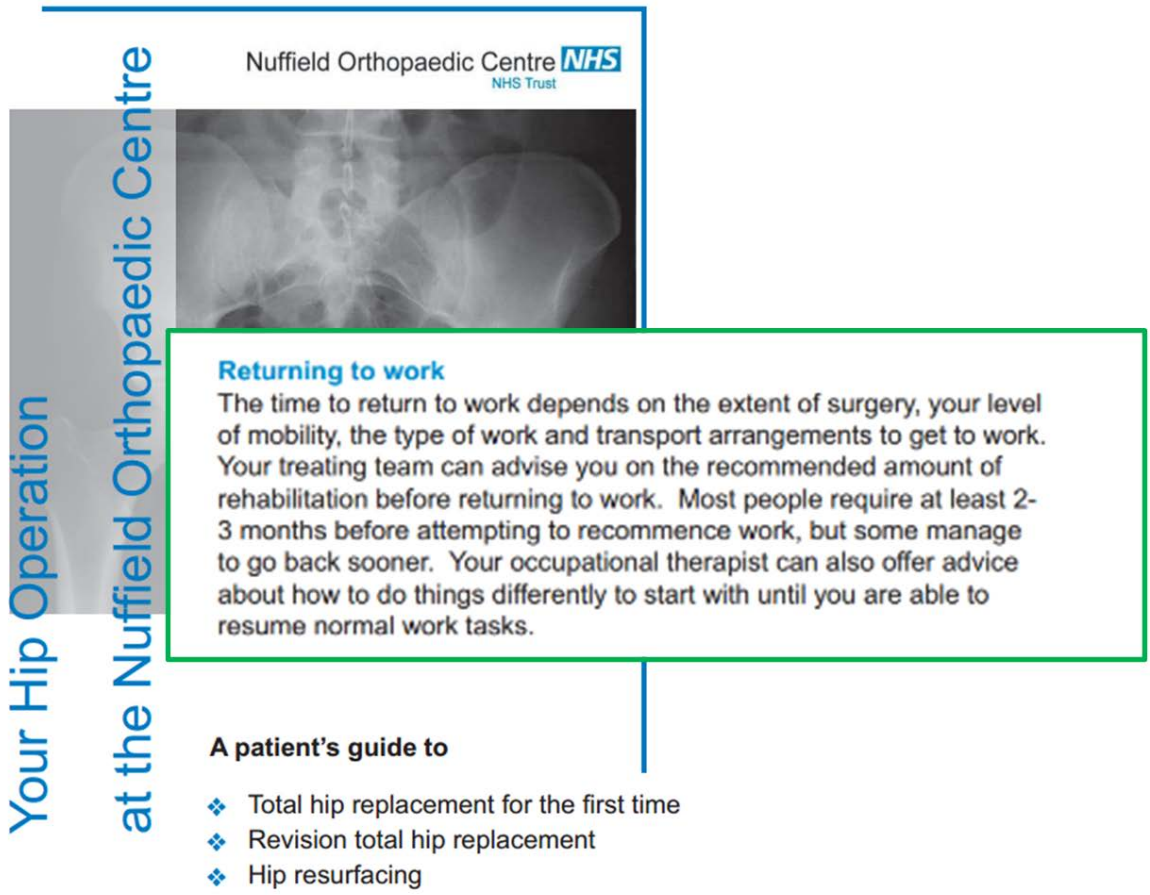

Figure 17. Online patient information provided by NOC

The advice about RTW provided by the Nuffield Orthopaedic Centre (NOC) in Oxford (Figure 17) states: "The time to return to work depends on the extent of the surgery, your level of mobility, the type of work and transport arrangements to get to work", and that most people need at least 2-3 months off work but that some manage to return earlier. Of note, both examples above referenced months (rather than weeks or days) in terms of time to RTW.

These examples of the varied RTW advice available to patients within and between hospitals support findings that arthroplasty patients receive inconsistent advice about returning to work after lower limb arthroplasty [126]. And crucially, that much of this advice is not evidence-based although it may be "eminence-based".

Therefore, there is a pressing need for more research to explore the key variables that impact on RTW following arthroplasty in order that we can provide evidence-based knowledge for clinicians to be able to pass on to patients consistently in order to ensure, safe and timely RTW for all patients.

1.8 Aims and Objectives of this thesis

We have found that there is a need for more research to clarify when patients can make a safe and timely RTW after lower limb arthroplasty and that we need additional information about factors which impact RTW times after surgery in order that guidance can be, as far as possible, tailored to the needs of individuals. Therefore, the over-arching objectives of this thesis are to generate new knowledge about:

(a) The factors which impact time to return to work after THA and TKA

(b) The lived experiences of a cohort of THA and TKA patients who want to RTW post-arthroplasty

To meet these objectives, our aims are to:

1. Undertake a systematic review of the existing literature in order to evaluate which factors impact time taken to RTW after THA and TKA.

2. Recruit a prospective cohort of patients wait-listed for THA or TKA who wish to RTW post-operatively and follow them up until 6 months post-operatively to measure their time to RTW and the factors which impact this time

3. Undertake qualitative work nested within the prospective cohort study in order to evaluate their lived experiences of their journey from surgical wait-listing until return to work post-operatively and obtaining their insight into the advice they receive during that journey.

Chapter 2 Systematic review

2.1 Systematic review of determinants of time taken to return to work following lower limb arthroplasty

2.1.1 Introduction

OA causes significant problems in the working age population and can have a major effect on employment status [86]. Both hip and knee arthroplasties are successful operations, performed with increasing frequency, and found to be effective in improving pain and function in working-aged individuals [107].

Figures from the National Joint Registry for England, Wales, Northern Ireland and the Isle of Man [17] show that more than 185,000 primary lower limb arthroplasties (hip 87,733; knee 98,147) were performed in 2016, with around 18% of patients under the age of 60 years at the time of surgery. The number of operations being performed in this age group is growing rapidly and increased from 18,200 in 2006 to over 33,000 in 2014 [17].

The continued increase in frequency of arthroplasty, coupled with the steady rise in the average age of the UK workforce, means that arthroplasty patients are increasingly likely to need to work post-operatively and, indeed, to remain in work for longer after surgery. Therefore, work as a health outcome after arthroplasty has become increasingly important.

Studies describing work status and time to return to work (RTW) following arthroplasty report RTW times varying from several days to several months [112]. The current evidence does not explain these wide variations in timing of RTW and no existing systematic reviews explore associations between the timing of RTW following lower limb arthroplasty and different risk factors.

The first systematic review in this field was published by Kuijer et al in 2009 [133]. They carried out a systematic review of benefitting or limiting factors of healthcare interventions on RTW outcomes after hip and knee replacement surgery. Their search revealed a paucity of evidence in this area. The authors identified only three intervention studies that fitted their inclusion criteria: patients undergoing primary or revision of total hip arthroplasty (THA) or total knee arthroplasty (TKA); description of RTW or employment status post-operatively; and description of beneficial or

restricting factors affecting RTW. From the three studies which met these criteria, only the type of surgical procedure (two-incision versus mini-posterior) was found to significantly reduce the time to RTW. Post-operative movement restrictions were found to lengthen RTW times, and hospital post-operative discharge guidelines made no difference to RTW times.

A recent review of both quantitative and qualitative factors influencing RTW after lower limb arthroplasty [134] included 7 quantitative studies. Factors found to affect whether patients were able to successfully RTW after surgery were: being employed and able to work pre-operatively; younger age; and having fewer comorbidities. Factors reported to influence timing of RTW were: being motivated to RTW sooner; having no activity restrictions following surgery and those who classified themselves as having "light" workloads. The qualitative aspects of the review focused on patients' expectations and their decision to undergo surgery, with work found to be an important influence on the decision to have surgery. However, despite actively seeking to include qualitative studies, their search strategy did not identify any studies that explored work outcomes following hip or knee arthroplasty. Mean age of research participants (when provided) ranged from 64 to 76 years, suggesting that the majority of those of working age were not widely represented in this research.

A more recent systematic review of RTW status, time to RTW, and factors associated with work status included all clinical studies (with a minimum of 10 patients) undergoing THA and/or TKA, and reported on the patients' work status before and/or at least on one occasion after surgery [121]. Nineteen studies published between 1984 and 2013 met the inclusion criteria, 14 studies on THA, 4 on TKA, and one which included both THA and TKA patients. RTW rates ranged from 25% to 95% at 1-12 months after THA, and from 71-83% at 1-12 months after TKA. The lowest reported rate of 25% RTW after THA was from a study that only followed patients for a period of 7 weeks after their surgery. Factors found to be related to work status after lower limb arthroplasty included health, work and sociodemographic characteristics. Time to RTW was also reported with average times varying from 1.1-13.9 weeks after THA and from 8.0-12.0 weeks after TKA, however they did not examine which factors affected timing of RTW.

Whilst these systematic reviews all explored work outcomes amongst arthroplasty patients and identified factors which impact on RTW status, there is currently no published systematic review of what factors influence the time patients take to RTW after hip and knee replacement surgery.

Therefore, we set out to perform a systematic review of the literature to explore those factors which impact on timing of RTW after lower limb arthroplasty.

2.1.2 Systematic review question

Which factors affect timing of RTW in people aged 18 or older who want to go back to work after lower limb arthroplasty?

Specifically our questions were:

- How much time do people take off work after lower limb arthroplasty?
- What is known about factors associated with timing of return to work following lower limb arthroplasty?

2.1.3 Outcomes

- RTW status - percentage (and number, where known) of people able to RTW after lower limb arthroplasty
- Time to return to work after hip arthroplasty
- Time to return to work after knee arthroplasty
- Factors associated with timing of return to work after hip arthroplasty
- Factors associated with timing of return to work after knee arthroplasty

2.2 Methods

The review protocol was pre-registered with PROSPERO (registration number: CRD42017060058) [Appendix A]. The review was limited to publications in English with no restriction on year of publication and limited to full text reports only, to allow assessment of risk of bias for each study.

2.2.1 Search strategy

The search strategy incorporated two main groups of terms 'RTW factors' AND 'Arthroplasty' ('THA' OR 'TKA'). The search was adjusted for the databases in which it was searched, namely Medline (Appendix B), Embase (Appendix C), PsycINFO (Appendix D) and CINAHL (Cumulative Index of Nursing and Allied Health Literature; Appendix E). The search was restricted to include only papers in English and studies in humans. The initial search was performed by the first author

(LS) in January 2017 in Medline, Embase and PsycINFO. Searches of these three databases were updated in March 2018 and, in addition, a search of the CINAHL database was carried out.

2.2.2 Selection criteria

No restrictions were imposed during the search strategy. All observational and intervention studies that described work outcomes following lower limb arthroplasty were eligible for inclusion. Review articles were excluded, but their reference lists were checked for additional studies. Eligible studies were those including working-aged individuals (18 years and over) undergoing lower limb arthroplasty and whose time to return to work after surgery had been described.

2.2.3 Eligibility assessment

Results from the database searches were cross-checked and duplicate papers removed. Titles and abstracts of the remaining papers were screened by two reviewers (LS and CL) for suitability for inclusion. Where there was doubt about the suitability for inclusion at this stage, the full text of the article was assessed alongside the remaining full texts. If consensus between the reviewers could not be reached, disagreements were resolved by discussion or by a third reviewer (KWB). All reviewers agreed the final decision. The references of included studies and relevant systematic reviews were hand-searched for additional studies, following the same process as above.

2.2.4 Data collection

Screening of titles and abstracts: For screening of the remaining titles and abstracts, the following criteria were used: (i) total hip or knee arthroplasty (ii) reporting of patients' work status before and after surgery.

Selection of full text papers: Titles and abstracts identified as potentially eligible were selected for full article review. If an abstract was not available, the full text paper was requested. For the screening of the full text papers, the above mentioned criteria were again used, with the following specification regarding the reporting of work status: time taken to RTW, either on a continuous basis (days/weeks) or binary (e.g. RTW within 3 months).

2.2.5 Data extraction

Two reviewers (LS and CL) independently extracted data from the included studies using pre-piloted adapted data extraction forms for randomised controlled trials (Appendix F), observation studies (Appendix G) and case-control studies. Any disagreements were discussed between the two reviewers, and unresolved disagreements taken to a third reviewer (KWB). Study and participant characteristics were systematically extracted (when available) from the selected full text papers as follows:

- Title, first author, year of publication, journal title, country;
- Study design (retrospective, prospective);
- Number of participants in study (and number in intervention/comparator);
- Number and/or % of patients working pre-operatively;
- Type of arthroplasty performed;
- Baseline demographic characteristics;
- Follow-up period;
- Pre-operative joint symptoms and function, including measures used;
- Pre-operative occupation status, type and work pattern;
- Duration of time taken to return to work;
- Method of assessing return to work;
- Number and/or % of patients working post-operatively;
- Post-operative occupation status, type, and work pattern.

Where additional information or clarification were required, the first author contacted the relevant author via email.

2.2.6 Risk of bias (quality) assessment

The methodological quality of the studies was independently assessed by two reviewers (LS and KWB) using modified versions of the Scottish Intercollegiate Guidelines Network (SIGN) checklists

[129]. These checklists were selected as they were straightforward to learn to use, are widely used in this type of review and have been evaluated and adapted so that they balance methodological rigour and practicality of use. Following a pilot of the randomised controlled, cohort and case-control studies checklists, the papers were reviewed independently and any differences in scoring were resolved and agreed by discussion. The items included in the risk of bias assessment for cohort studies are shown in Table 5. For each item (e.g. Item 1: 'The study addresses an appropriate and clearly focused question') a response of either 'Yes', 'No', 'Can't say', or 'Does not apply' was required. Summary scores were initially derived by comparing the number of 'Yes' and 'Does not apply' responses with the number of 'No' and 'Can't say' for each study. The greater the number of 'Yes' and 'Does not apply' responses a study scored, the more likely they were to be categorised as low risk. However the final rating also took into consideration the number of items in the last three questions (Table 5; items 19-21) that received a 'Yes' response, as they related specifically to the study's quality as well as whether or not the study considered work factors in their outcomes. This process resulted in each study being assigned two overall quality scores. The first score assigned to each was a categorisation of each study into one of three levels using 'traffic light' colours to represent quality: green, low risk of bias (good); amber, moderate risk of bias (acceptable); or red, high risk of bias (weak). Simultaneously a five level system (++ excellent; + good; +/- acceptable; - weak; -- very weak) was also employed which provided more insight into the overall quality score provided by the colour coding.

Table 5. Items included in the risk of bias assessment checklist

RISK OF BIAS ASSESSMENT - COHORT STUDIES					
RECORD NUMBER: **Reviewer's initials:** **STUDY ID (author, year, title):**	Notes	Yes	No	Can't say	Does not apply
1. The study addresses an appropriate and clearly focused question/ hypothesis?					
SELECTION OF SUBJECTS					
3. The two groups being studied are selected from source populations that are comparable in all respects other than the factor under investigation					
4. The study indicates how many of the people asked to take part did so, in each of the groups being studied					
5. What percentage of individuals or clusters recruited into each arm of the study dropped out before study completion (lost to follow-up, response rate)					
6. Periods of recruitment, exposure, follow-up, and data collection (strobe list)					
7. Comparison is made between full participants and those lost to follow up, by exposure status					
ASSESSMENT					
8. The **outcomes** are clearly defined					
9. The assessment of outcome is made blind to exposure status. If the study is retrospective this may not be applicable /not applicable					
10. Where blinding was not possible, there is some recognition that knowledge of exposure status could have influenced the assessment of outcome					
11. The method of assessment of **exposure** is reliable (registry,validated questionnaire, exposure measured before/at the surgery/after surgery)					
12. Evidence from other sources is used to demonstrate that the method of outcome assessment is valid and reliable					
13. Exposure level or prognostic factor is assessed more than once					
QUALITY ITEMS					
14. Is the information regarding the number of patients who did not gave informed consent and who were not willing to participate adequately reported?					
15. Are the baseline characteristics of included patients reported?					
16. Is the surgical technique adequately reported?					
17. Are the prosthesis brand and fixation reported?					
METHODOLOGICAL QUALITY ITEMS					
18. How were the cohorts constructed? Consecutively/non-consecutetively/ unknown					
CONFOUNDING					
19. The main potential confounders* are identified and taken into account in the design and analysis.					
STATISTICAL ANALYSIS					
20. Have confidence intervals been provided?					
21. How well was the study done to minimise the **risk of bias or confounding** (recall bias for retrospective studies for prospective not so strong / healthy worker)					
**Counfounders include: age, gender, BMI, comorbidities, work factors.*					
OVERALL QUALITY ASSESSMENT (circle colour and symbol)	Green / Amber / Red	++	+	+/-	- --

2.3 Results

2.3.1 Inclusion and exclusion

Figure 18. Flow diagram of literature search results and inclusions/exclusions presents the PRISMA [130] flowchart for each stage of the literature search and reasons for exclusion. Our primary search in the four databases yielded 10,515 articles. After removing 2,001 duplications, 8,514 articles remained. Based on the title review, 8,446 citations were excluded; this left 68 articles for abstract review. During the abstract review, another 30 citations were excluded; this left 38 articles for full text review. After the full text review, 23 articles remained and their reference lists were hand searched for relevant studies. Of the 15 articles excluded at this stage, 6 were excluded due to having the wrong outcome (no time to RTW), 7 had an incorrect study design (no comparator), and 2 had insufficient data (Table 6). The hand search identified two additional citations. However, both were excluded at full text review.

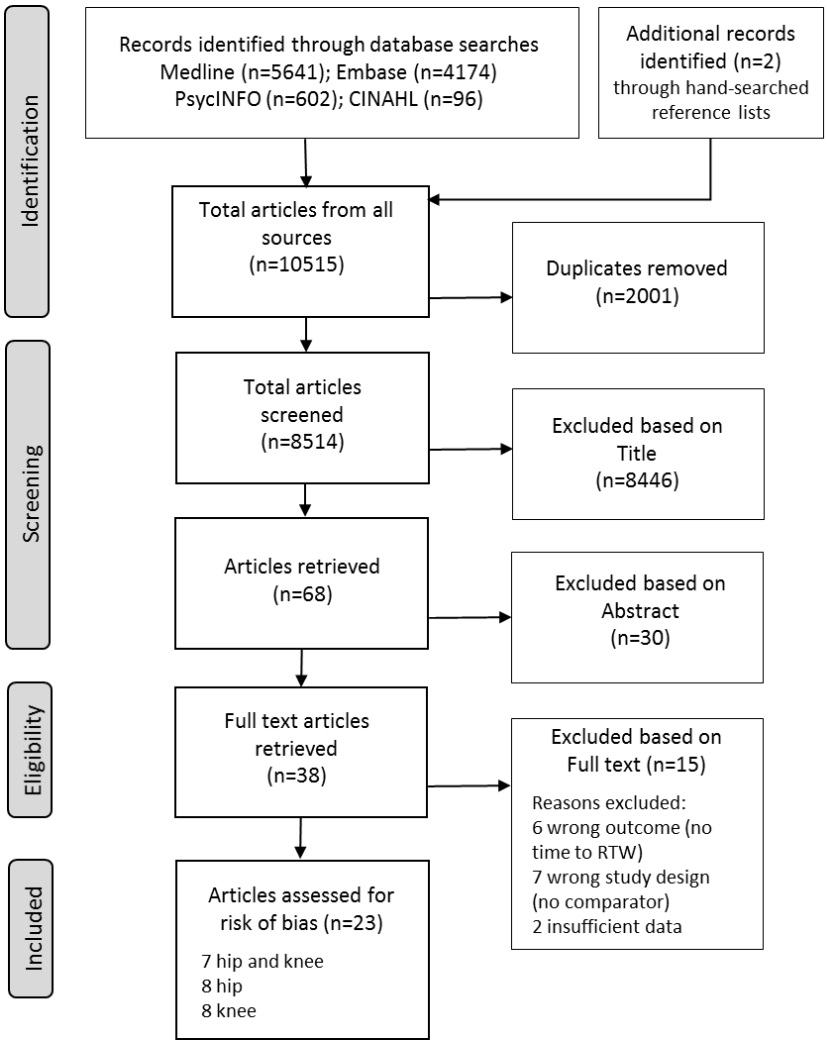

Figure 18. Flow diagram of literature search results and inclusions/exclusions

Table 6. Articles that were excluded at full text review

Article full reference	Joint	Reasons excluded code
Al-Hourani, K., MacDonald, D.J., Turnbull, G.S., Breusch, S.J. and Scott, C.E.H. (2021). "Return to Work Following Total Knee and Hip Arthroplasty: The Effect of Patient Intent and Preoperative Work Status. Journal of Arthroplasty." 36(2), 434-441.	Hip and knee	i
Bardgett, M., J. Lally, A. Malviya and D. Deehan (2016). "Return to work after knee replacement: A qualitative study of patient experiences." BMJ Open 6 (2).	Knee	ii
Clyde, C. T., N. Goyal, W. Y. Matar, D. Witmer, C. Restrepo and W. J. Hozack (2013). "Workers' Compensation patients after total joint arthroplasty: do they return to work?" Journal of Arthroplasty 28(6): 883-887.	Hip and knee	iii
Coole, C., Baker, P., McDaid, C. and Drummond, A. (2020). "Using intervention mapping to develop an occupational advice intervention to aid return to work following hip and knee replacement in the United Kingdom." BMC Health Services Research, 20(1), 523.	Hip and knee	ii
Cowie, J. G., G. S. Turnball, A. M. Ker and S. J. Breusch (2013). "Return to work and sports after total hip replacement." Archives of Orthopaedic and Trauma Surgery 133(5): 695-700.	Hip	iii
Johnsson, R. and B. M. Persson (1986). "Occupation after hip replacement for arthrosis." Acta Orthopaedica Scandinavica 57(3): 197-200.	Hip	i
Jorn, L. P., R. Johnsson and S. Toksvig-Larsen (1999). "Patient satisfaction, function and return to work after knee arthroplasty." Acta Orthopaedica Scandinavica 70(4): 343-347.	Knee	ii
Kievit, A. J., R. C. van Geenen, P. P. Kuijer, T. M. Pahlplatz, L. Blankevoort and M. U. Schafroth (2014). "Total knee arthroplasty and the unforeseen impact on return to work: a cross-sectional multicenter survey." Journal of Arthroplasty 29(6): 1163-1168.	Knee	ii
Kuijer, P. P. F. M., A. J. Kievit, et al (2016). "Which patients do not return to work after total knee arthroplasty?" Rheumatology International 36(9): 1249-1254.	Knee	i
Laasik, R. et al. (2019). "Return to work after primary total hip arthroplasty: a nationwide cohort study." Acta Orthopaedica, 90(3), 209-213.	Hip	i
Lyall, H., J. Ireland and M. Y. El-Zebdeh (2009). "The effect of total knee replacement on employment in patients under 60 years of age." Annals of the Royal College of Surgeons of England 91(5): 410-413.	Knee	ii
Nunley, R. M., E. L. Ruh, Q. Zhang, C. J. Della Valle, C. A. Engh, Jr., M. E. Berend, J. Parvizi, J. C. Clohisy and R. L. Barrack (2011). "Do patients return to work after hip arthroplasty surgery." Journal of Arthroplasty 26(6 Suppl):92-98.e91-93.	Hip	ii
Scott, C.E.H., Turnbull, G.S., Powell-Bowns, M.F.R., MacDonald, D.J., Breusch, S.J. (2018). "Activity levels and return to work after revision total hip and knee arthroplasty in patients under 65 years of age." Bone & Joint Journal, 100-B(8), 1043-1053.	Hip and knee	i
Suarez, J., J. Arguelles, M. Costales, C. Arechaga, F. Cabeza and M. Vijande (1996). "Factors influencing the return to work of patients after hip replacement and rehabilitation." Archives of Physical Medicine & Rehabilitation 77(3): 269-272.	Hip	i
Tilbury, C., C. S. Leichtenberg, R. L. Tordoir, M. J. Holtslag, S. H. Verdegaal, H. M. Kroon, R. G. Nelissen and T. P. Vliet Vlieland (2015). "Return to work after total hip and knee arthroplasty: results from a clinical study." Rheumatology International 35(12): 2059-2067.	Hip and knee	ii
Reason for exclusion codes		
i. Wrong outcome (including no time to RTW)	6	
ii. Wrong study design (including no comparator)	7	
iii. Insufficient data	2	
Total excluded	**15**	

Table 7. Summary data of study characteristics of studies of determinants of RTW after lower limb arthroplasty

Year	First author; country	Joint	Type of op	Total number included	Number of workers	Duration of study	Duration of post-op follow-up	Sex, male	Age at surgery	Main indication for surgery	% RTW	Median time to RTW (IQR)	Mean time to RTW (95% CI)	% RTW (time point)
RANDOMISED CONTROLLED TRIAL														
2005	Peak; USA	Hip	Primary (uni and bi) [uncem]	265 (303 hips)	183	March - December 2002	6 months	52%	58.3 years (range 14-88)	Various	Restricted group 95% RTW Unrestricted group 100% RTW (6 months)	x	Restricted group 9.5 weeks (range 1-32) Unrestricted group 6.5 weeks (range 0.7-20)	Restricted group 18% RTW Unrestricted group 50% (6 weeks)
PROSPECTIVE COHORT														
2019	Boersma; Netherlands	Hip and Knee	Primary THA or TKA	243	172 (68 THA; 104 TKA)	March 2012 to July 2016	1 year	43%	56 years [median; IQR 51-59]	OA	THR 94% RTW TKR 95% RTW by 1 year	THA 85 days (SD 69) TKA 93 days (SD 71)	x	x
2016	Hoorntje; Netherlands	Knee	Primary uni	266	266 (228 employed; 34 self-employed)	January - March 2017	1 year	44%	58.3 years (mean; SD 6.0)	OA	89% RTW (working before TKA) 67% (full) 22% (partial)	3 months (IQR 2-5)	x	x
2020	Rondon; USA	Hip and Knee	Primary	391	391 (243 THA; 148 TKA)	June-December 2017	12 weeks	x	TJA 59.2 (8.7); THA 57.8 (9.0); TKA 61.6 (7.8)	x	THA 95.1% RTW TKA 95.3% RTW	x	x	THA 90.9% RTW TKA 88.5% RTW (12 weeks)
2013	Sankar; Canada	Hip and Knee	Primary	360	360 (190 THA; 170 TKA)	2005-2008 (4 centres)	1 year	48% (53% THA; 42% TKA)	THA 56.1 years (SD 9.9) TKA 57.5 years (SD 7.2)	OA	THR 87% RTW TKR 85% RTW by 1 year	x	x	THA 85% RTW TKA 77% RTW (6 months)
2011	Styron; USA	Knee	Primary (uni and bi)	162	162	x	6 months	32%	57 years (median; IQR 52, 61)	x	[90%] RTW by 30 weeks	8.9 weeks	x	72.2% RTW (3 months)

Table 7. *Continued*

Year	First author; country	Joint	Type of op	Total number included	Number of workers	Duration of study	Duration of post-op follow-up	Sex, male	Age at surgery	Main indication for surgery	% RTW	Median time to RTW (IQR)	Mean time to RTW (95% CI)	% RTW (time point)
PROSPECTIVE COHORT														
2017	Scott; UK	Knee	Primary (uni and bi)	289	261 (working prior to TKA)	December 2014	3.4 years (mean; range 2-4)	49%	59 years (range 42-65)	OA 276/289 (96%)	40% returned to any work	x	13.5 weeks (range 2-104)	x
2006	Tanavalee; Thailand	Hip	Primary (uni and bi) [uncem]	70	Unknown	2002-2004	20.2 months (mean; range 12-36)	40% (2-i 23%; M-P 57%)	2-i 53 years (range 34-75) M-P 54.9 years (range 38-76)	AVN 67.5%, OA 17.5% (2-i) AVN 42% OA 33% (M-P)	x	x	2-i 3 weeks (SD 1.3) M-P 7 weeks (SD 2.1) to sedentary/ light work	x
2006	Pagnano; USA	Hip	Bi - staged [uncem]	26	Unknown	2003-2004	Minimum 6 months after second op	38%	69 years (range 42-81)	OA	x	x	M-P 38 days (range 14-90) 2-i 42 days (range 9-56)	x
RETROSPECTIVE COHORT														
2020	Blevins: USA	Knee	Primary uni TKA or UKA	300 TKA/UKA (286 patients)	Unknown	2013-2015	2 years	56%	65.2 (+/- 9 years)	x	x	x	TKA 38.6 (+/- 6.23 days) UKA 20.6 (+/- 7.89 days)	x
2016	He; China	Hip	Primary (uni and bi)	128 (194 hips - 66 bi; 62 uni)	128 87/128 (68% employed within 1 year before THR)	2009-2013	Minimum 1 year (if bi - 1 year after second op)	84%	40 years (SD 8; range 23-63 years)	Ankylosing spondylitis (AS)	95% RTW (working before THR) 77% (all workers)	x	x	All workers - 52% RTW (6 months)

Table 7. *Continued*

Year	First author; country	Joint	Type of op	Total number included	Number of workers	Duration of study	Duration of post-op follow-up	Sex, male	Age at surgery	Main indication for surgery	% RTW	Median time to RTW (IQR)	Mean time to RTW (95% CI)	% RTW (time point)
RETROSPECTIVE COHORT														
2020	Kievit; Netherlands	Knee	TKA or UKA	324	167 TKA 157 UKA working within 2 years prior to surgery	2003-2012	2 years	TKA 49% UKA 51%	60 (range 40-84)	x	TKA 72% RTW UKA 75% RTW within 2 years	x	x	TKA 63% RTW UKA 73% RTW) (3 months)
2015	Kleim; UK	**Hip and Knee**	THA and TKA	102	83 employed pre-op (THA 46/52; TKA 37/50)	x	6 months - 3 years	THA 44% TKA 34%	54 years (median; range 20-59)	OA	78.4% RTW (THA 75%; TKA 82%)	12 weeks (range 2-64; no IQR)	THA - 12 weeks; SD 5.0 TKA - 13 weeks; SD 10.0	x
2014	Lombardi (2); USA	Knee	Primary TKA	494	494 working during 3 months before surgery	2011-2012	1 - 5 years	43%	54 years (range 19-60)	OA (98%)	98% RTW (working in the 3 months before TKA) 89% returned to the same job	x	8.9 weeks (SD 9.1; no Cis)	x
2019	McGonagle; Australia	Hip and Knee	Primary THA, TKA or UKA	116	116in paid work 3 months prior to surgery	2015-2017	6-12 months	55%	56 years (SD 7.3)	x	91.40%	THA 6.4 (+/- 3.8) TKA 7.7 (+/- 3.9) UKA 5.9 (+/- 3.2) (weeks)	x	x
2014	Poehling-Monaghan (1); USA	Hip	Primary THA [uncem]	222 (126 DA; 96 M-P)	71 (36 DA; 35 M-P)	2011-2012	8 weeks	50% (47% DA; 54% M-P)	Mean 64.4 (SD 12.4) Median 65.5 (IQR 58-74)	x	x	x	x	DA 69% RTW M-P 97% RTW (8 weeks)

Table 7. *Continued*

Year	First author; country	Joint	Type of op	Total number included	Number of workers	Duration of study	Duration of post-op follow-up	Sex, male	Age at surgery	Main indication for surgery	% RTW	Median time to RTW (IQR)	Mean time to RTW (95% CI)	% RTW (time point)
RETROSPECTIVE COHORT														
2010	Foote; UK	Knee	TKR, UKR and PFR	109	49 employed pre-op (TKR 27/41; UKR 22/31)	2002-2006	3 years (mean; range 1-5 years)	TKR 54% UKR 32%	53 years (range 40-60)	OA 65/72 (90%)	82% RTW (who were working prior to surgery)	TKR 12 weeks (range 4-52) UKR 11 weeks (range 0-24) (No 95% CIs reported)	x	x
2006	Mobasheri; UK	Hip	Primary (uni and bi)	81	81 (51 employed prior to surgery)	1993-2003	3 years (mean; range 6 months - 10 years)	65%	51.4 years (range 29-60)	OA (67%)	96% RTW (working pre-op) 43% RTW (not working pre-op)	x	10.5 weeks (working pre-op) 35 weeks (not working pre-op)	x
NON-RANDOMISED TRIAL (PROSPECTIVE)														
2016	Poehling-Monaghan (2); USA	Hip	Primary THA	100 (50 DA; 50 M-P)	57 (30 DA; 27 M-P)	2013-2014	8 weeks	48% (52% DA; 44% M-P)	63 years (SD 10.3; range 35-86)	x	x	x	DA 38 days (range 3-100) M-P 26 days (range 3-60)	x
2014	Mikkelsen; Denmark	Hip	Primary [cem/ uncem/ hybrid]	365	91 still working or at sick leave at time of surgery	May - November 2011	6 weeks	52%	68.7 years (SD 10.0)	OA	x	x	x	Restricted group 32.4% RTW Unrestricted group 53.7% RTW p=0.045 (6 weeks)
1998	Weingarten; USA	Hip and Knee	THA, TKA, hip fracture	560	112 (THA 62; TKA 50)	1994-1996 (6 centres)	90-150 days	36% (THA 39%; TKA 34%)	69 (+/- 11) years	x	x	x	x	Hip - baseline 11% intervention 17% Knee - baseline 17% intervention 13% (within 30 days)
CASE-CONTROL														
2016	Stigmar; Sweden	Hip and Knee	THA and TKA	2303	2303 (THA 1307; TKA 996)	2004-2012	2 years	50% (THA 54%; TKA 44%)	THA 53 years (SD 5.1) TKA 55 years (SD 3.9)	OA	x	THA women 89 days (IQR 69-124); THA men 88 days (IQR 61-110); TKA women 117 days (IQR 90-183); TKA men 96 days (IQR 82-153)	x	x
2009	Lombardi (1); USA	Knee	Primary TKA and UKA (uni and bi)	206 (103 medial UKR patients matched TKA)	Unknown	2004-2005	31 months (mean; range 1-52)	UKA 37% TKA 37%	UKA 61 years (+/- 10.3; range 40-85) TKA 62 years (+/- 10.0; range 41-85)	OA	x	x	UKA - 8.2 weeks (+/- 6.2; range 1-32) TKA - 8.0 weeks (+/- 5.6; range 0-32)	x

2.3.2 Study characteristics

Table 7 presents the main data extracted for each of the 23 studies that met the inclusion criteria. The studies were published between 2005 and 2020, with the exception of one study published in 1998. Of the 23 included studies, 7 included outcomes for both hip and knee arthroplasty (3 prospective cohort ; 2 retrospective cohort [104, 131]; 1 case-control [132]; and 1 non-randomised trial [133]), 8 for hip arthroplasty (1 RCT [134]; 2 prospective cohort [135, 136]; 3 retrospective cohort [109, 137, 138]; and 2 non-randomised trials [139, 140]), and 8 for knee arthroplasty (3 prospective cohort [106, 111, 141], 4 retrospective cohort [114, 142-144], and 1 case-control [145]). Ten of the studies were from USA, 4 from the UK, 3 from the Netherlands, and one each from Australia, Canada, China, Denmark, Sweden and Thailand.

2.3.3 Participants

Participants were all recruited through their operating centre. The 23 studies comprised 7,468 hip and knee arthroplasty patients with at least 5,584 (2,527 hip and 3,057 knee) of participants either at work pre-operatively and/or intending to RTW after their operation. Four studies did not report the number of workers within their cohorts [135, 136, 144, 145]. The mean age of THA participants ranged between 39-69 years for all included hip studies, and between 39-56.1 years for studies that stated they only included workers. The mean age of TKA/UKA (unicompartmental knee arthroplasty) participants ranged between 53-69.5 years for all knee studies, and between 55-60 years for working populations. On average across the 23 studies, men represented 52% (range 38-84%) of participants in hip replacement studies, and 44% (range 32-56%) in knee replacement studies. However, these proportions will not necessarily apply to the working populations in these studies because gender was not always described by working status in studies which included both workers and non-workers. From the studies that only included workers, for hip arthroplasty there were between 44-84% male participants, and for knee arthroplasty, between 32-49% of the study participants were male. The hip arthroplasty study (84% of the participants were male), explored work outcomes following arthroplasty for patients with ankylosing spondylitis (AS) [137], which is around three times more common in men than in women [146].

2.3.4 Diagnoses

Osteoarthritis (OA) was the main indicator for surgery, where diagnoses were reported, with the exception of two hip arthroplasty studies (Table 2). In these two studies, Avascular Necrosis (AVN)

was the most common indication for surgery [136], and the second investigated work outcomes for patients with AS [137].

2.3.5 Methodological assessment

Our quality assessment exercise identified 6 of the 23 studies as good, 11 as acceptable, and 6 as weak (Table 8) using the colour coding (traffic light) scoring system. There was little consistency between the outcome measures used to record work outcomes either within or between hip and knee studies or study designs.

Table 8. Summary of quality assessment

Year	First author; country	Joint	Score colour	Score symbol
RANDOMISED CONTROLLED TRIAL				
2005	Peak; USA	Hip	🟢	(+)
PROSPECTIVE COHORT				
2016	Hoorntje; Netherlands	Knee	🟢	(++)
2019	Boersma; Netherlands	Hip and Knee	🟢	(+)
2013	Sankar; Canada	Hip and Knee	🟢	(+)
2011	Styron; USA	Knee	🟢	(+)
2020	Rondon; USA	Hip and Knee	🟡	(+/-)
2017	Scott; UK	Knee	🟡	(+/-)
2006	Tanavalee; Thailand	Hip	🔴	(-)
2006	Pagnano; USA	Hip	🔴	(--)
RETROSPECTIVE COHORT				
2016	He; China	Hip	🟢	(+)
2020	Kievit; Netherlands	Knee	🟡	(+/-)
2015	Kleim; UK	Hip and Knee	🟡	(+/-)
2014	Lombardi (2); USA	Knee	🟡	(+/-)
2020	Blevins; USA	Knee	🟡	(-)
2019	McGonagle; Australia	Hip and Knee	🟡	(-)
2014	Poehling-Monaghan (1); USA	Hip	🟡	(-)
2010	Foote; UK	Knee	🔴	(-)
2006	Mobasheri; UK	Hip	🔴	(-)
NON-RANDOMISED TRIAL (PROSPECTIVE)				
2016	Poehling-Monaghan (2); USA	Hip	🟡	(+/-)
2014	Mikkelsen; Denmark	Hip	🔴	(-)
1998	Weingarten; USA	Hip and Knee	🔴	(-)
CASE-CONTROL				
2016	Stigmar; Sweden	Hip and Knee	🟡	(+/-)
2009	Lombardi (1); USA	Knee	🟡	(-)

One of the 6 studies rated as good quality was a RCT (hip); 4 were prospective cohort studies (2 hip and knee, 2 knee) and 1 was a retrospective cohort study (hip).

Of the 11 studies rated as acceptable quality, 2 were prospective cohort studies (1 hip and knee, 1 knee); 6 were retrospective cohort studies (3 knee, 2 hip and knee, 1 hip); one was a non-randomised trial (hip); and 2 were case-control studies (hip and knee, knee).

Two of the 6 studies rated as weak quality were prospective cohort studies (both hip); there were 2 retrospective cohort studies (hip, knee); and 2 non-randomised trials (hip and knee, hip).

2.3.6 Measurement of RTW timescales

There was no standardised way of collecting RTW times between the studies. A retrospective cohort study of hip and knee arthroplasty [104] was the only study in this review to report both median and mean RTW times after lower limb arthroplasty. The vast majority (18/23) of studies reported one outcome for time to RTW, either median, mean, or % RTW by a time point. Three studies reported only the median time to RTW [132, 141, 142]; 8 studies reported only the mean time to RTW [109, 111, 114, 135, 136, 140, 144, 145]; and 7 studies reported only the percentage who returned to work by a time point [101, 133, 137-139, 143, 147]. Four studies reported either the median or mean time to RTW as well as the proportion of participants who had returned to work by a specific time point: three reported median time to RTW and % RTW by between 3 months and 1 year [106, 131, 148], the other reported mean time to RTW and % RTW by 6 weeks [134].

2.3.7 Duration of post-operative follow-up

The average post-operative follow-up of prospective studies of hip arthroplasty ranged from 6 weeks to 20.2 months. For retrospective studies of work outcomes after hip arthroplasty, the average follow-up ranged from 8 weeks to 3 years.

The prospective studies of knee arthroplasty reported an average post-operative follow-up period which ranged from <150 days to 3.3 years. The average follow-up of retrospective studies of knee arthroplasty ranged from 6 months to 3 years.

2.3.8 Work factors

Less than half (11/23) [101, 104, 106, 111, 114, 131, 137, 141, 143, 147, 148] of the studies considered work factors beyond whether the person was employed or not. Those that did report

more detailed information about work factors (e.g. physical demands, pre-op sickness etc) were more likely to have considered return to work as a primary outcome.

2.3.9 Measurements of return to work after hip arthroplasty

Percentage RTW after hip arthroplasty

Studies of hip arthroplasty reported consistently high RTW rates among people who were able to work before their surgery. The RCT compared RTW outcomes between patients who followed a restricted movement rehabilitation protocol after their operation with those who followed an unrestricted movement routine. Six months post-operatively, the restricted group had a 95% RTW rate, and 100% of those in the unrestricted group had returned to work [134]. The prospective cohort studies which measured RTW one year post-operatively, reported RTW rates of 87% [101], 94% [148] and 95% [147]. Similarly, the retrospective cohort studies reported RTW rates of 95% [137], 75% [104], 96% [109] and 91% [131] following hip arthroplasty.

Median time to RTW after hip arthroplasty

The median time to RTW after THA was reported in three papers. Two were retrospective studies of hip and knee arthroplasty which reported median times to RTW of 12 (range 2-64) weeks [104] and 6.4 (+/1 3.8) [131] weeks after hip arthroplasty. The third was a case-control study [132] with a median of 89 days [12.7 weeks] (IQR 69-124 days) for women to RTW and 88 days [12.6 weeks] (IQR 61-110 days) for men to RTW following hip replacement surgery.

Mean time to RTW after hip arthroplasty

The mean time to RTW after THA was reported in 7 papers, which included one RCT [134], 3 prospective cohort studies [135, 136, 148], 2 retrospective cohort studies [104, 109], and 1 non-randomised trial [138]. The mean time to RTW after hip arthroplasty ranged from 3 weeks [136] to 12 weeks [104, 148].

Percentage RTW after hip arthroplasty by time point

Nine studies reported the percentage of participants who had returned to work by a given time point (Table 7).

Five of the studies reported RTW status at one time point. Two of these were non-randomised trials which reported between 11-17% returned to work within 30 days of their operation [133], and between 32.4-53.7% returned to work within 6 weeks post-operatively [139]. Two retrospective cohort studies reported between 69-97% of patients returned to work by 8 weeks

[138], and 91% RTW up to 1 year after surgery. The other study that reported the proportion who returned to work at one post-operative time point was a prospective cohort study which found that 94% returned to work within 1 year of total hip arthroplasty.

Four studies reported RTW status at more than one time point post-operatively. The RCT measured RTW status at 6 weeks and 6 months post-operatively [134]. One prospective cohort study reported RTW status at 1 month, 3 months, 6 months and 1 year after surgery [101], another prospective study reported RTW status within 12 weeks and more than 12 weeks [147]. One retrospective cohort study measured RTW rates at 3 months, 6 months and 1 year after hip arthroplasty [137]. The percentage who RTW after surgery increased at the later time points within each of the studies, however the prospective cohort study [101] reported that there was little difference in the percentage of patients who had returned to work at 6 months (85%) compared with 1 year (87%) after hip arthroplasty.

2.3.10 Measurements of return to work after knee arthroplasty

Percentage RTW after knee arthroplasty

Studies of knee arthroplasty also generally reported high rates of RTW after arthroplasty among people who were working before their surgery.

Five of the six prospective cohort studies which reported percentage RTW after knee replacement surgery found high rates of RTW, which were 89% RTW by 1 year [141]; 85% RTW by 1 year [101]; 90% RTW by 6 months [106]; 94% RTW by 1 year [148]; and 95% RTW more than 12 weeks [147] after hip arthroplasty. Although one prospective cohort study reported only 40% RTW [111] after knee arthroplasty.

The proportion of participants who returned to work after knee arthroplasty, which were measured in five retrospective cohort studies, were 72% (TKA) and 75% (UKA) RTW [143], 91% RTW [131], 82% RTW [104], 98% RTW [114], and 82% RTW [142] respectively.

Median time to RTW after knee arthroplasty

Median time to RTW after knee arthroplasty was reported in 6 papers. Two prospective cohort studies, one with a median time to RTW of 3 months (IQR 2-5 months) [141], and the other with a median of 8.9 weeks [106] to RTW after surgery. Three retrospective cohort studies reported a median of 7.7 (+/- 3.9) weeks (THA) and 5.9 (+/- 3.2) weeks (UKA) [131], 12 weeks (range 2-64 weeks) [104], and 11 weeks (range 0-24 weeks) [142] to RTW. A case-control study [132] reported

a median of 117 days [16.7 weeks] (IQR 90-183 days) for women, and 96 days [13.7 weeks] (IQR 82-153 days) for men to RTW following knee replacement surgery.

Mean time to RTW after knee arthroplasty

Mean time to RTW after knee arthroplasty was reported in 6 studies. Two prospective cohort studies which reported similar mean times to RTW of 13.5 weeks (range 2-104 weeks) [111] and 93 days [13.3 weeks] (SD 71) [148]. Three retrospective studies reported time to RTW of 38.6 days (TKA) [5.5 weeks] and 20.6 days (UKA) [2.9 weeks] [143], 13 weeks (SD 10) [104], and 8.9 weeks (SD 9.1) [114]. A case-control study reported a mean average of 8 weeks (range 0-32 weeks) to RTW after knee arthroplasty [145].

Percentage RTW after knee arthroplasty by time point

The proportion of participants who RTW after knee arthroplasty were provided by 7 studies. Four reported a single post-operative time point: RTW within 30 days [133]; 3 months [106]; and 1 year [131, 148]. Three studies reported RTW at more than one time point: 1 month, 3 months, 6 months and 1 year [101]; within 12 week, more than 12 weeks [147]; and 3 months and within 2 years of knee replacement surgery.

2.4 Factors associated with time to RTW after lower limb arthroplasty

Determinants of time to RTW included in this review came from studies which either compared time to RTW between different factors (i.e. gender, type of work) within a cohort, or from the outcome of trials that compared time to RTW between intervention groups (i.e. type of surgery).

Risk factors reported can be grouped into four main categories: surgical factors; post-operative rehabilitation factors; demographic and social factors; and work-related factors.

The findings for each factor that has been considered more than once in either hip or knee studies have been grouped and reported below under their broad categories.

2.4.1 Surgical factors

Ten studies compared RTW outcomes for patients undergoing different surgeries (Table 9). There were five studies for hip, three for knee arthroplasty, and study included both hip and knee arthroplasty patients.

Two prospective cohort studies of hip arthroplasty, both published in 2006 and of weak quality according to our study's risk of bias criteria, reported different outcomes for patients operated on

using the two-incision surgical approach compared to the mini-posterior approach. One study of patients with avascular necrosis (AVN) as the main indication for surgery reported that the two-incision surgical approach was associated with earlier RTW compared to the mini-posterior approach THA [136]. However, no association with time to RTW was found in the other prospective study which included only patients with OA [135].

A retrospective cohort study published in 2014 [138] and a non-randomised trial published in 2016 [140], both rated as being of acceptable quality, reported that patients undergoing mini-posterior approach surgery returned to work earlier than direct anterior surgical approach patients.

In 2016, a good quality retrospective cohort [137] study reported that patients with AS undergoing unilateral surgery returned to work earlier than those undergoing bilateral THA. And a retrospective cohort study of hip and knee arthroplasty published in 2019 [131], of acceptable quality, reported that type of surgery (THA, TKA, UKA) was not associated with time to RTW.

In contrast to the hip, one of the five studies exploring surgical factors on time to RTW after knee arthroplasty found that laterality was not associated with time to RTW [106]. A good quality prospective cohort study found no significant difference in time to RTW either part-time or full-time for patients undergoing unilateral or bilateral TKA [106].

Two retrospective cohort studies, both of acceptable quality, reported that UKA patients return to work earlier compared to TKA patients. Although, a case-control study of acceptable quality [145] found no association with the type of surgery performed (TKA vs UKA) and time to RTW.

Table 9. Effect of surgical factors on time to RTW following hip and knee arthroplasty

Year	First author; country	Risk of bias		Effect of surgical factors on time to RTW
		Score colour	Score symbol	
Hip arthroplasty				
PROSPECTIVE COHORT				
2006	Tanavalee†; Thailand	🔴	(-)	**Two-incision surgical approach THA was associated with earlier RTW compared to mini-posterior approach.** 2-i 3 weeks (SD 1.3) / M-P 7 weeks (SD 2.1) to sedentary/light work p<0.01
2006	Pagnano; USA	🔴	(--)	**Surgical approach (two-incision compared to mini-posterior THA) was not associated with time to RTW.** M-P 38 days; 14-90 / 2-i 42 days; 9-56 p=0.60
RETROSPECTIVE COHORT				
2016	He‡; China	🟢	(+)	**Unilateral THA was associated with earlier RTW compared to bilateral THA.** OR 4.26 (1.477, 11.28) p=0.003
2019	McGonagle*; Australia	🟡	(-)	**Type of surgery (THA, TKA, UKA) was not associated with time to RTW** Time of RTW was not significantly infuenced by type of surgery (p=0.18)
2014	Poehling-Monaghan (1); USA	🟡	(-)	**Mini-posterior approach was associated with earlier RTW compared to direct anterior approach.** DA 69% RTW / M-P 97% RTW (8 weeks) p=0.0018
NON-RANDOMISED TRIAL (PROSPECTIVE)				
2016	Poehling-Monaghan (2); USA	🟡	(+/-)	**Mini-posterior approach was associated with earlier RTW compared to direct anterior approach.** DA 38 days; range 3-100 / M-P 26 days; range 3-60 p=0.0354
Knee arthroplasty				
PROSPECTIVE COHORT				
2011	Styron; USA	🟢	(+)	**Laterality (bi compared to uni) was not associated with time to RTW.** Acceleration Factor (Risk Factor) 0.940 (0.756, 1.169) p=0.577 time to RTW at least part-time; 0.917 (0.741, 1.134) p=0.423 to RTW full-time [multivariate]
RETROSPECTIVE COHORT				
2020	Kievit; Netherlands	🟡	(+/-)	**UKA was associated with earlier RTW compared to TKA patients** More UKA patients return to work within 3 months (73% versus 48%) p < 0.01.
2020	Blevins, USA	🟡	(-)	**UKA was associated with earlier RTW compared to TKA pateints** Return to work was faster in the UKA group (mean 20.6 ± 7.89 vs. 38.6 ± 6.23 days) p<.001
2019	McGonagle*; Australia	🟡	(-)	**Type of surgery (THA, TKA, UKA) was not associated with time to RTW** Time of RTW was not significantly infuenced by type of surgery (p=0.18)
CASE-CONTROL				
2009	Lombardi (1); USA	🟡	(-)	**Type of surgery (TKA compared to UKA) was not associated with time to RTW.** UKA - 8.2 weeks (+/- 6.2; 1-32) / TKA - 8.0 weeks (+/- 5.6; 0-32) p=0.8180

* Hip and knee studies; † Main indication for surgery Avascular Necrosis; ‡ Patients with anklylosing spondylitis

2.4.2 Post-operative rehabilitation factors

Two prospective studies of hip arthroplasty patients compared RTW outcomes for people who followed different post-operative rehabilitation regimes (Table 10). Both a good quality RCT [134] and a non-randomised trial [139] of weaker quality, reported that patients who followed an unrestricted movement rehabilitation protocol post-operatively returned to work significantly earlier than those who followed a restricted movement protocol.

No knee arthroplasty studies included in this review compared time to RTW for different post-operative rehabilitation protocols.

Table 10. Effect of post-operative rehabilitation factors on time to RTW following hip arthroplasty

Year	First author; country	Risk of bias		Effect of post-operative rehabilitation protocols on time to RTW
		Score colour	Score symbol	
Hip arthroplasty				
RANDOMISED CONTROLLED TRIAL				
2005	Peak; USA		(+)	**Unrestricted post-op rehab was associated with earlier RTW compared to restricted post-op protocol.** Restricted group 9.5 weeks; 1-32 Unrestricted group 6.5 weeks (0.7-20) p<0.001
NON-RANDOMISED TRIAL (PROSPECTIVE)				
2014	Mikkelsen; Denmark		(-)	**Unrestricted post-op rehab was associated with earlier RTW compared to restricted post-op protocol.** Restricted group 32.4% RTW Unrestricted group 53.7% RTW (6 weeks) p=0.045

2.4.3 Demographic and social factors

Gender

The effect of gender on time to return to work was a commonly explored factor included in this review. Nine studies reported the effect of gender on time to RTW following lower limb arthroplasty (Table 11). Four of these studies explored RTW outcomes for both hip and knee arthroplasty, two prospective cohort studies [101, 147], one of which analysed hip and knee as one group [147], one retrospective cohort study also analysed hip and knee as one group [104], and one case-control study [132] which analysed hip and knee separately. Two retrospective cohort studies compared timing of RTW following hip arthroplasty. For knee arthroplasty, three further studies are included, one prospective cohort study [106] and two retrospective cohort studies [114, 142].

Following hip arthroplasty, four of the six studies reported that being male was associated with earlier RTW. These include a good quality prospective cohort study [101], a second prospectively cohort study of acceptable quality [147], a weak quality retrospective cohort study, and a case-control study [132] of acceptable quality. However, two other studies, both retrospective cohorts, one of good [137] and one of acceptable quality [104], found no difference in time to RTW between men and women following THA.

The effect of gender on time to RTW was more mixed after knee arthroplasty. Three studies found that men returned to work earlier than women, one was a good quality prospective cohort study [101], the second was an acceptable quality prospective cohort study [147], and the other a case-control study of acceptable quality [132]. In contrast, one good quality prospective cohort study [106]) reported that women returned to work earlier. Three retrospective cohort studies, two of acceptable quality [104, 114] and one of weak quality [142] reported no effect of gender on time to RTW following knee arthroplasty.

Table 11. Effect of gender on time to RTW following hip and knee arthroplasty

Year	First author; country	Risk of bias		Effect of gender on time to RTW
		Score colour	Score symbol	
Hip arthroplasty				
PROSPECTIVE COHORT				
2013	Sankar*; Canada	🟢	(+)	**Being male was associated with earlier RTW.** Outcome: RTW by 1 month, 3 month or 6-12 month (ref) Male - THA: OR 4.1 (95% CI 2.1-8.2) [multivariate]
2020	Rondon**; USA	🟡	(+/-)	**Being male was associated with earlier RTW.** Outcome: male sex standard coefficient -7.8 days (p=0.003) [multivariate]
RETROSPECTIVE COHORT				
2016	He‡; China	🟢	(+)	**No effect of gender.** Outcome: RTW by <3 months, 3-6 months, 6-12 months, unemployed at 1 year [ref]). Male - (all) OR 1.75 (95% CI 0.65, 4.74) p=0.268; (employed pre-op) OR 3.10 (95% CI 0.72, 13.28) p=0.128 [multivariate]
2015	Kleim**; UK	🟡	(+/-)	**No effect of gender.**
2006	Mobasheri; UK	🔴	(-)	**Being male was associated with earlier RTW.** "Women took longer to get back to work (25 weeks compared to 12 weeks for men)"
CASE-CONTROL				
2016	Stigmar*; Sweden	🟡	(+/-)	**Being male was associated with earlier RTW.** "Women generally had a slightly delayed RTW compared to men"
Knee arthroplasty				
PROSPECTIVE COHORT				
2013	Sankar*; Canada	🟢	(+)	**Being male was associated with earlier RTW.** Outcome: RTW by 1 month, 3 month or 6-12 month (ref) Male - TKA: OR 4.4 (95% CI 2.1-9.3) [multivariate]
2011	Styron; USA	🟢	(+)	**Being female was associated with earlier RTW.** Female - Acceleration Factor (Risk Factor) 0.783 (95% CI 0.639, 0.960) p=0.018 time to RTW at least part-time; 0.785 (0.641, 0.963) p=0.020 time to RTW full-time [multivariate]
2020	Rondon**; USA	🟡	(+/-)	**Being male was associated with earlier RTW.** Outcome: male sex standard coefficient -7.8 days (p=0.003) [multivariate]
RETROSPECTIVE COHORT				
2015	Kleim**; UK	🟡	(+/-)	**No effect of gender.**
2014	Lombardi (2); USA	🟡	(+/-)	**No effect of gender.** "No difference between male and female patients ... in time off work required for recovery after surgery"
2010	Foote; UK	🔴	(-)	**No effect of gender.** "When gender is controlled for these differences are slightly less but not substantially altered"
CASE-CONTROL				
2016	Stigmar*; Sweden	🟡	(+/-)	**Being male was associated with earlier RTW.** "Women generally had a slightly delayed RTW compared to men"

* Hip and knee studies; ** Hip and knee analysed as one group; ‡ Patients with anklylosing spondylitis

2.4.4 Age

Four studies explored the effect of age on time to RTW following lower limb arthroplasty (Table 12). Two of the studies (one prospective and one cohort study) reported RTW outcomes for both hip and knee arthroplasty. There was a further retrospective cohort study of THA, and a prospective cohort study following knee arthroplasty.

Younger age was found to be associated with earlier RTW in one good quality retrospective cohort study of patients with AS [137]. However, neither the good quality prospective cohort study [101] nor the retrospective cohort study of acceptable quality found any effect of age on time to RTW after hip arthroplasty.

None of the studies of time to RTW after knee arthroplasty found an effect of age.

Table 12. Effect of age on time to RTW following hip and knee arthroplasty

Year	First author; country	Risk of bias		Effect of age on time to RTW
		Score colour	Score symbol	
Hip arthroplasty				
PROSPECTIVE COHORT				
2013	Sankar*; Canada	🟢	(+)	**Age was not associated with earlier RTW.** Outcome: return to work by 1 month, 3 months or 6-12 months (ref) Age - THA OR 1.0 (95% CI 1.0-1.1) [multivariate]
RETROSPECTIVE COHORT				
2016	He‡; China	🟢	(+)	**Younger age was associated with earlier RTW.** Outcome: RTW <3 months, 3-6 months, 6-12 months, unemployed at 1 year [ref]). Age, per 10 years - (all) OR 0.53 (95% CI 0.38, 0.80) p=0.003; (Employed pre-op) OR 0.40 (95% CI 0.23, 0.70) p=0.001 [multivariate]
2015	Kleim**; UK	🟡	(+/-)	**No effect of age.**
Knee arthroplasty				
PROSPECTIVE COHORT				
2013	Sankar*; Canada	🟢	(+)	**Age was not associated with earlier RTW.** Outcome: return to work by 1 month, 3 months or 6-12 months (ref) Age - THA OR 1.0 (95% CI 1.0-1.1); TKA OR 1.1 (95% CI 1.0-1.1) [multivariate]
2011	Styron; USA	🟢	(+)	**Age was not associated with earlier RTW.** Age - Acceleration Factor (Risk Factor) 1.079 (95% CI 0.957, 1.217) p=0.213 time to RTW at least part-time; 1.098 (95% CI 0.975, 1.237) p=0.124 [multivariate]
RETROSPECTIVE COHORT				
2015	Kleim**; UK	🟡	(+/-)	**No effect of age.**

* Hip and knee studies; ** Hip and knee analysed as one group

2.4.5 Body Mass Index (BMI)

Two studies explored whether BMI had an effect on time to RTW following lower limb arthroplasty (Table 13). Neither the good quality prospective cohort study including both hip and knee arthroplasty [101], nor the good quality prospective cohort study of knee arthroplasty [106] found any effect of BMI on time to RTW after lower limb arthroplasty.

Table 13. Effect of BMI on time to RTW following hip and knee arthroplasty

Year	First author; country	Risk of bias		Effect of BMI on time to RTW
		Score colour	Score symbol	
Hip arthroplasty				
PROSPECTIVE COHORT				
2013	Sankar*; Canada	●	(+)	**No effect of BMI (>30 kg/m^2).**
Knee arthroplasty				
PROSPECTIVE COHORT				
2013	Sankar*; Canada	●	(+)	**No effect of BMI (>30 kg/m^2).**
2011	Styron; USA	●	(+)	**No effect of BMI (>40 kg/m^2).**
* Hip and knee studies				

2.4.6 Education

Two studies of hip and knee arthroplasty explored whether level of education affected time to RTW after surgery (Table 14).

A good quality prospective cohort study [101] found that university education was associated with earlier RTW after hip arthroplasty, but not after knee arthroplasty.

A retrospective cohort study with an acceptable quality rating [104] analysed outcomes after hip and knee arthroplasty as one group. They report that higher level of education was associated with earlier RTW after lower limb arthroplasty.

Table 14. Effect of education on time to RTW following hip and knee arthroplasty

Year	First author; country	Risk of bias		Effect of education on time to RTW
		Score colour	Score symbol	
Hip arthroplasty				
PROSPECTIVE COHORT				
2013	Sankar*; Canada	🟢	(+)	**University education was associated was with earlier RTW for THA.** Outcome: RTW by 1 month, 3 months or 6-12 months (ref) Education: greater than high school THA OR 2.0 (1.3-3.2) [multivariate]
RETROSPECTIVE COHORT				
2015	Kleim**; UK	🟡	(+/-)	**Higher level of qualification was associated with earlier RTW.** Patients with level 2 or 3 qualifications RTW (mean = 9.9 weeks) compared to level 1 or lower qualification (mean = 12.6 weeks), 2.7 weeks faster on average (p=0.041).
Knee arthroplasty				
PROSPECTIVE COHORT				
2013	Sankar*; Canada	🟢	(+)	**University education was not associated with earlier RTW for TKA.** "Education was not significant in the first stage of modelling and was not carried forward to the final model"
RETROSPECTIVE COHORT				
2015	Kleim**; UK	🟡	(+/-)	**Higher level of qualification was associated with earlier RTW.** Patients with level 2 or 3 qualifications RTW (mean = 9.9 weeks) compared to level 1 or lower qualification (mean = 12.6 weeks), 2.7 weeks faster on average (p=0.041).

* Hip and knee studies; ** Hip and knee analysed as one group

2.4.7 Work-related factors

Pre-operative unemployment

Three studies (two hip and one knee arthroplasty) considered RTW outcomes for people who were unemployed before surgery (Table 15).

Two retrospective cohort studies, of good [137] and weak [109] quality found that pre-operative unemployment was associated with later RTW after hip arthroplasty.

A prospective cohort study of knee arthroplasty [111] found that none of the patients who were unemployed before surgery were able to RTW.

Table 15. Effect of pre-operative unemployment on time to RTW following hip and knee arthroplasty

Year	First author; country	Risk of bias		Effect of unemployment on time to RTW
		Score colour	Score symbol	
Hip arthroplasty				
RETROSPECTIVE COHORT				
2016	He‡; China		(+)	**Pre-operative unemployment was associated with later RTW.** Outcome: RTW <3 months, 3-6 months, 6-12 months, unemployed at 1 year [ref]). Employed pre-surgery - OR 16.56 (95% CI 6.40, 42.91) p<0.001 [multivariate]
2006	Mobasheri; UK		(-)	**Pre-operative unemployment was associated with later RTW.** Patients working pre-op took an average of 10.5 weeks to RTW. Patients not working pre-op took an average of 35 weeks to gain employment
Knee arthroplasty				
PROSPECTIVE COHORT				
2017	Scott; UK		(+/-)	**Pre-operative unemployment was associated with no RTW.** Patients (n=28) not working before the operation did not RTW
‡ Patients with anklylosing spondylitis				

Pre-operative sickness absence from work

Two retrospective cohort studies examined the effect of pre-operative sick leave on time to RTW following lower limb arthroplasty (Table 16). Both the retrospective study of hip and knee arthroplasty patients of acceptable quality [104] and the weak quality study of hip arthroplasty [109] reported that people who needed to take time off work due to their joint symptoms before their operation took significantly longer to RTW after surgery.

Table 16. Effect of pre-operative sickness absence on time to RTW following hip and knee arthroplasty

Year	First author; country	Risk of bias		Effect of pre-operative sick leave on time to RTW
		Score colour	Score symbol	
Hip arthroplasty				
RETROSPECTIVE COHORT				
2015	Kleim**; UK		(+/-)	**Pre-operative sick leave was associated with later RTW.** Patients with pre-op sick leave due to hip or knee arthritis take 4.6 weeks longer to RTW than those who do not. Mean time to RTW for those with sick leave was 15 weeks, mean for those without 10.4 weeks (p=0.016)
2006	Mobasheri; UK		(-)	**Pre-operative sick leave was associated with later RTW.** Patients who were off work pre-operatively due to hip pain took a mean average of 28 weeks to RTW, compared with a mean of 10.5 weeks to RTW for those able to work right up to their surgery.
Knee arthroplasty				
RETROSPECTIVE COHORT				
2015	Kleim**; UK		(+/-)	**Pre-operative sick leave was associated with later RTW.** Patients with pre-op sick leave due to hip or knee arthritis take 4.6 weeks longer to RTW than those who do not. Mean time to RTW for those with sick leave was 15 weeks, mean for those without 10.4 weeks (p=0.016)
** Hip and knee analysed as one group				

2.4.8 Job physical demands

Eight studies compared time to RTW by job physical demand category (Table 17), with most reporting that having a more physically demanding job was associated with later RTW after lower limb arthroplasty. These included four studies of hips and knees, one of hip, and three of knee arthroplasty. They were all cohort studies (4 prospective; 4 retrospective) assessed as either good or acceptable quality. However, while one of the studies of hip and knee [101] found low physical demand at work was associated with earlier RTW following hip arthroplasty, they did not find that job physical demands impacted on time to RTW after knee arthroplasty.

Table 17. Effect of job physical demands on time to RTW following hip and knee arthroplasty

Year	First author; country	Risk of bias		Effect of job physical demands on time to RTW
		Score colour	Score symbol	
Hip arthroplasty				
PROSPECTIVE COHORT				
2013	Sankar*; Canada	🟢	(+)	**Low physical demand at work was associated with earlier RTW after THA.** Outcome: RTW by 1 month, 3 months or 6-12 months (ref) Low physical demand (ref: high) THA OR 2.9 (1.1-7.6) [multivariate]
2020	Rondon**; USA	🟡	(+/-)	**More physically demand job was associated with later RTW.** Outcome: Occupation with at least 50% physical duties standard coefficient -7.6 days (p<0.001) [multivariate]
RETROSPECTIVE COHORT				
2016	He‡; China	🟢	(+)	**Low or moderate physical demand was associated with earlier RTW.** Outcome: RTW <3 months, 3-6 months, 6-12 months, unemployed at 1 year [ref]). Low physical demand (ref: high) OR 22.18 (5.52, 89.03) p<0.001; mod physical demand (ref: high) OR 6.23 (95% CI 1.83, 21.22) p=0.003.
2015	Kleim**; UK	🟡	(+/-)	**More physically demanding job was associated with later RTW.** Manual level of 0 RTW (on average) 2.5 weeks faster than those with manual level of 1 (p=0.026). Manual level 1 occupations RTW on average 6.2 weeks faster than manual level 2 (p=0.001)
2019	McGonagle**; Australia	🟡	(-)	**Job physical demand was no significantly associated with earlier RTW** Non-significant correlation between physical demands of the work versus time of RTW (p = 0.28)
Knee arthroplasty				
PROSPECTIVE COHORT				
2013	Sankar*; Canada	🟢	(+)	**Job physical demand was not associated with earlier RTW after TKA.** Outcome: RTW by 1 month, 3 months or 6-12 months (ref) Low physical demand (ref: high) TKA OR 1.3 (0.5-3.8)] [multivariate]
2011	Styron; USA	🟢	(+)	**More physically demanding job was associated with later RTW.** Acceleration Factor (Risk Factor) 1.116 (95% CI 1.025, 1.215) p=0.022 time to RTW at least part-time [multivariate]
2020	Rondon**; USA	🟡	(+/-)	**More physically demand job was associated with later RTW.** Outcome: Occupation with at least 50% physical duties standard coefficient -7.6 days (p<0.001) [multivariate]
2017	Scott; UK	🟡	(+/-)	**Heavy/moderate manual labour was associated with later RTW.** Heavy/moderate manual work positively predicted RTW.
RETROSPECTIVE COHORT				
2015	Kleim**; UK	🟡	(+/-)	**More physically demanding job was associated with later RTW.** Manual level of 0 RTW (on average) 2.5 weeks faster than those with manual level of 1 (p=0.026). Manual level 1 occupations RTW on average 6.2 weeks faster than manual level 2 (p=0.001).
2014	Lombardi (2); USA	🟡	(+/-)	**More physically demanding job was associated with later RTW.** Very heavy labour required took 10.7 weeks to RTW compared with 8.1 weeks for both heavy and medium labourers, 10.5 weeks for light labourers, and only 6.5 weeks for sedentary labourers (p=0.011).
2019	McGonagle**; Australia	🟡	(-)	**Job physical demand was no significantly associated with earlier RTW** Non-significant correlation between physical demands of the work versus time of RTW (p = 0.28)

* Hip and knee studies; ** Hip and knee analysed as one group; ‡ Patients with anklylosing spondylitis

Job classification

One good quality prospective cohort study which included both hip and knee arthroplasty patients [101] examined the effect of job classification on time to RTW after surgery (Table 18). They did not find an effect of job classification on time to RTW for those undergoing hip arthroplasty. However, for those undergoing knee arthroplasty they showed an effect of job classification on time to RTW, with those in business, finance, administration, health science and arts sector roles having returned to work earlier than those in trades, transportation and manufacturing businesses.

Table 18. Effect of job classification on time to RTW following hip and knee arthroplasty

Year	First author; country	Risk of bias		Effect of job class on time to RTW
		Score colour	Score symbol	
Hip arthroplasty				
PROSPECTIVE COHORT				
2013	Sankar*; Canada		(+)	**Job class was not associated with time to RTW for THA.**
Knee arthroplasty				
PROSPECTIVE COHORT				
2013	Sankar*; Canada		(+)	**Job class was associated with time to RTW for TKA.** Job class (ref: trades, transportation and manufacturing) business, finance, administration 5.5 (1.3-24.2); Health science, arts 4.0 (1.2-13.0)
* Hip and knee studies				

2.4.9 Employment type (employed/self-employed)

Two cohort studies examined the association between employment type and RTW after hip arthroplasty. One prospective cohort study, rated as acceptable quality, reported that self-employment was associated with earlier RTW [147], while a retrospective study of hip arthroplasty, rated as weak, reported that being self-employed rather than salaried did not affect the time to RTW after hip arthroplasty [109] (Table 19). For knee arthroplasty, two good quality prospective cohort studies [106, 141] and one prospective study of acceptable quality [147] found that self-employment was associated with earlier RTW. However one of the good quality studies [106] found that while self-employed workers RTW part-time earlier, there was no difference in time to RTW between self-employed and salaried workers in time to RTW full-time.

Table 19. Effect of employment type on time to RTW following hip and knee arthroplasty

Year	First author; country	Risk of bias		Effect of self-employment on time to RTW
		Score colour	Score symbol	
Hip arthroplasty				
PROSPECTIVE COHORT				
2020	Rondon**; USA	🟡	(+/-)	**Self-employment was associated with earlier RTW.** Outcome: self-employed standard coefficient -11.9 days (p<0.001) [multivariate]
RETROSPECTIVE COHORT				
2006	Mobasheri; UK	🔴	(-)	**No effect of self-employment.** Being self-employed rather than a salaried employee did not affect the time to RTW
Knee arthroplasty				
PROSPECTIVE COHORT				
2016	Hoorntje; Netherlands	🟢	(++)	**Self-employment was associated with earlier RTW.** Self-employed (n=34) returned to work significantly faster (2 months, IQR 1-3) than employed (3 months, IQR 2-5, p<0.001
2011	Styron; USA	🟢	(+)	**Self-employment was associated with earlier RTW part-time but not full-time.** Self-employment (acceleration factor=0.792)
2020	Rondon**; USA	🟡	(+/-)	**Self-employment was associated with earlier RTW.** Outcome: self-employed standard coefficient -11.9 days (p<0.001) [multivariate]
** Hip and knee analysed as one group				

2.4.10 Single factors explored as potential determinants of time to RTW

A number of other factors have been considered only once within this review and the effect of each factor on time to RTW is shown in Table 20 and Table 20 shows the studies which have found effects on time to RTW, and Table 21 shows the factors not found to have an effect on time to RTW following lower limb arthroplasty.

Table 20. Single factors found to have an effect on time to RTW following hip and knee arthroplasty

Factor	First author	How factor was assessed	Risk of bias		Effect of factor on time to RTW
			Score colour	Score symbol	
Hip arthroplasty					
Availability of light work duties	Rondon**	Questionnaire		(+/-)	Associated with earlier RTW
Higher income (per $10,000)	Rondon**	Questionnaire		(+/-)	Associated with earlier RTW
Longer length of hospital stay	Rondon**	Questionnaire		(+/-)	Associated with later RTW
More hours spent standing	Rondon**	Questionnaire		(+/-)	Associated with later RTW
Higher pre-operative physical function	He‡	BASFI		(+)	Associated with earlier RTW
Flexible working conditions available	McGonagle**	Questionnaire		(-)	Associated with earlier RTW
Knee arthroplasty					
Greater number of comorbidities	Styron	FCI		(+)	Associated with earlier RTW
Higher pre-operative physical function	Styron	WOMAC		(+)	Associated with earlier RTW
Lower pre-operative joint pain	Styron	WOMAC		(+)	Associated with earlier RTW
Higher pre-operative mental health	Styron	SF-12		(+)	Associated with earlier RTW
Receiving Workers' Compensation	Styron	Questionnaire		(+)	Associated with later RTW
Handicap accessible workplace	Styron	Questionnaire		(+)	Associated with earlier RTW
Motivation (sense of urgency)	Styron	Questionnaire		(+)	Associated with earlier RTW
Availability of light work duties	Rondon**	Questionnaire		(+/-)	Associated with earlier RTW
Higher income (per $10,000)	Rondon**	Questionnaire		(+/-)	Associated with earlier RTW
Longer length of hospital stay	Rondon**	Questionnaire		(+/-)	Associated with later RTW
More hours spent standing	Rondon**	Questionnaire		(+/-)	Associated with later RTW
Flexible working conditions available	McGonagle**	Questionnaire		(-)	Associated with earlier RTW

** Hip and knee analysed as one group; ‡ Patients with anklylosing spondylitis; BASFI (Bath Ankylosing Spondylitis Functional Index); FCI (Functional Comorbidity Index); WOMAC (Western Ontario and McMaster Universities Osteoarthritis Index) physical function subscale and pain subscale; SF-12 (Short-Form 12) mental composite summary score.

Table 21. Single factors not found to have an effect on time to RTW following hip and knee arthroplasty

Factor	First author	How factor was assessed	Risk of bias	
			Score colour	Score symbol
Hip arthroplasty				
Preoperative physical activity level	Boersma*	SQUASH questionnaire		(+)
Pre-operative disease activity score	He‡	BASDAI		(+)
Disease biomarker	He‡	Blood test (HLA-B27 antigens)		(+)
Hospital practice guidelines	Weingarten	Questionnaire		(-)
Knee arthroplasty				
Preoperative physical activity level	Boersma*	SQUASH questionnaire		(+)
Ethnicity	Styron	Questionnaire		(+)
Pre-operative physical health	Styron	SF-12		(+)
RTW main reason for TKA	Styron	Questionnaire		(+)
Work associated with joint problems	Styron	Questionnaire		(+)
Employer health insurance	Styron	Questionnaire		(+)
Recovery factors (post-operative)	Styron	Low-back pain; assistance during recovery		(+)
Disability insurance	Styron	Questionnaire		(+)
Hospital practice guidelines	Weingarten	Questionnaire		(-)

* Hip and knee studies; ‡ Patients with anklylosing spondylitis; BASDAI (Bath Ankylosing Spondylitis Disease Activity Index); FCI (Functional Comorbidity Index); SF-12 (Short-Form 12) physical composite summary score

2.5 Discussion

This systematic literature review was performed in order to examine those factors which impact on the time taken to return to work after hip and knee arthroplasty surgery. In total, we included the findings from 23 studies (1 RCT, 8 prospective cohort, 9 retrospective cohort, 2 case-control and 3 non-randomised studies), 15 of which included patients returning to work after hip arthroplasty and 14 after knee arthroplasty. The factors which had been evaluated as determinants of time to return to work fell into three broad categories: socio-demographic factors; surgical and post-operative rehabilitative factors; and work-related factors. There was marked heterogeneity in study design and variation in assessment of RTW and therefore it was not possible to pool data. Overall, there was some (weak) evidence that women took longer to RTW than men [101, 109, 132, 147] and that younger patients returned earlier than older ones [137], as did those with higher levels of educational attainment as compared to those with lower levels [101, 104], but that BMI was not associated [101, 106]. In terms of surgical factors, there was some (weak) evidence that patients undergoing UKA returned to work earlier than those undergoing TKA [143, 144] and after THA, there was some (weak) evidence for a benefit of the two-incision approach (versus mini-posterior approach) [136], unilateral THA (versus bilateral) [137], and mini-posterior approach (versus direct-anterior approach) [138]. Post-operative rehabilitation factors were only explored in hip arthroplasty patients. Both a good quality RCT [134] and a poor quality non-randomised trial [139] found evidence that those who followed an unrestricted (range of motion of the hip limited for first 6 weeks) post-operative rehabilitation protocol returned to work earlier than those who followed a restricted (the same limits to range of motion plus additional hip precautions during the first 6 weeks) post-operative protocol. Two studies provided consistent evidence that pre-operative sick leave was associated with slower RTW [104, 109]. There was reasonably consistent evidence that those needing to RTW in physically demanding jobs took longer after hip and knee arthroplasty [101, 104, 106, 111, 114, 131, 137, 147]. However, the one study which also assessed motivation (sense of urgency) to RTW found that this was a more important factor predicting early RTW than the type of work [106]. There was (weak) evidence from two studies that self-employed patients made earlier RTW after knee arthroplasty than employed [106, 141, 147]. A number of other factors were reported as determinants (positive and negative) in only one study (pre-operative function; number of comorbidities; joint pain score; mental health; receiving workers' compensation ; accessibility of workplace; availability to return to light duties; flexible working conditions; hours spent standing at work; and income) [106, 131, 137, 147]. Other factors considered in a single study which appeared to have no effect were: biomarkers of disease activity pre-operatively; ethnicity; SF-12 measured pre-operative physical health status; pre-operative physical function; insurance

(employer or disability); length of hospital stay; post-operative recovery factors (low back pain, assistance during recovery); doing work associated with the joint disease, or being able to work being the main reason for needing the arthroplasty [106, 147]. Work is important for health and yet our review shows that, despite the well-documented variability in time to RTW after arthroplasty [107, 149, 150], the reasons for this are generally poorly understood with an absence of good-quality prospective studies using consistent methods of recording pre- and post-operative information about work.

As stated, the aim of this review was not to compare time to RTW after arthroplasty across all available studies, but rather to evaluate the factors which influence the time taken to RTW. Since relevant data were not available for many studies, this considerably reduced the number of studies available for inclusion in the current review. Despite this, it is encouraging that the times to RTW reported for the included studies in this review (Table 7) were in line with those reported previously by Tilbury and colleagues (average time to return to work varied from 1.1 to 13.9 weeks after THA and from 8.0 to 12.0 weeks after TKA [107]) as was the finding that most people who were able to work before their operation were able to RTW after surgery. A key methodological point which is shared by the current review with those published previously is the lack of standardisation of assessment of time to RTW. For one thing, it is often good rehabilitative practice for people to make a “phased return” to work, returning perhaps to shorter hours or assigned to “light duties” and it is almost universally unclear from the literature whether this denotes time to return to the workplace in any way or time to return to full, active duties in line with their full job requirements. Both are important outcomes and both should be assessed. Secondly, time to RTW is reported by some studies as time taken to return in “days” and others in “weeks” but others provide a summary of the proportion of individuals who had made a RTW at a pre-defined time point(s). Each of these measures will be similar but not necessarily exactly the same, for example, it is unclear how the data are adjusted for e.g. people who work part-time or RTW mid-week. Although there is usually consistency of recording time to RTW from the date of surgery until resumption of work, one study within this review recorded time to RTW as the time period between stopping work and returning to work [143], further hindering comparison with other studies. Thirdly, time to RTW is unlikely to be normally distributed, because most people will not return very quickly but people then return in “clusters”, most often at the beginning rather than middle or end of a week, creating data which are positively skewed. Therefore, if time to RTW is the consensus measure, it should be reported as a median value, accompanied by 25th-75th centile ranges. However, we found that the majority of studies reported only the mean time to RTW. In this review, only one study reported time to RTW after hip and knee arthroplasty as median and mean summary statistics [104]. Unfortunately however, the median reported was

combined for both hip and knee participants, whereas the means were reported separately for hip and knee patients. The median of 12 weeks to RTW in this case was the same as the mean for hip replacement, but the mean time to RTW after knee arthroplasty was one week later (13 weeks) than the combined median time to RTW. In order to progress this area, consensus as to how to best measure and report RTW after surgery is urgently needed, particularly if we are to be able to directly compare outcomes between studies.

Although we found that a large number of studies reported time to return to work as a secondary outcome (n=8,514), relatively few described factors which affected the time to return to work. That it is reported so commonly demonstrates the growing acceptance of the importance of time taken to RTW after these types of operations, particularly as surgeons move to less invasive, more conservative types of surgery with pro-active rapid discharge protocols and early mobilisation. However, to demonstrate the overall effectiveness of these more modern approaches, it is essential that we understand which non-surgical factors are important so that these can be measured and considered as "confounders". Some socio-demographic factors (age, gender, BMI) are routinely measured but rarely is their association with time to RTW reported. Other factors which clearly could impact on time to RTW but are not currently routinely recorded (educational attainment; number/type of comorbidities; pre-operative function; mood; motivation to RTW) need additional research in order to clarify their importance and develop consensus as to how best to measure them consistently. It is surprising however, how little attention has been given investigating the type of work to which the individual needs to return. It is clearly important to record pre-operative sick leave /unemployment but also the nature of the work demands upon return. Job title is well-recognised to be a poor measure of the physical work demands for any job and there was substantial heterogeneity among studies in terms of how they assessed physical work demands. International consensus on how to best do this is needed desperately. Detailed occupational hygiene measurements are the "gold standard" but are expensive and time-consuming. Self-reported exposures using standardised questionnaires are widely used but recognised to be relatively inaccurate. There is growing use of job-exposure matrices in occupational health research [151], which provide a standardised means of assessing exposures on a large-scale. Whichever approach is developed, there is a clear need for this to be done consistently using the same methodology across studies.

Overall, the risk of bias exercise highlighted wide variability in the quality of studies included in this review. Our assessment identified 6 of the 23 studies as good [101, 106, 134, 137, 141, 148], 11 as acceptable [104, 111, 114, 131, 132, 138, 140, 143-145, 147], and 6 as weak [109, 133, 135, 136, 139, 142]. The only RCT (hip; [134]) was rated as good; 4 (2 hip and knee; 2 knee only) of the 8 prospective cohort studies received a rating of good; and only one (hip) of the 9 retrospective

studies was rated good. One of the main factors which led to poor scores was the lack of detailed information relating to work outcomes. The only RCT [134] eligible for inclusion in this review was rated as a good quality study, but lacked detailed information regarding work factors and therefore did not contribute greatly to our overall findings. In the non-randomised trials [133, 139, 140], we were also unable to exclude potential bias that might have been introduced by the recruitment strategies used to identify study participants when insufficient information was provided in this respect (i.e. was there any selection bias amongst patients who were referred to a particular surgeon?)

It was a consistent finding from the review that RTW involving more physically demanding activities generally was slower than for less demanding types of work. This was found despite physically demanding work being measured in a number of different ways, and was seen across higher and lower quality studies. This is not a surprising finding and underpins the guidelines about RTW after arthroplasty published by the UK Royal College of Surgeons [152, 153]. However, these guidelines were developed as a consensus in the absence of evidence and this does raise the question as to whether this guidance is therefore self-fulfilling? It is difficult to determine whether people really need to take longer times off work because they go back to physically demanding work, or whether the expectation that it will take longer is created by the surgical team, GP or rehabilitation specialists they consulted, or indeed by the employer. If patients are advised not to work until a certain time, this may deter them from trying before this time and yet in reality, with encouragement and support, they may have been in a position to try. It is important to continue to collect data post-operatively to examine the longer term outcomes amongst patients who do/do not RTW early. Of particular interest in this regard would be those individuals who are self-employed because they are very heavily incentivised and motivated [154] to get back to work quickly no matter how heavy their work demands are. Post-operative follow up would enable a comparison of outcomes between early and later returners to investigate whether any identifiable harm results from returning to work in a physically demanding job sooner than these studies imply. This review indicates that too few studies are collecting this information about time and type of work to inform this debate, and it might be that without the available evidence such expectations are perpetuated.

Allied to the above, is the potential importance of what advice is proffered by surgeons, the surgical multi-disciplinary team and the primary care providers regarding RTW at different stages of the pre-operative and post-operative journey and the extent to which this is concordant/discordant. Depending upon what information is given by whom and when, it is likely to create expectations and beliefs that will be strongly held from then onwards. For example, an administrator who has been advised by the surgeon at the pre-operative appointment that it is

likely they will “not return to work until 4 months after the operation” will probably arrange with their employer to anticipate no return in advance of 4 months, no matter how well they feel post-operatively or how easily they could, in fact, temporarily work from home. It is clear that how information is presented and by whom influences how flexibly the patient interprets that information. One retrospective study of knee arthroplasty described the pre-operative advice and recommendations given to participants about the time they would need off work depending on the physical demands of their job [114]. The difference in the time taken to RTW between the different physical demand categories found in the study largely reflected the varied pre-operative advice they received about the time they would need off work due to the nature of their job. Individual differences such as attitudes to work and motivation to RTW are important effect-modifiers in time to RTW and, while there is probably little that clinicians can do during patient consultations to influence these personal factors, it is important to measure them so that they can be excluded from factors that can be modified, such as the RTW advice provided by healthcare professionals.

It is vital to understand RTW outcomes from the patient’s viewpoint. Qualitative research can be a very useful approach in order to better understand the individual’s perspective about their joint replacement, their ability to work, and their journey back to work to help to identify gaps in patient information and in the rehabilitation process. Currently, only a limited number of qualitative studies of RTW after arthroplasty have been performed and they all underline the need for more qualitative research to fully understand the patient-related factors [126, 150, 155].

This systematic review has many strengths. To our knowledge, this is the first systematic review to identify determinants of time to RTW after lower limb arthroplasty, and to compare RTW outcomes within and between hip and knee arthroplasty studies. This systematic review was rigorously conducted with a comprehensive literature search and independent screening of eligible studies by two assessors. The outcomes described were drawn from a wide range of relevant studies. A particular strength of this systematic review was the ability to collate information to compare the effect of the same potential determinants of time to return to work across different study designs, and between hip and knee arthroplasty.

However, this systematic review has some limitations which should be acknowledged, not least the low availability of high quality, prospective studies. Most studies had a retrospective design, thus increasing the risk of recall bias. Additionally, the varied RTW data that were extracted, combined with different reported measurements of time in the studies, limited the reporting of comparative data and prevented further data synthesis. The search strategy was restricted to studies published in English, therefore, some relevant studies may have been missed, although

many of the identified studies were published from non-English-speaking countries, which mitigates the risk of having omitted important articles. Literature searches were carried out using four databases, and it is possible that articles were overlooked that were not in any of the searched databases. However, a broad scope for each of the database searches was employed, in addition to hand-searched reference lists of relevant articles. Despite this inclusive strategy, only 23 studies met the inclusion criteria. There were significantly more studies addressing the relationship between lower limb arthroplasty and RTW status, but even those were sparse compared to the comprehensive literature on joint replacements.

The papers included in this systematic review utilised an extremely diverse range of measures. A synthesis of risk factors for time to RTW after arthroplasty would be greatly facilitated if a common set of work outcomes were routinely incorporated into all studies of outcomes of arthroplasty which include workers. As it is clear there are numerous weaknesses of the available literature, there is an urgent need to move towards standardised ways of reporting time to RTW following all elective surgery: whether time to RTW is measured in days or weeks; whether full and/or partial RTW time(s) are recorded; whether number of hours or days per week are recorded; and consensus is required information about the type of work they need to return to. The main variables that merit assessment based on this systematic review are:

1. Pre-operatively (within 3 months of surgery):
    - work status (employed, off sick, unemployed)
    - date when last worked
    - job title and physical demands
    - number of working hours per week (pre-operative)
    - the type of work they need to return to.
2. Post-operatively (up to 1 year after surgery):
    - have they returned to work?
    - how long did they take to RTW (in weeks)?
    - did they return to full duties?
    - number of working hours per week (post-operative)
    - the type of work they returned to.

A common set of work variable would assist researchers, healthcare professional and patients to understand the factors that should inform the decision to undergo arthroplasty, when weighed against the type of work a person wishes to return to.

It is also important for studies to report the number or percentage of workers included in their cohorts to which these variables relate. This information would facilitate calculation of time to RTW and this variable is likely to be best summarised by median and interquartile range to account for a skewed distribution.

In summary, a wealth of studies have explored different patient outcomes after lower limb arthroplasty, but a relative dearth considered the impact on the time it took patients to RTW after their surgery. A greater number of studies have compared RTW status rather than timing of RTW after arthroplasty. The usefulness of their findings is also hampered by a lack of standardisation in data collection methods of work outcomes. In terms of future studies, the routine collection of a standardised set of RTW variables is recommended in order to ensure that research evidence on RTW after lower limb arthroplasty is relevant and comparable. Access to more robust work-related data would greatly assist healthcare providers, clinical decision-makers, and individuals themselves when considering outcomes after lower limb arthroplasty.

Chapter 3 RTW-COASt Methods

3.1 Return to Work-Clinical Outcomes in Arthroplasty Study (RTW-COASt): A prospective study to observe and explore the journey back to work for people undergoing hip and knee arthroplasty

3.1.1 Introduction

To meet the second main aim of this thesis, the Return to Work-Clinical Outcomes in Arthroplasty Study (RTW-COASt) was set up with the aims to describe the rates and timing of RTW of working age patients and to identify and explore factors which impact on these work outcomes. Patients were recruited prospectively from those eligible to take part in the Clinical Outcomes in Arthroplasty Study (COASt) [156] and patients' experiences were observed from when they were listed for lower limb arthroplasty until 6 months post-operatively.

3.1.2 RTW-COASt PPI involvement

The protocol and questionnaire for the RTW-COASt follow-up study were presented (by LSS) and discussed at the meeting of the Medical Research Council (MRC) Lifecourse Epidemiology Unit Research Review Panel in January 2017. This included describing the need for the study, the recruitment procedures, and questionnaires to be used in the quantitative study, as well as the questions to be used for the qualitative interviews. While there was some discussion regarding the potential burden to participants given the length of the questionnaires (particularly baseline) and number of data collection time points in the cohort study, the group were very supportive of the need for this type of research. There were no concerns raised regarding the nature of the qualitative questions. Most of the issues and suggestions minuted from the meeting reflected a generally positive response for this research and the patient-facing materials.

3.1.3 RTW-COASt amendments to Clinical Outcomes in Arthroplasty Study (COASt) Methods

COASt Methods and aims

The Clinical Outcomes in Arthroplasty Study (COASt) was a dual-site prospective, longitudinal cohort study of patients undergoing total hip and knee arthroplasty in two centres: Southampton and Oxford. COASt was one work package funded by an NIHR Programme Grant for Applied

Research (No. 5.12). The overarching aims of the programme grant were to inform policy-makers about the current healthcare system in the UK in order to predict the outcomes and risk of failure of lower limb arthroplasty, and to give advice on the cost-effectiveness of the implementation of predictive tools which might predict outcomes. COASt was designed to establish a dual-site pragmatic prospective lower limb arthroplasty cohort in order to collect data to test and refine the practicality and effectiveness of the new prediction of prognosis instrument developed in a preceding work package within the programme grant.

RTW-COASt: amendments to COASt protocol

The longitudinal design and sampling frame of COASt provided an excellent basis from which to study work outcomes in this cohort of patients. All patients who had been listed for hip and knee arthroplasties in Southampton were considered for inclusion in COASt, thus providing an ideal opportunity to observe the journey back to work following arthroplasty and identify factors that impact whether patients are able to return to their job and the timing at which they can return to work.

3.1.4 COASt patient pathway

COASt: Consent and patient recruitment

All participants who were listed for hip and knee replacement surgeries at Nuffield Orthopaedic Centre (NOC) Oxford and University Hospital Southampton (UHS) were potentially eligible for inclusion in COASt. The orthopaedic team identified patients who met the inclusion criteria who were sent a recruitment pack, which included the Patient Information Sheet (PIS), sample consent form and recruitment letter (see Appendix H for amended RTW-COASt version).

After approximately two weeks, ensuring that the patient had sufficient time for consideration, a member of the COASt team contacted them to discuss the study in more detail, as specified in the PIS. The COASt team member elicited verbal consent for further participation during the telephone discussion. The verbal consent included an agreement that the participant would be sent the Patient Self-Assessment booklet for completion. Written informed consent was taken at the subsequent face-to-face research appointment.

Once written informed consent had been obtained, participants were assigned a site-specific study number. In some cases, participants were listed for surgery for different joints (hip versus knee, left versus right) at different time points. Where the participant was willing for the researchers to collect the data relating to more than one operation, a second written consent was obtained and a new study number allocated. This ensured the highest quality of data collection

and management. The screening log contained the details of all participants, and whether or not they had enrolled in the study. Patients who chose to opt out of the research were flagged on the screening log so that they were not contacted about the research on further occasions.

COASt In-patient data and sample collection

COASt collected inpatient data and intraoperative samples (intraoperative biomaterial) with patients' explicit consent.

COASt Follow-up

With the patient's consent, follow-up questionnaires were mailed at six weeks post-operatively and then annually for up to five years. The participants were asked to complete the questionnaires and returned them in the pre-paid envelope provided.

COASt Data

The data were collected and stored in accordance with Good Clinical Practice (GCP) and the Data Protection Act 1998. Data were collected from questionnaires at baseline and follow-up. Additional data were collected from participants' hospital records again with their explicit consent.

COASt Safety reporting

Study-related risk assessments were carried out and participants were informed of such risks, however small, in PIS or in discussions where necessary.

COASt Ethics

COASt was approved by the Oxfordshire Research Ethics Committee (REC) A (Ethics Reference: 10/H0604/91). The sponsoring organisation of the study was the University Hospitals Southampton NHS Foundation Trust. Although UHS was the sponsor for the study, the majority of the co-ordination was done in Oxford where the study Chief Investigator was based. Oxford has considerable experience in setting up and running multicentre studies, is cognisant of the issues on research governance and other frameworks which are essential for conducting and maintaining clinical studies. COASt has been conducted and maintained in accordance to International Conference on Harmonisation-Good Clinical Practice (ICH-GCP) guidelines and is in compliance with the other regulatory requirements and governing bodies.

3.1.5 RTW-COASt ethics amendment to COASt ethics

To set about the current study, therefore, a substantial amendment was submitted to the COASt protocol through Oxford REC A to incorporate work-related outcomes into existing COASt measures, and to add further data collection points to capture a timeline of work-related outcomes for RTW-COASt. The substantial amendment included changes to study patient correspondence and questionnaires, as well as requesting inclusion of a new telephone interview schedule/questionnaires at 3- and 6- months post-operatively.

In line with this, the COASt PIS and consent form (Appendix H) were amended to inform participants of the additional time points required for RTW-COASt and this too was approved by the Research Ethics Committee.

RTW-COASt: Additional data collection points

Given that most patients returning to work are likely to go back to their jobs at a time point between 6 weeks and 1 year post-operatively [107], we added two further post-operative data collection points (3 months and 6 months) to be able to capture work outcomes more reliably prospectively to reduce the risk of recall bias.

RTW-COASt: Additional questions for working population

Questions about employment were added to the baseline pre-operative booklets for hip (COASt CRF 018) and knee (COASt CRF 017), 6 week post-operative booklets for hip (COASt CRF 006) and knee (COASt CRF 005). To incorporate these new questions about employment, we removed questions no longer required from the previous versions of these booklets while rationalising the order of the questions, so as not to increase the burden of participation in RTW-COASt.

The 3- and 6- month post-operative (telephone) booklets for hip (COASt CRF 031; 033) and knee (COASt CRF 030; 032) arthroplasty patients were added to the protocol and included questions about current or latest employment, workplace adaptations and any advice received about returning to work at any stage before or after arthroplasty. To maximise response rates, these booklets were either used as a telephone interview schedule or posted to patients to complete at home (according to their preference).

3.1.6 RTW-COASt Aims

1. To observe the range of RTW timescales following hip and knee arthroplasty
2. To identify and evaluate factors that can promote optimum sustained RTW for patients following hip and knee arthroplasty

3.2 RTW-COASt Study design

RTW-COASt was a longitudinal cohort study of patients listed for hip and knee arthroplasties funded by the NHS and performed in three Southampton hospitals (University Hospital Southampton, Spire Southampton Hospital and Nuffield Health Wessex Hospital). The study collected baseline, intraoperative and follow-up information for s after arthroplasty (see Table 22 for RTW-COASt timeline).

Table 22. Timeline of RTW-COASt data collection points

Enrolled	**Pre-op** <3 months	**Peri-op** *Surgery*	**Post-op**		
			6 weeks	**3 months**	**6 months**
	Time 1	Time 2	Time 3	Time 4	Time 5
✓					
Informed consent process	**Self-assessment booklet**	Inpatient medical record	**Self-assessment booklet**	**Telephone interview** (or self-assessment booklet)	**Telephone interview** (or self-assessment booklet)
Appendix H	Appendix I Appendix J		Appendix K	Appendix L	Appendix M

RTW-COASt Participating hospitals

The main recruitment hospital in RTW-COASt was University Hospital Southampton. All patients considered for inclusion in COASt were referred for arthroplasty at UHS orthopaedic outpatient clinics. Arthroplasties were performed by surgeons at either UHS or one of the local outsourced private hospitals (Spire Southampton and Nuffield Wessex).

RTW-COASt Study population

The study population comprised all working-age (18-69 years) patients listed for hip or knee arthroplasty from UHS, who reported that they intended to seek paid employment after surgery. Inclusion and exclusion criteria are shown in Table 23.

RTW-COASt Patient inclusion and exclusion criteria

Table 23. RTW-COASt patient inclusion and exclusion

Inclusion criteria	Exclusion criteria
Aged between 18-69 years^	Charcot's arthropathy or other severe neurological disorders
On NHS waiting list for hip or knee arthroplasty	
Participant intends to RTW after surgery^	
Able and willing to give informed consent	
English language level necessary to understand and complete study materials	

^ Further inclusion criteria added for RTW-COASt

3.2.1 RTW-COASt Patient pathway

For RTW-COASt patients listed for surgery at UHS, the recruitment processes established in COASt were maintained with the addition of data collection points at 3 and 6 months post-operatively, and the removal of any data collection after 1 year post-operatively. The additional research appointments and assessments involved as part of full participation in COASt (e.g. physical examinations, collection of blood and urine samples, DEXA scans) were removed from the RTW-COASt protocol since they were not directly related to RTW-COASt's main study questions. We also considered that this might aid recruitment by limiting participant burden, especially as we were recruiting from a working population. The key difference between COASt and RTW-COASt during this part of the recruitment process was that only adults aged up to 69 years old (rather than no upper age limit) were screened for inclusion in the study. The decision not to contact patients aged 70 years or older was made following a pilot study we carried out that showed very few people in the sample aged >69 years wanted to RTW after surgery (see 3.2.2 below).

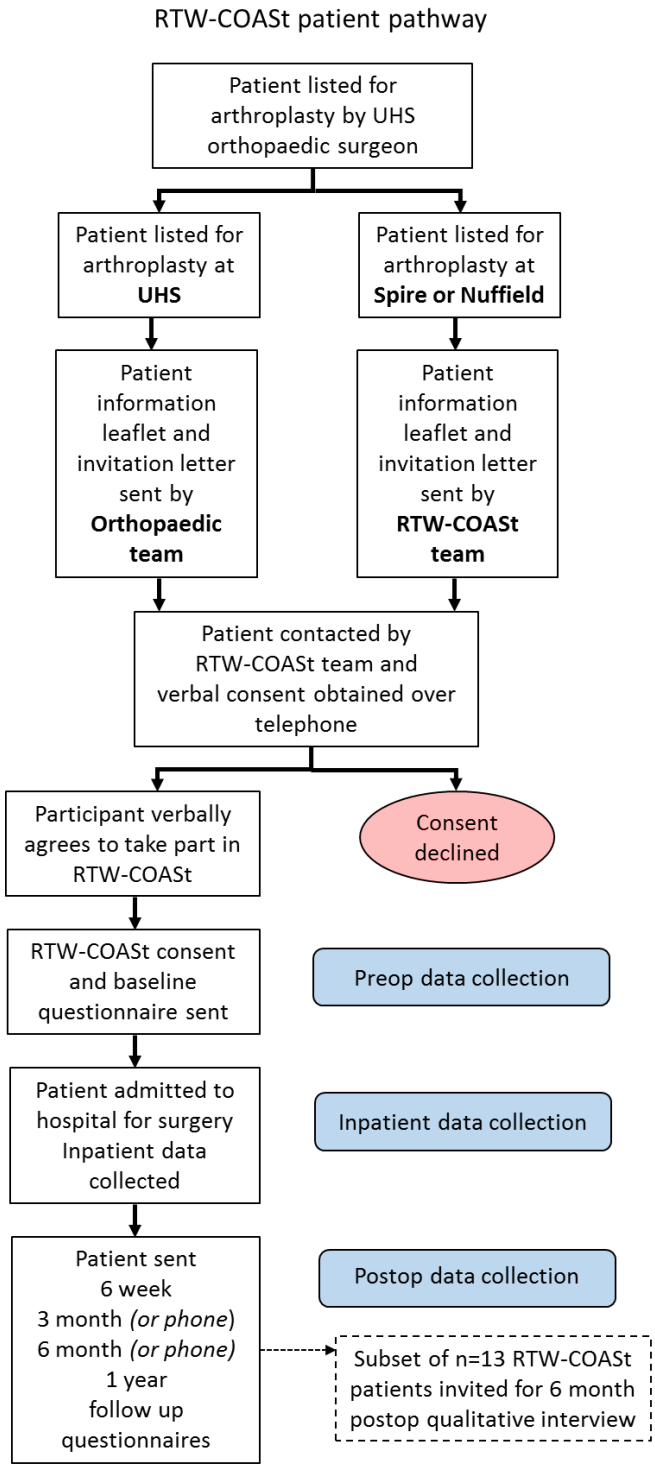

Figure 19. RTW-COASt recruitment process. The right hand side blue boxes depict the phase of data collection

A new process of recruitment was set up for RTW-COASt patients when their surgery was outsourced to private hospitals (Spire Southampton and Nuffield Wessex). The Orthopaedic Outsourcing Administrator provided a list of patients' details to the RTW-COASt research team who were then sent the study recruitment pack (Appendix H) direct to the patients. The patient pathway for Outsourced patients then re-joined that for UHS patients (Figure 19).

3.2.2 Pilot of RTW-COASt recruitment strategy

To maximise recruitment to RTW-COASt we wanted to establish how many patients who were above traditional retirement ages would plan to return to paid work after their operations. Initially we contacted all patients, regardless of age, who were listed for TJA at both UHS and outsourced hospitals. After contacting the first 40 patients referred to RTW-COASt (n=20 UHS patients, age range 34-88 including 12 patients aged ≥70; and n= 20 Outsourced patients, age range 40-78 including 5 patients aged ≥70) we found that no patients aged 70 or above were in paid employment pre-operatively or intended to RTW after surgery. The decision was then made to contact patients aged up to 69 years only, to be able to focus our recruitment efforts on patients most likely to intend to RTW after surgery, and to avoid unnecessarily bothering those unlikely to be eligible for the study.

3.2.3 RTW-COASt Outcome measures

The outcome measures collected at each data collection point of RTW-COASt (Table 24) were selected to capture variables previously found to be associated with RTW outcomes identified from searches of the scientific literature [107, 149, 150]. All 8 outcome domains defined in the International standard set of outcome measures for hip and knee OA [53] – joint pain, physical functioning, health-related quality of life, work status, mortality, reoperations, readmissions and overall satisfaction with treatment effects – were included within RTW-COASt assessments.

Table 24. RTW-COASt data collection points and main sections included in the assessments

Enrolled	**Pre-op** <3 months	**Peri-op** *Surgery*	**Post-op**		
			6 weeks	**3 months**	**6 months**
	Time 1	Time 2	Time 3	Time 4	Time 5
✓					
Informed consent process	**Self-assessment booklet**	Inpatient medical record	**Self-assessment booklet**	**Telephone interview** (or self-assessment booklet)	**Telephone interview** (or self-assessment booklet)
Appendix H	Appendix I Appendix J		Appendix K	Appendix L	Appendix M
Patient Information Sheet Written consent	Demographic characteristics Operated joint information RTW after arthroplasty advice Patient general health Current/ latest employment details RTW attitudes and expectations Current health, pain, function and activities	Details of surgery Postoperative complications (before discharge)	Postoperative health care contact related to operated joint (after discharge) Postoperative work outcomes and activity RTW after arthroplasty advice Postoperative daily activities Current health, pain, function and activities	Postoperative work outcomes and activity RTW after arthroplasty advice Postoperative daily activities	Postoperative work outcomes and activity RTW after arthroplasty advice Postoperative daily activities Open questions about patient's experience of RTW after arthroplasty

In addition, we introduced some open questions about patients' experiences of RTW after lower limb arthroplasty in order to provide patients the opportunity to inform us about what was important to them when deciding to return to work after surgery, and allowing us to explore in greater depth the possible effect the impact of these factors had on the time taken to RTW after arthroplasty.

3.2.4 RTW-COASt patient reported outcome measures (PROMs)

RTW-COASt questionnaires covered the following main domains: demographic and anthropometric characteristics; joint pain and function; physical and mental health; current work status, content and characteristics of paid work; physical demands of work; motivation and attitudes towards work; social participation; and RTW advice.

Detailed below are the PROMs that were used for RTW-COASt, some of which were retained from COASt, and considered important to address RTW-COASt's research questions.

3.2.5 RTW Joint specific and other health outcomes

Oxford Hip Score (OHS) and Oxford Knee Score (OKS)

Two of the most commonly used and nationally recommended joint specific PROMs are the Oxford Hip Score (OHS) [157] and Oxford Knee Score (OKS) [158] OHS and OKS are included in the NHS PROMs programme but can also be used as standalone questionnaires [159] and were originally developed to assess patient-reported pain and function in randomised trials of hip and knee replacement. Both Oxford scores have been widely assessed for reliability, validity and responsiveness in prospective studies. They have also been used to measure outcomes after other interventions (e.g. osteotomy, rehabilitation), have been translated into many different languages (e.g. Swedish, Chinese), and are used in national joint registries, including England, Sweden and New Zealand.

OHS and OKS were collected at baseline and 6 weeks post-operatively. The OHS (Questions 49.1-49.12, Appendix K) and OKS (Questions 49.1-49.12) consist of 12 questions about their joint specific pain and function in the preceding four weeks. Questions are scored on a Likert scale from 0 to 4, with the results added up to a total score. The overall score maximum is 48, with 0 as the worst possible score indicating poor function and/or severe pain; and 48 representing the best score suggesting no adverse symptoms and excellent joint function [160].

EQ-5D (EuroQol-5 Dimensions)

EQ-5D is a well-used validated quality of life measure used widely in the UK and accepted by the National Institute for Health and Care Excellence (NICE) for the assessment of health economic impacts of healthcare interventions. It uses standardised questions to ask patients to rate: their general health state; mobility; self-care; usual activities; pain; and anxiety/depression [161].

EQ-5D (EuroQol-5 Dimensions) was collected in COASt and is also included in the NHS PROMs programme. EQ-5D is a standardised instrument for measuring health-related quality of life status and is used across a wide range of health conditions. For each of the five dimensions (mobility, self-care, usual activities, pain/discomfort, and anxiety/depression) there are a choice of five statements which participants are asked to complete that best describe their health state today (Questions 47.1-47.5, Appendix K). There should only be one response selected for each dimension. EQ-5D was measured pre-operatively and at 6 weeks post-operatively.

Aberdeen Measure of Impairment

Also retained from COAST, the Aberdeen Impairment, Activity Limitation and Participation Restriction (Ab-IAP) Measure: Participation Restriction (Ab-P) section consists of a 15-item rating

of levels of social participation [162]. The Ab-IAP tool was developed to measure the International Classification of Functioning, Disability and Health (ICF) constructs of impairment, activity limitation and participation restriction [162]. This validated tool includes questions about a participant's social life in order to measure how socially restricted an individual had been in the preceding 4 weeks due to their joint problem (48.1-48.15, Appendix K). An example question is "How does your joint problem restrict you visiting friends and family?" There are 5 levels of response for each item, ranging from (i) 'Not at all' to (v) 'Extremely'. Ab-P was included in the baseline and 6 week post-operative questionnaires.

The Hospital Anxiety and Depression Scale (HADS)

HADS [163] was developed to measure anxiety and depression in a general medical population of patients, and has since been validated for use in many countries and settings, including psychiatric and primary care as well as the general population [164]. It is one of the NICE recommended tools for screening for anxiety and depression [165] [166]. It consists of 14 statements (7 related to anxiety and 7 related to depression) to each of which patients are asked to indicate one from a choice of four responses (different for each statement), describing how they had been feeling during the past week. An example statement related to anxiety is: "I get a sort of frightened feeling like something awful is about to happen:" with a choice from (a) Very definitely and quite badly (b) Yes, but not too badly (c) A little, but it doesn't worry me (d) Not at all. An example statement that relates to depression is: "I look forward with enjoyment to things:" (a) As much as I ever did; (b) Rather less than I used to; (c) Definitely less than I used to; (d) Hardly at all.

Somatising tendency

Somatising tendency (a predisposition to worry about common somatic symptoms) is known to be a risk factor for musculoskeletal pain and associated disability [167] and therefore could be an important factor in predicting positive and negative outcomes after surgery. A measure of somatising tendency was added at baseline using a 7-question somatising tendency scale [167] derived from the Brief Symptom Inventory (BSI) [168] which asked about distress from seven common physical symptoms (faintness/dizziness, chest pains, nausea, difficulties breathing, numbness/tingling, feeling weak, and hot or cold spells) during the past 7 days (Questions 23 a-g, Appendix K). Possible responses for each of the 7 questions ranged from 'Not at all' (scores 0) to 'Extremely' (scores 4). Responses were classified according to the number of such symptoms reported as causing at least 'moderate' (scores 2) distress.

Self-Rated Health

Also added to RTW-COASt was a measure of self-rated health (SRH). SRH (patient's appraisal of their general health) is a valid and reliable measure among those without cognitive impairment [169], the most frequently used health measure in epidemiological research, and found to be a strong predictor for mortality and morbidity [170]. This was measured at baseline with a five response option to the question: "In general would you say your health is?" (Excellent; very good; good; fair; poor). We combined the responses 'very good' and 'good', and also those for 'fair' and 'poor' to create three levels of response (Questions 15 a-e).

3.2.6 RTW-COASt Occupational outcomes

Questions were asked about participants' current employment status or last paid job. Among those in work, pre-operative information collected included: the average number of hours worked per week; any high physical demands in their job (e.g. kneeling or squatting, standing or walking for more than two hours a day); whether driving was important as part of their job; and whether driving or using public transport was important for getting to and from their workplace. The questions chosen to elicit this information were derived and developed from work questions previously used in a cohort study of 8,000 adults aged 50-64 recruited from GP practices across England (The Health and Employment After Fifty [HEAF] Study) [171], and an international longitudinal study of over 12,000 participants aged 20-59 years from 18 countries (Cultural and Psychosocial Influences on Disability [CUPID] study) [172]. Questions about any reduction in their work activities and perceived coping with workplace demands due to problems with the joint, were based on those used in a questionnaire study of employment characteristics and job loss in 370 patients on a waiting list for hip or knee surgery at an English district general hospital [103].

At baseline, participants were also asked about their expectations of their ability to work after their operation. The presenteeism scale from the Work Productivity and Activity Impairment Questionnaire: Specific Health Problem V2.0 (WPAI:SHP) [173] was adapted at baseline for RTW-COASt to use as a measure of how much patients expected their joint problem to interfere with their ability to carry out their work activities post-operatively, at 6 weeks, 3 months, 6 months and 1 year (Questions 44 a-d, Appendix K). Participants were asked, "Thinking about the work you plan to do after surgery, how much do you expect your joint replacement to affect your ability to work at 6 weeks after your surgery?" The same question about post-operative work expectations was repeated for 12 weeks, 26 weeks, and 12 months after surgery. Responders were asked to circle a number on a 10-point scale ranging from 0 (joint problem will have no effect on my work) to 10 (joint problem will completely prevent me from working) for each post-operative time point.

The post-operative questionnaires also included WPAI:SHP in its validated form which asked how much their joint problem affected their ability to do their job during the past 7 days. Participants were asked to circle a number along a 10-point scale from 0 (joint problem had no effect on my work) to 10 (joint problem completely prevented me from working) as a measure of their current work presenteeism, and then used to compare with patients' pre-operative expectations of their ability to work at each post-operative time point.

RTW-COASt baseline questionnaires also collected information about participant's motivation [106] and attitudes to work [174] (Questions 45 and 46 a-d, Appendix K) in order to be able to assess what impact these work related factors had on time taken to RTW.

Details about any advice received about RTW after arthroplasty from healthcare professionals or elsewhere were collected pre-operatively and at all post-operative data collection points. If patients had received RTW advice from healthcare professionals, they were asked to indicate who provided the advice and the nature of the advice as they recalled it. If patients had been told how long they should expect to be off work after arthroplasty, this was compared to the time they subsequently took to RTW to measure the impact of time to RTW advice. Any variability in advice given between different healthcare professionals (i.e. different surgeons providing different advice; differences in advice between healthcare professions), or to different groups of patients (i.e. heavy work vs light work; male vs female) were explored.

3.2.7 RTW-COASt Patient assessment booklets

The hip and knee versions of RTW-COASt assessments at each time point were identical, with the exceptions of: the wording of questions in versions reflecting the anatomical site being operated (either hip or knee); and the version of the Oxford score (either OHS or OKS) used was dependent on the site being operated (either hip or knee).

The key content within each section of the questionnaires is detailed below and follows the order of presentation within the questionnaires. See relevant appendices highlighted in Table 24 for a copy of the specific questions asked at each time point.

Pre-operative patient self-assessment hip (Appendix I) and knee (Appendix J) booklets

Enrolled	**Pre-op** <3 months	**Peri-op** *Surgery*	Post-op		
			6 weeks	3 months	6 months
	Time 1	Time 2	Time 3	Time 4	Time 5
✓					

Demographic and anthropometric characteristics that were collected include: age; gender; education; height and weight; ethnic group. Participants were also asked about their smoking status and alcohol consumption (Questions 1-8).

For operated joint symptoms, patients were asked how long they had suffered with joint symptoms, about any previous surgery to that joint, and use of NHS, private, and social care services related to the joint (Questions 9-11)

Questions about RTW after arthroplasty advice included whether they had received any RTW advice from healthcare professionals, or elsewhere, and if so, from whom and what the advice they received was (Questions 12-14).

Patients were asked about their health during the past 12 months which included: their general health; pain at other sites; previous surgery to other joints; any comorbid conditions and their impact on the patient; use of home care services. The final general health questions in this section were about somatising symptoms (e.g. faintness or dizziness, numbness or tingling in parts of body) during the past 7 days (Questions 15-23).

Patients were asked about their current work status (e.g. employed, self-employed, off sick, unemployed). Those who stated that they were currently working in a paid job were asked about their occupation, industry, length of job tenure, whether it was in the public or private sector, the number of employees in the organisation, whether they had access to occupational health services, the normal content of their job, the number of hours worked, physical demands of the job, whether driving was necessary for work, how the joint problem affects their work, number of days off work due to sickness in the previous 6 months, any change of duties due to the joint problem, details of any entitlement to sick pay, and their proportion of contribution to the household income. For those not working pre-operatively, details of their previous occupation, industry-type, the date they left employment and whether the reason for leaving was mainly, partly, or not due to the problem with their joint (Questions 24-41) were collected.

Questions about RTW after surgery, expectations about surgery outcomes and attitudes to the surgery included: when they hoped to return to paid work after surgery; whether they expected to return to their current (or previous) job; whether they expected the content of their work to be different once they returned; how much they expected their joint replacement to affect their ability to work post-operatively; their motivation to RTW (e.g. How important is it to you as an individual that you return to work?) and attitudes to work (e.g. I really can't think well of myself unless I have a job) (Questions 42-46).

For current health, pain, function and activities, patients were asked about their current (today) health status (EQ-5D; Questions 47.1-47), past week anxiety and depression (HADS) scores (Questions 50.1-50.14), past 4 week pain and function (OHS or OKS; Questions 49.1-49.14) and social activities (Ab-P; Questions 48.1-48.15).

Inpatient medical record

Enrolled	**Pre-op** <3 months	**Peri-op** *Surgery*	Post-op		
			6 weeks	3 months	6 months
	Time 1	Time 2	Time 3	Time 4	Time 5
✓					

The details of surgery that were extracted from patients' medical notes included: date of operation; operated joint (hip/knee); joint side (left/right/bilateral); and the type of surgery (e.g. total, unilateral, revision). Details of any peri- or post-operative complications were also recorded.

6 week post-operative patient self-assessment hip (Appendix K) and knee booklets

Enrolled	**Pre-op** <3 months	**Peri-op** *Surgery*	Post-op		
			6 weeks	3 months	6 months
	Time 1	Time 2	Time 3	Time 4	Time 5
✓					

For the 6-week post-operative assessment, information was collected about any post-operative health care contact related to the operated joint received after being discharged from hospital, options included use of NHS, private, and social care services since operation. Details of any post-operative complications since they were discharged from hospital were also recorded (Questions 1-4).

For post-operative work outcomes and activity, patients were asked about their current work status. If they had returned to work, they were asked: the date that they had returned to work and whether they were still in work. If they had left work since RTW after their operation, they were asked what date they left and the reason for leaving. Those who had returned to work at 6 weeks post-operatively were also asked their current working hours, any sickness absence since RTW, the impact of joint replacement on their ability to work, and the nature of any workplace adjustments that had enabled them to work (Questions 5-18).

Participants were asked about any RTW after arthroplasty advice they had received, either pre-operatively or post-operatively, and if so, from whom they received the advice and the nature of the advice received (Questions 19-25).

Patients were asked to indicate how much the joint problem affected their daily activities (other than work at a job). This was measured using the WPAI:SHP daily activities tool with responses on a scale from 0 to 10 with 0 (joint problem had no effect on daily activities) to 10 (joint problem completely prevented me from doing my daily activities). Patients were also asked to indicate whether their joint problem affected their driving ability (Questions 26-27).

Any patients who had returned to a new employer or to a completely new work position since their operation were asked to complete details about their new job including occupation, industry, length of job tenure, public or private sector employers, the number of employees in the organisation, whether they had access to occupational health services, the normal content of their job, the number of hours worked, physical demands of the job, and whether driving was necessary for work (Questions 28-35).

For current health, pain, function and activities, patients were asked about their current (today) health status (EQ-5D), past week anxiety and depression (HADS), past 4-week pain and function (OHS or OKS), and social activities (Ab-P) (Questions 36-38).

3 month post-operative telephone interview (or patient self-assessment) hip and knee (Appendix L) booklets

Enrolled	**Pre-op** <3 months	**Peri-op** *Surgery*	**Post-op**		
			6 weeks	3 months	6 months
	Time 1	Time 2	Time 3	Time 4	Time 5
✓					

Where possible, the 3-month outcome measures were collected via a brief telephone interview, otherwise participants were sent the self-assessment booklet to complete.

At three months, RTW-COASt participants were again asked their current work status. If they had returned to work, the date they returned to work was recorded. If they had left work since RTW after their operation they were asked what date they had left and the reason for leaving. Those still in work were asked about: their current working hours; any sickness absence since returning to work; the impact of joint replacement on their ability to work and the nature of any workplace adjustments (Questions 2-16).

Participants were asked at 3-months post-operatively about any RTW after arthroplasty advice they had received, either pre-operatively or post-operatively, and if so, from whom they received the advice and the nature of the advice received (Questions 17-23).

The 3-month post-operative questionnaire also asked participants to indicate how much the joint problem affected their daily activities (other than work at a job) using the WPAI:SHP daily activities tool. Patients were also asked to indicate whether their joint problem affected their driving ability (Questions 24-25).

Patients who had returned to work for a new employer or to a completely new work position since their operation were asked about their occupation, industry, length of job tenure, public or private sector employers, the number of employees in the organisation, whether they had access to occupational health services, the normal content of their job, the number of hours worked, physical demands of the job, and whether driving was necessary for work (Questions 26-34).

6 month post-operative telephone interview (or patient self-assessment) hip (Appendix M) and knee booklets

Enrolled	**Pre-op** <3 months	**Peri-op** *Surgery*	Post-op		
			6 weeks	3 months	6 months
	Time 1	Time 2	Time 3	Time 4	Time 5
✓					

Where possible, the 6-month outcome measures were collected via a brief telephone interview, otherwise participants were sent the self-assessment booklet to complete by hand.

Current work status was collected at 6months post-operatively. If they had returned to work, the date they returned was recorded. If they had left work since returning to work after their operation they were asked what date they had left and the reason for leaving. Those still in work were asked their current working hours, any sickness absence since RTW, the impact of joint replacement on their ability to work and the nature of any workplace adjustments (Questions 2-16).

Information about any RTW after arthroplasty advice patients received was again recorded (Questions 17-23).

Six-month post-operative daily activity scores were measured using the WPAI:SHP daily activities tool. Patients were also asked to indicate whether their joint problem affected their driving ability (Questions 24-25).

Patients who had returned to work for a new employer or to a completely new work position since their operation were asked about their occupation, industry, length of job tenure, public or private sector, the number of employees in the organisation, whether they had access to occupational health services, the normal content of their job, the number of hours worked, physical demands of the job, and whether driving was necessary for work (Questions 26-34).

Open questions about a patient's experience of RTW after arthroplasty were introduced at the end of the 6-month post-operative telephone interviews/questionnaires. The open questions detailed below allowed patients to tell us what was important to them in their journey back to work (Questions 35-39):

Please briefly describe what your job involves, and what impact total joint replacement surgery has had on your day-to-day tasks at work since going back after your operation …

What were the most important things you needed to consider when you were deciding when to return to work after your operation?

What do you wish you had known about returning to work after total joint replacement surgery from the beginning (before your operation)?

What (if anything) could have made the experience of returning to work better for you?

Is there anything else about your experience of returning to work after total joint replacement that you would like to tell us about?

3.2.8 Main exposure

Primary and revision hip and knee replacement surgery.

3.2.9 RTW-COASt Main outcome variables

- 6 month RTW status (returned to work yes/no)
- Time taken to RTW after surgery (in days)

3.2.10 RTW-COASt Main predictor variables

- Pre-operative sickness absence (days off due to joint symptoms during previous 6 months)
- Physical demands of the job patient wishes to return to

3.2.11 Data Analysis

Analyses were completed in Stata. Prior to analysis, data distributions were checked for inconsistencies, outliers and missing information.

Descriptive statistics were used to gain an understanding of the distribution of data for each variable. Primary descriptive analysis of baseline demographic, health and work related characteristics were reported using standard descriptive summaries (e.g. means and standard deviations for continuous variables such as age, and percentages for categorical variables such as gender).

The primary analysis included all participants meeting all inclusion and exclusion criteria at baseline and focussed on RTW rates and time taken to RTW. The primary endpoints were the rate of return to any work within 6 months of surgery, and the time it took to return to any work. The secondary endpoints were whether they returned to work very early (<30 days after surgery), or early (<49 days after surgery).

3.2.12 Statistical Analysis

Risks for these outcomes were assessed using Cox regression. The risk factors of principal interest were: a) pre-operative sick leave (number of days' sickness absence from work during 6 months before surgery); b) job type (manual/moderate/non manual); and c) RTW advice from healthcare professionals (RTW advice received? Yes/No, from who, what stated). Other potentially confounding variables taken into account in the analysis included: joint site, age, gender, pain, function, somatising tendencies, expectations, work attitudes and motivation.

3.2.13 RTW-COASt Ethical considerations

COASt received full ethical approval for its programme of work from Oxfordshire REC A in December 2010 (Oxford REC A Reference: 10/H0604/91). The sponsoring organisation of the study is the UHS NHS Foundation Trust (sponsor reference: MED0938). Full approval from the

local research and development (R&D) department within UHS NHS Trust was obtained in January 2011.

Subsequent to previous amendments, approval for changes to COASt self-assessment questionnaires to include work outcomes for RTW-COASt was sought from the Oxfordshire REC A committee and granted in March 2017 (Oxford REC A Reference: 10/H0604/91 Amendment number 5.0). Further approval for this amendment was sought and obtained from UHS R&D and the Health Research Authority to begin recruitment of patients to RTW-COASt from April 2017. The first RTW-COASt patient was recruited on 16th May 2017.

The following considerations were identified as potential ethical issues applicable to the study:

Patient informed consent

Within the existing COASt permissions, there was provision to recruit patients whose NHS surgery was outsourced to private hospitals in Southampton (Spire Southampton Hospital and Nuffield Health Wessex Hospital). The COASt team had not contacted these patients previously, however, for RTW-COASt it was important to approach those individuals outsourced to local private hospitals because such patients tended to be younger and with fewer medical problems, and thus potentially more likely to want to RTW after their operation. The existing recruitment procedure was used for UHS patients and a new source of patient referrals was set up to capture outsourced patients (see RTW-COASt pathway Page 91).

Informed consent was obtained from patients according to Good Clinical Practice (GCP) guidelines. The consent processes allowed the participant the opportunity to ask questions about the study. The original signed, completed consent form was kept in the Study Site File and a copy given to the patient.

Potential RTW-COASt participants were identified by the orthopaedic team when they were listed for hip or knee arthroplasty at UHS. Patients were either sent or given a recruitment pack containing (Appendix H): Patient Information Sheet (PIS) which includes a sample consent form and a recruitment letter. The recruitment pack was either handed to the participant in clinic or posted after their appointment, depending on time and staff resources. UHS patients listed for NHS surgery at local outsourced providers (Southampton Spire and Nuffield hospitals) aged <70 years were sent the PIS pack separately once their details were forwarded to the RTW-COASt team from the UHS Orthopaedic Outsourcing department. The PIS informed potential participants that a member of the research team would telephone them to discuss the study in more detail approximately two weeks after receipt of the COASt study pack, thereby ensuring that a potential

participant had sufficient time to read through the information and decide whether they wished to take part. There was an opportunity for patients to opt out of the study at this point by emailing or telephoning the RTW-COASt office.

Unless an opt-out request was received, attempts were made to follow-up all patients referred with a telephone call to assess their eligibility for the study and to discuss what their involvement would be if they consented to take part. Once verbal consent was obtained, the patient was sent the RTW-COASt written consent form, baseline pre-operative questionnaire booklet and a pre-paid envelope to return the completed consent form and booklet. When the written consent and baseline booklet were received, the patient was assigned a RTW-COASt study number. In some cases, a participant was listed for surgery for different joints (hip versus knee, left versus right) at different time points. Where the participant was willing to provide information relating to a second operation, a second written consent was sought and a separate study number allocated. As with the previous COASt, this ensured the high quality of data collection and management. The screening log contained details of all participants, irrespective of whether they were enrolled in the study of all patients referred to RTW-COASt from UHS or outsourced hospitals. Patients who chose to opt out from the research were flagged on the screening log so that they were not contacted again by the research team.

If participants preferred to complete and/or return study materials in person, a research appointment was arranged to coincide with an existing NHS appointment, where possible.

Potential risks and burdens to participants

It was not anticipated that the completion of questionnaires and telephone interviews about RTW after arthroplasty would cause any particular risk or discomfort for RTW-COASt participants. Questions within RTW-COASt required patients to reflect on pain, activity limitation and social impact as a consequence of their disease state. It is possible that this focused reflection may be upsetting for some patients, although the potential physical and/psychological harm or distress was envisaged to be similar to that experienced in everyday life. However the research team was available to discuss any concerns that patients raised.

The burdens for RTW-COASt participants were limited to the completion of questionnaires and brief telephone interviews. Patients were offered help with completion of questionnaires if required and any patients who did not want to answer RTW-COASt questions over the phone were sent a hard copy of the questions to complete at their convenience. Participants who agreed to take part in the more in-depth post-operative telephone interviews were offered an appointment at their convenience (evenings and weekends if required). Permission to record the

telephone interview was requested before recording commenced, and patients were notified before recording started and once recording had finished. Patients were instructed to inform the interviewer if they wished to pause or stop the interview at any time.

Participant benefits

Participants were informed that there was no direct personal benefit or gain in taking part in RTW-COASt. Involvement or withdrawal from the study was fully discussed, and it was emphasised that the decision whether or not to take part would have no bearing on their continuing medical care.

Withdrawal of consent

Participants were entitled to withdraw consent to take part in RTW-COASt at any time. Patients were informed about their right to withdraw consent during recruitment. In addition, the PIS provided information on what to do if the participant decided they no longer wished to take part. Participants were again assured that withdrawal of consent would have no effect on their continuing clinical care or involvement in other research studies.

Confidentiality

Data collected from the self-assessment questionnaires and telephone interviews contained personal details and information about participants' health and work. Only clinicians and researchers actively involved in the study had access to these data. All data collection phases utilised participant coding methods by which all patients referred to RTW-COASt were assigned a study screening number. Those subsequently recruited were then assigned a RTW-COASt study number following receipt of written informed consent. Access to the coding criteria was limited to the immediate research team. All hard copy data were stored in a lockable filing cabinet and all electronic data were stored on an encrypted password accessed device, in accordance with the Data Protection Act 1988.

All members of the COASt research team had access to medical records. This was required by the researchers to screen for history of relevant medical information and to maintain contact with the participants. The NHS code of confidentiality was adhered to during recruitment, data collection, analysis and dissemination of any other activity pertaining to the conduct of this research study. Participants were anonymised at the time of recruitment, using an alphanumeric code (study number) which was used on all subsequent documentation.

In summary, chapter 3 has described the detailed methods and data collection of the prospective cohort study RTW-COASt both at baseline and all follow-up time points. The details of recruitment, patient flow, patient characteristics and work characteristics of those who participated will be summarised in the next Chapter.

Chapter 4 RTW-COASt results

4.1 Recruitment

This chapter describes the identification of participants for RTW-COASt, the characteristics of those recruited and their work characteristics. Recruitment took place between May 2017 and June 2018. From a total of 711 referrals (Table 25), 456 patients were eligible to be screened (on waiting list for hip or knee surgery from Southampton General Hospital) to take part in RTW-COASt. During screening, 313 participants were excluded because either they were not active in the workforce (n=97), they were not having total joint replacement surgery (n=157), or they had already undergone the surgery before being contacted or surgery was delayed or cancelled (n=65). One further participant was excluded because her level of English language proficiency meant she would not have been able to complete the study assessments. This left a remainder of 136 lower limb arthroplasty patients who were eligible to take part. From these, 39 declined and verbal consent was provided by 97 patients, however 25 did not return the baseline questionnaire before their operation, and 19 operations were either cancelled or delayed until after the study cut-off point. Therefore a total of 53 patients were recruited to RTW-COASt.

Table 25. RTW-COASt recruitment (May 2017 to June 2018)

Total referrals received (324 SGH; 235 Spire; 152 Nuffield)	**711**
Excluded pre-screen (aged 70+ years)	-255
Eligible to screen	**456**
Excluded post-screen (72 retired; 25 not returning to paid work)	-97
Excluded post-screen (not total joint replacement surgery)	-157
Excluded post-screen (53 already had op; 12 delayed/cancelled; 1 non-English speaker)	-66
Eligible to take part	**136**
No - Declined (20 opted out before contacting; 10 said No; 9 unable to contact)	-39
Yes - **Verbal consent to take part and baseline sent**	**97**
No - Baseline/written consent not received before op (25); no op by study cut-off (19)	-44
Yes - **Recruited into the study**	**53**

Operating sites: NHS hospital - Southampton General Hospital (SGH); Outsourced hospitals - Spire Southampton Hospital; and Nuffield Health Wessex Hospital; op=operation

RTW outcomes were collected for all 53 participants post-operatively. Figure 20 shows the number of post-operative follow-ups completed at each data collection time point. Eighty-nine percent of participants completed the assessment 6 weeks after surgery, this reduced to 79% at 3 months, but then increased to 96% at 6 months after surgery.

Included in the study n=53	**6 weeks (FU1) received** n=47	**3 months (FU2) received** n=42	**6 months (FU3) received** n=51

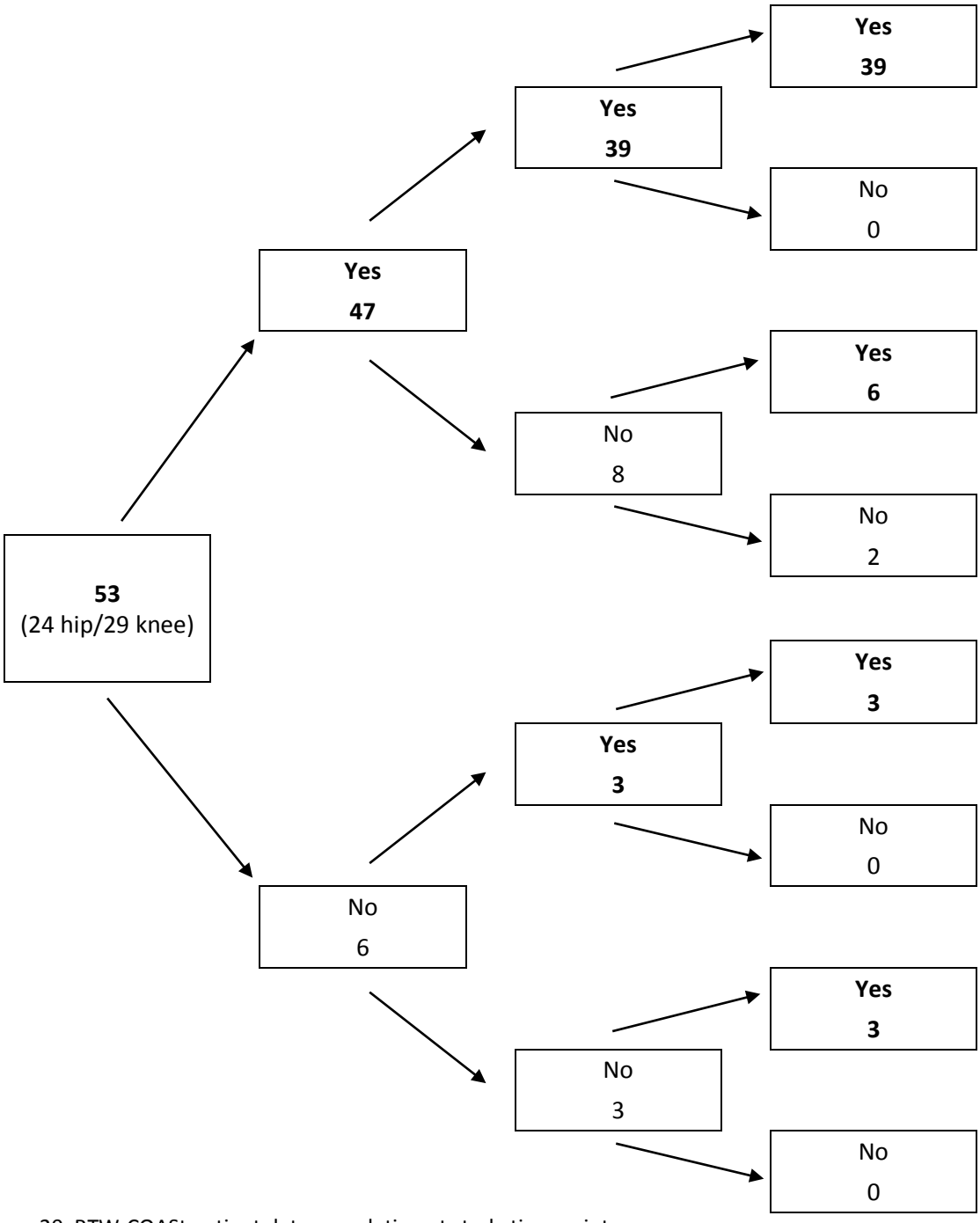

Figure 20. RTW-COASt patient data completion at study time points

4.2 RTW-COASt participants

4.2.1 Baseline socio-demographic characteristics

The baseline socio-demographic characteristics of the 53 (24 hips, 29 knees) lower limb arthroplasty patients are shown in Table 27. There were more women undergoing hip arthroplasty than men and just under half of the knee arthroplasty group were women. The median age of the study participants (59 years) was similar in all gender/joint groups and there were few people of any other ethnicity than white (British). Education level was generally split equally between up to school (GCSE/O level) and above (further education onwards) for the whole group and within each gender group, but a greater proportion of patients undergoing hip arthroplasty were educated above school level. More study participants were married than not married, with similar marital status distribution across gender/joint groups. Smoking status, weekly alcohol consumption, and BMI were distributed similarly across gender/joint group, with just under half of the sample being ex/current smokers. The vast majority (95%) of participants were in work (employed 70%; self-employed 25%) pre-operatively, the remaining three participants were employed but off sick at baseline.

4.2.2 RTW-COASt participant characteristics compared with COASt and other arthroplasty cohorts that included a working-age population

The characteristics of RTW-COASt participants were compared with the entire COASt cohort (Table 26). As both COASt and RTW-COASt participants were recruited from the same hospital, their characteristics (with the exception of age), were likely to be similar. Therefore, characteristics from other key arthroplasty studies [117, 175] with a working-age population were also included for comparison.

Table 26. Comparison of RTW-COASt participant characteristics with other arthroplasty cohorts

	Hips				Knees			
Variable	**RTW-COASt**	**Arden (COASt)** [156]	**Tilbury cohort** [117]	**Baker (NIHR)** [175]	**RTW-COASt**	**Arden (COASt)** [156]	**Tilbury cohort** [117]	**Baker (NIHR)** [175]
Sex (women)	70.8%	60.2%	48.0%	41.6%**	48.3%	54.9%	56.2%	41.6%**
Age	56.9	68.23	56.0	58.9	60.2	68.71	56.2	61.3
Ethnicity (white)	87.5%	95.6%		94.2%**	96.6%	97.7%		94.2%**
Education (up to GCSE)	37.5%	42.9%			55.2%			
BMI kg/m^2	27.8	27.97	27.8	28.2**	29.0	30.52	29.9	28.2**
Oxford score	18.3	18.63	23.0		24.5	20.31	24.0	
Hope / expected time to RTW	6.8 weeks (range 2-18)			9.5 weeks (range 1-68)**	7.2 weeks (range 2-13)			9.5 weeks (range 1-68)**
**Hips and knees combined								

Table 26 shows that there was a wide variation in the proportion of females included in each study, from 41.6% (combined hip and knee)[175] to 70.8% (RTW-COASt hips). The average age of participants was similar between the RTW cohorts (RTW-COASt, Tilbury and Baker) for hips (56.9, 56.0 and 58.9 respectively) and for knees (60.2, 56.2, 61.3 respectively). The average age of participants was higher for both hips (68.23) and knees (68.71) for the COASt cohort which included all those undergoing arthroplasty, regardless of their working status. On average, the participants in all of the hip and knee arthroplasty studies were defined as overweight with marked similarity in BMI scores across the cohorts.

From the data available to compare, RTW-COASt participants appear broadly similar to other cohorts of return to work after arthroplasty studies. Unfortunately, there were no comparable data published from other cohorts that would enable us to compare the enthusiasm to return to work amongst participants in the RTW-COASt as compared with other cohorts. This potential source of bias is discussed in the Discussion.

4.2.3 Baseline health status

Table 28 shows that at baseline, people whose affected joint was the knee reported a longer time suffering problems from the joint, were more likely to have had previous surgery to that and other lower limb joints, reported greater pain at baseline, and were much more likely to have discussed RTW with a healthcare professional. Functional limitations experienced as a

consequence of the joint problem at baseline were similar between hips and knees, as was prevalence of reported MSD pain at other anatomical sites, and the number of visits to see a hospital doctor for the joint problem during the previous 12 months. However a much higher proportion of people whose affected joint was the hip rather than the knee visited their GP about the joint problem in the preceding 12 months (Table 28). In terms of participants' general health and comorbid conditions, overall healthcare utilisation was similar for hip and knee patients, as was the number of medicines taken for other health conditions, and the number of health problems that stopped people doing things during the previous 12 months. However, in comparison with knee patients, hip arthroplasty patients were more likely to: rate their general health as fair or poor (than good, very good or excellent); report more somatising tendency symptoms; have higher levels of anxiety and depression; and report a greater level of impact of the joint problem on health-related quality of life and social activities.

The impact of joint problems on participants' social activities were similar between men and women. Men reported suffering from the joint problem for longer than women pre-operatively, were more likely to have had previous surgery to their lower limb joints, and a greater proportion reported having MSD pain at other anatomical joint sites. A similar proportion of men and women had visited a GP at least once in the previous year. Women visited their GP about their joint problem more frequently than men, but men were more likely to have had discussions with a health professional about RTW following arthroplasty, and were more likely to have accessed other sources of information about RTW after lower limb arthroplasty. There were few differences between women and men in terms of the pain and function of their joint at baseline, the number of visits to a hospital doctor during the preceding 12 months, and most measures of baseline general health. However, women were more likely than men to report fair or poor as opposed to good, very good or excellent general health, and women were more likely to have seen their GP during the previous 12 months. However, men were more likely to have taken medication for a health condition in the previous 12 months.

Table 27. Baseline socio-demographic characteristics of people taking part in the study by site of arthroplasty and gender

Results are expressed as n(%), mean(SD), or median(IQR) depending on the nature of the variables

		Joint		Sex	
	All (n=53)	**Hip (n=24)**	**Knee (n=29)**	**Men (n=22)**	**Women (n=31)**
Sex					
Women	**31 (58.5)**	17 (70.8)	14 (48.3)	-	-
Age (years)	**58.9 (54.2,60.0)**	56.9 (51.1,63.0)	60.2 (56.2,63.0)	59.4 (56.2,63.6)	58.9 (51.9,63.0)
Ethnicity					
White British	**49 (92.5)**	21 (87.5)	28 (96.6)	22 (100)	27 (87.1)
Education level					
Up to school (e.g. GCSE/O Level)	**25 (47.2)**	9 (37.5)	16 (55.2)	10 (45.5)	15 (48.4)
Further education (e.g. A level) or higher	**28 (52.8)**	15 (62.5)	13 (44.8)	12 (54.6)	16 (51.6)
Marital status					
Married	**35 (66.0)**	14 (58.3)	21 (72.4)	17 (77.3)	18 (58.1)
BMI	**28.7 (26.7,31.8)**	27.8 (26.6,31.4)	29.0 (26.7,32.5)	27.3 (26.1,30.9)	29.5 (26.8,32.8)
Smoking status					
Ex/Current smoker	**25 (47.2)**	11 (45.8)	14 (48.3)	11 (50.0)	14 (45.2)
Units of alcohol per week	**3.0 (2.0,7.0)**	3.5 (2.0,8.0)	3.0 (1.0,5.0)	5.5 (2.0,11.0)	3.0 (1.0,3.0)
Employment status					
Employed (at work)	**37 (69.8)**	18 (75.0)	19 (65.5)	12 (54.6)	25 (80.7)
Self-employed (at work)	**13 (24.5)**	5 (20.8)	8 (27.6)	9 (40.9)	4 (12.9)
Employed (off sick)	**2 (3.8)**	1 (4.2)	1 (3.5)	-	2 (6.5)
Self-employed (off sick)	**1 (1.9)**	-	1 (3.5)	1 (4.6)	-

Table 28. Baseline health status of people taking part in the study by site of arthroplasty and gender

Results are expressed as n(%), mean(SD), or median(IQR) depending on the nature of the variables

		Joint		Sex	
	All (n=53)	**Hip (n=24)**	**Knee (n=29)**	**Men (n=22)**	**Women (n=31)**
Problems with hip or knee joint					
Time suffered from joint problem (months)	**48.0 (24.0,72.0)**	36.0 (21.5,55.0)	72.0 (48.0,120.0)	72.0 (48.0,120.0)	36.0 (24.0,72.0)
Previous surgery at this joint (n=1 missing)	**21 (39.6)**	3 (12.5)	18 (62.1)	11 (50.0)	10 (32.3)
Oxford (Hip/Knee) score (OHS/OKS) pain and function	**21.7 (8.8)**	18.3 (7.3)	24.5 (8.9)	23.5 (9.4)	20.4 (8.2)
Oxford pain score	**8.9 (5.4)**	5.8 (4.0)	11.5 (5.1)	10.2 (5.9)	8.1 (4.9)
Oxford function score	**12.7 (4.0)**	12.4 (3.6)	13.0 (4.4)	13.4 (3.9)	12.3 (4.2)
MSD pain (other than to-be-operated joint)	**23 (43.4)**	11 (45.8)	12 (41.4)	13 (59.1)	10 (32.3)
Previous surgery at other lower limb joints (1 missing)	**31 (59.6)**	8 (33.3)	23 (79.3)	14 (63.6)	17 (54.8)
Contact with healthcare professionals					
Number of visits to GP for joint problem last 12 months (n=6 missing)					
0	**6 (11.3)**	1 (4.2)	5 (17.2)	2 (9.1)	4 (12.9)
1	**17 (32.1)**	4 (16.7)	13 (44.8)	11 (50.0)	6 (19.4)
2+	**24 (45.3)**	15 (62.5)	9 (31.0)	6 (27.3)	18 (58.1)
Number of visits to hospital doctor for joint problem last 12 months (n=3 missing)					
0	**9 (17.0)**	3 (12.5)	6 (20.7)	5 (22.7)	4 (12.9)
1	**19 (35.9)**	10 (41.7)	9 (31.0)	9 (40.9)	10 (32.3)
2+	**22 (41.5)**	10 (41.7)	12 (41.4)	7 (31.8)	15 (48.4)
Discussed RTW with healthcare professional	**26 (49.1)**	7 (29.2)	19 (65.5)	13 (59.1)	13 (41.9)
Other sources of RTW advice	**22 (41.5)**	12 (50.0)	10 (34.5)	11 (50.0)	11 (35.5)

Table 28. *Continued*. Baseline health status of people taking part in the study by site of arthroplasty and gender

Results are expressed as n(%), mean(SD), or median(IQR) depending on the nature of the variables

		Joint		Sex	
	All (n=53)	**Hip (n=24)**	**Knee (n=29)**	**Men (n=22)**	**Women (n=31)**
General health					
Self-reported health					
Fair/poor	**5 (9.4)**	4 (16.7)	1 (3.5)	1 (4.6)	4 (12.9)
Number of health problems seen doctor about past 12 months					
0	**22 (41.5)**	10 (41.7)	12 (41.4)	11 (50.0)	11 (35.5)
1	**18 (34.0)**	10 (41.7)	8 (27.6)	8 (36.4)	10 (32.3)
2+	**13 (24.5)**	4 (16.7)	9 (31.0)	3 (13.6)	10 (32.3)
Number of problems went to hospital about past 12 months					
0	**35 (66.0)**	16 (66.7)	19 (65.5)	15 (68.2)	20 (64.5)
1	**13 (24.5)**	6 (25.0)	7 (24.1)	7 (31.8)	6 (19.4)
2+	**5 (9.4)**	2 (8.3)	3 (10.3)	-	5 (16.1)
Number of problems taking medicine for past 12 months					
0	**28 (52.8)**	14 (58.3)	14 (48.3)	13 (59.1)	15 (48.4)
1	**14 (26.4)**	6 (25.0)	8 (27.6)	7 (31.8)	7 (22.6)
2+	**11 (20.8)**	4 (16.7)	7 (24.1)	2 (9.1)	9 (29.0)
Number of problems stop me doing things past 12 months					
0	**37 (69.8)**	17 (70.8)	20 (69.0)	16 (72.7)	21 (67.7)
1	**13 (24.5)**	5 (20.8)	8 (27.6)	5 (22.7)	8 (25.8)
2+	**3 (5.7)**	2 (8.3)	1 (3.5)	1 (4.6)	2 (6.5)

Table 28. *Continued*. Baseline health status of people taking part in the study by site of arthroplasty and gender

Results are expressed as n(%), mean(SD), or median(IQR) depending on the nature of the variables

		Joint		Sex	
	All (n=53)	**Hip (n=24)**	**Knee (n=29)**	**Men (n=22)**	**Women (n=31)**
General health (continued)					
EQ-5D					
Mobility	**3.1 (0.8)**	3.3 (0.6)	2.9 (0.9)	3.2 (0.8)	3.0 (0.8)
Self-care	**1.8 (0.9)**	2.3 (0.9)	1.5 (0.7)	2.0 (1.0)	1.7 (0.8)
Usual activities	**2.9 (1.0)**	3.4 (0.9)	2.5 (0.9)	2.7 (0.8)	3.0 (1.1)
Pain/discomfort	**3.5 (0.7)**	3.8 (0.6)	3.2 (0.7)	3.6 (0.8)	3.5 (0.8)
Anxiety/depression	**1.8 (0.8)**	1.7 (0.8)	1.8 (0.9)	1.5 (0.9)	1.9 (0.8)
Somatising tendency (n=11 missing)					
0	**28 (52.8)**	11 (45.8)	17 (58.6)	11 (50.0)	17 (54.8)
1	**4 (7.6)**	3 (12.5)	1 (3.5)	1 (4.6)	3 (9.7)
2+	**10 (18.9)**	6 (25.0)	4 (13.8)	2 (9.1)	8 (25.8)
Hospital Anxiety and Depression score (HADS)	**14.4 (6.1)**	16.6 (6.6)	12.7 (5.0)	12.4 (5.5)	16.0 (6.1)
Hospital Depression score (HADS)	**8.1 (3.0)**	9.4 (3.0)	7.0 (2.6)	7.5 (2.4)	8.4 (3.4)
Hospital Anxiety score (HADS)	**6.2 (4.0)**	7.0 (4.5)	5.5 (3.4)	4.9 (3.8)	7.2 (3.9)
Aberdeen Social Activity	**21.5 (10.7)**	26.7 (9.9)	17.3 (9.5)	20.9 (10.2)	22.0 (11.2)

4.2.4 Baseline work factors

Given the similarities of the socio-demographic and health-related characteristics between women and men, baseline work characteristics were described for men and women combined, by joint (Table 29). These tables show that people whose affected joint was the knee were much more likely to be working in the private sector, working in smaller organisations, have a more physically demanding job, had their work duties altered or reduced pre-operatively, and were less likely to be eligible for sick pay than the hip arthroplasty group. Work factors were strikingly similar between the hip and knee groups (including the median number of hours worked each week (40 hours), the likelihood of having reduced working hours due to the joint problem (30%), personal contribution to household income (75%), and access to an occupational health service (30%) through work. The hip and knee groups were also similar in terms of the importance of being able to drive to get to the workplace, and the impact of the joint problem on their ability to work pre-operatively.

In terms of expectations about the impact that the joint replacement would have on their ability to work post-operatively, both hip and knee groups expected the impact to be greatest at 6 weeks post-operatively and reduce at similar rates at each subsequent time point (3 months and 6 months), until 1 year after surgery when their expectation of an impact of the joint replacement on work was minimal. The percentage of people who hoped to be back at work by 6 weeks after their surgery was the same (58%) for hips and knees. A further 25% of hip and 17% of knee patients hoped to RTW by 8 weeks, and the remainder hoped to be back at either 12, 13, or 18 weeks post-operatively. Notably, none of the participants in either group said they expected to RTW at 9, 10 and 11 weeks after their operation, even though they were asked to self-generate the number of weeks they hoped to RTW by.

Table 29. Baseline work factors among people taking part in the study by site of arthroplasty

Results are expressed as n(%), mean(SD), or median(IQR) depending on the nature of the variables

		Joint	
	All (n=53)	**Hip (n=24)**	**Knee (n=29)**
Workplace factors			
Work sector (n=2 missing)			
Public sector	**13 (24.5)**	9 (37.5)	4 (13.8)
Private sector	**38 (71.7)**	14 (58.3)	24 (82.8)
Number of people in organisation (n=2 missing)			
Just me	**11 (20.8)**	4 (16.7)	7 (24.1)
2-9	**7 (13.2)**	1 (4.2)	6 (20.7)
10-29	**5 (9.4)**	2 (8.3)	3 (10.3)
30-499	**11 (20.8)**	6 (25.0)	5 (17.2)
500+	**17 (32.1)**	10 (41.7)	7 (24.1)
Access to OHS through work	**16 (30.2)**	7 (29.2)	9 (31.0)
Eligible for sick pay	**26 (49.1)**	16 (66.7)	10 (34.5)
Number of weeks eligible full sick pay	**18 (8,26)**	16 (4,26)	21 (12,26)
Number of weeks eligible reduced sick pay	**13 (6,26)**	12 (6,13)	26 (16,39)

OHS=occupational health service.

Table 29. *Continued*. Baseline work factors among people taking part in the study by site of arthroplasty

Results are expressed as n(%), mean(SD), or median(IQR) depending on the nature of the variables

		Joint	
	All (n=53)	**Hip (n=24)**	**Knee (n=29)**
Worker factors			
Hours worked each week	**40 (28,45)**	40 (28,45)	40 (30,40)
Standing/walking >2 hrs/day	**36 (67.9)**	14 (58.3)	22 (75.9)
Walking > 1 mile a day	**23 (43.4)**	9 (37.5)	14 (48.3)
Kneeling	**27 (50.9)**	12 (50.0)	15 (51.7)
Climbing > 30 flights of stairs	**8 (15.1)**	3 (12.5)	5 (17.2)
Climbing ladders	**9 (17.0)**	2 (8.3)	7 (24.1)
Lifting 10kg or more by hand	**15 (28.3)**	3 (12.5)	12 (41.4)
Driving essential to the job	**13 (24.5)**	4 (16.7)	9 (31.0)
Driving essential for getting to work	**36 (67.9)**	17 (70.8)	19 (65.5)
Public transport essential for getting to work	**3 (5.7)**	1 (4.2)	2 (6.9)
Contributes half or more to household income (n=3 missing)	**40 (75.5)**	18 (75.0)	22 (75.9)
Impact of joint problem on work pre-operatively			
Joint problem affected ability to work before surgery			
Not at all	**6 (11.3)**	3 (12.5)	3 (10.3)
Yes, a little	**25 (47.2)**	10 (41.7)	15 (51.7)
Yes, a lot	**22 (41.5)**	11 (45.8)	11 (37.9)
Reduced working hours due to joint problem	**16 (30.2)**	7 (29.2)	9 (31.0)
Days off sick due to joint problems in past 6 months	**0 (0,5)**	1.5 (0,11)	0 (0,2)
Work duties altered or reduced (n=1 missing)	**19 (35.9)**	7 (29.2)	12 (41.4)

Table 29. *Continued*. Baseline work factors among people taking part in the study by site of arthroplasty

Results are expressed as n(%), mean(SD), or median(IQR) depending on the nature of the variables

		Joint	
	All (n=53)	**Hip (n=24)**	**Knee (n=29)**
Expectations after surgery (pre-operatively)			
Belief that surgery will affect ability to work at 6 weeks± (n=2 missing)	**5.6 (2.8)**	5.0 (3.1)	6.1 (2.5)
Belief that surgery will affect ability to work at 12 weeks± (n= 1 missing)	**3.4 (2.0)**	3.2 (2.4)	3.6 (1.6)
Belief that surgery will affect ability to work at 26 weeks± (n= 3 missing)	**2.0 (1.2)**	2.1 (1.5)	1.9 (1.0)
Belief that surgery will affect ability to work at 12 months ± (n= 3 missing)	**1.4 (1.3)**	1.3 (1.1)	1.5 (1.4)
How soon do you hope to return to work? (weeks) ±± (n=1 missing)			
2	**6 (11.3)**	3 (12.5)	3 (10.3)
3	**1 (1.9)**	1 (4.2)	-
4	**3 (5.7)**	1 (4.2)	2 (6.9)
5	**2 (3.8)**	-	2 (6.9)
6	**19 (35.9)**	9 (37.5)	10 (34.5)
7	**1 (1.9)**	1 (4.2)	-
8	**10 (18.9)**	5 (20.8)	5 (17.2)
12	**8 (15.1)**	2 (8.3)	6 (20.7)
13	**1 (1.9)**	-	1 (3.5)
18	**1 (1.9)**	1 (4.2)	-
How soon do you hope to return to work? (n=1 missing)			
Up to 7 weeks	**32 (60.4)**	15 (62.5)	17 (58.6)
8 weeks or more	**20 (27.7)**	8 (33.3)	12 (41.4)

± Visual analogue scale, the score ranges between 1 (no effect on work) and 10 (completely prevented from working); ±±Self-generated response to open question about expected number of weeks.

In summary, we recruited 53 people into RTW-COASt which included both men and women, and patients undergoing hip and knee replacement surgery. We were able to amalgamate the datasets as we did not observe any major differences in baseline factors between the groups that prevented us from doing so, and given the small sample size, it appeared appropriate. The next Chapter goes on to examine their return to work post-operatively.

Chapter 5 Time to return to work after lower limb arthroplasty

5.1 RTW-COASt cohort: Time to RTW

Forty-seven of the 53 (89%) RTW-COASt lower limb arthroplasty patients (83% hip, 93% knee) had returned to work within 6 months of their operation, at a median of 8.6 weeks (60 days; IQR 44-74).

The median time to RTW after hip arthroplasty was 62 days, and 55.5 days following knee arthroplasty. Figure 21 (hip) and Figure 22 (knee) show the time it took each participant to RTW and include details of their job title, gender and age. Although the median time to RTW in this cohort, knee arthroplasty patients RTW earlier than hip, 19 of the 20 (95%) hip patients had returned to work within 11 weeks of their surgery, whereas a third of knee arthroplasty patients took longer than 11 weeks to return to their job.

To explore any differences between those who RTW earlier and later in this cohort, a very early RTW (VE-RTW) was defined as return within 30 days, and an early RTW (E-RTW) as a return within 49 days (third of the distribution of time to RTW).

A 58 year old, male chauffeur driver who had undergone hip arthroplasty was the earliest to RTW at just 10 days after surgery. A 53 year old, female CAD designer was the first to RTW after knee arthroplasty, 19 days after her operation. Overall, there were six lower limb arthroplasty (4 hip, 2 knee) patients who RTW very early (within 30 days). A further 10 patients (2 hip, 8 knee) returned to work within 7 weeks of their operation, resulting in a total of 16 (9 men, 7 women) lower limb arthroplasty patients who returned to work early (within 49 days).

5.1.1 Very early returners (RTW within 30 days of surgery)

The choice of the definition of return to work within 30 days as “very early RTW” was made a priori based on published evidence that a small, but important minority of people make a RTW within one month [133, 144]. The decision was endorsed by clinical experts.

There were six people (3 men, 3 women) who returned within 30 days of lower limb arthroplasty (Table 30). The four hip replacement patients returned at 10 days, 21 days, 28 days and 30 days after surgery, and two knee replacement patients went back at 19 days and 26 days after surgery. Their ages ranged from 33 to 69 years. Five of them had undertaken at least further education,

and five of the early returners were married. They were all at work preoperatively, five were self-employed and one was an employee. They held a range of jobs (chauffeur driver, CAD designer, bar manager, vehicle technician, private tutor and a psychotherapist), with varying working hours and physical demands required for their job. Some characteristics were shared by all of the very early returners; they were all white (British), had all visited their GP about their joint problem at least once during the preceding 12 months, and all suffered at least moderate problems with their mobility and pain/discomfort as measured using EQ-5D.

However, there were also differences in the baseline characteristics of patients in the VE-RTW group. For example, the time they had suffered with the joint problem varied widely (5, 11, 12 and 18 months for hip, and 36 and 120 months for knee arthroplasty).

Work factors that very early returners had in common with one another were that they all worked for private companies, none had access to an occupational health service, or needed to access public transport for work, and all but one (who was eligible for 2 weeks' paid sickness) were not eligible for sick pay. The amount of weeks the six very early returners expected to take to RTW ranged from 2-6 weeks after surgery, and five of them had expected to RTW within 4 weeks of their surgery.

To further explore the characteristics of the very early returners, their group characteristics were compared with those of the whole cohort. Very early returners were of similar age and marital status as the remainder of the cohort but were more likely to be men, to have at least further education, and to have never smoked. In addition, very early returners were more likely than the rest of the cohort to have suffered with the joint problem for less time, to have undergone previous surgery to the operated joint and other lower limb joints, to be suffering greater MSD pain at other lower limb joints, and to have discussed RTW with a healthcare professional. All of the very early returners had seen their GP and a hospital doctor at least once during the previous year about their joint problem in comparison with 89% and 83% of the remainder of the cohort who had seen their GP and a hospital doctor respectively. In terms of work factors, the very early returners worked the same number of hours, had a similar rate of joint-related sickness absence, and similar proportions had their duties or working hours altered or reduced, as the remainder of the cohort. However, very early returners were more likely to work in the private sector, to be self-employed, and working as a sole trader/practitioner. The very early returners were also less likely to be eligible for paid sickness absence, or to state that driving was essential for getting to work and back. All of the very early returners hoped to RTW within 7 weeks, whereas 58% of the remainder of the cohort hoped to RTW within 7 weeks of their surgery.

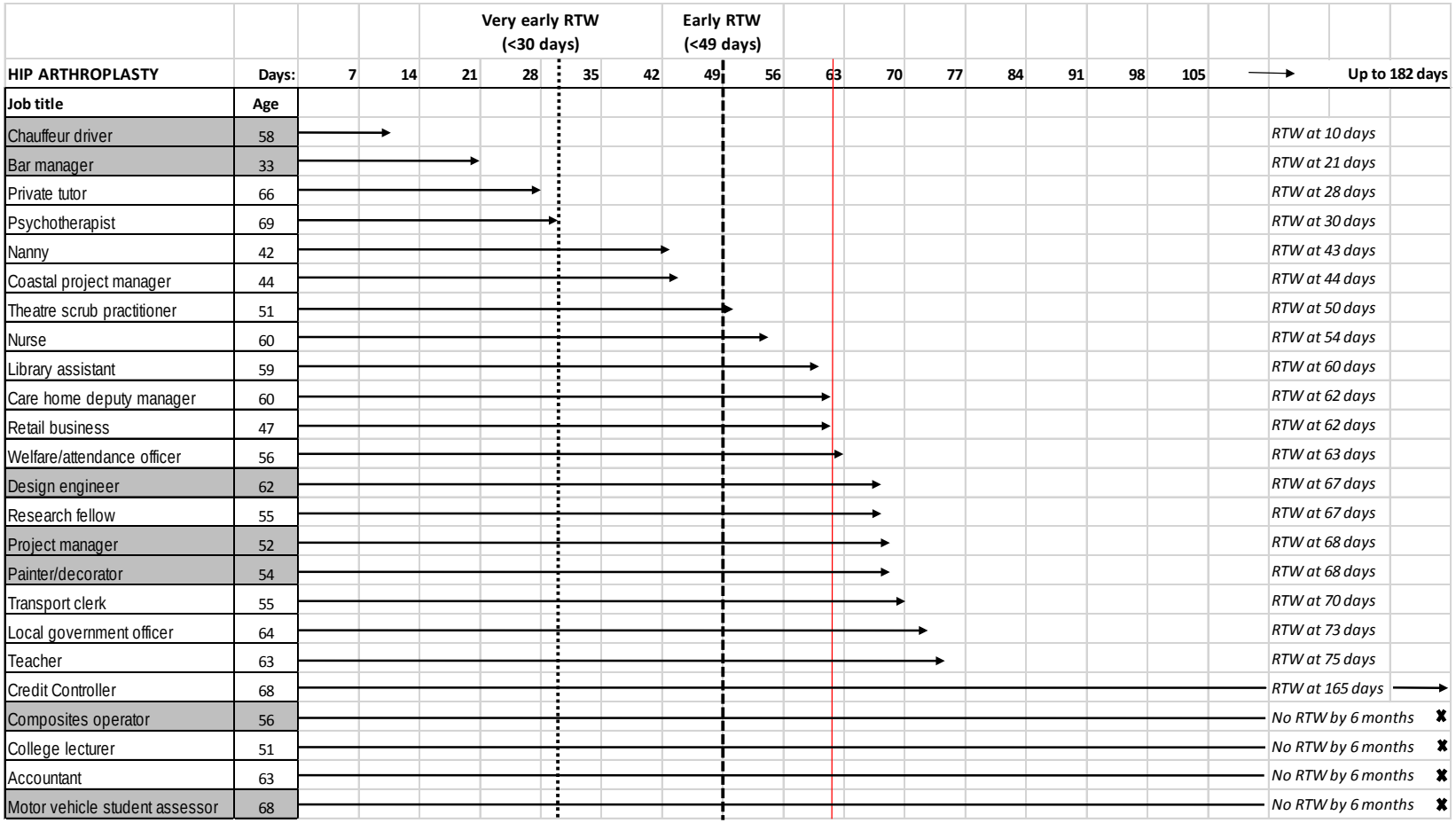

Figure 21. Number of days taken to RTW within 6 months of hip arthroplasty for each participant. Grey background=male; red line=median time to RTW (62 days)

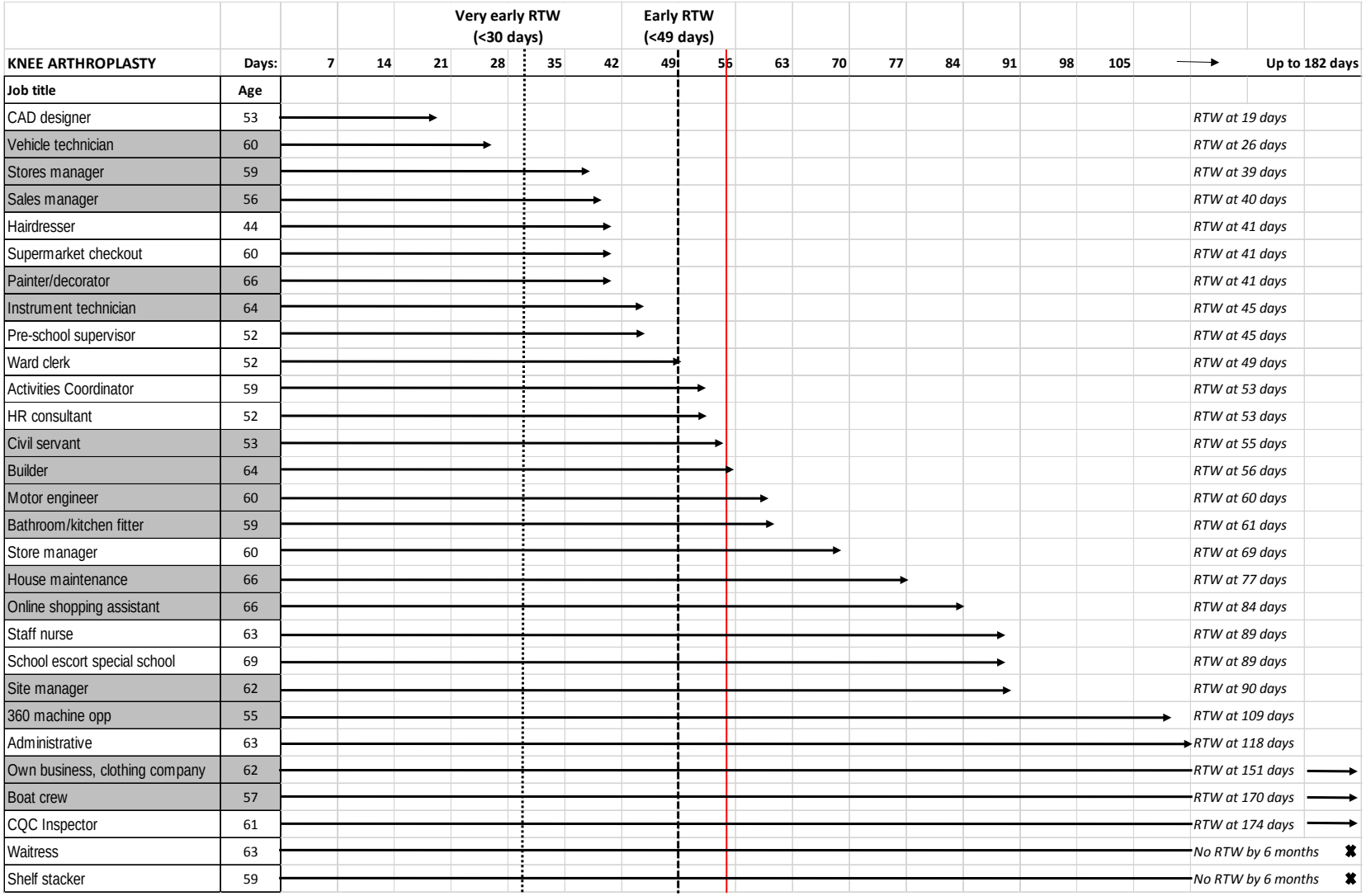

Figure 22. Number of days taken to RTW within 6 months of knee arthroplasty for each participant. Grey background=male; red line=median time to RTW (55.5 days)

Table 30. Baseline characteristics of the six very early returners (RTW within 30 days of surgery)

Lower limb arthroplasty	**Hip**	**Knee**	**Hip**	**Knee**	**Hip**	**Hip**
Time taken to RTW after surgery	***10 days***	***19 days***	***21 days***	***26 days***	***28 days***	***30 days***
Socio-demographic characteristics						
Sex	Male	Female	Male	Male	Female	Female
Age (years)	58	53	33	60	66	69
Ethnicity	White (British)	White (British)	White (British)	White (British)	White (British)	White (British)
Education level	Further education	GCSEs	Further education	Further education	Higher education	Higher education
Marital status	Not married	Married	Married	Married	Married	Married
BMI	26	27	27	30	22	23
Smoking status	Ex/current	Never smoker	Never smoker	Ex/current	Never smoker	Never smoker
Units of alcohol per week	6	2	14	2	8	3
Job title	**Chauffeur driver**	**CAD designer**	**Bar manager**	**Vehicle technician**	**Private tutor**	**Psycho-therapist**
Pre-operative employment status	Self-employed (at work)	Self-employed (at work)	Employed (at work)	Self-employed (at work)	Self-employed (at work)	Self-employed (at work)
Health status characteristics						
<u>Problems with hip or knee joint</u>						
Time suffered from joint problem (months)	12	36	18	120	11	5
Previous surgery at this joint	No	No	Yes	Yes	No	Yes
Oxford (Hip/Knee) score (OHS/OKS) pain and function	26	25	13	19	20	33
Oxford pain score	10	13	3	8	5	15
Oxford function score	16	12	10	11	15	18
MSD pain (other than to-be-operated joint)	Back/neck; knees; other hip	Back/neck	No	Hips; other knee	No	Other hip
Previous surgery at other lower limb joints (1 missing)	No	No	Yes	Yes	Yes	Yes

Lower limb arthroplasty ***Time taken to RTW after surgery***	**Hip** ***10 days***	**Knee** ***19 days***	**Hip** ***21 days***	**Knee** ***26 days***	**Hip** ***28 days***	**Hip** ***30 days***
<u>Contact with healthcare professionals</u>						
Number visits to GP for joint problem last 12 months	2+	2+	2+	1	2+	2+
Number visits to hospital for problem last 12 months	1	0	2+	2+	1	1
Discussed RTW with healthcare professional	Should be able to return to work much sooner with this new ceramic hip replacement (nurse at hospital)	I should be able to start working at my computer [at home] 2 weeks after surgery, as long as I take regular breaks and do my physio (surgeon; physio at GP)	Advised on time needed to take off, type of training possible, and things to be careful about (surgeon and nurse)	No	No	Whilst inflamed - space own patient appointments with at least 30 minutes rest / ice pack (osteopath); recovery 6 weeks then see patient alternative days initially, then increase (physio at hospital)
Other sources of RTW advice	Friend has recently had similar operation. He was walking and mobile within a few days.	No	No	No	No	www.arthritiscareuk.org re: phased RTW

Lower limb arthroplasty	**Hip**	**Knee**	**Hip**	**Knee**	**Hip**	**Hip**
Time taken to RTW after surgery	***10 days***	***19 days***	***21 days***	***26 days***	***28 days***	***30 days***
General health						
Self-reported health	Good	Very good	Very good	Poor	Excellent	Very good
Number health problems seen doctor, past 12 months	0	1	0	2+	0	1
Number problems went to hospital, past 12 months	0	0	0	1	0	0
Number problems taking medicine past, 12 months	0	1	0	1	0	0
Number problems stop doing things past, 12 months	0	1	0	1	0	0
EQ-5D (score ranges from 1-5 for each domain)						
Mobility	3	4	4	4	3	3
Self-care	2	1	3	2	1	1
Usual activities	3	3	3	3	2	3
Pain/discomfort	3	4	4	5	3	3
Anxiety/depression	1	3	2	1	1	2
Somatising tendency	1	2+	0	[missing]	2+	0
Hospital Anxiety and Depression score	19	22	8	15	9	14
Hospital Depression score (HADS)	11	11	8	8	6	9
Hospital Anxiety score (HADS)	8	11	0	7	3	5
Aberdeen Social Activity	34	13	19	26	9	18
Work factors						
Workplace factors						
Work sector (Public or Private)	Private	Private	Private	Private	Private	Private
Number of people in organisation	30-499	Just me	10-29	2-9	Just me	Just me
Access to OHS through work	No	No	No	No	No	No
Eligible for sick pay	No	No	Yes (2 weeks)	No	No	No
Number of weeks eligible full sick pay						
Number of weeks eligible reduced sick pay						

Lower limb arthroplasty	**Hip**	**Knee**	**Hip**	**Knee**	**Hip**	**Hip**
Time taken to RTW after surgery	***10 days***	***19 days***	***21 days***	***26 days***	***28 days***	***30 days***
Worker factors						
Hours worked each week	45	40	45	[missing]	6	15
Standing/walking >2 hrs/day	No	No	Yes	Yes	No	No
Walking > 1 mile a day	Yes	No	Yes	No	No	No
Kneeling	No	No	Yes	Yes	No	No
Climbing > 30 flights of stairs	No	No	Yes	No	No	No
Climbing ladders	No	No	Yes	No	No	No
Lifting 10kg or more by hand	No	No	Yes	Yes	No	No
Driving essential to the job	Yes	No, but useful	No	Yes	No	No, but useful
Driving essential for getting to work	Yes	No	No	Yes	No	No
Public transport essential for getting to work	No	No	No	No	No	No
Contributes half or more to household income	Yes	Yes	Yes	Yes	No	No
Impact of joint problem on work pre-operatively						
Joint problem affected ability to work before surgery	Yes, a little	No, not at all	Yes, a lot	Yes, a lot	No, not at all	Yes, a little
Reduced working hours due to joint problem	No	No	No	Yes	No	Yes
Days off sick due to joint problems in past 6 months	0	0	0	72	0	14
Work duties altered or reduced	No	No	No	Yes	No	Yes
Expectations after surgery (pre-operatively)						
Belief surgery will affect ability to work at 6 weeks±	1	6	8	4	1	7
Belief surgery will affect ability to work at 12 weeks±	1	4	6	4	1	1
Belief surgery will affect ability to work at 26 weeks±	1	1	4	3	1	1
Belief surgery will affect ability to work at 12 months ±	1	1	2	3	1	1
How soon do you hope to return to work?¥	**2 weeks**	**2 weeks**	**3 weeks**	**4 weeks**	**2 weeks**	**6 weeks**

OHS=occupational health service; ± Visual analogue scale, the score ranges between 1 (no effect on work) and 10 (completely prevented from working); ¥Self-generated response to open question about expected number of weeks to RTW.

5.1.2 Early returners (RTW within 49 days of surgery)

As there is no accepted definition for "early RTW", we made the pragmatic decision to explore the distribution of RTW times of the whole cohort. We found that the time point at which one-third of participants had made a RTW was 49 days and therefore decided to employ this as our definition for the subsequent analyses. We compared the characteristics (demographic, personal, surgical, and occupational) between people who returned to work within 49 days as compared with everyone else, using Cox proportional hazard regression models.

There were 16 lower limb arthroplasty patients who RTW within 49 days of surgery, six of whom had undergone hip surgery, whilst the remaining 10 had undergone knee replacement surgery. There were 7 men and 9 women who returned to work within 49 days of surgery.

Systematic unadjusted and age/sex/joint adjusted Cox models (Table 31) were performed for baseline characteristics as predictors of RTW by 49 days (7 weeks). A trend was observed for being more likely to return to work early if undergoing knee arthroplasty (Figure 24), and for men (Figure 23) but the differences between joint and sex were not statistically significant. However, a significant difference between age and the likelihood of RTW by 49 days was found, in that the older the patient was at the time of their surgery, the less likely they were to RTW early. Figure 25 showed that a greater proportion in the younger group were back at work by any given time. No other baseline socio-demographic factors were statistically significantly different between early and later returners.

Table 31. Hazard Ratios (95%CIs) for early RTW (within 49 days of surgery) for socio-demographic risk factors

The total number of events is 16	Number (%) RTW within 49 days	Unadjusted	age-sex-joint adjusted
		HR (95%CI)	
Joint			
Hip	6 (25.0)	Ref	
Knee	10 (34.5)	1.36 (0.49,3.73)	1.84 (0.61,5.51)
Sex			
Men	7 (31.8)	Ref	
Women	9 (29.0)	0.84 (0.31,2.25)	0.72 (0.26,2.03)
Age (years)		**0.93 (0.87,0.99)***	**0.91 (0.85,0.98)***
Education level			
Up to school (e.g. GCSE/O Level)	5 (20.0)	Ref	
Further education (e.g. A level) or higher	11 (39.3)	2.16 (0.75,6.23)	1.94 (0.66,5.66)
Marital status			
Married	8 (22.9)	Ref	
Not married	8 (50.0)	2.35 (0.88,6.28)	2.41 (0.83,7.03)
BMI		0.91 (0.79,1.06)	0.90 (0.77,1.05)
Smoking status			
Never smoker	11 (39.3)	Ref	
Ex/Current smoker	5 (20.0)	2.23 (0.77,6.42)	2.16 (0.74,6.26)
Units of alcohol per week		1.00 (0.94,1.08)	1.00 (0.93,1.08)
Employment status			
Employed	10 (27.0)	Ref	
Self-employed	6 (46.2)	2.35 (0.85,6.47)	2.95 (0.93,9.41)

*Significant at p<0.05; HR=hazard ratio; CI=confidence interval; RTW=return to work.

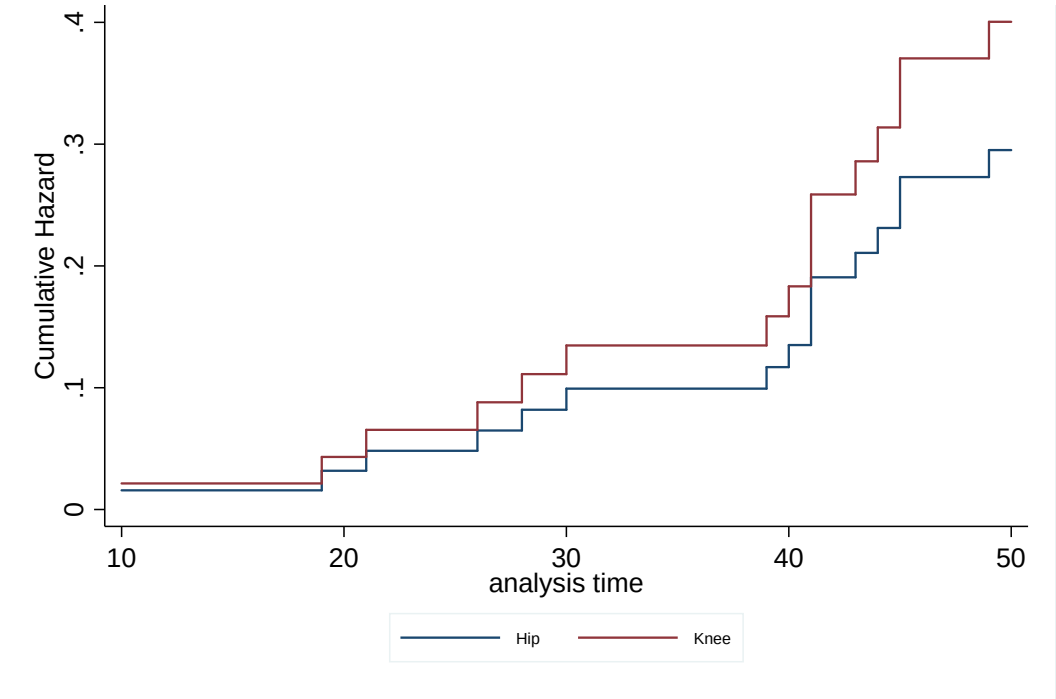

Figure 24. Cox proportional hazard regression by joint (age-sex-joint adjusted HRs (95%CI) not statistically significant different by joint)

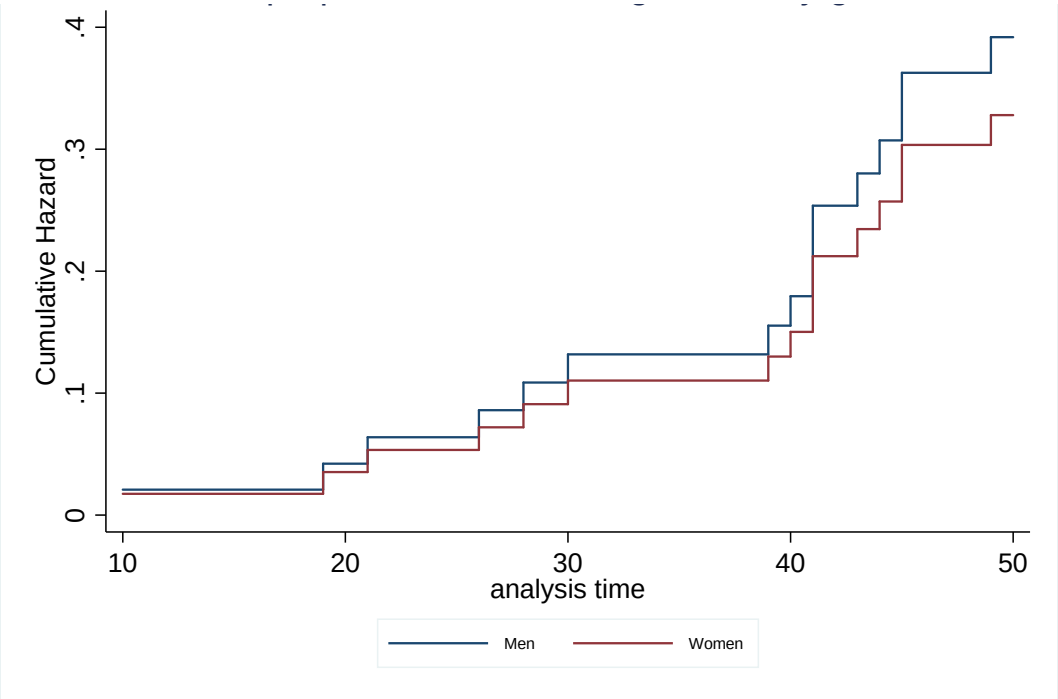

Figure 23. Cox proportional hazard regression by gender (age-sex-joint adjusted HRs (95%CI) not statistically significant different by gender)

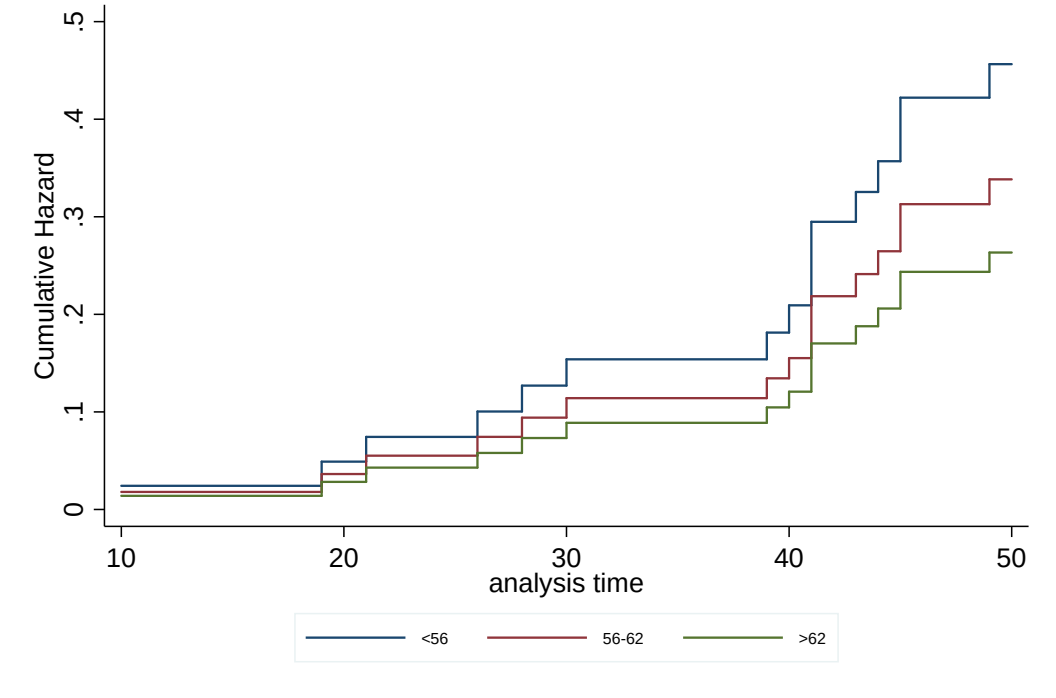

Figure 25. Cox proportional hazard regression by age (age-sex-joint adjusted HRs (95%CI) statistically significant difference (0.91 [0.85,0.98])

Having explored the relationships with sex and age, only age had a significant effect on the likelihood of returning to work early and was therefore adjusted for in all subsequent models. Although neither gender, nor knee versus hip surgery, were found to be statistically significantly associated with early versus late return in the univariable analyses, we continued to adjust for joint site and gender throughout our subsequent analyses for completeness. Next, we explored the data about pre-operative health status on early versus later RTW after surgery (Table 32).

Table 32. Hazard Ratios (95%CIs) for early RTW (within 49 days of surgery) for health related risk factors

The total number of events is 16	Number (%) RTW within 49 days	Unadjusted	age-sex-joint adjusted
		HR (95%CI)	
Time suffered from joint problem (months)		1.00 (0.99,1.00)	1.00 (0.99,1.00)
Previous surgery at this joint			
No	6 (19.4)	Ref	
Yes	10 (47.6)	**2.75 (1.00,7.59)***	2.32 (0.56,9.69)
Number of visits to the GP last 12 m		1.07 (0.53,2.16)	1.24 (0.53,2.91)
Number of visits to hospital doctor last 12 m		0.85 (0.44,1.62)	0.75 (0.36,1.55)
Discussed RTW with healthcare professional			
No	6 (22.2)	Ref	
Yes	10 (38.5)	1.99 (0.72,5.49)	1.48 (0.47,4.64)
Other sources of RTW advice			
No	8 (25.8)	Ref	
Yes	8 (36.4)	1.44 (0.54,3.84)	1.27 (0.45,3.57)
Self-reported health			
at least good	15 (31.3)	Ref	
Fair/poor	1 (20.0)	1.54 (0.20,11.67)	0.62 (0.07,5.77)
MSD pain (other than operated joint)			
No	9 (30.0)	Ref	
Yes	7 (30.4)	1.10 (0.41,2.96)	1.22 (0.42,3.57)
Previous surgery at other lower limb joints			
No	4 (19.1)	Ref	
Yes	12 (38.7)	2.12 (0.68,6.59)	1.99 (0.48,8.19)
Problems seen doctor about past 12 m		0.96 (0.63,1.47)	1.00 (0.63,1.60)
Problems went to hospital about past 12 m		0.78 (0.38,1.61)	0.76 (0.37,1.56)
Problems taking medicine for past 12 m		1.02 (0.66,1.57)	1.08 (0.67,1.73)
Problems stop me doing things past 12 m		0.94 (0.48,1.85)	0.91 (0.43,1.92)
Somatising tendency		0.90 (0.60,1.36)	0.93 (0.61,1.42)
EQ-5D			
Mobility		0.64 (0.36,1.13)	0.61 (0.31,1.18)
Self-care		0.60 (0.31,1.15)	0.53 (0.26,1.09)
Usual activities		**0.58 (0.35,0.98)***	**0.49 (0.26,0.94)***
Pain/discomfort		0.80 (0.42,1.52)	0.67 (0.28,1.61)
Anxiety/depression		0.69 (0.36,1.33)	0.68 (0.35,1.32)
Aberdeen Social Activity		0.95 (0.90,1.01)	0.94 (0.88,1.01)
Oxford (Hip/Knee) score (OHS/OKS) pain and function		1.04 (0.98,1.09)	1.05 (0.99,1.12)
Oxford pain score		1.06 (0.97,1.15)	1.09 (0.98,1.22)
Oxford function score		1.07 (0.95,1.21)	1.09 (0.96,1.23)
Hospital Anxiety and Depression score (HADS)		0.92 (0.83,1.01)	0.92 (0.83,1.03)
Hospital Depression score (HADS)		0.87 (0.72,1.05)	0.84 (0.68,1.05)
Hospital Anxiety score (HADS)		0.91 (0.79,1.04)	0.93 (0.80,1.07)

*Significant at $p<0.05$; HR=hazard ratio; CI=confidence interval; RTW=return to work; m=months.

A number of different health factors were available but surprisingly very few were seen to be predictive of early versus later RTW. Previous surgery to the operated joint was associated with shorter time to RTW post-operatively by 7 weeks, but this was not significant after adjustment. There was a suggestion that greater social activity limitations (Aberdeen) and more problems with joint pain and function (Oxford scores) pre-operatively were associated with early RTW, but they did not reach statistical significance. The only factor which obtained statistical significance for baseline health was the EQ-5D score for usual activities, with the higher the score (poorer health) in that domain pre-operatively, the lower the chances of being in the E-RTW group.

Table 33. Hazard Ratios (95% CIs) for early RTW (within 49 days of surgery) for work risk factors

The total number of events is 16	Number (%) RTW within 49 days	Unadjusted	age-sex-joint adjusted
		HR (95%CI)	
Work sector			
Public sector	2 (15.4)	Ref	
Private sector	13 (34.2)	2.69 (0.61,11.92)	3.02 (0.64,14.16)
Number of people in organisation			
Just me	5 (45.5)	3.47 (0.83,14.56)	3.63 (0.76,17.37)
<500	8 (34.8)	2.42 (0.64,9.12)	2.50 (0.64,9.72)
500+	3 (17.7)	Ref	
Access to OHS through work			
No	12 (40.0)	2.73 (0.77,9.67)	2.66 (0.70,10.08)
Yes	3 (18.8)	Ref	
Hours worked each week		1.00 (0.97,1.04)	0.99 (0.94,1.05)
Standing/walking >2 hours/day			
No	8 (47.1)	**2.66 (1.00,7.10)***	**3.03 (1.13,8.14)***
Yes	8 (22.2)	Ref	
Walking > 1 mile a day			
No	9 (30.0)	1.04 (0.39,2.80)	1.41 (0.50,3.97)
Yes	7 (30.4)	Ref	
Kneeling			
No	9 (34.6)	1.53 (0.57,4.11)	1.65 (0.61,4.47)
Yes	7 (25.9)	Ref	
Climbing > 30 flights of stairs			
No	13 (28.9)	0.76 (0.22,2.66)	0.78 (0.22,2.83)
Yes	3 (27.5)	Ref	
Climbing ladders			
No	13 (29.6)	0.89 (0.25,3.13)	1.05 (0.26,4.31)
Yes	3 (33.3)	Ref	
Lifting 10kg or more by hand			
No	13 (34.2)	1.75 (0.50,6.14)	2.18 (0.55,8.58)
Yes	3 (20.0)	Ref	
Driving important to the job			
Essential	5 (38.5)	Ref	
a part but not essential	4 (36.4)	0.94 (0.25,3.49)	0.88 (0.23,3.39)
No	7 (24.1)	0.53 (0.17,1.67)	0.55 (0.15,2.00)
Driving important for getting to work			
Essential	8 (22.2)	Ref	
useful but not essential	2 (33.3)	1.40 (0.30,6.61)	1.19 (0.25,5.63)
No	6 (54.6)	**3.21 (1.11,9.27)***	2.79 (0.92,8.50)
Public transport important for getting to work			
Essential	1 (33.3)	Ref	
useful but not essential	2 (28.6)	0.86 (0.08,9.51)	1.07 (0.09,12.57)
No	13 (30.2)	1.07 (0.14,8.18)	1.53 (0.19,12.01)

The total number of events is 16	Number (%) RTW within 49 days	Unadjusted	age-sex-joint adjusted
		HR (95%CI)	
Joint problem affected ability to work			
Not at all	3 (50.0)	2.93 (0.70,12.30)	**8.41 (1.55,45.71)***
Yes, a little	8 (32.0)	1.45 (0.47,4.44)	1.19 (0.38,3.66)
Yes, a lot	5 (22.7)	Ref	
Reduced working hours due to joint			
No	14 (37.8)	Ref	
Yes	2 (12.5)	3.32 (0.75,14.62)	3.50 (0.76,16.04)
Days off sick due to joint past 6 months		1.01 (0.99,1.03)	1.02 (0.99,1.04)
Work duties altered or reduced			
No	10 (30.3)	Ref	
Yes	6 (31.6)	1.01 (0.37,2.78)	0.73 (0.26,2.05)
Eligible for sick pay			
No	10 (41.7)	Ref	
Yes	6 (23.1)	0.41 (0.16,1.06)	0.44 (0.16,1.17)
Contribution of the household income			
Less than half	3 (30.0)	Ref	
Half or more	13 (32.5)	0.72 (0.34,1.53)	0.74 (0.36,1.49)
How soon do you hope to return to work			
Up to 7 weeks	15 (46.9)	**12.52 (1.65,94.98)***	**10.36 (1.32,81.08)***
8 weeks or more	1 (5.0)	Ref	
How much expect surgery to affect work ability at 6 weeks		**0.81 (0.67,0.98)***	**0.79 (0.64,0.97)***
How much expect surgery to affect work ability at 12 weeks		0.77 (0.58,1.03)	0.73 (0.52,1.02)
How much expect surgery to affect work ability at 26 weeks		0.56 (0.29,1.07)	0.56 (0.29,1.09)
How much expect surgery to affect work ability at 12 months		0.75 (0.36,1.55)	0.70 (0.28,1.78)

*Significant at $p<0.05$; HR=hazard ratio; CI=confidence interval; RTW=return to work.

In the next step, we explored the relationship between occupational factors and RTW (Table 33). Many of the factors that were collected were not found to be importantly associated with early RTW. The chances of being an early returner tended to be increased if it was not essential to be able to drive to get to work (unadjusted OR 3.21, 95% CI 0.17-0.67) but the effect became non-significant after adjustment.

However, we identified work factors which were significantly associated with early RTW after adjustment. It was found that people were more likely to go back early if their joint problem did not affect their ability to work pre-operatively, and that those who were returning to jobs where they did not have to stand or walk for more than two hours a day had an increased chance of

returning to work early. It was clear that patient expectations were important. Those who replied in the affirmative to the question enquiring whether they expected that surgery would impact on their work 6 weeks post-operatively were less likely to RTW by 49 days. On the other hand, people who believed they would be able to RTW by 7 weeks were significantly more likely to do so.

The mutually adjusted models of hazard ratios (Table 35) were created using a stepped analysis, taking forward each socio-demographic, health, and work factor significantly associated with early RTW (along with joint and gender) in the adjusted univariate analyses (Table 31-32). The proportion of people who RTW within 49 days, by each variable that was included in the final model are shown in Figure 26.

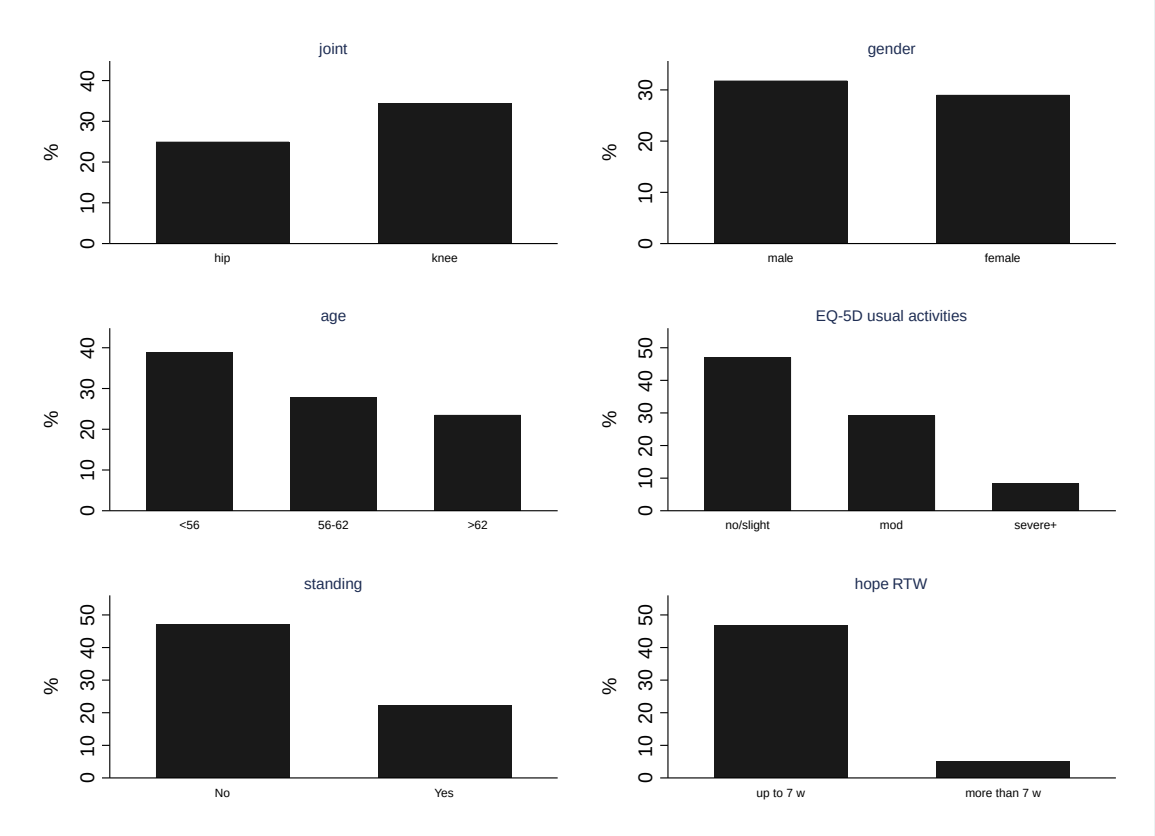

Figure 26. Proportion of people who RTW within 49 days, by categories of each variable included in the final model (joint, gender, age, EQ-5D usual activities, standing at work, and when they hope to RTW). Age has been recoded into thirds of the distribution

The effect of age was still significant after mutual adjustment (Table 35), and taken forward along with sex and gender. EQ-5D usual activities was then added as the only health variable significantly associated with early RTW. The association with EQ-5D usual activities remained significant and so was carried forward so that subsequent multivariable models were adjusted for age-sex-gender and EQ-5D usual activities. Work factors associated with early RTW in univariate

analyses were then added in turn. The work factor which remained significantly predictive of being in the early RTW group after mutual adjustment was having a job that did not involve standing or walking for more than 2 hours a day. Therefore, this work factor was added to the model and carried forward to the subsequent analysis which included patients' pre-operative expectations about work after surgery (Table 35). In the final model, the independent factors associated with early return to work were: younger age; better score for EQ-5D usual activities pre-operatively; not needing to stand/walk at work for > 2 hours day and; expecting to be able to return to work within 7 weeks.

5.1.3 Power calculations for predictor variables

Using key outcomes from our study, we undertook post-hoc power calculations with a 5% significant level and 80% power (shown in Table 34).

Table 34. RTW-COASt HRs compared with Minimal detected ORs required

Variable	RTW COASt findings: Hazard Ratios (Confidence Intervals)	Minimal detectable ORs to detect differences
Gender (women)	0.72 (0.26,2.03)	5.55
Not standing/walking > 2 hours/day	3.41 (1.25,9.28)	6.14
Hope to RTW within 7 weeks (vs later)	11.63 (1.35,100.18)	5.57

As expected, and almost without exception, most factors (for which we performed power calculations) from the results of the RTW-COASt study were underpowered to detect differences between groups (Table 34). Notably however, the variable "hoping to RTW within 7 weeks of surgery" with a hazard ratio of 11.63 from the RTW-COASt findings, is well within the minimally detectable odds ratio of 5.57 to detect an effect, although the confidence intervals around the HR are wide (1.35,100.18).

Table 35. Hazard Ratios (95%CIs) for early RTW (within 49 days of surgery) - mutually adjust models

	HR (95%CI)						
Joint (Knee vs Hip)	1.84 (0.61,5.51)	1.02 (0.29,3.55)	0.91 (0.25,3.27)	1.28 (0.34,4.83)	1.24 (0.32,4.77)	1.08 (0.31,3.74)	1.24 (0.32,4.77)
Sex (Women vs Men)	0.72 (0.26,2.03)	0.69 (0.24,1.96)	0.64 (0.23,1.83)	0.48 (0.15,1.55)	1.08 (0.32,3.57)	0.77 (0.26,2.30)	1.08 (0.32,3.57)
Age (years)	**0.91 (0.85,0.98)***	0.91 (0.85,0.98)	0.90 (0.84,0.97)	0.89 (0.82,0.96)	0.93 (0.86,1.01)	0.92 (0.86,0.99)	0.93 (0.86,1.01)
EQ-5D Usual activities		**0.49 (0.26,0.94)***	0.47 (0.25,0.88)	0.56 (0.27,1.16)	0.47 (0.26,0.87)	0.48 (0.25,0.91)	0.47 (0.26,0.87)
No standing/walking >2 hours/day			**3.41 (1.25,9.28)***		4.15 (1.35,12.81)	3.06 (1.06,8.80)	4.15 (1.35,12.81)
Joint problem affected ability to do job							
Not at all				4.11 (0.58,29.38)			
Yes, a little				0.85 (0.25,2.90)			
Yes, a lot				Ref			
How soon do you hope to RTW (Up to 7 weeks vs more)					**11.63 (1.35,100.18)***		11.63 (1.35,100.18)
How much expect to affect work ability at 6 weeks						0.86 (0.69,1.06)	

*Significant at p<0.05; HR=hazard ratio; CI=confidence interval; RTW=return to work.

5.1.4 6 month follow-up variables to assess risk of harm from VE or E-RTW

In addition to exploring factors which enable early RTW, it was vital to understand whether early RTW could cause any increased risk of complications or harm. Using data from the 6 month follow-up, we compared those who had returned to work either very early (<30 days) or early (<49 days) with those who had not in terms of their self-reported work participation and function in the 6 month questionnaire.

The first potential indicator of harm explored was whether any of the participants who had RTW after arthroplasty had subsequently needed to stop working. We found that everyone who went back to work was still in work at 6 months, except one, who was neither in the VE-RTW or the E-RTW group, and the reason that they had given for leaving their job post-operatively was not because of the operated joint.

We also explored self-reported function at work and in usual daily activities 6 months post-operatively comparing those with early RTW or very early RTW with everybody else. Both outcomes were recorded on a visual analogue scale ranging from 0 (no problems) - 10 (completely prevented from working or completely prevented from daily activities). Two-sample Wilcoxon rank-sum (Mann-Whitney) tests of medians were carried out to compare the scores between the VE-RTW group and those who did not RTW very early. No statistically significant differences were found between the scores for function at work or at home for those who returned to work within 30 days of surgery as compared to those who did not. Similarly, no statistically significant differences were found for the scores between the E-RTW group compared to those who RTW later, however the differences in their functional scores at work 6 months post-operatively almost reached statistical significance ($p=0.0511$), suggesting that those who went back early (within 49 days) were less likely to be having difficulties at work 6 months after surgery.

Therefore, the measures of harm available within this study and collected at 6 months after surgery did not signal any harm from returning to work either within 30 days or 49 days, and indeed, pointed towards a possible benefit on the functional capability at work 6 months after surgery, for those who went back to work early.

5.2 Discussion

In this prospective cohort study, we found that the majority (47/53; 89%) of patients returned to work within 6 months after total hip (83%) and knee (93%) arthroplasty. The median time to return to work after THA was 62 days (8.9 weeks) and 55.5 days (7.9 weeks) after TKA. Combining THA and TKA patients, the factors which we found associated with earlier RTW (defined as within 49 days of the surgery) were: younger age; better pre-operative functional "usual activities" (EQ-5D) score; not returning to a job where there was a requirement to stand/walk for more than two hours a day; and having a pre-operative expectation that they would make a RTW within 7 weeks of surgery. None of the other socio-demographic, personal, surgical or occupational factors were found to be associated with earlier RTW. Comparison of job status, function at work and usual daily activity scores at 6 months post-operatively between those who made a very early RTW and those who returned to work later, and early RTW and those who returned to work later did not suggest any harm from earlier RTW, and even suggested a possible benefit on these outcomes at 6 months, for those who returned to work early.

The time taken to RTW post-operatively in this study were commensurate with those reported by Tilbury and colleagues' [107] in their systematic review of the literature about time to RTW. Summarising the evidence, they reported a time to RTW of between 1-14 weeks following THA and between 8-12 weeks following TKA. Unfortunately, a number of the studies which report RTW times only describe the mean time to RTW but we found three studies in our systematic review which reported the median time to RTW. Kleim and colleagues, in a retrospective cohort study [104], reported RTW rates of 78.4% after THA and 82% after TKA with a median time to RTW of 12 and 13 weeks respectively. Foote et al [142] performed a retrospective study of knee replacement patients in which they reported that 82% RTW at a median of 12 weeks following TKA. Finally, in Styron's prospective cohort study [106] they reported that 90% of knee arthroplasty patients RTW within 30 weeks of surgery at a median RTW time of 8.9 weeks, findings which are very similar to those of the current study. The distribution of times taken to RTW is skewed and it is important that the median time to RTW is reported in such studies in order to maximise comparability.

In this study, 11% (6/53) of participants had returned to work within 30 days of their surgery which we defined as very early RTW (VE-RTW). This included four patients who had received THA and 2 who had received TKA. The earliest RTW was achieved by a male THA recipient who RTW in 10 days. Notably, the youngest participant (age <35 years) was in this group. Only one of those who made a VE-RTW was entitled to sick pay (only for 2 weeks in total) and the remaining 5/6

were self-employed. They returned to a range of different types of work (including e.g. professional driving, desk-based work and more physical work in the hospitality sector), with varying working hours and physical job requirements. All of them had pre-operative expectations that they would return with 6 weeks. The only study we found that had reported the proportion of THA and TKA patients who had returned to work by 30 days after surgery was a non-randomised trial carried out in 1998 [133]. They reported a similar proportion of patients had returned to work (between 11-17% for hip and between 13-17% for knee) within 30 days of their operation. Together, these data might suggest that at least 10% of patients are able to make a successful RTW within a month of their surgery, an important finding for health professionals and patients to consider when discussing RTW after arthroplasty. We cannot take these findings to mean that everybody can be expected to RTW within a month but for a significant minority, this is clearly achievable. As has been shown in other health conditions, provision of paid sick leave is clearly a factor in deciding about RTW. Those with better sick pay provision tend to take longer sickness absence after elective surgery [176]. Importantly, none of this group appeared to suffer any consequences or complications in the short-term from returning quickly. It would be clinically useful to try to better understand characteristics that enable a successful very early RTW in order to pre-operatively identify such individuals and provide the necessary support and encouragement. To do this however, we will need more good quality comparable data in this field.

For purposes of comparison, an early RTW (E-RTW) was also defined, based on a third of the distribution of the cohort's RTW times, which was within 49 days of surgery. Sixteen of the 53 RTW-COASt participants returned to work within 49 days (E-RTW). We then evaluated a range of socio-demographic, clinical, surgical and occupational factors for their role in affecting ability to make an early RTW. In the current study, there was a non-significant tendency for men to be more likely to RTW early than women. There is some evidence from other studies (albeit weak) that women take longer to RTW than men post-arthroplasty. If there are gender differences, the effect seems to be relatively small, perhaps reflecting the different types of employment to which people need to return. One of the factors that we found associated age so that younger patients were more likely to make an early RTW. This had been found previously among hip arthroplasty recipients [137] and Scott et al [111] reported that, after TKA, age, rather than function or activity, was the factor most important in determining whether patients made a successful RTW, but interestingly an effect of younger age has not been shown universally [101, 104, 106]. Of course, it is worth reflecting that the people who are recruited to such studies, who want to RTW after their surgery, tend to be within a fairly clustered age group, there are not many older people who want to RTW after surgery and there are not many people under 40 years of age who need a hip

or knee replacement, so to try and find age effects in a fairly narrow set of age bands makes it quite difficult and although there were age effects in our study, age should not be a barrier in aiming to RTW.

The current study did not find an effect of obesity on time taken to RTW. BMI is used by some Clinical Commissioning Groups (CCGs) in the UK as a reason not to perform lower limb arthroplasty, even though this is not in line with NICE guidance. Patients report that surgeons say that prognosis will be much better if pre-operative weight loss can be achieved and that the anaesthetic is safer (and there probably is some data to support that) etc. From the current study, and consistent with the findings of others [101, 106], it does not appear that BMI affected time to RTW after arthroplasty.

Although we considered pre-operative smoking and alcohol consumption, neither lifestyle factor was found to have any impact on time to RTW. There is evidence from a systematic review of hip lower limb arthroplasty studies that smoking was associated with a higher risk of post-operative complications and mortality after arthroplasty [177]. However, few other researchers have explored the impact of smoking on RTW outcomes and, based upon this study alone, there is currently inconclusive evidence for an effect of smoking on RTW prognosis.

We did not find a significant association between education level and time return to work, in contrast with the findings of Kleim [104] and Sankar [101], both of which found that higher levels of educational attainment were associated with earlier RTW after arthroplasty. However, we did find a non-significant tendency in the same direction. It seems likely that those who reach higher educational attainment have more choice about subsequent employment and in particular are less dependent upon physically very-demanding work and that this may explain any relationship with time to RTW post-operatively.

We explored a number of different pre-operative health factors in relation to early RTW (duration of pre-operative symptoms; Oxford hip/knee score; pain score; Oxford function score; pain at other musculoskeletal sites; orthopaedic surgery at another site; pre-operative healthcare utilisation; self-reported health; domains of EQ-5D (mobility, self-care, usual activities); mental health, but surprisingly very few were seen to be associated. Of all the health markers explored, having a better pre-operative EQ-5D functional score for “usual activities” was the only one which we found associated with earlier RTW. The usual activities domain enquires about the impact of a health condition (in this case hip or knee joint failure) on an individual’s work, along with study, housework, family or leisure activities. We could not find a direct comparison of this measure elsewhere in the RTW after arthroplasty literature. In other studies, pre-operative sick leave has been found to be associated with later RTW [104, 109] and this might perhaps reflect, at least to

some extent, pre-operative function. Although, when we explored pre-operative sick leave in the current study, we found not association. Amongst this cohort, measuring single morbidities or comorbidities was not particularly useful in predicting time to RTW, whilst the more generic measure of how individuals scored their ability to do their usual activities was useful. We cannot exclude the possibility that we were under-powered to see a relationship with some aspect of pre-operative health and time to RTW. However, if replicated, our findings may suggest that a useful predictor would be to enquire what impact their condition had on their daily activities rather than going through lists of medical conditions with them. Furthermore, this finding that pre-operative function is important for RTW outcomes provides additional evidence that people should be offered arthroplasty before there is too great an impact on their usual activities (including work) from the primary joint failure [102].

It was clear that patient expectations were important. Those who pre-operatively reported that they expected that surgery would affect their ability to work 6 weeks post-operatively were less likely to RTW by 49 days. On the other hand, people who believed they would be able to RTW by 7 weeks were significantly more likely to do so. Interestingly, we found little in the literature to suggest that patient expectations had been considered in other studies. However, this seems to be a really important finding in that people's expectations could potentially be influenced by the healthcare professionals dealing with them from very early in their referral for the surgery. If patients were given a consistent, positive view about early RTW, conveyed by all members of the healthcare team, it could well mean that RTW expectations can be altered amongst healthcare professionals as well as their patients. The only similar findings we identified came from a prospective cohort study of RTW following TKA [106]. They did not ask when participants expected to RTW but instead enquired how important it was for the participant to return to work in less than a month after surgery. They reported that people who said that it was important to RTW in less than a month of surgery were found to return in half the time taken by other employees, again suggesting the importance of what people expect (or how important it is to them personally) on their RTW times. Healthcare workers could potentially impact these expectations significantly.

It is commonly stated in patient information that people who need to return to physically-demanding work will need to take longer to RTW. In the current study, we explored this hypothesis carefully. Firstly, we did not find that those who were returning to more physically demanding work took longer time to RTW. However, we found that people who were returning to a job which did not require them to be able to stand or walk for more than 2 hours a day were more likely to make an earlier RTW. Interestingly, previous studies have found that those returning to a more physically demanding job went back to work earlier than those who were not

doing physically demanding work, after hip arthroplasty [104, 137] and knee arthroplasty [106, 111, 114]. In contrast, Sankar et al found that job physical demands did not affect time to RTW [101]. A prospective cohort study following knee arthroplasty reported that heavy/moderate manual work positively predicted RTW (although they did not report on time to RTW), and one study which also assessed motivation to RTW found that a sense of urgency to RTW was a more important factor predicting early RTW than the type of work they were returning to after TKA [106]. Taken together therefore, there is currently limited evidence that those who need to return to physically-demanding work actually do need longer recovery times. However, perhaps eminence- rather than evidence-based guidance tends to have given the rather opposite view that is reflected in much of the patient information in circulation. It is clear that what expectations people are given is important in determining what actually happens so that this could be a self-fulfilling whereby patients are told that they will need longer to RTW and therefore, they take longer to RTW. If there is no harm in earlier RTW, or even there are rehabilitation benefits, then it may be time to challenge the patient information in circulation and healthcare could be encouraged to give more positive views about the likelihood of early RTW, no matter what the nature of the employment.

Our results need to be considered alongside several limitations. Firstly, for practical reasons, we were only able to recruit a relatively small sample of people who fulfilled the eligibility criteria and wanted to RTW. One reason for this was that NHS waiting-list targets meant that the lowest-risk patients (in many cases those most eligible to RTW) were outsourced to a different waiting-list, based for the most part in local private settings, and although we obtained ethical approval to recruit from all settings, we found additional complexity in identifying these patients from the separately-held waiting lists. Anyone recruiting to a study like this in the future will need to have consideration of whether they are finding the whole eligible sample. Again, practicalities meant that we recruited from one large tertiary NHS Foundation Trust and the surrounding outsourced activity. In practice therefore, most of the operations were performed by a relatively small group (10-15) of surgeons who might have been giving fairly consistent advice, and possibly proactive advice, about RTW to their patients. To restrict this bias, the surgeons in this location were not briefed about the aims of this study, which was set up as a sub-study of the much larger COASt study. However, because these are research-active surgeons in a research-renowned centre, their practise may well be more forward-thinking and evidence-based than that seen amongst all surgeons. We would suggest that future studies recruit from multiple centres to assess any impact of different surgeons who might be giving different information to patients about RTW. Because of the recruitment challenges, we ended with a rather smaller sample than we hoped and unfortunately this may have increased the risk that we were restricted in our statistical power to

observe some effects that may in fact have been found in a bigger study, and given the small numbers in the study the associations that we found will need to be replicated. It was challenging to recruit to this study and therefore, it is difficult to know how representative our participants are. In general, our participants appear to have RTW promptly and have had positive expectations about RTW which may not be found to the same extent in a truly population based sample. The information leaflet indicated that we were researching about RTW and our eligibility criteria required that participants "wanted to RTW post-operatively" so that there may well have been some responder bias.

Much of the literature has separated knee replacements from hip replacements. On the whole, when reported separately, knee replacement patients appear to RTW later than hip replacement patients but it remains to be seen if this is because the surgeons performing the surgery of those two joints give different expectations to their patients, which are self-fulfilling or whether people actually do need different lengths of time after different types of joint replacements. Ideally, we would have liked to have included a greater number of participants with each type of arthroplasty to explore this in more detail. Although this was not possible, our study suggests remarkable similarities in time to RTW after both operations, and interestingly the study of Kleim et al [104] reported similarly. It could be that the similarities within the working population counteract differences in outcomes between hips and knees that might be expected based on rehabilitation studies following lower limb arthroplasty in the general population [178].

There are many strengths to our study. The first being that we carried out a prospective "real life" study of a working population undergoing lower limb arthroplasty. RTW-COASt included men and women undergoing either hip or knee arthroplasty. We collected prospective data at multiple time points so were less reliant on data from recall. We measured time to return to work in days and all potentially relevant exposures, including work factors were carefully collected pre-operatively.

Comparing the results of our study is difficult because of some lack of existing literature in this field, and marked heterogeneity in study design and assessment of RTW of the published literature available. For one thing, few studies have been carried out where RTW was a primary outcome and therefore many studies include people who did not necessarily need to RTW. Secondly, how to record or measure RTW has been reported in a range of different ways, whether it is by the number who have gone back by a certain time point, whether the percentage of patients who have gone back to work by a certain time point, and then whether RTW is measured in days, weeks, or months. Thirdly, very few studies considered the type of work that people are returning to, or whether they have gone back to full duties or restricted duties on return.

One interesting observation from our research data was that, when given the freedom to express any number of weeks, none of the participants reported that they expected to RTW 9,10 or 11 weeks after surgery. This seems extraordinary, given that some indicated that they expected to RTW as early as 2 weeks and this went up to a maximum of 18 weeks, but nobody selected a figure between 8 weeks (~2 months) and 12 weeks (~3 months). One explanation for this finding could be that they are thinking about RTW in terms of months, whether this is conscious or not (i.e. before 2 months or 3 months or more). Whilst these reported expectations did not seem prevent RTW between weeks 9-11 for some, It could be that this subtle but important change in language from talking about RTW in months, to weeks, if not days, might well enable some to be more flexible when thinking about time to RTW. The same is often the case for which day of the week to make a RTW. Most people tend to RTW on a Monday and then face a complete week, whereas the best advice might well be to start back on a Thursday or Friday, have the weekend and then face the full week. All healthcare professionals should be more mindful of advice that they provide about RTW.

Our findings, if replicated, have potentially positive real-world applications, for example, reducing the burden of pre-operative assessment by using a measure of usual activities, and from that score being able to identify when the need for arthroplasty is becoming more urgent. Likewise, if the finding regarding how expectations about time to RTW is associated with actual time to RTW can be replicated, this suggests that clinicians have an opportunity to encourage earlier return to work by giving positive expectations about this from very early in their referral for the surgery. If patients were given a consistent, positive view about early RTW, expressed by all members of the healthcare team, it could well mean that their patients beliefs and expectations could be altered and that RTW times could be shortened. Our findings that 6-months outcomes were not poorer amongst these who RTW early or very early are reassuring but longer-term follow-up amidst larger cohorts of patients will be required to confirm this finding. Ideally, we would recommend that a large, multi-centre trial would be the ideal approach to fully investigate these questions. We would then be able to explore the impact of lower limb arthroplasty on time to RTW while measuring any differences in outcomes between hospitals, surgeons and healthcare teams and the effect of different types of advice at different times in the healthcare journey, as well as the risk of harm.

5.2.1 RTW-COASt potential biases, representativeness and generalisability of findings

The need to minimise biases was considered in the design of RTW-COASt's prospective methodology which included regular data collection points to reduce the effect of recall bias. Much consideration was given to the study protocol to minimise information bias, including the

use of valid and reliable assessment tools, as well as the timing of these assessments. However, a number of potential biases remain.

For practical reasons, we were only able to recruit a relatively small sample. One reason for this was that the youngest and fittest patients requiring lower limb arthroplasty (those most eligible to RTW) were being outsourced to have their operations in private settings which created logistical challenges in identifying and recruiting these patients. Therefore, it is difficult to know how representative our participants are. Anyone recruiting to a study like this in the future will need to have consideration of whether they are finding the whole eligible sample.

Given its small sample size, RTW-COASt is subject to detection bias. We were restricted in our statistical power to observe some effects that may in fact have been found in a bigger study, and given the small numbers in the study the associations that we found will need to be replicated. For example, we did not find the expected effect of prior sickness absence on time to RTW in our study, although very little sickness absence was reported by RTW-COASt participants, possibly also suggesting a healthy participant bias in this cohort. The study information leaflet indicated that we were researching about RTW and our eligibility criteria required that participants "wanted to RTW post-operatively" so that there may well have been some responder bias.

With the challenges in recruiting to RTW-COASt, it is difficult to know how representative our participants were but in general, our participants appeared to have RTW promptly and have had positive expectations about RTW which may not be found to the same extent in a more representative sample of arthroplasty patients. It seems likely that they were a particularly motivated group for whom RTW was a high priority and our findings must be considered alongside this as a participation bias.

Most of the operations were performed by a relatively small group (10-15) of surgeons who might have been giving fairly consistent advice, and possibly proactive advice, about RTW to their patients. To restrict this information bias, we would suggest that future studies recruit from multiple centres to assess any impact of different surgeons who might be giving different information to patients about RTW.

The design of RTW-COASt to one recruiting site and its small sample size impedes the generalisability of the findings to the wider total joint arthroplasty population who want to RTW after surgery. To address this, we would recommend that a large, multi-centre trial would be the ideal approach to fully investigate the study questions. It would then be possible to explore the impact of lower limb arthroplasty on time to RTW while measuring any differences in outcomes

between hospitals, surgeons and healthcare teams and the effect of different types of advice at different times in the healthcare journey, as well as the risk of harm.

Therefore a larger prospective study across different hospitals is needed to see whether the associations that we found are replicated and effects that we might have expected to detect are found.

Chapter 6 Qualitative study

6.1 A qualitative analysis of how people decide when to return to work after lower limb arthroplasty

6.1.1 Introduction

While some work factors (e.g. pre-operative sickness absence, physical demands of job, and type of employment) are increasingly considered within quantitative research in this field, few researchers have examined RTW following arthroplasty from the patients' perspectives [150]. Within the quantitative component of RTW-COASt (Chapters 3-5), we collected data at baseline and follow-up about socio-demographic factors, clinical and surgical factors and occupational factors which might influence RTW following arthroplasty and analysed their relative importance in determining time to RTW post-operatively. To supplement this however, as stated in the third main aim of this thesis, we wanted to carry out a more in-depth exploration from the patients' perspectives of what was important to them when deciding to RTW. To achieve this, we invited a subset of RTW-COASt participants to take part in a recorded individual telephone interview six months after their surgery in which we explored their lived experience of deciding when to RTW after arthroplasty. Our aim was to gain a greater insight into what factors were important to individuals when they were thinking about when to RTW after their operation, and to identify key themes to inform future research in respect of optimising return to work outcomes.

6.1.2 Methods

Study design

This semi-structured qualitative interview study was nested within the RTW-COASt cohort study. The approach we chose was semi-structured in-depth qualitative interviews. These were chosen as they enable the collection of comparable patient data while allowing for further exploration of the participant's thoughts, feelings and beliefs about the health condition [179], which might not otherwise have been considered by the researcher or healthcare provider. Telephone interviews were the most practical for our purpose and have been shown to yield good-quality qualitative data suitable for our purposes and to maximise respondent participation with sensitive topics [180] including work-stress [181]. The questions in the semi-structured topic guide Table 36 were developed after our literature review and co-designed in consultation with experts in

musculoskeletal health and work [KWB, DC, KP and CL]. Additional guidance was sought from qualitative research experts [EW, MB] to develop the topic guide further to enable the participants to talk freely about their experiences and expand on any aspects that they considered relevant (Table 36). Furthermore, the interview schedule was piloted with two patients who had received an arthroplasty but who were not eligible for RTW-COASt (no substantial changes arose).

Table 36. Semi-structured interview schedule

1	Please briefly describe what your job involves, and what impact total joint replacement surgery has had on your day-to-day tasks at work since going back after your operation
2	What were the most important things you needed to consider when you were deciding when to return to work after your operation? / Version for retiree (Interview 9): When you were thinking about whether to go back to work, and talking with your employers, what were the most important things for you that you needed to consider?
3	What do you wish you had known about returning to work after total joint replacement surgery from the beginning (before your operation)?
4	What (if anything) could have made the experience of returning to work better for you?
5	Is there anything else about your experience of returning to work after total joint replacement that you would like to tell us about?

Participant sample and recruitment

A convenience sample of RTW-COASt participants were invited to take part in semi-structured interviews about their experiences around return to work following hip and knee replacement surgery. We decided not to sample purposively on the basis of operated joint, age or gender as we wanted to collect as broad a range of views about the experience of the RTW decision and there was little evidence to inform purposive sampling [182].

As part of the consent for participation in RTW-COASt, everybody was asked to give consent for us to contact them 6 months after their surgery to invite them to take part in a telephone interview. The main inclusion criteria for RTW-COASt were: participants needed to be aged between 18-69 years of age, on an NHS waiting list for hip or knee arthroplasty, and the participant was intending to RTW after surgery. People were deemed ineligible for RTW-COASt if the main indication for their arthroplasty was Charcot's arthropathy or other severe neurological disorders. Everyone

recruited into RTW-COASt (n=53) was therefore eligible to take part in the qualitative interviews, provided that they had reached the time point of 6-months since their operation at the time of the qualitative interviews (May-September 2018). To reach as broad a sample as possible, we attempted to contact all eligible participants. Those who were contactable were then re-consented to take part in the telephone interview. This involved thanking them for their previous participation in RTW-COASt, reminding participants that they had agreed to be contacted to be invited to take part in the telephone interview, but that this was completely voluntary and they were under no obligation to take part. Renewal of consent was obtained and they were reminded that, whether or not they took part, this would not impact in any way on their clinical care, and that they could withdraw themselves or their data from the study at any time, in line with the original consent that they had signed for RTW-COASt (See Withdrawal of Consent in RTW-COASt methods on page 106).

6.1.3 Data collection

As described above, we planned to carry out the qualitative interviews by telephone but one interview was conducted face to face at the request of that particular participant. Everybody was invited to choose a suitable time for the interview to be held. We reassured everybody that they could pause or stop the interview at any time.

A question schedule was developed by the research team, designed to give a deeper understanding of the participants' experiences and to respond to their leads in a flexible way, while allowing the collection of similar information from everyone. Interviews were conducted whenever suited the participant and the mean interview duration was 35 minutes (range 23-48 minutes). LS conducted all 13 interviews which were digitally recorded with the permission of each participant and transcribed verbatim, then anonymised prior to analysis.

6.1.4 Analysis

Thematic analysis was used to structure data collection and interpretation [183, 184]. As described by Braun and Clarke [183], TA is an analysis strategy commonly used in healthcare research and is independent of any one theory and epistemology. Broadly, TA aims to discover patterns and develop themes from broad reading of the data. TA was chosen here as it specifies an analytical approach to coding and theme development, and has been successfully applied to similar qualitative questions such as those involving lived experience and patients' understandings and perceptions [183, 184]. An inductive approach was adopted, so that the themes identified were generated from the data rather than from a pre-conceived coding scheme. Analysis was

done primarily by LS. Data collection and analyses were conducted iteratively to inform when sufficient interviews had been conducted to enable a rich account of participants' experiences [185] .

Initially, the coder transcribed each interview, then checked for accuracy by listening to the interview while reading the transcript, and then re-reading the transcripts repeatedly, with and without listening to the interview, until fully familiar with, and immersed in, the interview data. During this process any thoughts and preliminary codes were noted, then each transcript was re-read with initial codes being assigned to any elements considered pertinent to the overall analysis.

Connections between salient features (initial codes) were organised into broader themes from which main themes were identified and grouped with related sub-themes. The number of initial codes as well as their salience and fervour were taken into account in the development of themes. Initial theme ideas were discussed with the research team, and particularly with the experienced qualitative researcher (EW) within the team, who reviewed six of the interviews independently. After both independent assessment of the six interviews, the themes and supporting quotes which had been independently identified were compared and the initial codes and themes were debated. There was a high level of consistency between themes identified by both researchers, and where there were differences, these were debated until a consensus was agreed. Data collection and iterative analyses continued until no new insights were coming out of the data. The complexity of determining sufficient sample size for qualitative interviews is widely acknowledged [186], however there is some empirical evidence to support 13 interviews being an adequate sample size for analysing qualitative interviews [187]. Further discussion and debate between the researchers resulted in four themes and their underpinning sub-themes being identified, named and exemplified.

6.2 Results

In total, 21 of the 53 RTW-COASt participants had reached their 6-month post-operative milestone during the interview study phase (May-September 2018). Attempts were made to contact all of these but four could not be contacted by telephone. A further four participants declined telephone contact at 6-months (see recruitment flow diagram below, Figure 27). The final sample of qualitative interviews therefore comprised 13 RTW-COASt participants (hip=4, knee=9; compared to 24 hips, 29 knees in main RTW-COASt cohort).

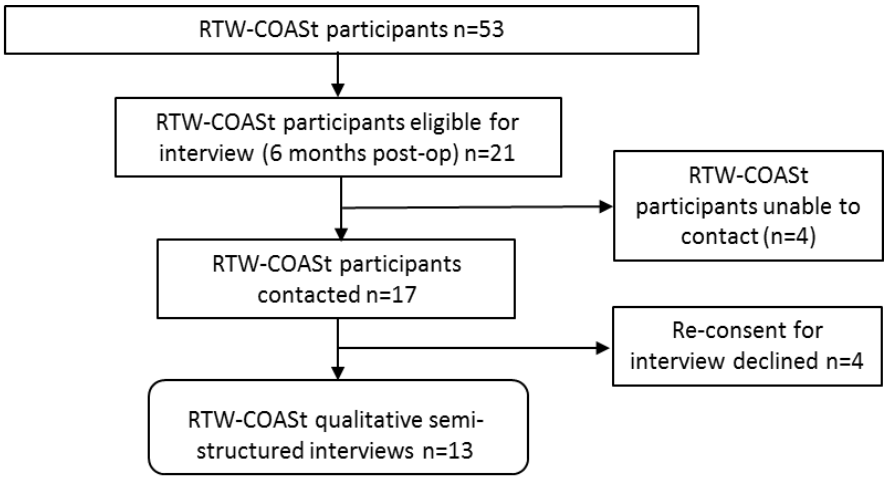

Figure 27. RTW-COASt Qualitative semi-structured interview recruitment

The majority of the interviewees were male (9/13, 82% compared to 42% male in main RTW-COASt cohort) with a median age of 60 years (median age 59 in main RTW-COASt). Twelve participants had returned to work (92%, compared to 89% in RTW-COASt cohort) at a median of 64.5 days (median 60 days RTW-COASt) after surgery. One participant who had been able to return to work 109 days after surgery, was only in work for 3 weeks and was unemployed at the time of the interview, although he said that this was not due to the impact of the joint replacement surgery, and that he was available and actively looking for work. One of the participants had retired at the time of the interview. He was past traditional retirement age but felt the decision to retire was mainly based on his employer's lack of support during the post-operative period, and although he was relieved with his decision to retire at the time of the interview, he had not ruled out returning to work in the future.

6.3 Main Themes

The analysis identified four main themes: Trust in joint; Self-efficacy; Appropriate healthcare support; and Support from work (Figure 28): Within the first main theme, Trust in joint, we identified 3 sub-themes: time to heal; functionality in the work environment; and a good recovery. Under the second main theme, Self-efficacy, 4 sub-themes were identified: belief in own ability to RTW; belief in own ability to plan for RTW; cognitive style; and determination and resilience. Under the third main theme, Appropriate healthcare support we found two sub-themes: positive patient-healthcare professional partnership; and structural issues (difficulties accessing healthcare support or not available locally). Within the final main theme, Support from

work we found 4 sub-themes: phased RTW; supportive team; work enjoyment; and work as therapy.

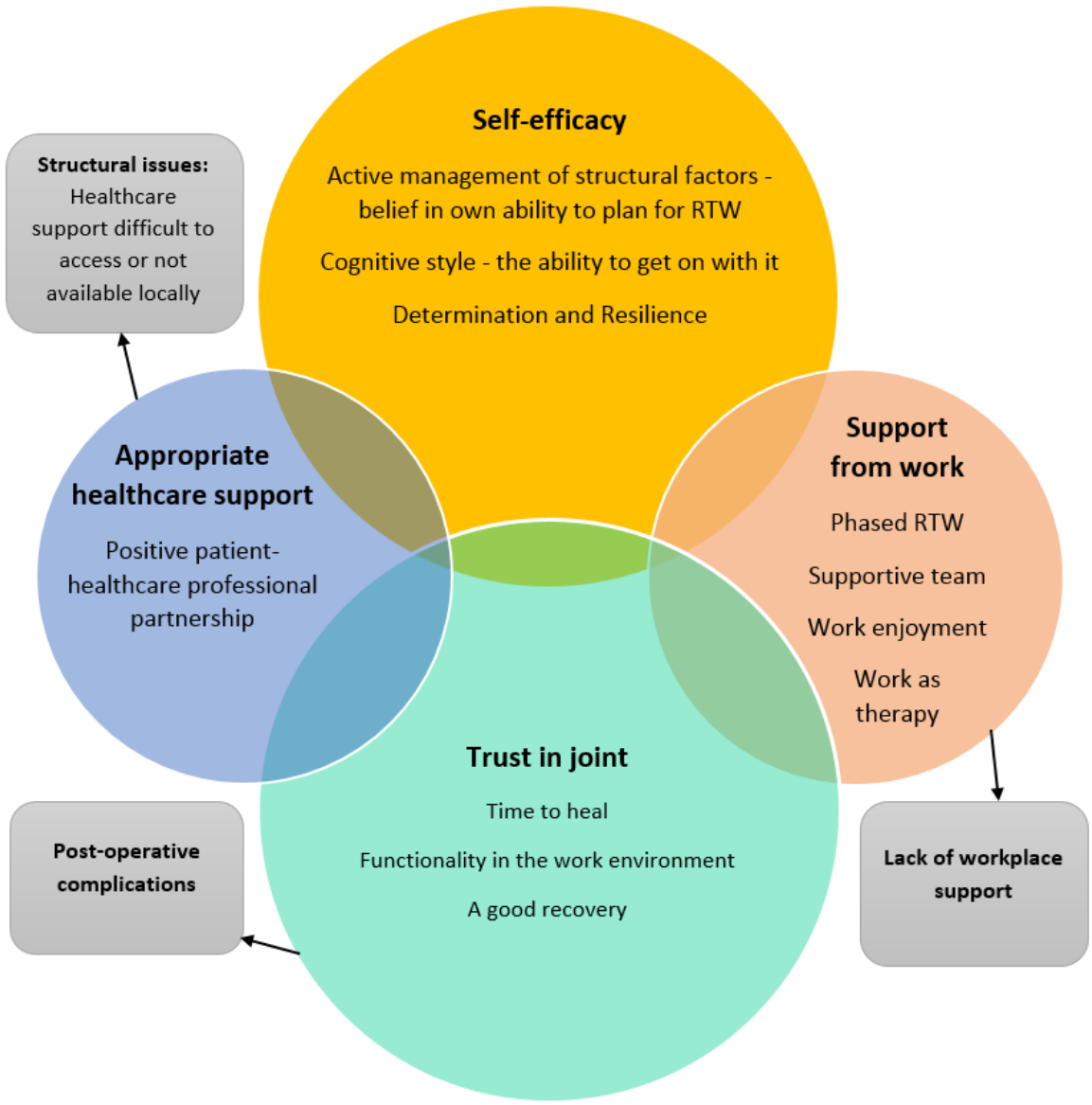

Figure 28. RTW-COASt model of themes important when considering RTW after arthroplasty

In the following section, anonymised verbatim quotes followed by the corresponding participant's interviewee numbers are used to illustrate key points and themes. Patient demographics, employment details and time to return to work are also reported to contextualise the data (Table 37).

Table 37. Qualitative participants' characteristics at the time of interview

Participant number	**Joint**	**Gender**	**Age at surgery**	**Pre-op employment role; and type**	**Change in employment type post-op**	**Employment status**	**Time to RTW** (days)
1	Knee	Male	64	General builder; Self-employed		At work	56
2	Knee	Male	59	Bathroom/kitchen fitter; Self-employed		At work	61
3	Knee	Female	52	Pre-school supervisor; Employed		At work	45
4	Knee	Male	62	Clothing business owner; Self-employed		At work	151
5	Hip	Male	54	Painter and decorator; Self-employed		At work	68
6	Knee	Female	61	CQC inspector; Employed		At work	174
7	Knee	Female	52	Hospital ward clerk; Employed		At work	49
8	Knee	Male	62	Site manager; Employed	Self-employed	At work	90
9	Hip	Male	68	FE College vehicle assessor; Employed	Retired	Retired	N/A
10	Knee	Male	66	Painter and decorator; Self-employed		At work	41
11	Knee	Male	55	Ground worker; Self-employed		Looking for work	109
12	Hip	Male	62	Design engineer; Employed		At work	67
13	Hip	Female	47	Retail business owner; Self-employed		At work	62

6.4 Theme 1: Trust in joint – needed to be 'good and ready' to return to work

Our analysis suggested that the first main theme that emerged from the interviews was one that we named "Trust in Joint". Participants discussed the need to feel 'good and ready' when deciding when to return to work. Beneath that, we found three key sub-themes: time to heal; functioning in the workplace (e.g. managing pain and mobility); and the importance of a good recovery in aiding the decision to return to work.

Time to heal

For some, this meant that they needed the time and space to feel healed generally following surgery:

> *When I was good and ready and I think that probably a 3 month lay-up helped me and my knee is a lot stronger for it, whereas probably the first one, I went back too early and maybe the period of time working slowed the healing, a little bit, I don't know (Interviewee 8)*

> *you've just got to let it recover and heal haven't you really (Interviewee 13)*

From this, it is hard to know how each individual measured feeling healed, although Interviewee 8 could draw on their previous experience to benchmark what felt right for them. But what is important to draw out here is that individuals did not want to go back until they judged sufficient recovery after their operation had taken place.

Functionality in the working environment: Mobility and pain

For most, there were particular milestones that were important to them when considering when to return to their work, which seemed to mainly relate to pain and mobility that would be necessary to carry out work tasks. Pain was an important consideration for many. Some participants focused on the need to be without pain:

> *Just being able to carry on my day-to-day job without being in pain is the most important thing (Interviewee 3)*

> *I was always very conscious of it, and it was painful, whereas now I tend to forget about it now and I'm pain free see (Interviewee 10)*

There was considerable emphasis on pain needing to be at a level where it would not distract individuals from their working duties. This requirement for being without pain was shared by

many, but for others, their goal for considering when to return to work was more about enabling function whereby they felt they had reached a point in their recovery where their mobility was at least at the minimum level required to perform their jobs:

> *So it had to be to a point when I could get easily up and down stairs really (Interviewee 4)*

> *The most important thing I thought about was being able to kneel down … Before they done it, I was, if I have this knee I have to be able to kneel down, and I can be on my knees for 4 or 5 hours of the day, so it wasn't just kneel down and get back up again, I've got to be able to kneel down and stay on my knees, you know, when I'm tiling a big floor, you're down there for some length of time (Interviewee 2).*

Alongside specific functional milestones such as being able to get up and down stairs and to kneel easily, some referred to their recovery milestones related to more of a feeling of sufficient healing:

> *I could feel in my body that I was capable of driving and I didn't risk it before that amount of time, and yeah it was important to drive, I need to do that for my work (Interviewee 5)*

The need for feeling safe to return to work for others' benefit was also expressed:

> *Whether I felt safe being around the children. Whether I could walk around the room and be safe and able to just walk without any aids of any kind anyway (Interviewee 3)*

Responsibility to and safety of others is a key element of the RTW decision here. An individual's ability to feel safe to be able to navigate through their workplace environment was also a consideration when thinking about going back to work:

> *I mean I couldn't have gone into where we work with crutches, it wouldn't have been safe to manoeuvre round things, so I, there was no way I could've gone in there with crutches, it just wouldn't have been practical to be able to do that (Interviewee 13)*

In addition to the practical health and safety considerations for the worker and also those around them, these data may also suggest the importance of the interviewees' wish to identify as an 'able-bodied' person, rather than having to function in their work environments with walking aids. Interviewee 4 expressed directly that they did not want to do certain things until they could be independent of help from others to be able to do so:

> *I couldn't even drive a car for three months so I wouldn't have been able to do work. I couldn't climb up and down stairs, the thought of getting on an aeroplane I couldn't*

> *physically do an aeroplane. As an able-bodied person I would have to have had some help but I didn't really want that (Interviewee 4).*

These comments suggest that there may be a tension here between safety needs and a propensity to avoid going back to work until 'fully' recovered. It is possible that a phased return to work before when fully recovered may aid recovery but if people believe that they need to be 100% recovered or that it will be "unsafe" then they may delay their return unnecessarily.

A good recovery

Being happy with the outcome of the surgery and a sense of having made a good recovery was a key sub-theme within the Trust in Joint theme with more than half of RTW-COASt interviewees expressing highly positive outcomes:

> *One of the best things I've ever had done (Interviewee 11)*

> *I had the op done on the 12th December and by the 25th December I was walking without sticks and everything so it was amazing (Interviewee 6)*

The notion of complete life transformation is striking for some, with the impact of the operation on their ability to work surpassing their pre-operative expectations:

> *the difference is amazing. I … if someone had told me that I was going to be 50% better after the operation I would've taken that with open arms, but it's just transformed my life … incredible … it's improved everything, completely … it's just transformed everything completely (Interviewee 1)*

> *it has made an incredible difference on my ability to work and whatever, yes, it's a really significant change … all in all, although it was very painful at the time, it was a, I wouldn't say good experience, but it's been very successful I feel and very worthwhile doing because it's got my life back on track so, on that side of it, it's been very positive. Yeah, I would say it was a total success (Interviewee 11)*

These quotes also illustrate well through their repetition and absoluteness of tone – 'total success', 'transformed everything completely' just how intensely positive had been the experience for these participants.

'It sort of backfired' – setback during recovery

However, a positive experience was not experienced by everyone; some felt their expectations were not met and that the surgery had 'backfired':

> *Well, as I'm talking to you now, I'm in pain … the original plan was, you know, do this, it will save your knee so you don't have to have the whole knee, you'll go pain free, and I've actually gone the opposite way, I've gone more painful. So it's sort of backfired a little bit if you know what I mean … but it's no different to how it was before I had it operated on, you know the pain I suffer from being on my knees all day it's no different to what it was, if anything it's probably worse. It's a little bit upsetting to think that I've gone through you know the whole operation and everything else and then you sort of think, I'm no better off, you know, so I've sort of gone through the whole procedure for no reason (Interviewee 2)*

Although their outcomes were contrasting, both Interviewee 11 and Interviewee 2 acknowledged what they had to go through undergoing lower limb arthroplasty, therefore the disappointment for Interviewee 2 to not have experienced any relief from his main pre-operative symptom of pain was difficult for him to reconcile with the perceived cost of undergoing the procedure.

Trust of the operated joint was so important to Interviewee 9 that for him the absence of complete trust in the operated joint was a barrier to returning to work:

> *I don't want to commit myself until I'm 100% certain that I can do what I need to do, and the hip is not going to give me any grief (Interviewee 9)*

Although for most, fully trusting their operated joint was not the only factor when determining when they feel they can return to work, and even after returning to work, complete trust was not required to have made a successful return to work, as clearly expressed by interviewee 4:

> *I still don't trust it really. Even though it's probably stronger than my other knee, which is not great either, and needs doing (Interviewee 4)*

And despite the post-operative complications with pain, Interviewee 2 still expressed some trust in his knee joint, at least in terms of its function, but also his determination to carry on:

> *It's not 100% but it's, it's pretty good, you know, we are coming up to nearly a year so I don't know what I expected to be back, you know, within the year 100% I don't know, but you know I have full movement and everything else about my knee, it's just the pain it causes … It doesn't affect anything because I just get on with it. I'm not going to let it stop*

> *me doing anything I need to do. And that's purely me as a person saying, I'm suffering with it but I'm not going to stop doing what I do, walking, cycling, shopping, going to work etc … My knee stops me doing things, but I do it anyway … So a normal person would say, I'm in too much pain I'm not doing it, whereas I just go, you know what, get on with it. (Interviewee 2).*

Interviewee 2 demonstrates that although he has to manage considerable pain, the ability to trust his joint meant that he was able to return to work. He then goes on to say*, 'My knee stops me doing this, but I do it anyway'* and this example of self-determination demonstrates another key theme produced from these data (self-efficacy), which seems to be linked with trust in joint, often as a reciprocal relationship for individuals deciding when they feel able to return to work.

6.5 Theme 2: Self-efficacy – belief in own ability to return to work

Three commonly reported sub-themes occurred as participants discussed how they decided when to return to work in relation to their belief in their own ability to return to work: Active management of structural factors (e.g. self-belief in their ability to make their personal circumstances work for them); cognitive styles (e.g. the ability to get on with it, not ruminating); and determination and resilience (e.g. persevering through pain).

Active management of structural factors – belief in own ability to to plan for RTW

Self-belief in ability to plan around personal circumstances, and acting on these plans, was an important component of the RTW decision. Interviewee 5 was self-employed and wanted to plan for the lack of income while he was recuperating from the operation and was in a financial position to do so:

> *We applied for a mortgage holiday for 2 months, so I didn't have to pay from the 1st December to, actually it was 3 months, December 1st, January 1st and February 1st we didn't pay our mortgage, so we didn't have to pay the earnings that I lost, we obviously wouldn't have been able to pay the mortgage while I wasn't working (Interviewee 5).*

Even though Interviewee 5 had made arrangements for the mortgage payments to be covered for a 3 month period, this did not determine when he went back to work, as he was able to RTW within 10 weeks of surgery.

However, not all of the RTW-COASt interviewees had the financial resources to manage their RTW, for them there was a financial necessity to go back to work:

> *I needed to go back to work, I had to have an income (Interviewee 1)*

> *Well really being self-employed because you can't seem to claim for anything, it's quite a lengthy process and what you can claim for is fairly minimal, it was always important that I got back to work as soon as possible (Interviewee 10)*

In this study, these financial drivers of when to return to work were mainly expressed by those who were self-employed.

Cognitive style – the ability to get on with it

While some made provisions for their forthcoming surgery, others just wanted to get on with the operation once they had made up their mind, without ruminating. Interviewee 1 clearly describes actively refusing to be given negative information once they had decided to proceed:

> *No, I went into it completely blinkered in lots of ways because I didn't want to hear anything negative about any of it, I just wanted it done and I hoped and prayed that it would be fine. And it's exactly that. It's perfect …. I spoke to one person who had exactly the same operation ten years ago and he's fine … Then an American golfer, caddy, had exactly the same operation and he's fine, and that was all the positive feedback I needed to go forward. I briefly looked online and I started to see negative things, so I stopped looking (Interviewee 1)*

Determination and Resilience

For many, an individual's determination and resilience were key drivers in their sense of self-efficacy to recover successfully from surgery and be able to return to work:

> *I was always determined that I would continue and I had no intention of letting that operation put me back, I would've kept going regardless of how uncomfortable it was, but it's just got better and better (Interviewee 1)*

> *my attitude to life is if something needs doing, do it and get on with it, don't sit there whinging about, I can't do this, and I can't do that because if you do that you won't do it, and that's how people end of sitting in armchairs all day with the TV switched on … I get on with it (Interviewee 2)*

Even though one person says they are not suffering, and one says they are, they both share the common element of determination to keep going. We cannot know for sure if Interviewee 1 would have kept going if they were suffering, but their intentions are clear and their determination does appear to have been very helpful to them. The sense that successful outcomes were a measure of an individual's determination and amount of effort they were prepared to put into their own rehabilitation was echoed by other interviewees:

> *I think everybody's different when they have some sort of surgery and people work harder than others. The biggest thing for me is to explain to them that if you need to do 3 [e.g. leg exercises], then you really need to do 3, or whatever they [physiotherapists] say, even*

> *though it's going to be hard work and it might be a bit uncomfortable, you really have to push to do it (Interviewee 13)*

> *Yeah, I'd already returned to work before I saw [surgeon] I'd made my own decision. I sort of took the advice of the physios from the hospital and just done me exercises, worked on it, done all the stretching, and then felt fit to go back to work. I worked hard at it (Interviewee 5)*

As well as interviewee 5 expressing the effort they had put into their recovery to enable them to return to work, with the information they had received, they felt empowered to make their own decision to go back to work without needing "permission" from the surgeon at the post-operative follow-up appointment. Having control and being able to make their own decisions was also found to facilitate return to work if participants felt able to control both the pace at which they returned to work, and could make changes that helped them:

> *I suppose initially when I went back I was a little bit slower, a bit more conscious of it … Yeah, I did need to go back to work and I was trying to pace my jobs a little bit, so you know, I think for the first couple of weeks I was doing like four days a week, just so not to overdo it, I sort of eased myself back in, you know, with not too much trouble at all really (Interviewee 10)*

> *And the same with work, initially it was a bit awkward, I bought some really comfy knee pads, and I thought, well you're going to have to kneel down at some point, so you just got to try (Interviewee 1)*

Participants here show willingness and ability to adapt, which appears helpful beyond simply the initial RTW but also for settling into new accommodations which are enabling a sustainable working life.

6.6 Theme 3: Appropriate healthcare support

The level of healthcare support required following lower limb arthroplasty varies widely between individuals, but what seemed important to interviewees was the belief that the healthcare support they needed was available to them. In line with our model, this theme has strong salience but it is influenced by, and influences, two other main themes: Trust in joint and Self-efficacy.

Positive healthcare professional-patient partnership

When individuals were unsure about the recovery of their joint, it was important for them to seek advice and guidance to enable them to work towards trusting the joint. Interviewee 8 was confident that the support would be there if needed:

> *they said to me if I need to initiate another visit into them I would, but they gave me plenty of exercises in which to get on with, and you know, build some muscle up (Interviewee 8)*

And continuity of healthcare professional pre and post-operatively was valued:

> *that was really good because she obviously knew what I was like beforehand and how I was after, she said it was quite good for her as well, because she could see, before and after (Interviewee 13)*

Patients very much valued a positive patient-healthcare professional relationship and acknowledged the impact their relationships with healthcare professionals had on their post-operative outcomes, and especially when a patient's work was taken into consideration from the beginning of their joint replacement surgery journey:

> *The most important thing I thought about was being able to kneel down. And hence that's why my scar on my knee goes round my knee instead of straight down my knee, because the surgeon said that if we cut round your knee, you won't be kneeling on scar tissue and it'll be a lot less painful (Interviewee 2)*

Patients were disappointed when they did not have a positive patient-healthcare professional relationship, unlike Interviewee 2, Interviewee 12 felt that the healthcare professionals were only interested in the joint itself, and not him as an individual:

> *they only talk about the actual joint itself … as I say, he [the surgeon] wasn't really worried about it, because all he said was, well he actually said it as well, if anything went wrong or there were after effects of the surgery itself, then he's liable for 3 months, and he just wanted to make sure that the actual wound had healed up nicely, or was healing up, and*

> *that there wasn't any problems with the hip itself, everything else was like, pfft almost nothing to do with him (Interviewee 12)*

For interviewee 12, it seemed that his perception that the healthcare team were not interested in him and his recovery was a cause of frustration which he felt had impacted negatively on his post-operative recovery, and in turn return to work.

Structural issues: Difficult to access, or post-operative healthcare support not available locally

Unfortunately, for a number of interviewees, they did not feel that the right amount of support post-operatively had been available to them, and rather they had made the decision to return to work despite the lack of appropriate information and supervision from the healthcare team, and without this, slower RTW was more likely:

> *Physios, that's right, they weren't interested, he said it was nothing to do with him … It was, here's a list of things that you can do, here are the things you can't do, here's a list of exercises you should do, of course when you've got the other problems creeping in, there's no one then to go to for help, you know, even the doctor was next to useless really … Well it would be nice to know that somebody could actually tell you what was actually wrong … if someone actually said, oh that's because of this, or that's because of that, and it's going to take 3 months to recover, or something (Interviewee 12)*

Interviewee 12 clearly felt abandoned by the physiotherapy team post-operatively and although able to access their GP, felt their support was not appropriate for the advice and reassurance they needed. And when Interviewee 9 experienced complications more than six weeks after their operation, after persevering with trying to contact their GP and then eventually being advised to phone the hospital where the operation was carried out, they reported:

> *then after six weeks I'd just come off my crutches and I woke up on a Sunday morning like I'd be shot in the backside with a big swelling, couldn't see my GP, couldn't get in for two weeks, couldn't even get a phone consultation until at least 4 days later, eventually I kept phoning the surgery and managed to speak to a doctor, and they said I need to contact hospital, so I phoned the ward sister (Interviewee 9)*

Ready access to post-operative healthcare support would have meant that the post-operative complication could have been addressed more promptly and reduce the stress and frustration felt by the interviewee trying to seek healthcare support. Provision of information about where to seek post-operative support should be mandatory for everyone undergoing surgery, but for some in this cohort, the only way they were aware of what post-operative provisions were available was

based on their previous experience of lower limb arthroplasty or experience with how to negotiate their way around the health service:

> *it was me that asked because I'd had it done with the other knee, the gym referral, can I have that done then to help things, so it was me really asking (Interviewee 3)*

> *Luckily because I work in the hospital I know things don't always happen, so I started to chase within 2 weeks and they got me in and I did the knee class and everything (Interviewee 7).*

In these cases, it seemed that individuals' previous experience meant that they felt better placed to access post-operative support which enabled them to feel confident in their post-operative recovery which in turn allowed them to think about when they would feel able to return to their job.

6.7 Theme 4: Support from Work

The final main theme that was generated from these data was the impact on successful return to work in a supportive work environment. We also found four key sub-themes: phased RTW, returning to a supportive team, work enjoyment, and work as therapy.

Phased return to work

If an individual was returning to a work environment where they could work reduced hours and pace themselves, they felt more confident to return to work:

> *when I first came back I did four hours every other day and that increased over 4/5 weeks until I was back to full-time hours … They put it in place that if there were any problems, I went back, I had to go back (Interviewee 7)*

Interviewee 7's employers facilitated a planned phased return to work and a mechanism to review progress against the plan and adapt as necessary.

Supportive team

Knowing that they would be returning to an environment where they would be working alongside supportive workmates also aided the decision to return to work. For Interviewee 10, going back to work in a supportive environment where they were assured that consideration for their well-being would be provided gave them the confidence to return to the workplace:

> *he is very good, because he knows, he's a friend of mine and he knows what I've had done and if there was any doubt that I was not going to be able to lift, or not going to be able to bend, you know, he wouldn't want me to do it (Interviewee 10)*

Work enjoyment and work as therapy

The work an individual is returning to, and how they feel about their work also seemed important in deciding when to return to work. And those that enjoyed their work found it easier to consider returning to work:

> *I enjoy doing what I do so that makes it a lot easier for me I guess (Interviewee 1)*

But more than the pleasure and satisfaction they would gain from returning to their job, many expressed how they saw the work they were returning to very much part of the post-operative

rehabilitation process, when going back to work is seen as a milestone in the journey to recovery, rather than the destination:

> *initially it was a little bit stiff and that, but that seems, with more and more getting into work, it felt a lot better then (Interviewee 8)*

> *I was desperate to get back to work and get things working properly so I was doing everything I could, you know, to get the knee bending (Interviewee 10)*

For many participants considering when they should return to work, the notion of being fully-recovered was not necessary, nor indeed obtainable, just that they needed to feel fit enough to return to work so that the final stages of recovery from surgery could begin. Interviewee 1 was clear that for him, the best post-operative therapy was returning to work:

> *There's nothing you could've told me, I don't think anybody could've told me, that would've made it easier, you know, the best therapy for me was actually my occupation (Interviewee 1)*

When support of employer is absent – lack of consideration for the individual's own experience

Our analysis suggested that a mismatch in expectations between the individual and their employer could cause a potential barrier for RTW following lower limb arthroplasty. As emerged above, an individual is more likely to contemplate returning to work within a supportive environment, but we saw the reciprocal when the employer's expectations did not match the individual's experience, that this caused friction which could delay, or even prevent, return to work. Interviewee 7's employers were initially accommodating by allowing a phased return to work and providing a free bus pass for the first three weeks, but then showed no flexibility when she still needed support beyond this:

> *I walk into work, it's only, it's just under a mile, but I needed to be able to do that because obviously parking onsite is a no-no. I ended up only having I think it was 3 weeks parking onsite because Travelwise wouldn't let me have any more … Through occupational health as well and I got somebody over there who was, no you can't have another pass, you know, tickets for a week, so I needed to be able to walk in (Interviewee 7)*

This resulted in Interviewee 7 needing to increase her phased return to work period. And while she appreciated being able to go back to work on a phased return, she had not previously been aware that the time she was unable to work during those weeks would be taken away from her annual leave total for the year. This lack of flexibility in terms of being able to extend the period of

the free bus pass and poor communication of the terms of phased return to work are potential barriers to early return to work, and to the potential benefit to recovery from surgery that an earlier return to work could provide:

> *And having to use annual leave for your phased return … If I had known … I think I would've stayed off until I was completely fit again instead of coming back and struggling for a bit just to be back at work (Interviewee 7)*

Similarly, a lack of flexibility and preparedness from the employer, along with little consideration given to the concerns of their employee, proved to be a barrier for returning to work for Interviewee 9:

> *Well the problem was they knew 5 months prior to me having my operation that I was going in to have the hip replaced and they just didn't get anybody in to cover me thinking that I would be coming back after 6 weeks, that's what I was told by HR … Yeah they assumed I'd be back after 6 weeks … my answer to that question to the lady at HR was, are you medically trained? And she said no, and I said well where have you got that figure from? She said, well going by other people, I said well you can't go by other people, I said, you know, I find that quite strange with the problems I've had (Interviewee 9)*

But given the post-operative complications Interviewee 9 endured, the continued lack of understanding from their employer meant he felt pressurised to decide on a definite return to work date:

> *Yeah. I had a well-being meeting with the HR unit, section at the college and the union people and they were pressing me to get a decision on what is the long term outcome and is there a possible date of me being able to return to work, and I said at the moment, no … I can't give you a definitive date of the possibility of myself coming back to work at this present time, and trying to do the job as I need to do it, you know, and they understood that so the HR people went away and then came back and made me an offer and I declined that with the union people, they went away and came back and gave me an improved offer which I accepted … To be honest, it's [retirement package] taken a bit of a weight off my shoulders (Interviewee 9)*

While Interviewee 9 felt a sense of relief once a retirement settlement was agreed with their employer with the support of their union, the decision to retire was driven more by a mismatch between employer and employee expectations in relation to how long it would take for them to feel able to return to their job, and lack of understanding and support from the employer. This conflict of the employer's expectation with the individual's experience is partly driven by the lack

of empirical evidence on which to base predicted time to return to work and shows how important it is for such data to be available.

6.8 Discussion

To meet the third main aim of this thesis (to understand the lived experiences of lower limb arthroplasty recipients around RTW post-operatively), we carried out qualitative research with eligible participants in RTW-COASt. We invited all RTW-COASt participants who had reached the 6-month milestone whether they would consent to give a telephone interview. In total, 13 participants underwent semi-structured interviews with LS. After transcription and coding, Thematic Analysis (TA) was used to structure and analyse the data and four key themes were identified: self-efficacy to achieve a successful RTW; trust that joint has healed; the importance of appropriate healthcare support within a positive patient-healthcare professional partnership; and support from the workplace to which the patient needs to return. Overall, these data point to the importance of the beliefs, confidence and expectations of the patient, that they tend to have some anxiety as to whether the operated joint can be "trusted", the value of support from the healthcare team, particularly if there is continuity of care and the relevance of relationships and accessibility, as well as adaptations, at work to enable a successful RTW post-arthroplasty.

Amongst all of the four main themes, trust in joint and self-efficacy were the two most salient themes that emerged from these interview. It seemed that amongst those individuals who perceived both a good level of trust in their joint and self-efficacy, most of the barriers that might be there because of a lack of support from healthcare providers or the workplace could be overcome. The importance of self-efficacy and confidence were also emphasised by McGonagle and colleagues [131] who also undertook mixed-methods work amongst people who wished to RTW after arthroplasty. They found that self-efficacy as defined by making an active recovery (e.g. walking/cycling), and psychological factors (e.g. a desire to RTW and escape boredom) also enabled early RTW. Importantly, we found evidence in the current study that both self-efficacy and trust in joint could be increased by good support from their healthcare team (and the promise of ongoing support if needed). For example, Interviewee 8 reported having felt reassured that the healthcare team would be there if needed and this gave him the confidence to 'get on with' (increasing self-efficacy) his recovery: "they said to me if I need to initiate another visit into them I would, but they gave me plenty of exercises in which to get on with, and you know, build some muscle up." Moreover, people with more self-efficacy, based upon personal experiences or knowledge, appeared to also be better able to access healthcare support: *"*Luckily because I work in the hospital I know things don't always happen, so I started to chase within 2 weeks and they got me in and I did the knee class and everything (Interviewee 7)*".* Clearly there are important inter-relationships between the four main themes. However, these findings point to the vitally important role that the healthcare team can play in the RTW journey of their patients. It does not appear that everybody will need lots of time post-operatively actively doing rehabilitation but

what they do need is plenty of information and to be able to access reassurance and information as/when something unexpected arises even several weeks post-operatively. This really points to the relevance and importance to successful RTW that could be achieved if every member of the healthcare team mentioned RTW right from the beginning of the process and were consistent in the advice they offered about likelihood of timing of RTW. Patients are surprised, and potentially lose confidence, when the information they receive from different healthcare professionals is inconsistent [126]. The evidence from other research also points to the importance of the surgeon's word in this process as their advice seems to be that to which patients are most likely to adhere to after arthroplasty [188] and other surgical interventions [189].

It is not at all surprising that the participants also emphasised the importance of the role of the employer or manager, or human resources at the workplace, as well as the support of co-workers on their decisions about the timing of RTW. These findings accord with those of another qualitative study which recruited 8 patients who were experiencing limitations at work (n=4) or on sick leave (n=4) following TKA [190]. The authors reported that the participants who had not gone back to work felt they had received minimum support from work and were struggling to adapt, whereas the other participants, who were able to return to work, reported that they had received 'concrete' support from their workplace which they believed enabled their RTW. Similar results were also reported in another mixed-methods study which evaluated factors influencing RTW after hip and knee arthroplasty [131]. The authors reported a significantly earlier time of RTW following lower limb arthroplasty if flexible working conditions were available. Enjoying one's work, believing that RTW would help post-operative recovery, expecting that work colleagues will provide support and the availability of flexibility (of hours or work tasks, or travel support) were all mentioned by our participants. However, it was equally clear that when employers failed to communicate clearly or were perceived as inflexible or unsupportive, this impacted markedly on a successful RTW. This is likely to be particularly important for employers who provide paid sick leave e.g. in this country, the NHS. One of our participants discovered that she was going to be penalised her annual leave in order to subsidise her phased RTW and would in fact have been entitled to take longer paid sick leave had she realised. These short-sighted work practices do not encourage employees to make an earlier RTW and may in fact also result in a more delayed recovery post-operatively.

A number of interviewees discussed the difficulty they had of considering returning to work while still using walking aids. Although this was not true of all, as others did discuss using aids when they first went back to work, the notion of being 'able-bodied' was essential for some before considering going back to work. This appears to be consistent with the concept of "healing" that emerged under theme 1. Whether this is a personal belief that they hold about themselves,

whether it is driven by a cultural expectation that they perceive from society or their workplace, or whether it is driven from the "messages" they receive from healthcare professionals, or indeed a combination, our research would suggest that feeling "healed" or "able-bodied" again was important in deciding that they were ready to RTW. Importantly, where an individual perceives that they need to achieve a specific level (not using walking aids or 100% healed), this expectation could be a barrier to RTW and they could be missing out on the potential rehabilitative benefits that an earlier RTW could provide. Certainly, as reported by one of our interviewees, "I was desperate to get back to work and get things working properly" suggesting that RTW was the marker in his/her mind of "recovery". These are really interesting constructs that individuals seem to hold, and in some cases, be constrained by, and it would be helpful to undertake more research to better understand where these beliefs come from and whether they are modifiable. Indeed, Sullivan [191] has written that we need to know more about how these "negative expectations" develop, and suggested that sometimes such expectations may be initiated within the healthcare professional-patient relationship, although very little is currently known about this, the findings from our study provide several points in the patient journey, from pre-operative consultations with healthcare professionals, up until individuals return to work after lower limb arthroplasty, and beyond, where healthcare teams could positively intervene.

The results of our study suggest that while all four main themes could and should be optimised to facilitate successful RTW. However, there was some evidence that if an individual was particularly strong in any one of the themes generated from this study, that this could enable them sufficiently to be able to return to work successfully. For example, Interviewee 2 who did not have '100%' trust in his knee joint, especially in terms of the pain he was experiencing post-operatively, still felt that he was able to get on with things and get back to work because of his own determination and resilience: 'My knee stops me doing things, but I do it anyway … So a normal person would say, I'm in too much pain I'm not doing it, whereas I just go, you know what, get on with it'. Likewise, Interviewee 5 reported: "I'd already returned to work before I saw [surgeon] I'd made my own decision. I sort of took the advice of the physios from the hospital and just done me exercises, worked on it, done all the stretching, and then felt fit to go back to work". This individual seemed to have trust in their operated joint which enabled them to overcome any barriers that a supportive workplace might put up, although this is perhaps easier when the individual also has self-efficacy. Similarly if someone felt well-supported by their work, and that they could return to work at a pace they felt comfortable at, and that their individual circumstances and needs were considered and adapted for where necessary, even if they were low in the other three themes, a good RTW outcome could still be achieved.

This study has many strengths, we spent time and care creating the questions to capture individual's experiences of returning to work after surgery and explore how they decided when to return to work. The questions were discussed and developed with musculoskeletal and qualitative research experts. Interviews were carried out by an experienced qualitative interviewer able to capture rich data from people, who then immersed herself in the data to identify connections between salient features leading to the generation of themes reported in this study. The sample size of 13 is an excellent number for such research and allowed inclusion of a spread of men and women and people doing different types of work. The thematic analysis stages were supported by a qualitative research expert, who along with the team of musculoskeletal health and work expert discussed initial theme ideas and supported the analysis of the qualitative data.

However there are still some limitations. Firstly, not all eligible participants were able to be contacted or agreed to take part and may therefore have differed from those included in the study. The second limitation is that the proportion of female interviewees was lower than the proportion in the RTW-COASt cohort. This had the potential to over represent the experiences of men. However, against this, when we examined the interview transcriptions, we found no differences between men and women in terms of the salience of the four key themes generated. A further limitation was that the interviewer was not a practising clinician, and had not personally undergone lower limb arthroplasty themselves, and it is possible that participants may have thought that the interviewer could not really have "understood" and may have held back when discussing their experiences. On the other hand, it is possible that with the interviewer having this "distance" from the clinical team, interviewees may have felt more comfortable to discuss their clinical experiences, especially if they were negative. These data do not allow us to say that these themes are representative of all patients undergoing arthroplasty and want to return to work. Although, representativeness was never intended to be an aim of thematic analysis [183], rather it aims to discover patterns and develop themes which we have generated and reported here.

In conclusion: This in-depth analysis has highlighted key themes that are important for individuals when considering when to go back to work after lower limb arthroplasty: that they feel confident in the operated joint's performance and in their own recovery; they have belief in their ability to recover and go back to work; they have access to the post-operative healthcare support they need; and returning to a supportive work environment can aid earlier return to work, which in itself, may aid their recovery. These data provide insight that can be taken forward into future research. Findings from our study show the positive impact that having access to the post-operative healthcare support patients need can have on their self-efficacy and trust in their joint to feel able to return to work, as well as the important role healthcare professionals, especially

the operating surgeon, can provide to help their patients feel informed and empowered on their rehabilitation pathway safely back into work.

Chapter 7 Discussion

7.1 General discussion

As we showed in Chapter 1, although there is an increasing body of work considering return to work (RTW) after lower limb arthroplasty, the current limited scientific base impedes our ability to fully understand and ultimately improve outcomes for lower limb arthroplasty patients who wish to return to work post-operatively. The objectives of this thesis were therefore to generate new knowledge about: (a) the factors which impact time to return to work after THA and TKA and (b) the lived experiences of a cohort of THA and TKA patients who want to RTW post-arthroplasty. To address these, we utilised a mixed methodology approach including a systematic review, a prospective cohort study and qualitative research amongst participants in the cohort study.

Systematic review

Firstly, we undertook a systematic review. The aims were to understand what the existing literature could tell us about how long it takes for people to return to work safely after hip and knee arthroplasty. However, we also evaluated what the literature could tell us about which factors (socio-demographic, clinical, surgical and work-related) affected the time taken to make a successful RTW after lower limb arthroplasty. The existing evidence was reviewed systematically according to the PICO: amongst working-aged individuals (18 years and over); who have undergone lower limb arthroplasty (hip or knee); and whose time to RTW after surgery had been described; which factors are associated with the time taken to make a safe RTW? Having tuned a search strategy, we interrogated 4 databases that included studies published up to May 2021 that met our eligibility criteria and identified 23 studies that fulfilled our criteria. Of these, 8 included RTW outcomes after hip arthroplasty, 8 after knee arthroplasty and 7 included both hip and knee arthroplasty patients. Our quality assessment, based upon the SIGN methodology but also addressing the way in which work outcomes were reported in each paper, resulted in over a quarter of included papers assessed as poor quality. Unfortunately, the included studies were markedly heterogeneous in their design, methodology and in particular how time to RTW was measured or reported. Therefore, it was not possible to pool data between studies, so instead we carried out a narrative review. Overall, our conclusion was that there is currently limited evidence in the existing literature to address our main research questions. However, the included studies of hip arthroplasty reported consistently high RTW rates of between 75% and 100%. Similarly, rates of RTW after knee arthroplasty were also high (between 82% and 98%), with the exception of one prospective cohort study which reported only 40% RTW after knee arthroplasty [111]. Notably

however, even in this study, all participants aged under 50 years returned to work after surgery. In relation to our question about what factors are associated with time to RTW, overall, we found some evidence that younger patients returned earlier than older ones [137]. There was also some evidence that women took longer to RTW than men [101, 109, 132], as did those with higher levels of educational attainment as compared to those with lower levels [101, 104], but there was little evidence to support that BMI was associated with longer or shorter times to RTW post-arthroplasty [101, 106]. Although investigated in only small numbers of studies, there was some evidence that surgical techniques might affect time to RTW. These suggested that the two-incision surgical approach resulted in shorter RTW times than the mini-posterior approach [136], that recipients of unilateral THA (as compared with bilateral THA) [137] returned to work more quickly and that the mini-posterior surgical approach resulted in faster RTW times as compared with the direct-anterior approach [138, 140, 192]. Different types of post-operative rehabilitation were investigated only in hip arthroplasty patients, but the results of both studies suggested that following an unrestricted (versus restricted) rehabilitation protocol [134, 139] resulted in earlier times to RTW. In relation to occupational factors, a small number of studies provided consistent evidence that individuals who took sick leave pre-operatively tended to make a slower RTW post-operatively [104, 109]. There was also reasonably consistent evidence that those needing to RTW in physically demanding jobs took longer after hip and knee arthroplasty [101, 104, 106, 111, 114]. However, the one study which also assessed motivation (sense of urgency) to RTW found that this was a more important factor predicting early RTW than were the physical demands [106]. There was (weak) evidence from two studies that self-employed patients made earlier RTW after knee arthroplasty than employed [106, 141].

Overall therefore, the systematic review informed us that most people who want to RTW after hip or knee arthroplasty are able to do so. Earlier RTW is associated with younger age at time of surgery, possibly male gender, higher levels of educational attainment, (possibly) returning to work that is less physically demanding, (possibly) being self-employed, some surgical techniques, unrestricted post-operative rehabilitation and not being off sick pre-operatively. Frustratingly the included papers measured time to RTW in a range of different ways: mean time to RTW, median time to RTW or percentage of participants who had returned to work by one or more time points. Moreover, it was not always clear how many participants in a study actually wanted or planned to RTW. Most studies included only limited data about the nature of the work to which individuals were returning and none informed about partial or phased RTW as compared to time taken to make a full return to normal duties. Also, none detailed the nature of advice or recommendations (if any) that had been given to their participants about when they might reasonably expect to RTW before, during or after their surgery. Overall therefore, the existing literature provided only

limited insight from which to create evidence-based recommendations for patients about when they might safely expect to RTW to different types of work, how to phase a return, whether or not there is a risk of harm from RTW too soon or indeed whether there might be benefits for function of earlier RTW.

Prospective cohort study (RTW-COASt)

Given the weaknesses of the evidence-base therefore, we wanted to further address the question of how long people take to return to work after lower limb arthroplasty and the determinants of time to RTW. To do this, we designed and carried out a prospective cohort study (RTW-COASt), recruiting participants from when they were listed for surgery up until 6 months after surgery and following the entire journey post-operatively very closely. The set-up of this study benefitted from the existing COASt study which was actively recruiting in Southampton Hospitals, so that, after a substantial ethics amendment, and with developmental work on the protocol, PIS, and questionnaires, we were able to carry out RTW-COASt to collect relevant personal, clinical, surgical and work-related information pre-operatively, and then at 6 weeks, 3 months and 6 months after arthroplasty. The study was designed to fill some of the gaps identified in the systematic review, i.e. detailed information about work; prospective data throughout the RTW journey; evaluation of participants' views about the advice they were given about RTW; and details of the nature and timing of the RTW carefully collected.

Recruitment to RTW-COASt proved more difficult than anticipated. There were structural factors outside of our control (notably the outsourcing of patients from waiting lists to private providers). Even despite our obtaining ethical approval to recruit from these private providers, the available data proved to be messy so that we were informed of people who were not waitlisted for arthroplasty or had even had their arthroplasty and we recruited patients only to find that their surgery was cancelled or postponed. Moreover, a large number of people who gave verbal consent for participation failed to return the baseline questionnaire. Despite the challenges, we recruited 53 patients undergoing hip or knee arthroplasty. Of these, most (89%) were able to return to work after hip and knee replacement surgery. Participants returned to work at a median of 62 days after hip replacement and 55.5 days following knee replacement surgery and all those who had returned to work after surgery were still in work (or available for work) 6 months after their operation. We did however find that RTW happened over a wide range of time after surgery which gave us the capacity, even within a relatively small sample, to explore the factors that affected time to RTW.

A small group of people (n=6, 11%) were able to RTW within 30 days of surgery, which we defined as having made a very early RTW. Although too small a group to perform complex statistical analyses on, it is worth noting that the 6 included men and women, people with hip and knee arthroplasty and returning to different types of work. Notably, 5/6 were self-employed and the other individual was only entitled to 2 weeks of paid sick leave. Nobody in this group reported any problems after making their very early RTW.

For the statistical analyses, we chose to define the one-third of participants who RTW most quickly. We amalgamated THA recipients with TKA recipients having shown no major differences between the groups for the key factors, and to enhance our statistical power. The cut-off within our population was 49 days post-operative (7 weeks) and 16 participants achieved RTW within this time frame. For the purposes of the subsequent analyses, these were defined as the "early RTW" group.

The factors we found associated with earlier RTW included: being a younger age at the time of surgery; and having better pre-operative functioning in "usual activities" (EQ-5D). We did not find that those who were returning to more physically demanding jobs took longer to RTW but those who reported that they needed to stand/walk for more than 2 hours a day at work were less likely to be in the early RTW group. Having the pre-operative expectation that they would RTW within 7 weeks of surgery was very strongly associated with making an early return to work. We did not find an effect of sickness absence on time to RTW in our study, but very little sickness absence was reported by participants, possibly suggesting a healthy participant bias in this cohort. Amongst all RTW-COASt participants followed up to 6 months, nobody reported a deterioration in pain or function from their replaced joint after making a RTW.

Although recruitment to RTW-COASt proved challenging, we were able to recruit a sample of patients who were from a range of backgrounds, were working in diverse occupations and experienced a range of different times to RTW. A small, but important, group (11%) achieved a RTW within 30 days and a key marker of this was self-employment or very limited paid sickness absence. Self-employment had not been strongly demonstrated in other studies post-arthroplasty but is not a surprising finding. People who are self-employed are likely to be unpaid or paying others to do their work whilst off themselves but also can create themselves perhaps more flexibility to carry out their work around their rehabilitation needs. The availability of paid sick leave is well known to be associated with longer sickness absence after other elective operations (e.g. carpal tunnel syndrome) [176] and even after workplace injuries (e.g. back pain) [193, 194].

Amongst those who returned to work either "very early" or "early", a key determinant was that their pre-operative expectations were to return quickly. We could not find any previous studies

that had considered this amongst their determinants but the one study that had measured "motivation" found it to be an important predictor, more important than physical demands at work [106]. Whilst these are not quite the same constructs, both point to an important role for the individual's own perceptions, beliefs, and expectations in subsequent outcomes. This is particularly valuable to clinicians because there is potential for expectations to be influenced by good-quality consistent information provided throughout the journey from primary care to secondary care, the operation, rehabilitation and RTW. There is evidence that advice given by the surgeon themselves is the most important factor taken into account [188, 189] by patients (at least in relation to carpal tunnel surgery) and this suggests an important role for surgeons in giving positive expectations to their patients pre-operatively about RTW. The lived experiences of this were considered further in our qualitative work. Other factors (requirement to stand at work) are also important as these are again potentially modifiable by negotiating modifications to duties in advance with the employer (e.g. rotation of tasks, sharing of tasks, working half days etc.). It is not perhaps surprising that younger patients RTW earlier but better pre-operative function is another potentially modifiable factor. The concept of "prehab" (optimising functioning before surgery with aim of improving post-operative outcomes) prior to surgery is not new [195, 196], and the evidence for its benefit is limited [197], our findings hint that maximising preoperative function through e.g. muscle strengthening etc could impact importantly on RTW post-operatively. Moreover, there is a consistent debate within the arthroplasty community as to whether surgical intervention should be delayed "as long as possible". It is for example recognised that patients who have more pain or poor function before surgery have a greater likelihood of greater postoperative gains (Franklin et al. 2008, Rolfson et al. 2009, Judge et al. 2012b, Greene et al. 2015). Moreover, when the primary operation is performed at younger ages, there is a greater likelihood that a revision procedure will be needed [198-200]. There is therefore a complex balance to be struck between pre-operative status and timing of arthroplasty. Our findings that pre-operative function is important in determining RTW times, alongside the negative effect of pre-operative sick leave shown by others [104, 109], would appear to suggest that another factor that will need to be considered in deciding on the timing of intervention will be the needs and wishes of the patient about RTW and it could be that earlier intervention with arthroplasty, whilst function is preserved, will enhance ability to participate in work post-operatively.

Qualitative research nested within RTW COASt

To supplement this work further, we performed a more in-depth exploration of what factors were important to individuals when they were thinking about when to RTW after surgery. We invited a

subset of RTW-COASt participants to take part in semi-structured interviews designed to gain a greater insight into what was important when deciding to RTW from the patients' perspectives.

In total 13 interviews were carried out 6-months after the arthroplasty surgery. By that time, twelve of the thirteen interviewees had returned to work. The one participant who was not working had made the decision to retire post-operatively. Thematic analysis was used to structure data collection and interpretation. Four key themes were generated from the data: self-efficacy to achieve a successful RTW; trust that joint has healed; the importance of appropriate healthcare support within a positive patient-healthcare professional partnership; and support from the workplace to which they need to return. Those who felt positive about all four of the themes were most likely to achieve an earlier return to work. However, we clearly found that the themes had reciprocity and saw an important effect of an individual's beliefs, expectations and determination. The role of healthcare professionals was both direct and indirect. Support from the healthcare team, and confidence that support was there if required, could considerably enhance trust in joint and self-efficacy. This points to the important role that the healthcare team could play in promoting RTW promptly and safely. Engendering patients with confidence that the procedure has worked well, that they are recovering well, there is healthcare support if needed, and encouraging patients to think about returning to some work as soon as they are able could potentially enhance their trust that the joint is healing and increase their belief that they can achieve their goal of going back to work post-operatively, thus maximising their chances of returning to work successfully. The qualitative work also revealed an interesting area for research around the concept of "healing" after surgery. Whilst some participants placed reliance on RTW as something that would help them recover and get back to normal, others expected to be fully "healed", independent and not requiring any walking aids before they could RTW. It would be interesting to understand where these expectations came from and how modifiable they might be. A supportive work environment that facilitated a phased (both in terms of hours and duties) return to work gave workers the confidence to go back to work, highlighting the crucial role employers can play in supporting their employee's transition back into work. This is not surprising but even in this relatively small sample, participants' experiences of "supportive" employers varied enormously. Overall therefore, our qualitative study suggested that if individuals trust that the joint itself has healed and they believe in their own ability to aid their recovery and go back to work, then they will be successful in returning to work, and the support they do, or do not, receive from healthcare professions and their workplace can highly influence work outcomes.

Limitations

A number of limitations across our research studies need to be considered when interpreting our findings. The low availability of high quality, prospective studies of RTW following arthroplasty was a limitation of our systematic review. Most studies had a retrospective design, thus increasing the risk of recall bias. Additionally, the varied RTW data that were extracted, combined with different reported measurements of time in the studies, limited the reporting of comparative data and prevented further data synthesis. Literature searches were carried out using four databases, and focussed only on studies published in English, and it is possible that articles were overlooked that were not in any of the searched databases or that were published in another language. Despite an inclusive search strategy, only 23 studies met the inclusion criteria and the usefulness of their findings was restricted by the lack of standardisation in data collection methods for work outcomes.

The results from our prospective study need to be considered alongside several limitations. Firstly, for practical reasons, we were only able to recruit a relatively small sample of people who fulfilled the eligibility criteria and wanted to RTW. One reason for this was that NHS waiting-list targets meant that the lowest-risk patients (in many cases those most eligible to RTW) were outsourced to a different waiting-list, based for the most part in local private settings, and although we obtained ethical approval to recruit from all settings, we found additional complexity in identifying these patients from the separately-held waiting lists. Because of the recruitment challenges, we ended with a rather smaller sample than we hoped and unfortunately this may have increased the risk that we were restricted in our statistical power to observe some effects that may in fact have been found in a bigger study, and given the small numbers in the study the associations that we found will need to be replicated. Given the challenges in recruiting it is difficult to know how representative our participants are but in general, our participants appear to have RTW promptly and have had positive expectations about RTW which may not be found to the same extent in a truly population based sample. It seems likely that they were a particularly motivated group for whom RTW was a high priority and our findings must be considered alongside this as a participation bias.

Much of the literature has separated knee replacements from hip replacements. On the whole, when reported separately, knee replacement patients appear to RTW more slowly than hip replacement patients but it remains to be seen if this is because the surgeons performing the surgery of those two joints give different expectations to their patients, which therefore become self-fulfilling or whether people actually do need different lengths of time after different types of joint replacements. Ideally, we would have liked to have included a greater number of

participants with each type of arthroplasty to explore this in more detail. Although this was not possible, our study suggests remarkable similarities in time to RTW after both operations, and interestingly the study of Kleim et al [104] reported similarly. It could be that the similarities within the working population counteract differences in outcomes between hips and knees that might be expected based on rehabilitation studies following lower limb arthroplasty in the general population [178] and recently published NHS Digital report of PROMs in England [[201]]. More data from carefully conducted prospective studies with work information collected systematically and uniformly could rapidly clarify whether or not there really are differences after TKA as compared with THA.

As well as the limitations of RTW-COASt the qualitative semi-structured interview study had additional limitations. Not all eligible participants were able to be contacted or agreed to take part and may therefore have differed from those included in the study. The second limitation is that the proportion of female interviewees was lower than the proportion in the RTW-COASt cohort thus having the potential to over-represent the experiences of men. Importantly, when we examined the interview transcriptions there were no differences between men and women in terms of the salience of the four key themes generated from their interviews. Once again these may have been a group who were particularly motivated to RTW and in whom that was a more important outcome than the more general population receiving arthroplasty surgery. Therefore, these data do not allow us to say that the themes that were generated from our participants are representative of all patients undergoing arthroplasty and want to return to work.

Strengths

To our knowledge, our systematic review is the first to identify determinants of time taken to RTW after lower limb arthroplasty, and to compare RTW outcomes within and between hip and knee arthroplasty studies. The review was conducted rigorously with a comprehensive literature search in four databases and independent screening of eligible studies by two assessors. Likewise, quality assessment was conducted by two assessors independently. The outcomes described were drawn from a wide range of relevant studies. A particular strength of this systematic review was the ability to collate information to compare the effect of the same potential determinants of time to return to work across different study designs, and between hip and knee arthroplasty.

There are many strengths to our longitudinal study of RTW following lower limb arthroplasty. The first being that we carried out a prospective “real life” study of a working population undergoing lower limb arthroplasty. RTW-COASt included men and women undergoing either hip or knee arthroplasty. We collected prospective data at multiple time points so were less reliant on data

from recall. We measured time to return to work in days and all potentially relevant exposures, including work factors, which were carefully collected pre-operatively. Our sample included men and women from a diverse range of backgrounds and needing to RTW in different types of occupation. Even if they were a particularly motivated group overall, we saw substantial diversity in time taken to RTW so that internal comparisons of the determinants of the time frames to RTW are valid.

The strengths of our qualitative work were that we spent time and care creating the questions to capture individual's experiences of returning to work after surgery and explore how they decided when to return to work. The questions were discussed and developed in collaboration with musculoskeletal and qualitative research experts. Interviews were carried out by an experienced qualitative interviewer and the data was analysed with the support of a qualitative research expert and a team with musculoskeletal health and work expertise.

Future research

There is a pressing need for future studies of hip and knee arthroplasty to consider work outcomes and to collect work outcome data in a uniform way in all studies going forward.

In light of the findings of our systematic review, the routine collection of a standardised set of RTW variables is recommended in order to ensure that research evidence on RTW after lower limb arthroplasty is relevant and comparable. Access to more robust work-related data would greatly assist healthcare providers, clinical decision-makers, and individuals themselves when considering outcomes after lower limb arthroplasty.

Because of the challenges recruiting to RTW-COASt, we ended with a rather smaller sample than we hoped which meant we were restricted on statistical power, and the extent to which these findings relate to other centres and cohorts of patients is unknown. Therefore a larger prospective study across different hospitals is now needed to see whether the associations that we found are replicated and effects that we might have expected to detect are found. A larger study would also allow us to determine whether the "usual activities" element of the EQ-5D PROM is an important predictor of time to RTW. We would suggest that future studies recruit from multiple centres to assess any impact of different surgeons and local healthcare teams who might be giving different information to patients about RTW. It would also be important to observe return to work outcomes over a greater period of time. We were only able to observe return to work outcomes up to 6 months after surgery, and while most had returned to work and stayed in work at 6 months, we were unable to observe whether any of the remaining participants were able to successfully return to work after this time. We were only able to measure potential harm up to 6

months after surgery. By carrying out a larger study over a longer period of time, the important question about whether any harm can be observed amongst those who return to work early after surgery could be more fully addressed. With a longer study we could then include measures of harm at further follow-up points, at 1 year after surgery and then annually thereafter, and if the study included a greater number of participants then we could statistically test measures of harm between those who returned to work earlier and those who returned later, at different post-operative time points. For example, there is good evidence that exposure to some physically-demanding activities increases the risk of primary hip or knee OA [40, 101, 104, 106, 111, 114, 137, 202] and it is currently unknown whether long-term RTW involving similar exposures increases the risk of failure of the primary arthroplasty. We also found in RTW-COASt that there was often a long lag time between the pre-operative assessment in the outpatients clinic and the surgery which meant that many who agreed to take part in our study were not operated on in time to be included in our study, but those patients would be able to be included in a study which ran for a greater period of time. We also found that participation was restricted by needing to contact the participant by phone, as there were many that we were unable to contact. A future study would benefit for employing additional recruitment strategies, including sending invitation letters and emails.

Our findings also suggest that more research is required about the role of the healthcare team in promoting rehabilitation and RTW after arthroplasty. It is feasible that the beliefs of some patients that they could not RTW until they were “healed” came from interactions with healthcare professionals, whether intentionally or unintentionally on the part of the healthcare team. It would be helpful to better understand this construct and thereby enable healthcare professionals to tackle unhelpful beliefs and promote positive expectations. Despite being a small study, our cohort study clearly demonstrated the importance of positive expectations of patients in determining successful early RTW. It would be desirable to evaluate an intervention to ensure consistent positive advice given throughout the healthcare journey and its impact on RTW timing.

Implications

Work matters to people and is important to their overall well-being, however we do not routinely collect work outcomes in clinical research, or in clinical care. To address this we need to agree on standard ways of collecting core information about patients’ work in all studies involving those of working age.

With people working to older ages and increasing number of arthroplasties being performed, the specific need to consider work factors in patient outcomes following arthroplasty is increasingly urgent.

Operating before the impact of their condition negatively impacts their work (e.g. time off sick) and social activities generally, may improve outcomes for patients in terms of RTW, but more research is needed to confirm this. We contest that RTW outcomes for patients should also form a part of the debate within the arthroplasty community as to whether surgery should be delayed "as long as possible" or not. A bigger study would be able to examine whether, at least for a working population, surgery should be delayed "until its measurably impacting on day-to-day life".

An important part of optimising RTW after surgery is exploring what impact an early return has on their ability to do their job, both in the short and long term. A longitudinal study would be able to examine any effects across time, and between different types of jobs.

Qualitative work confirmed that patients need and expect healthcare professionals to be able to provide clear and consistent guidance about RTW and surgery, as well as confirming the pivotal role healthcare professionals play in influencing how people feel about their recovery and ability to be able to go back to work. Having access to the post-operative healthcare support they needed was a key theme in this study and the importance of patients being provided with information before they are discharged from hospital, about what post-operative support is available to them, and how they can access it, is essential.

7.2 Conclusion

A large multi-site long term study is needed to address the important issues highlighted in this thesis and to inform healthcare professionals and employers to enable people back into work safely and successfully after surgery (see Figure 29).

The current evidence-base is limited and lack of standardisation between studies impedes comparison for research and the ability to inform patients about how long they might need to take off work after surgery, and depending on their job. It is important to determine what effect, if any, demographic, social, health and work factors have on time to return to work, to further inform patients what impact surgery may have on their work.

Our study showed some indication of benefit of an earlier return to work outcomes, but it will be important to confirm these results in a larger study by looking for indicators of harm (or benefit) in the short and longer term from an early return to work, and to different types of jobs.

The finding that an individual's pre-operative expectations about when they will RTW was strongly linked to the actual time they took off work, highlights an opportunity for healthcare professionals to influence their patients' expectations about when they can return to work thus optimising return to work outcomes for their patients.

Individuals should feel confident that lower limb arthroplasty is a successful operation and their likelihood of returning to any type of work afterwards is high. Patients should be encouraged to go back to work as soon as they feel able, and especially if their initial return can be on reduced hours and/or duties.

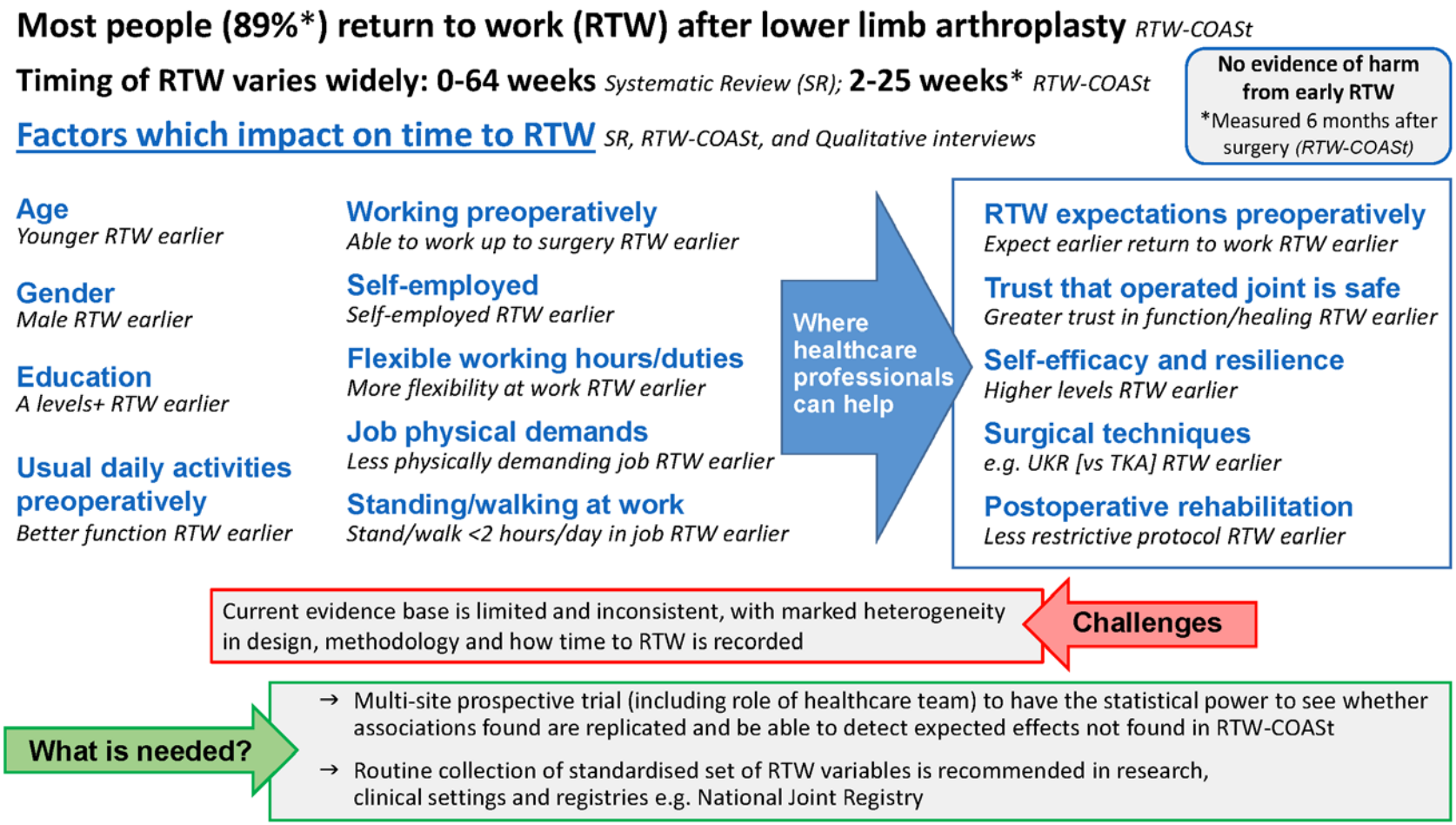

Figure 29. Diagram of factors which impact on time to RTW, highlighting modifiable factors where healthcare professionals can potentially positively intervene, current challenges in the research field, and what is needed to take this work forward

Appendix A :

UNIVERSITY of York
Centre for Reviews and Dissemination

NHS
National Institute for Health Research

PROSPERO International prospective register of systematic reviews

Systematic review of determinants of return to work timescales and strategies to enhance return to work following lower limb arthroplasty

Lisa Shipway, Cathy Linaker, Clare Harris, David Coggon, Keith Palmer, Karen Walker-Bone

Citation

Lisa Shipway, Cathy Linaker, Clare Harris, David Coggon, Keith Palmer, Karen Walker-Bone. Systematic review of determinants of return to work timescales and strategies to enhance return to work following lower limb arthroplasty. PROSPERO 2017:CRD42017060058 Available from
http://www.crd.york.ac.uk/PROSPERO_REBRANDING/display_record.asp?ID=CRD42017060058

Review question(s)

1. How much time does it take to return to work following lower limb arthroplasty?

2. What is known about factors associated with timing of return to work following lower limb arthroplasty?

3. What is the impact of strategies/interventions aimed to improve return to work after arthroplasty on timing of return to work?

Searches

The review will be limited to publications in English due to limited time and resources to enable translation. Year of publication will be unrestricted. The review will be limited to full text reports only to allow assessment of risk of bias for each study.

The search strategy will include the following databases:

MEDLINE (Ovid)

EMBASE (Ovid)

PsycINFO (EBSCO)

Types of study to be included

No restrictions will be imposed during the search strategy. All observational and intervention studies that describe work outcomes following lower limb arthroplasty will be included for data extraction. Review articles will be excluded, but if relevant, they will be descried in the introduction and/or discussion sections, and their reference lists will be checked for additional studies.

Condition or domain being studied

Arthroplasty is most commonly performed for patients with osteoarthritis (OA). OA causes significant problems in the working age population and can have a major effect on employment status. Both hip and knee arthroplasties are successful operations, performed with increasing frequency, and found to be effective in improving pain and function in working aged individuals. Figures from the National Joint Registry (for England, Wales, Northern Ireland and the Isle of Man) show that approximately 160,000 lower limb arthroplasties are performed each year, with around 18 per cent of patients below the age of 60 years. This increasing trend in arthroplasty frequencies resulted in the number of patients undergoing hip and knee replacement rising from 18,213 in 2006 to over 33,000 in 2014. The growth in the number of operations for those aged under 60 years coupled with progressive rises in the age of the UK workforce, means that arthroplasty patients are increasingly likely to need to work after their surgery and to remain in work for longer.

Participants/ population

Working-aged individuals undergoing total hip arthroplasty or total knee arthroplasty and whose return to work has been followed up post-operatively.

Intervention(s), exposure(s)
Any strategy or intervention aimed at improving outcomes after lower limb arthroplasty where return to work time has been assessed.

Comparator(s)/ control
Any alternative intervention, placebo or no intervention.

Context
Currently, there is no evidence on which to advise patients about when they should return to work after surgery. Due to the rising frequency of lower limb arthroplasty among the working population, work as an outcome has become increasingly important. Studies publishing work status and time to return to work following arthroplasty report return to work times varying from several days to several months. Current evidence does not explain these wide variations in timing of return to work and there are no existing systematic reviews which quantify associations with timing of return to work following lower limb arthroplasty for different risk factors or interventions.

Outcome(s)
Primary outcomes
1. Percentage (and number) of patients returning to work after lower limb arthroplasty.

2. Time to return to work after total hip or knee arthroplasty.

3. Predictors of timing of return to work after hip and knee arthroplasty.

Secondary outcomes
1. Comparing return to work outcomes and determinants between hip and knee arthroplasty.

Data extraction, (selection and coding)
Results from the database searches will be cross-checked and duplicate papers will be removed. Titles and abstracts of the remaining papers will be screened by two reviewers (LS and CL) for suitability for inclusion. Where there is doubt about the suitability for inclusion at this stage, the full text of the article will be assessed alongside the remaining full texts. If consensus between the reviewers cannot be obtained, disagreements will be resolved by discussion or by a third reviewer (KWB). The references of included studies and relevant systematic reviews will be hand-searched for additional studies.

LS and CL will independently extract the data from the included studies using a pre-piloted data extraction form. Any disagreement will be discussed between the two reviewers, and if necessary taken to a third reviewer (KWB).

Data items will be extracted as follows:

• Author, year of publication, country, study design;

• Number of participants in study (and number in intervention/comparator);

• Type of arthroplasty performed;

• Baseline demographic characteristics e.g. age, sex, psycho-social characteristics, BMI;

• Pre-operative occupation status, type and work pattern;

• Pre-operative joint symptoms and function, including measures used;

• Follow-up period;

• Number or % of patients working preoperatively;

• Duration of incapacity of work/time taken to return to work;

• Method of assessing return to work;

• Number or % of patients working preoperatively

• Post-operative occupation status, type and work pattern.

Risk of bias (quality) assessment
The methodological quality of the studies will be assessed by two reviewers (LS and CL) using the Scottish Intercollegiate Guidelines Network (SIGN) checklists for Randomised Controlled Trials, Cohort Studies and Case-Control studies. These checklists consider a list of relevant issues and lead to an overall grade for risk of bias for each study. Risk of bias will be appraised independently and will be reported and used to inform the narrative review synthesis.

Strategy for data synthesis
Return to work timescales will be reported for each study with details on occupation, surgical procedure and factors/strategies associated with timing of return to work.

Analysis of subgroups or subsets
Potential sources of heterogeneity (e.g. joint, age, gender, occupation, surgical procedure, and pre-operative symptoms) will be explored using sub-group analysis.

Dissemination plans
Dissemination plans include: publication in a peer-reviewed journal and presentation of findings at national and international rheumatology and occupational medicine conferences.

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UNIVERSITY of York
Centre for Reviews and Dissemination

NHS
National Institute for Health Research

Anticipated or actual start date
19 January 2017

Anticipated completion date
01 August 2017

Funding sources/sponsors
Arthritis Research UK/MRC Centre for Musculoskeletal Health and Work, MRC Lifecourse Epidemiology Unit, University of Southampton

Conflicts of interest
None known

Language
English

Country
England

Subject index terms status
Subject indexing assigned by CRD

Subject index terms
Arthroplasty; Humans; Lower Extremity; Return to Work

Stage of review
Ongoing

Date of registration in PROSPERO
30 March 2017

Date of publication of this revision
30 March 2017

Stage of review at time of this submission	Started	Completed
Preliminary searches	Yes	No
Piloting of the study selection process	Yes	No
Formal screening of search results against eligibility criteria	Yes	No
Data extraction	No	No
Risk of bias (quality) assessment	No	No
Data analysis	No	No

Appendix B :

1/19/2017 Ovid: Search Results

Database(s): **Ovid MEDLINE(R)** 1946 to December Week 1 2016

Search Strategy:

#	Searches	Results
1	exp Arthroplasty, Replacement, Hip/	22644
2	exp Arthroplasty, Replacement, Knee/	18436
3	"hip replace$".mp.	11273
4	"knee replace$".mp.	7522
5	exp Hip Prosthesis/	23182
6	exp Knee Prosthesis/	11078
7	hip prosthes$.mp.	24145
8	knee prosthes$.mp.	11848
9	hip arthroplast$.mp.	17135
10	knee arthroplast$.mp.	15592
11	total hip$.mp.	27210
12	total knee$.mp.	17251
13	THA.mp.	6630
14	TKA.mp.	5808
15	THR.mp.	25754
16	TKR.mp.	1527
17	exp Return to Work/	1229
18	Return$ to work.mp.	9019
19	resum$ work.mp.	353
20	exp Rehabilitation/	189288
21	exp disability evaluation/	49329
22	"working abilit$".mp.	570
23	exp Employment/	79329
24	exp Sick Leave/	5172
25	exp Resilience, Psychological/	3273
26	exp self efficacy/	17168
27	attitude/ or catastrophization/ or optimism/ or pessimism/	46754
28	"time off work".mp.	714
29	exp "Recovery of Function"/	45133
30	exp Workers' Compensation/	7801
31	exp Workload/	19081
32	exp Occupations/	34311
33	exp Occupational Health/	30885
34	physical work demands.mp.	99
35	exp work capacity evaluation/	5835
36	psychology, industrial/ or absenteeism/ or efficiency/ or presenteeism/	23545
37	1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 or 10 or 11 or 12 or 13 or 14 or 15 or 16	93734
38	17 or 18 or 19 or 20 or 21 or 22 or 23 or 24 or 25 or 26 or 27 or 28 or 29 or 30 or 31 or 32 or 33 or 34 or 35	469779
39	37 and 38	4858
40	limit 39 to english language	4384
41	limit 40 to humans	4357

Appendix C :

1/18/2017 Ovid: Search Results

Database(s): **Embase** 1980 to 2017 Week 03

Search Strategy:

#	Searches	Results
1	exp hip arthroplasty/ or exp hip surgery/	24597
2	exp knee arthroplasty/ or exp knee surgery/	32161
3	"hip replace$".mp.	14790
4	"knee replace$".mp.	25211
5	exp hip prosthesis/	39587
6	exp knee prosthesis/	9614
7	hip prosthes$.mp.	39452
8	knee prosthes$.mp.	9888
9	hip arthroplast$.mp.	30773
10	knee arthroplast$.mp.	28292
11	total hip$.mp.	42595
12	total knee$.mp.	26727
13	THA.mp.	9484
14	TKA.mp.	8003
15	THR.mp.	23593
16	TKR.mp.	2412
17	exp return to work/	3448
18	exp work resumption/	3377
19	Return$ to work.mp.	12253
20	"working abilit$".mp.	694
21	exp employment/	80931
22	exp medical leave/	5840
23	exp absenteeism/	15787
24	exp workman compensation/	8143
25	exp workload/	38372
26	exp occupational health/	205134
27	exp manual labor/	2891
28	exp "quality of life"/	398972
29	1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 or 10 or 11 or 12 or 13 or 14 or 15 or 16	130383
30	17 or 18 or 19 or 20 or 21 or 22 or 23 or 24 or 25 or 26 or 27 or 28	688293
31	29 and 30	4903
32	limit 31 to english language	4569
33	limit 32 to human	4409
34	limit 33 to (article or "review")	3308

Appendix D :

MY EBSCOhost

Wednesday, January 18, 2017 7:53:24 PM

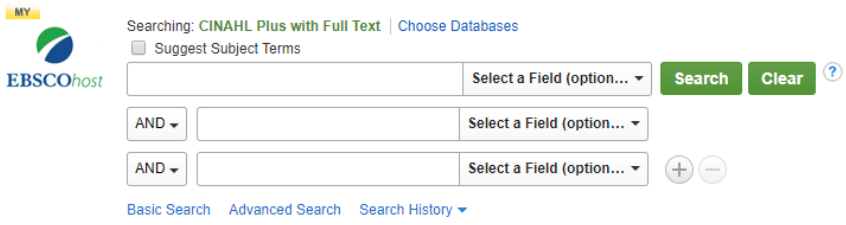
#	Query	Limiters/Expanders	Last Run Via	Results
S18	S16 AND S17	Search modes - Find all my search terms	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - PsycINFO	446
S17	S7 OR S8 OR S9 OR S10 OR S11 OR S12 OR S13 OR S14 OR S15	Search modes - Find all my search terms	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - PsycINFO	1,073,680
S16	S1 OR S2 OR S3 OR S4 OR S5 OR S6	Search modes - Find all my search terms	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - PsycINFO	509
S15	"returning to work"	Search modes - Boolean/Phrase	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - PsycINFO	495
S14	"employment status"	Search modes - Find all my search terms	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - PsycINFO	16,278
S13	reemployment	Search modes - Find all my search terms	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - PsycINFO	1,319
S12	employment	Search modes - Find all my search terms	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - PsycINFO	61,497
S11	rehabilitation or therapy or treatment	Search modes - Find all my search terms	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - PsycINFO	1,026,912

S10	"rehabilitation programs"	Search modes - Find all my search terms	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - PsycINFO	2,253
S9	"total knee replacement rehabilitation"	Search modes - Find all my search terms	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - PsycINFO	1
S8	"total hip replacement rehabilitation"	Search modes - Find all my search terms	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - PsycINFO	0
S7	"return to work"	Search modes - Find all my search terms	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - PsycINFO	2,122
S6	"knee prosthesis"	Search modes - Find all my search terms	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - PsycINFO	19
S5	"hip prosthesis"	Search modes - Find all my search terms	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - PsycINFO	34
S4	"total knee replacement" or "total knee arthroplasty"	Search modes - Find all my search terms	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - PsycINFO	172
S3	"total hip replacement" or "total hip arthroplasty"	Search modes - Find all my search terms	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - PsycINFO	145
S2	arthroplasty, replacement, knee	Search modes - Find all my search terms	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - PsycINFO	233
S1	arthroplasty, replacement,	Search modes - Find all	Interface - EBSCOhost	251

Appendix E :

CINAHL database search terms 22/03/2018

Saved on EBSCO, file name: A SR CINAHL 22032018



Search History/Alerts

Print Search History | Retrieve Searches | Retrieve Alerts | Save Searches / Alerts

Select / deselect all | Search with AND | Search with OR | Delete Searches | Refresh Se

	Search ID#	Search Terms	Search Options	Actions
	S14	S12 AND S13	Search modes - Find all my search terms	View Results (63) | View Details | Edit
	S13	S7 OR S8 OR S9 OR S10 OR S11	Search modes - Find all my search terms	Rerun | View Details | Edit
	S12	S1 OR S2 OR S3 OR S4 OR S5 OR S6	Search modes - Find all my search terms	Rerun | View Details | Edit
	S11	"returning to work"	Search modes - Boolean/Phrase	Rerun | View Details | Edit
	S10	"employment status"	Search modes - Find all my search terms	Rerun | View Details | Edit
	S9	reemployment	Search modes - Find all my search terms	Rerun | View Details | Edit
	S8	employment	Search modes - Find all my search terms	Rerun | View Details | Edit
	S7	"return to work"	Search modes - Find all my search terms	Rerun | View Details | Edit
	S6	"knee prosthesis"	Search modes - Find all my search terms	Rerun | View Details | Edit
	S5	"hip prosthesis"	Search modes - Find all my search terms	Rerun | View Details | Edit
	S4	"total knee replacement" or "total knee arthroplasty"	Search modes - Find all my search terms	Rerun | View Details | Edit
	S3	"total hip replacement" or "total hip arthroplasty"	Search modes - Find all my search terms	Rerun | View Details | Edit
	S2	arthroplasty, replacement, knee	Search modes - Find all my search terms	Rerun | View Details | Edit
	S1	arthroplasty, replacement, hip	Search modes - Find all my search terms	Rerun | View Details | Edit

Appendix F :

COASt - RTW | **Data Extraction – Randomised controlled trials** 1

STUDY IDENTIFICATION - **Title:**				
Reviewer	**Record number**	**Year**	**Primary author**	**Journal**

STUDY DETAILS		**Location in text**
Study design (Prospective /retrospective)		
Country or multi-national		
Duration of study recruitment		
Source of participants & method of recruitment		
Number assessed for eligibility		
Total number randomised		
PARTICIPANT CHARACTERISTICS		**Location in text**
Key inclusion criteria (including diagnosis)		
Key exclusion criteria		
Hip / knee / R or L		
Bilateral/unilateral surgery		
Type of surgery (same or different)		
Duration of follow-up after surgery		
INTERVENTION(S) & COMPARATOR(S)		
Group 1	**N**	**Location in text**
Description of intervention		
Post-op management		
RTW/functional advice given, when & who by		
Age (mean, SD)		
Male/female		
Educational attainment/SES		
Comorbidity (e.g. depression)		
Pre-op severity status (measure & score)		
Pre-op sick leave		
Workers comp/insurance/other funding for time off		
Occupational classification (including size of organisation) and numbers post-operative		
Total number of workers		
Group 2	**N**	**Location in text**
Description of intervention		
Post-op management		
RTW/functional advice given, when & who by		
Age (mean, SD)		
Male/female		
Educational attainment/SES		
Comorbidity (e.g. depression)		
Pre-op severity status (measure & score)		
Pre-op sick leave		
Workers comp/insurance/other funding for time off		
Occupational classification (including size of organisation) and numbers post-operative		
Total number of workers		

OUTCOMES		
Mark all outcomes recorded for this trial: Y/N Return to work timescale Y/N Return to full duties / partial duties Y/N Number of drop outs/losses to follow-up Y/N Complications Y/N Measures of symptom severity Y/N Measures of function Y/N Cost		
Primary outcome: Return to work time point		Location in text
Term used in text (eg sick leave, time to RTW etc)		
Definition of measure (eg time from surgery to return to full duties etc)		
Method of data collection (eg patient self-report etc)		
Time point(s) at which outcome is reported		

RESULTS: return to work time point

Grp 1 N workers	Grp 1 Mean/ median	Grp 1 SD/IQR	Grp 2 N workers	Grp 2 Mean/ median	Grp 2 SD/IQR	Time point	Type of effect estimate	Low CI	Up CI	p-value	Location in text

Other outcomes for RTW Group 1 Group 2											

Grp 1 N workers	Grp 1 Mean/ median	Grp 1 SD/IQR	Grp 3 N workers	Grp 3 Mean/ median	Grp 3 SD/IQR	Time point	Type of effect estimate	Low CI	Up CI	p-value	Location in text

Other outcomes for RTW Group 3											

Grp 2 N workers	Grp 2 Mean/ median	Grp 2 SD/IQR	Grp 3 N workers	Grp 3 Mean/ median	Grp 3 SD/IQR	Time point	Type of effect estimate	Low CI	Up CI	p-value	Location in text

Appendix G :

STUDY IDENTIFICATION **Title:** x				
Reviewer	Record number	Year	Primary author	Journal

STUDY DETAILS		**Location in text**
Study design (Prospective /retrospective)		
Country or multi-national		
Duration of study recruitment		
Source of participants & method of recruitment		
Number assessed for eligibility		
Total number included		
PARTICIPANT CHARACTERISTICS		**Location in text**
Key inclusion criteria (including diagnosis)		
Key exclusion criteria		
Hip /knee / R or L		
Bilateral/unilateral surgery		
Type of surgery (same or different)		
Duration of follow-up after surgery		

INTERVENTION(S) & COMPARATOR(S)			
Group 1		**N**	**Location in text**
Description of exposure			
Post-op management			
RTW/functional advice given, when & who by			
Age (mean, SD)			
Male/female			
Educational attainment/SES			
Comorbidity (e.g. depression)			
Pre-op severity status (measure & score)			
Pre-op sick leave			
Worker's comp/insurance/ other funding for time off			
Occupational classification (including size of organisation) and numbers post-operative			
Total number of workers			
Group 2		**N**	**Location in text**
Description of exposure			
Post-op management			
RTW/functional advice given, when & who by			
Age (mean, SD)			
Male/female			
Educational attainment/SES			
Comorbidity (e.g. depression)			
Pre-op severity status (measure & score)			
Pre-op sick leave			
Worker's comp/insurance/ other funding for time off			
Occupational classification (including size of organisation) and numbers post-operative			
Total number of workers			

OUTCOMES

Mark all outcomes recorded for this trial:
Y/N Return to work timescale
Y/N Return to full duties / partial duties
Y/N Number of drop outs/losses to follow-up
Y/N Complications
Y/N Measures of symptom severity
Y/N Measures of function
Y/N Cost

Primary outcome: Return to work time point		Location in text
Term used in text (eg sick leave, time to RTW etc)		
Definition of measure (eg time from surgery to return to full duties etc)		
Method of data collection (eg patient self-report etc)		
Time point(s) at which outcome is reported		

RESULTS: return to work time point

Grp 1 N workers	Grp 1 Mean/ median	Grp 1 SD/IQR	Grp 2 N workers	Grp 2 Mean/ median	Grp 2 SD/IQR	Time point	Type of effect estimate	Low CI	Up CI	p-value	Location in text

Other outcomes for RTW
Group 1

Group 2

Grp 1 N workers	Grp 1 Mean/ median	Grp 1 SD/IQR	Grp 3 N workers	Grp 3 Mean/ median	Grp 3 SD/IQR	Time point	Type of effect estimate	Low CI	Up CI	p-value	Location in text

Other outcomes for RTW
Group 3

Grp 2 N workers	Grp 2 Mean/ median	Grp 2 SD/IQR	Grp 3 N workers	Grp 3 Mean/ median	Grp 3 SD/IQR	Time point	Type of effect estimate	Low CI	Up CI	p-value	Location in text

Appendix H :

University Hospital Southampton NHS
NHS Foundation Trust

Southampton General Hospital
Mailpoint 63, G Level, West Wing
Tremona Road
Southampton
SO16 6YD

Telephone: 02380 764005
Email: lisa.shipway@uhs.nhs.uk

COASt

Clinical Outcomes in Arthroplasty Study

Dear Sir/Madam

We are writing to invite you to take part in an important medical research project. You have been chosen because you have recently attended an orthopaedic clinic and been placed on the waiting list for a hip/knee replacement or revision surgery.

Before you decide whether to take part, it is important for you to understand why the research is being done, and what it will involve. Please take time to read the Patient Information Sheet enclosed and feel free to discuss it with family and friends. Please be assured that taking part in this study is voluntary and if you decide to decline this will not affect your medical care, or the surgery, in any way.

If you do NOT wish to take part in this project, please contact us by: telephone on 02380 764005 or email at lisa.shipway@uhs.nhs.uk. We will contact you by telephone, within two weeks, to discuss the project if we do not hear from you. Please feel free to contact our office if you require any further information.

Yours sincerely,

Professor N Arden
Chief Investigator

University Hospital Southampton NHS
NHS Foundation Trust

OMB
OXFORD MUSCULOSKELETAL BIOBANK

COASt

Clinical Outcomes in Arthroplasty Study

Chief Investigator: Professor Nigel Arden
MRC Epidemiology Resource Centre
Southampton Hospital

Oxford REC A (REC Ref: 10/H0604/91)

Patient Information Sheet

Introduction

We are inviting you to take part in a research project. Before you decide whether to take part it is important for you to know why the research is being done, and what it will involve for you. Please take time to read the following information carefully to decide whether you wish to take part. Please feel free to talk to others about the study if you wish.

What is the Research Project about?

Hip and knee replacements are the most common elective orthopaedic operations performed in the National Health Service (NHS). The aim of this research is to gain a better understanding of the mechanisms and risk factors underlying musculoskeletal diseases in order to develop new methods of assessment, diagnosis and treatment.

This is a joint study between University Hospital Southampton (UHS) NHS Foundation Trust and the Nuffield Orthopaedic Centre (NOC) within Oxford University Hospitals NHS Trust. Patients who are being considered for hip and knee replacements and revision surgery are being invited to take part in the COASt study.

Do I have to take part?

No. Your participation in this study is entirely voluntary. You are free to decline to enter or withdraw from the study at any time without having to give a reason. If you choose not to enter the study, or withdraw once entered, this will in no way affect your medical care or alter the treatment your doctors have already planned.

What will it involve if I decide to take part?

If you decide you would like to participate in the study, you will be contacted by a member of the research team who will answer any questions relating to the study that you may have. A research appointment will be made for you to attend Southampton General Hospital before and one or two years after your operation, at your convenience.

You may be sent a Patient Self Assessment questionnaire which will include social/medical history and aspects of your lifestyle to complete at home. You will be asked to bring the completed questionnaire with you when you come to your research appointment. During your research appointment you will be asked to sign a Study Consent Form. You will also be asked to provide blood, urine and/or tissue samples. You will be given a copy of your signed consent from and patient information sheet, copies of these will also be retained in your hospital records.

Information will be collected from your hospital records following your surgery.

All information will be retained in your research folder and recorded onto a password protected database.

You will be asked to complete a postal questionnaire at 6 weeks after your operation and then yearly for the next 5 years. You will also be asked to take part in a brief telephone interview at 3 and 6 months after your operation. You are free to decline to answer any of the questions at any time without giving a reason.

How will the information I provide be used?

Once the anonymised results of the study have been gathered and analysed, we will present this data at national and international scientific meetings and publish the results in medical journals so that others can read about and learn from them. This kind of research helps us to plan more efficiently and effectively for the National Health Service.

What are the advantages and disadvantages of taking part?

There are no disadvantages in contributing to this study. Blood samples are usually taken at the time of routine investigation/follow up. If you are having an operation then the tissue samples used for research are only taken from any tissue that is being removed in the normal course of surgical treatment: no additional tissue is removed.

There are no advantages to you, but the results of research using samples of tissue taken from you and others may help patients in the future. You are asked to donate your tissue freely for research and you will not receive a financial reward either now or in the future. Your samples will not be sold for profit to other researchers. Your samples may be used for research that may lead to the development of new assessment tools, drugs or therapies, which may eventually be marketed, and companies may sell these for profit.

What will happen to any samples that I give?

We will store your tissue, blood, urine samples and data at the Oxford Musculoskeletal BioBank (OMB) which is based in Oxford and licensed by the Human Tissue Authority and approved by a research ethics committee. The OMB is a tissue and data facility for a number of research projects that study diseases of bone, joint and other soft tissues.

Samples and data will be stored by the OMB for use by the COASt study. Upon completion of the COASt study any remaining samples and associated data will become available to other ethically approved projects, many of which are not yet known and will depend on the development of new research techniques in the future. However all research projects will be subject to approval by a Research Ethics Committee and access to samples and data will be controlled.

Scientists who are experts in genetics may perform tests on your samples – the results of these tests may provide information on which genes cause arthritis and other musculoskeletal diseases and whether it responds to certain treatments. Samples and data collected may be transferred for the purpose of research and analysis to associated investigators within/outside the European Economic Area.

Will my taking part in the project be kept confidential?

All information regarding your medical records will be treated as strictly confidential. The data will initially be stored at UHS and transferred to the database at Oxford for permanent storage. Participation in this study will in no way affect your legal rights.

Personal data, which may be sensitive (e.g. name, date of birth) will be collected and processed but only for research purposes in connection with this study. All data will remain confidential, and no personal details will be made available to any third parties. Details about you will be stored on a computer during this research project. Information on you, your clinical history and biological samples will be coded so that these are all anonymous.

What if something goes wrong?

We do not believe that you will be harmed by taking part in this research study but in the event that something does go wrong and if this is due to someone's negligence, then you may have grounds for legal action for compensation against UHS, but you may have to pay your legal costs. The normal NHS complaints mechanism will still be available to you. As the Chief Investigator is an employee of the University of Southampton, additional professional indemnity and clinical investigation insurance is in place. Regardless of this, any complaint about the way you have been dealt with during the study or any possible harm you might suffer will be addressed.

Please raise your concerns in the first instance with the Chief Investigator, Professor Nigel Arden. If you wish to make a more formal complaint, please contact the hospital's Patient Support Service on 023 81 206325 (available 9 am to 4:30 pm Monday to Friday, out of hours there is an answer phone). Email PatientSupportService@uhs.nhs.uk or write to Patient Support Services, MP 81, University Hospitals Southampton NHS Foundation Trust, Tremona Road, Southampton, SO16 6YD.

Where can I find out more about research in general?

INVOLVE is a national advisory group, funded by the National Institute for Health Research (NIHR). Its role is to support and promote active public involvement in NHS, public health and social care research, http://www.invo.org.uk/ or Wessex House, Upper Market Street, Eastleigh, Hampshire, SO50 9FD. Telephone: 02380 651088 or email admin@invo.org.uk.

Who is organising and funding the research?

This study is being funded by the National Institute of Health Research (NIHR). The researchers in this study conduct research on a time basis and are paid a fixed salary which is independent of whether you participate in the study or not.

Who has reviewed and approved the study?

This study has been reviewed and approved by Oxford REC A (REC Ref: 10/H0604/91).

Oxford Musculoskeletal BioBank has been approved by Oxford REC C (REC Ref: 09/H0606/11, 3rd March 2009) and is regulated and licensed by the Human Tissue Authority (Licence No: 12217).

Research enquiries:

If you have any questions, concerns or complaints about the study, please contact the research team.

Southampton Research Team:

Professor Nigel Arden **(Chief Investigator)**	Telephone: 01865 227357
Nuffield Department of Orthopaedic, Rheumatology and Musculoskeletal Sciences Botnor Research Centre, Old Road, Oxford OX3 7HE	Email: Nigel.arden@ndorms.ox.ac.uk
Lisa Shipway **(PhD researcher)**	Telephone: 02381 205279
Mailpoint 63 G Level West Wing Southampton General Hospital Tremona Road Southampton SO16 6YD	Email: ls2@mrc.soton.ac.uk

Oxford Research Team:

Stefanie Garden **(COASt Manager)**	Telephone: 01865 737850
Nuffield Department of Orthopaedics, Rheumatology & Musculoskeletal Sciences Nuffield Orthopaedic Hospital Windmill Road, Headington Oxford OX3 7HE	Email: Stefanie.garden@ndorms.ox.ac.uk
Karolina Kliskey **(Oxford Musculoskeletal BioBank Coordinator)**	Telephone: 01865 737418
Nuffield Department of Orthopaedics, Rheumatology & Musculoskeletal Sciences Nuffield Orthopaedic Hospital Windmill Road, Headington Oxford OX3 7HE	Email: Karolina.kliskey@ndorms.ox.ac.uk

SAMPLE CONSENT FORM

If you wish to take part in the study you will be asked to confirm your agreement with the following statements.

1	I confirm that I have read, understood and have had time to consider the Patient Information Sheet **Version 7.0 dated 28th November 2016** and have been given a copy to keep. I have had the opportunity to ask questions about this project.	Initial
2	I understand that my participation is voluntary and that I am free at any time to withdraw, without giving any reason, without my medical care or legal rights being affected.	Initial
3	I understand that relevant sections of my medical notes and data collected, during the study, may be looked at by individuals from the sponsor, from regulatory authorities or from the NHS Trust, where it is relevant to my taking part in this research. I give permission for these individuals to have access to my records.	Initial
4	I agree to give samples of blood, urine and tissue for COASt as detailed in the Patient Information Sheet.	Initial
5	I agree to have physical assessments.	Initial
6	I agree to take part in 1 preoperative and 2 postoperative postal questionnaires (6 weeks and 1 year after surgery) and 2 brief telephone interviews (3 and 6 months after surgery).	Initial
7	I agree to take part in the long term follow up of COASt.	Initial
8	I understand results from research tests on my samples might be medically important to me.-I agree to my GP being informed of relevant findings.	Initial
9	I agree that the sample(s) I have given and the information gathered about me can be stored for use in future projects, subject to ethical approval, which may include genetic studies as described in Patient Information Sheet. I understand that some of these projects may be carried out by researchers working abroad or for commercial companies.	Initial
10	I agree that the sample(s) of blood, urine and tissue I have given and the information gathered about me can be stored by the Oxford Musculoskeletal BioBank (OMB) in an anonymised format for the duration of the study.	Initial
11	Once the study is complete, I agree to gift the samples and the information gathered about me can be stored by the Oxford Musculoskeletal BioBank (OMB) for possible future research projects. If a commercial product were developed as a result of this study I will not profit financially from such a product. Please circle: Yes / No	Initial

Name of patient	Signature	Date
I have discussed the study with this patient who has agreed to give informed consent.		
Name of witness	Signature	Date

Appendix I :

Coast Study ID: _____ Pre Operative Patient Self Assessment - Hip

University Hospital Southampton NHS
NHS Foundation Trust

COASt
Clinical Outcomes in Arthroplasty Study

Dear Patient

Thank you for agreeing to take part in this study. This booklet is specifically for the hip surgery you are coming in for, so if it asks about 'your problem' it is referring to the problem you are having surgery for (i.e. hip surgery for hip problem etc.).

We would request that you complete all sections of this questionnaire.

We appreciate that the questionnaire is detailed but it will assist us to gather information for the study.

Please answer all questions in clear print.

Please use a black or blue pen.

Please tick all relevant option boxes.

Once you have completed this booklet please return in the enclosed envelope – No stamp required

For any further questions or information, please feel free to contact us:

Thank you

Lisa Shipway or Elena Zaballa
Tel: 023 80 764005 or 023 81 205279
Email: ls2@mrc.soton.ac.uk or
ez@mrc.soton.ac.uk

Coast Study ID: _____ Pre Operative Patient Self Assessment - Hip

Patient Self Assessment for Inpatient Surgery

Patients: Please be sure to complete the following …

All sections within this booklet

Please fill in today's date: D D M M Y Y Y Y

Patient personal details

1.1 **Study Number:** _____

1.2 **Date of Birth:** _____

1.3 **Address:** _____

_____ 1.4 **Post code:** _____

1.5 **Gender:** Male ☐ i Female ☐ ii

1.6 **Civil State:** Single ☐ i Married ☐ ii Widowed ☐ iii Divorced ☐ iv Separated ☐ v

2.1 **General Practitioner's (GP) Name:** _____

2.2 **Surgery Address:** _____

2.3 **Post Code:** _____ 2.4 **Tel. No.** _____

3.1 **At what age did you finish full time education?** _____

3.2 **Do you have any of the following qualifications?** *(Please tick all the boxes that apply)*

None ☐ i GCSE/O Level ☐ ii A level ☐ iii

Further education ☐ iv Higher education (diploma / degree / PhD) ☐ v

4. **Please give your height and your weight**

Height ☐ ft ☐☐ ins or ☐☐☐ cm

Weight ☐☐ st ☐☐ lbs or ☐☐☐ kg

Coast Study ID: _____ Pre Operative Patient Self Assessment - Hip

5. **Recording of ethnic group information for patients**

Please note: We are not asking about citizenship or nationality, but about the ethnic group to which you feel you belong. Please complete the form below by ticking the box of the ethnic group you feel you belong to. If you feel you are descended from more than one group, please tick the one you feel you belong to more, or choose the 'Any other ethnic group' option

A	**White**	British	☐
B		Irish	☐
C		Any other White Background	☐
D	**Mixed**	White and Black Caribbean	☐
E		White and Black African	☐
F		White and Asian	☐
G		Any other Mixed Background	☐
H	**Asian or British Asian**	Indian	☐
I		Pakistani	☐
J		Bangladeshi	☐
K		Any other Asian Background	☐
L	**Black or Black British**	Caribbean	☐
M		African	☐
N		Any other Black Background	☐
O	**Other Ethnic Groups**	Chinese	☐
P		Any other Ethnic Group	☐

6. **Have you ever smoked regularly (at least once a day for a month or longer)?**

a) No ☐ b) Yes ☐ *If No, go to Question 8*

7. **Do you still smoke regularly?** *(Tick one box)*

a) No ☐ b) Yes ☐

8. **How much of the following do you drink per week, on average?**

a) Beer, cider, lager ☐☐ Pints b) Wine, sherry ☐☐ Glasses

c) Spirits, liqueurs ☐☐ Measures

Coast Study ID: _____ Pre Operative Patient Self Assessment - Hip

The following questions are about your hip that is being operated on

9. **How long have you suffered with this problem?**

Months [ ][ ] i Years [ ][ ] ii

10. **Have you previously had any surgery to this hip?**

a) No [ ] b) Yes [ ] *If Yes, please indicate which operation(s) you have had to this hip and the year(s) of the operation(s)*

Type of Operation	Resurfacing	Osteotomy	Joint replacement	Other *(Please specify)*
	[ ]	[ ]	[ ]	_____
Year	YYYY	YYYY	YYYY	YYYY

11. **Have you used any of the following services, listed below, in the last 12 months for problems relating to your hip problem?** *(If Yes, please indicate NHS or private and how many times you have seen them)*

11.1 **General Practitioner (GP):**

No [ ] i Yes [ ] ii No. of times seen in NHS [ ][ ] iii No. of times seen privately [ ][ ] iv

11.2 **Hospital doctor:**

No [ ] i Yes [ ] ii No. of times seen in NHS [ ][ ] iii No. of times seen privately [ ][ ] iv

11.3 **Physiotherapist:**

No [ ] i Yes [ ] ii No. of times seen in NHS [ ][ ] iii No. of times seen privately [ ][ ] iv

11.4 **Nurse/Practitioner:**

No [ ] i Yes [ ] ii No. of times seen in NHS [ ][ ] iii No. of times seen privately [ ][ ] iv

If Yes, please state type of nurse/practitioner seen: _____

11.5 **Alternative practitioners (e.g. Chiropractor, Osteopath etc.)**

No [ ] i Yes [ ] ii No. of times seen in NHS [ ][ ] iii No. of times seen privately [ ][ ] iv

If Yes, please state type of practitioner seen: _____

11.6 **Accident and Emergency (A & E)**

No [ ] i Yes [ ] ii No. of times seen [ ][ ] iii *If Yes, please specify*

_____

11.7 **Other NHS services or health care professionals**

No [ ] i Yes [ ] ii *If Yes, please state type of service or professional seen*

_____

12. **Have you discussed working after your joint surgery with any member of your healthcare team?** No ☐ Yes ☐

If No, go to Question 14. **If Yes, please indicate which healthcare professional(s) you have discussed work after your surgery with:**

(Please tick all that apply)

12.1 **In a hospital setting** *(either at outpatient clinic or as an inpatient)*

a) Surgeon ☐
b) Nurse ☐
c) Physiotherapist ☐
d) Occupational therapist ☐
e) Other health professional at hospital *(Please state)* _____ ☐

12.2 **At the GP surgery or in the community**

a) General Practitioner (GP) ☐
b) Nurse ☐
c) Physiotherapist ☐
d) Other health professional at surgery *(Please state)* _____ ☐
e) Occupational Health clinician ☐
f) Other health professional *(Please state)* _____ ☐

13. **What advice have you been given?** *(If you received advice from more than one healthcare professional, please indicate **who** gave you **what** advice.)*

_____
_____
_____
_____
_____

14. **Have you found out about what to expect concerning work after joint surgery from any other sources?** (e.g. Family and friends, TV/radio programmes, web sites etc.)

a) No ☐ b) Yes ☐

14.1 **If Yes, please provide details about where (e.g. web site) you found out about return to work after surgery and what that information was:**

_____
_____
_____
_____

Coast Study ID: _____ Pre Operative Patient Self Assessment - Hip

Your general health

15. **In general would you say your health is?** *(Tick one box)*

a) Excellent ☐ b) Very good ☐ c) Good ☐ d) Fair ☐ e) Poor ☐

16. **During the past 12 months, have you had pain in your back or neck for a month or longer that made it difficult or impossible to get washed or dressed or do household chores?**

a) No ☐ b) Yes ☐

17. **During the past 12 months, have you had pain in your arm(s) or shoulder(s) for a month or longer that made it difficult or impossible to get washed or dressed or do household chores?**

a) No ☐ b) Yes ☐

18. **During the past 12 months, have you had pain in your knee(s) for a month or longer that made it difficult or impossible to get washed or dressed or do household chores?**

a) No ☐ b) Yes ☐

19. **During the past 12 months, have you had pain in your other hip for a month or longer that made it difficult or impossible to get washed or dressed or do household chores?**

a) No ☐ b) Yes ☐

20. **Have you previously had surgery to your other hip or your knee(s)?**

a) No ☐ b) Yes ☐ *If Yes, please indicate which operation(s) you have had to your hip or knee(s) and the year(s) of the operation(s)*

	Surgery to cartilage or ligaments	Resurfacing	Osteotomy	Joint replacement	Other *(Please specify)*
Other hip		☐ YYYY	☐ YYYY	☐ YYYY	_____ YYYY
Left knee	☐ YYYY	☐ YYYY	☐ YYYY	☐ YYYY	_____ YYYY
Right knee	☐ YYYY	☐ YYYY	☐ YYYY	☐ YYYY	_____ YYYY

Coast Study ID: _____ Pre Operative Patient Self Assessment - Hip

21. **In the past 12 months have you had any of the following problems?** *(Please tick all answers that apply)*

	Problem	Have you seen a doctor for the problem?	Have you visited hospital for the problem?	Have you had any prescribed medicine for the problem?	Has the problem stopped you doing things?
a)	Heart disease	☐	☐	☐	☐
b)	High blood pressure	☐	☐	☐	☐
c)	Lung disease	☐	☐	☐	☐
d)	Diabetes	☐	☐	☐	☐
e)	Ulcer or stomach disease	☐	☐	☐	☐
f)	Kidney disease	☐	☐	☐	☐
g)	Liver disease	☐	☐	☐	☐
h)	Anaemia or other blood disease	☐	☐	☐	☐
i)	Cancer	☐	☐	☐	☐
j)	Depression	☐	☐	☐	☐
k)	Osteoarthritis, degenerative arthritis	☐	☐	☐	☐
l)	Back pain	☐	☐	☐	☐
m)	Rheumatoid arthritis	☐	☐	☐	☐
	Other medical problem *(Please write in)*				
n)	_____	☐	☐	☐	☐
o)	_____	☐	☐	☐	☐

22. **Have you used any Home Care service in the past 12 months?** *(If Yes, please indicate the number of hours per week paid for by Social Services and/or paid by Yourself):*

No ☐[i] Yes ☐[ii] Hours a week by **Social Services** *(on average)*: _____ each week

Hours a week paid by **Yourself** *(on average):* _____ each week

22A. **Have you received any Unpaid care (e.g. from family or friends) in the past 12 months?**

No ☐[i] Yes ☐[ii] Hours a week of **Unpaid** care *(on average)*: _____ each week

Coast Study ID: _____ Pre Operative Patient Self Assessment - Hip

23. Below is a list of problems people sometimes have. **Please read each one carefully and circle the number that best describes how much that problem has distressed or bothered you during the past 7 days including today**. *(Please circle only one number for each problem)*

	Items	Not at all	A little bit	Moderately	Quite a bit	Extremely
a)	Faintness or dizziness	0	1	2	3	4
b)	Pains in the heart or chest	0	1	2	3	4
c)	Nausea or upset stomach	0	1	2	3	4
d)	Trouble getting your breath	0	1	2	3	4
e)	Numbness or tingling in parts of your body	0	1	2	3	4
f)	Feeling weak in parts of your body	0	1	2	3	4
g)	Hot or cold spells	0	1	2	3	4

Current employment status

24. **Which of the following best describes your current work situation?** *(Tick one box)*

a) Employed (at work) ☐ b) Self-employed (at work) ☐

c) Employed (off sick) ☐ d) Self-employed (off sick) ☐

e) No paid job ☐ *If you are not in a job at present, please go to Question 41*

For those currently in a paid job

Please complete the following questions only if you currently hold a paid job (whether or not you are off sick from this work). *If you do not have a job now, then please go to Question 41*

25. **What is your current occupation?**
(If you have more than one job, please answer with the details of your main job) _____

Industry (e.g. farming, shipyard, car factory, shoe shop, hospital, insurance office) _____

26. **When did you start working in your main job?** M M Y Y Y Y

27. **Do you work in the public or private sector?** *(Tick one box)*

a) **Public sector/local government** (e.g. local authority, NHS, fire service, police, ambulance service) ☐

b) **Private sector** ☐

28. **Approximately how many people work in your organisation, in total?** *(Tick one box)*

Just me ☐ 2-9 ☐ 10-29 ☐ 30-499 ☐ 500+ ☐

29. **Do you have access to an occupational health service in your main job?** *(Tick one box)*

a) No ☐ b) Yes ☐ c) Don't Know ☐

Normal content of your job

*The next set of questions relate to the **normal demands of your job**. If you've altered what you do because of your hip problem, please tell us what the work would normally be like without this problem.*

30. **Approximately how many hours do you normally work each week?** ☐☐ hours

31. **In an average day, does your main job normally include:** *(Tick one box on each line)*

	No	Yes
a) Standing/walking for more than 2 hours in total?	☐	☐
b) Walking for more than 1 mile in total?	☐	☐
c) Kneeling or squatting?	☐	☐
d) Climbing more than 30 flights of stairs?	☐	☐
e) Climbing ladders?	☐	☐
f) Lifting 10kg (20lbs) or more by hand?	☐	☐

32. **Is driving normally part of your main job?** *(Tick one box)*

a) Essential to the job ☐ b) A part of the job, but not essential ☐ c) No ☐

32A. **Is driving important for you to be able to get to or from your main place of work?** *(Tick one box)*

a) Essential for getting to or from workplace ☐ b) Useful but not essential ☐ c) No ☐

33. **Is using public transport important for you to be able to get to or from your main place of work?** *(Tick one box)*

a) Essential for getting to or from workplace ☐ b) Useful but not essential ☐ c) No ☐

The next set of questions are about how your hip problem may affect you at work

34. **Has your joint problem affected your ability to do your current job?**

a) No, not at all ☐ b) Yes, a little ☐ c) Yes, a lot ☐

35. **Have you reduced your working hours (either completely or partly) due to your hip problem?** No ☐ Yes ☐

36. **Have you been at work in the past 4 weeks?** No ☐ Yes ☐

36.1 **If No, when were you last at work?** D D M M Y Y

36.2 **If Yes, did you take any time off sick (either completely or partly) because of <u>your hip problem</u> in these 4 weeks?** No ☐[i] Yes ☐[ii]

36.3 **How much time have you taken off in total over the past 4 weeks?**

None ☐ Days ☐☐ Weeks ☐☐

36.4 **How much time have you taken off in total over the past 6 months (including the past 4 weeks)?**

None ☐ Days ☐☐ Weeks ☐☐

37. **Have any of the following changes been made at work to help you cope with your joint problem?** *(Please tick No or Yes for each item)*

	No	Yes
a) Your duties have been altered or reduced	☐	☐
b) Some of your duties have been given to another person	☐	☐
c) You have moved to another job within the same business	☐	☐
d) You have moved to a different workplace in the same business	☐	☐
e) Your working hours have changed (temporarily or permanently)	☐	☐
f) Work equipment obtained, or old equipment modified or changed	☐	☐
g) Alteration(s) have been made to the premises	☐	☐
If self-employed, go to Question 38. If employed, please continue		
h) New training has been provided	☐	☐
i) Extra supervision has been provided for you	☐	☐

38. **After your operation, will you be eligible for any sick pay from your employer (or an insurance scheme)?** *(Tick one box)*

a) No ☐ b) Yes ☐ c) Don't Know ☐

39. **If Yes, for how many weeks ...**

a) ... at full pay? ☐☐ weeks

b) ... at reduced pay? ☐☐ weeks

40. **Roughly how much of the total household income comes from money which you personally earn in a paid job?** Please do not include any money that you receive from pensions or investments *(Tick one box)*

a) None ☐ b) Less than a quarter ☐ c) Between a quarter and a half ☐ d) Half or more ☐

Please now go to Question 42

For those NOT currently in a paid job

41. **If you are not currently in paid work, what was your last paid job?** *Reason for leaving included problem with your hip(s)?*

Occupation	Industry	Date Left	Mainly	Partly	Not at all
_____	_____	M M Y Y Y Y	☐	☐	☐

41A. **If you left work because of a problem with your hip, please give further details:**

_____

Returning to work after surgery

42. **How soon do you hope to return to paid work after your surgery?**

☐☐ weeks

43. **What type of work do you hope to do after your joint replacement?** *(Tick one box)*

a) Same as my current or last job-***just the same*** ☐

b) Same as my current or last job-***with changes*** ☐ Please describe _____

c) Different from my current or last job ☐ Please describe _____

44. **Thinking about the work you plan to do after surgery, how much do you expect your joint replacement to affect your ability to work …**
(If you think the hip problem will affect your work activities only a little, choose a low number. Choose a high number if you expect your hip problem will affect your work activities a great deal)

… **6 weeks** after surgery? Hip problem will have no effect on my work	1	2	3	4	5	6	7	8	9	10	Hip problem will completely prevent me from working
					(Circle a number)						
… **12 weeks** after surgery? Hip problem will have no effect on my work	1	2	3	4	5	6	7	8	9	10	Hip problem will completely prevent me from working
					(Circle a number)						
… **26 weeks** after surgery? Hip problem will have no effect on my work	1	2	3	4	5	6	7	8	9	10	Hip problem will completely prevent me from working
					(Circle a number)						
… **12 months** after surgery? Hip problem will have no effect on my work	1	2	3	4	5	6	7	8	9	10	Hip problem will completely prevent me from working
					(Circle a number)						

Coast Study ID: _____ Pre Operative Patient Self Assessment - Hip

45. **How important is it to you as an individual that you return to work?**
(If it is very important to you, choose a high number. Choose a low number if is not very important to you)

Not important 1 2 3 4 5 Very important
(Circle a number)

46. **Please indicate how much you agree or disagree with each of the following statements**	Strongly agree	Agree	Disagree	Strongly disagree
	(Please tick one box on each line)			
a) If I don't have a job, I don't feel right …	☐	☐	☐	☐
b) A person should work in a job in order to keep the respect of family and friends …	☐	☐	☐	☐
c) I really can't think well of myself unless I have a job …	☐	☐	☐	☐
d) The most important things that happen to me involve work …	☐	☐	☐	☐

Your <u>current health</u>

47. **By placing a tick in one box in each group below, please indicate which statement best describes your health <u>today</u>:**

47.1 **Mobility**
- a) I have no problems in walking about ☐
- b) I have slight problems in walking about ☐
- c) I have moderate problems in walking about ☐
- d) I have severe problems in walking about ☐
- e) I am unable to walk about ☐

47.2 **Self-Care**
- a) I have no problems washing or dressing myself ☐
- b) I have slight problems washing or dressing myself ☐
- c) I have moderate problems washing or dressing myself ☐
- d) I have severe problems washing or dressing myself ☐
- e) I am unable to wash or dress myself ☐

47.3 **Usual Activities** (e.g. Work, study, housework, family or leisure activities)
- a) I have no problems doing my usual activities ☐
- b) I have slight problems doing my usual activities ☐
- c) I have moderate problems doing my usual activities ☐
- d) I have severe problems doing my usual activities ☐
- e) I am unable to do my usual activities ☐

47.4 **Pain/Discomfort**
- a) I have no pain or discomfort ☐
- b) I have slight pain or discomfort ☐
- c) I have moderate pain or discomfort ☐
- d) I have severe pain or discomfort ☐
- e) I have extreme pain or discomfort ☐

47.5 **Anxiety/Depression**
- a) I am not anxious or depressed ☐
- b) I am slightly anxious or depressed ☐
- c) I am moderately anxious or depressed ☐
- d) I am severely anxious or depressed ☐
- e) I am extremely anxious or depressed ☐

48. **The following questions concern your social life.** For each of the following situations please indicate how restricted you have been because of your hip problem in the last 4 weeks. For each question tick the box that describes you best.

48.1 How does your joint problem restrict you getting on with people (friends and family)?
Not at all [ ]i A little [ ]ii Moderately [ ]iii Severely [ ]iv Extremely [ ]v

48.2 How does your joint problem restrict you having friends or relatives over to your home?
Not at all [ ]i A little [ ]ii Moderately [ ]iii Severely [ ]iv Extremely [ ]v

48.3 How does your joint problem restrict you visiting friends or relatives?
Not at all [ ]i A little [ ]ii Moderately [ ]iii Severely [ ]iv Extremely [ ]v

48.4 How does your joint problem restrict you telephoning friends or relatives?
Not at all [ ]i A little [ ]ii Moderately [ ]iii Severely [ ]iv Extremely [ ]v

48.5 How does your joint problem restrict you showing affection?
Not at all [ ]i A little [ ]ii Moderately [ ]iii Severely [ ]iv Extremely [ ]v

48.6 How does your joint problem restrict you doing your usual social activities?
Not at all [ ]i A little [ ]ii Moderately [ ]iii Severely [ ]iv Extremely [ ]v

48.7 How does your joint problem restrict your opportunities for leisure activities?
Not at all [ ]i A little [ ]ii Moderately [ ]iii Severely [ ]iv Extremely [ ]v

48.8 How does your joint problem restrict you affording things you need?
Not at all [ ]i A little [ ]ii Moderately [ ]iii Severely [ ]iv Extremely [ ]v

48.9 How much of the time has your physical health or emotional problems interfered with your social activities (like visiting your friends, relatives, etc.)?
Not at all [ ]i A little [ ]ii Moderately [ ]iii Severely [ ]iv Extremely [ ]v

48.10 Has your joint problem made you avoid taking part in things in your home, social and leisure activities?
Not at all [ ]i A little [ ]ii Moderately [ ]iii Severely [ ]iv Extremely [ ]v

48.11 Does your joint problem restrict you taking part in vigorous leisure activities?
Not at all [ ]i A little [ ]ii Moderately [ ]iii Severely [ ]iv Extremely [ ]v

48.12 Has your joint problem made you less interested in taking part in things in your home, social and leisure activities?
Not at all [ ]i A little [ ]ii Moderately [ ]iii Severely [ ]iv Extremely [ ]v

48.13 Has your joint problem been distracting while you were taking part in things in your home, social and leisure activities?
Not at all [ ]i A little [ ]ii Moderately [ ]iii Severely [ ]iv Extremely [ ]v

48.14 Has your joint problem reduced your enjoyment of taking part in things in your home, social and leisure activities?
Not at all [ ]i A little [ ]ii Moderately [ ]iii Severely [ ]iv Extremely [ ]v

48.15 Has your joint problem affected how much you enjoy life?
Not at all [ ]i A little [ ]ii Moderately [ ]iii Severely [ ]iv Extremely [ ]v

Coast Study ID: _____ Pre Operative Patient Self Assessment - Hip

49. Oxford Hip Score

49.1 *During the past 4 weeks .....*
How would you describe the pain you usually have from your hip?

None ☐ i Very mild ☐ ii Mild ☐ iii Moderate ☐ iv Severe ☐ v

49.2 *During the past 4 weeks .....*
Have you had any trouble with washing and drying yourself (all over) because of your hip?

No trouble at all ☐ i Very little trouble ☐ ii Moderate trouble ☐ iii Extreme difficulty ☐ iv Impossible to do ☐ v

49.3 *During the past 4 weeks .....*
Have you had any trouble getting in and out of a car or using public transport because of your hip (whichever you tend to use)?

No trouble at all ☐ i Very little trouble ☐ ii Moderate trouble ☐ iii Extreme difficulty ☐ iv Impossible to do ☐ v

49.4 *During the past 4 weeks .....*
Have you been able to put on a pair of socks, stockings or tights?

Yes, easily ☐ i With little difficulty ☐ ii With moderate difficulty ☐ iii With extreme difficulty ☐ iv No, impossible ☐ v

49.5 *During the past 4 weeks .....*
Could you do household shopping on your own?

Yes easily ☐ i With little difficulty ☐ ii With moderate difficulty ☐ iii With extreme difficulty ☐ iv No, impossible ☐ v

49.6 *During the past 4 weeks .....*
How long have you been able to walk before pain from your hip becomes severe (with or without a stick)?

No pain/ more than 30 minutes ☐ i 16 to 30 minutes ☐ ii 5 to 15 minutes ☐ iii Around the house *only* ☐ iv Not at all – pain severe on walking ☐ v

49.7 *During the past 4 weeks .....*
Have you been able to climb a flight of stairs?

Yes easily ☐ i With little difficulty ☐ ii With moderate difficulty ☐ iii With extreme difficulty ☐ iv No, impossible ☐ v

49.8 *During the past 4 weeks .....*
After a meal (sat at a table), how painful has it been for you to stand up from a chair because of your hip?

Not at all painful ☐ i Slightly painful ☐ ii Moderately painful ☐ iii Very painful ☐ iv Unbearable ☐ v

49.9 *During the past 4 weeks .....*
Have you been limping when walking, because of your hip?

Rarely/ Never ☐ i Sometimes or just at first ☐ ii Often, not just at first ☐ iii Most of the time ☐ iv All of the time ☐ v

49.10 *During the past 4 weeks .....*
Have you had any sudden, severe pain – 'shooting', 'stabbing', or 'spasms' – from the affected hip?

No days ☐ i Only 1 or 2 days ☐ ii Some days ☐ iii Most days ☐ iv Every day ☐ v

49.11 *During the past 4 weeks .....*
How much has pain from your hip interfered with your usual work (including housework)?

Not at all ☐ i A little bit ☐ ii Moderately ☐ iii Greatly ☐ iv Totally ☐ v

49.12 *During the past 4 weeks .....*
Have you been troubled by pain from your hip in bed at night?

No nights ☐ i Only 1 or 2 nights ☐ ii Some nights ☐ iii Most nights ☐ iv Every night ☐ v

Coast Study ID: _____ Pre Operative Patient Self Assessment - Hip

50. **Please circle the option for each item that best describes how you have been feeling during the <u>past week</u>:**

50.1 **I feel tense or 'wound up':**
a) Most of the time
b) A lot of the time
c) From time to time, occasionally
d) Not at all

50.2 **I still enjoy the things I used to enjoy:**
a) Definitely as much
b) Not quite so much
c) Only a little
d) Not at all

50.3 **I get a sort of frightened feeling like something awful is about to happen:**
a) Very definitely and quite badly
b) Yes, but not too badly
c) A little, but it doesn't worry me
d) Not at all

50.4 **I can laugh and see the funny side of things:**
a) As much as I always could
b) Not quite so much now
c) Definitely not so much now
d) Not at all

50.5 **Worrying thoughts go through my mind:**
a) A great deal of the time
b) A lot of the time
c) From time to time but not too often
d) Only occasionally

50.6 **I feel cheerful:**
a) Not at all
b) Not often
c) Sometimes
d) Most of the time

50.7 **I can sit at ease and feel relaxed:**
a) Definitely
b) Usually
c) Not often
d) Not at all

50.8 **I feel as if I am slowed down:**
a) Nearly all of the time
b) Very often
c) Sometimes
d) Not at all

50.9 **I get a sort of frightened feeling like 'butterflies in the stomach':**
a) Not at all
b) Occasionally
c) Quite often
d) Very often

50.10 **I have lost interest in my appearance:**
a) Definitely
b) I don't take as much care as I should
c) I may not take quite as much care
d) I take just as much care as ever

50.11 **I feel restless as if I have to be on the move:**
a) Very much indeed
b) Quite a lot
c) Not very much
d) Not at all

50.12 **I look forward with enjoyment to things:**
a) As much as I ever did
b) Rather less than I used to
c) Definitely less than I used to
d) Hardly at all

50.13 **I get sudden feelings of panic:**
a) Very often indeed
b) Quite often
c) Not very often
d) Not at all

50.14 **I can enjoy a good book or radio or TV programme:**
a) Often
b) Sometimes
c) Not often
d) Very seldom

Thank you for completing this booklet

Please post back in the prepaid envelope supplied

For Office use only	A	B	1	2	3	4

Appendix J :

Coast Study ID: _____ Pre Operative Patient Self Assessment - Knee

University Hospital Southampton NHS
NHS Foundation Trust

COASt
Clinical Outcomes in Arthroplasty Study

Dear Patient

Thank you for agreeing to take part in this study. This booklet is specifically for the knee surgery you are coming in for, so if it asks about 'your problem' it is referring to the problem you are having surgery for (i.e. knee surgery for knee problem etc.).

We would request that you complete all sections of this questionnaire.

We appreciate that the questionnaire is detailed but it will assist us to gather information for the study.

Please answer all questions in clear print.

Please use a black or blue pen.

Please tick all relevant option boxes.

Once you have completed this booklet please return in the enclosed envelope – No stamp required

For any further questions or information, please feel free to contact us:

Thank you

Lisa Shipway or Elena Zaballa
Tel: 023 80 764005 or 023 81 205279
Email: ls2@mrc.soton.ac.uk or
ez@mrc.soton.ac.uk

Patient Self Assessment for Inpatient Surgery

Patients: Please be sure to complete the following …

All sections within this booklet

Please fill in today's date: D D M M Y Y Y Y

Patient personal details

1.1 **Study Number:** _____

1.2 **Date of Birth:** _____

1.3 **Address:** _____

_____ 1.4 **Post code:** _____

1.5 **Gender:** Male ☐ i Female ☐ ii

1.6 **Civil State:** Single ☐ i Married ☐ ii Widowed ☐ iii Divorced ☐ iv Separated ☐ v

2.1 **General Practitioner's (GP) Name:** _____

2.2 **Surgery Address:** _____

2.3 **Post Code:** _____ 2.4 **Tel. No.** _____

3.1 **At what age did you finish full time education?** _____

3.2 **Do you have any of the following qualifications?** *(Please tick all the boxes that apply)*

None ☐ i GCSE/O Level ☐ ii A level ☐ iii

Further education ☐ iv Higher education (diploma / degree / PhD) ☐ v

4. **Please give your height and your weight**

Height ☐ ft ☐☐ ins or ☐☐☐ cm

Weight ☐☐ st ☐☐ lbs or ☐☐☐ kg

Coast Study ID: _____ Pre Operative Patient Self Assessment - Knee

5. **Recording of ethnic group information for patients**

Please note: We are not asking about citizenship or nationality, but about the ethnic group to which you feel you belong. Please complete the form below by ticking the box of the ethnic group you feel you belong to. If you feel you are descended from more than one group, please tick the one you feel you belong to more, or choose the 'Any other ethnic group' option

A	**White**	British	☐
B		Irish	☐
C		Any other White Background	☐
D	**Mixed**	White and Black Caribbean	☐
E		White and Black African	☐
F		White and Asian	☐
G		Any other Mixed Background	☐
H	**Asian or British Asian**	Indian	☐
I		Pakistani	☐
J		Bangladeshi	☐
K		Any other Asian Background	☐
L	**Black or Black British**	Caribbean	☐
M		African	☐
N		Any other Black Background	☐
O	**Other Ethnic Groups**	Chinese	☐
P		Any other Ethnic Group	☐

6. **Have you ever smoked regularly (at least once a day for a month or longer)?**

a) No ☐ b) Yes ☐ *If No, go to Question 8*

7. **Do you still smoke regularly?** *(Tick one box)*

a) No ☐ b) Yes ☐

8. **How much of the following do you drink per week, on average?**

a) Beer, cider, lager ☐☐ Pints b) Wine, sherry ☐☐ Glasses

c) Spirits, liqueurs ☐☐ Measures

Coast Study ID: _____ Pre Operative Patient Self Assessment - Knee

The following questions are about <u>your knee that is being operated on</u>

9. **How long have you suffered with this problem?**

Months [ ][ ] i Years [ ][ ] ii

10. **Have you previously had any surgery to <u>this knee</u>?**

a) No [ ] b) Yes [ ] *If Yes, please indicate which operation(s) you have had to <u>this knee</u> and the <u>year(s)</u> of the operation(s)*

Type of operation	Surgery to cartilage or ligaments	Resurfacing	Osteotomy	Joint replacement	Other *(Please specify)*
	[ ]	[ ]	[ ]	[ ]	_____
Year	YYYY	YYYY	YYYY	YYYY	YYYY

11. **Have you used any of the following services, listed below, in the <u>last 12 months</u> for problems relating to <u>your knee problem</u>?** *(If Yes, please indicate NHS or private and how many times you have seen them)*

11.1 **General Practitioner (GP):**

No [ ] i Yes [ ] ii No. of times seen in NHS [ ][ ] iii No. of times seen privately [ ][ ] iv

11.2 **Hospital doctor:**

No [ ] i Yes [ ] ii No. of times seen in NHS [ ][ ] iii No. of times seen privately [ ][ ] iv

11.3 **Physiotherapist:**

No [ ] i Yes [ ] ii No. of times seen in NHS [ ][ ] iii No. of times seen privately [ ][ ] iv

11.4 **Nurse/Practitioner:**

No [ ] i Yes [ ] ii No. of times seen in NHS [ ][ ] iii No. of times seen privately [ ][ ] iv

If Yes, please state type of nurse/practitioner seen: _____

11.5 **Alternative practitioners (e.g. Chiropractor, Osteopath etc.)**

No [ ] i Yes [ ] ii No. of times seen in NHS [ ][ ] iii No. of times seen privately [ ][ ] iv

If Yes, please state type of practitioner seen: _____

11.6 **Accident and Emergency (A & E)**

No [ ] i Yes [ ] ii No. of times seen [ ][ ] iii *If Yes, please specify*

_____

11.7 **Other NHS services or health care professionals**

No [ ] i Yes [ ] ii *If Yes, please state type of service or professional seen*

_____

Coast Study ID: _____ Pre Operative Patient Self Assessment - Knee

12. **Have you discussed working after your joint surgery with any member of your healthcare team?** No ☐ Yes ☐

If No, go to Question 14. **If Yes, please indicate which healthcare professional(s) you have discussed work after your surgery with**

(Please tick all that apply)

12.1 **In a hospital setting** *(either at outpatient clinic or as an inpatient)*

a) Surgeon ☐
b) Nurse ☐
c) Physiotherapist ☐
d) Occupational therapist ☐
e) Other health professional at hospital *(Please state)* _____ ☐

12.2 **At the GP surgery or in the community**

a) General Practitioner (GP) ☐
b) Nurse ☐
c) Physiotherapist ☐
d) Other health professional at surgery *(Please state)* _____ ☐
e) Occupational Health clinician ☐
f) Other health professional *(Please state)* _____ ☐

13. **What advice have you been given?** *(If you received advice from more than one healthcare professional, please indicate who gave you what advice)*

_____
_____
_____
_____
_____

14. **Have you found out about what to expect concerning work after joint surgery from any other sources?** (e.g. Family and friends, TV/radio programmes, web sites etc.)

a) No ☐ b) Yes ☐

14.1 **If Yes, please provide details about where (e.g. web site) you found out about return to work after surgery and what that information was:**

_____
_____
_____
_____

Coast Study ID: _____ Pre Operative Patient Self Assessment - Knee

Your general health

15. **In general would you say your health is?** *(Tick one box)*

a) Excellent ☐ b) Very good ☐ c) Good ☐ d) Fair ☐ e) Poor ☐

16. **During the past 12 months, have you had pain in your back or neck for a month or longer that made it difficult or impossible to get washed or dressed or do household chores?**

a) No ☐ b) Yes ☐

17. **During the past 12 months, have you had pain in your arm(s) or shoulder(s) for a month or longer that made it difficult or impossible to get washed or dressed or do household chores?**

a) No ☐ b) Yes ☐

18. **During the past 12 months, have you had pain in your hip(s) for a month or longer that made it difficult or impossible to get washed or dressed or do household chores?**

a) No ☐ b) Yes ☐

19. **During the past 12 months, have you had pain in your other knee for a month or longer that made it difficult or impossible to get washed or dressed or do household chores?**

a) No ☐ b) Yes ☐

20. **Have you previously had surgery to your other knee or your hip(s)?**

a) No ☐ b) Yes ☐ *If Yes, please indicate which operation(s) you have had to your knee or hip(s) and the year(s) of the operation(s)*

	Surgery to cartilage or ligaments	Resurfacing	Osteotomy	Joint replacement	Other *(Please specify)*
Other knee	☐ YYYY	☐ YYYY	☐ YYYY	☐ YYYY	_____ YYYY
Left hip		☐ YYYY	☐ YYYY	☐ YYYY	_____ YYYY
Right hip		☐ YYYY	☐ YYYY	☐ YYYY	_____ YYYY

21. **In the past 12 months have you had any of the following problems?** *(Please tick all answers that apply)*

	Problem	Have you seen a doctor for the problem?	Have you visited hospital for the problem?	Have you had any prescribed medicine for the problem?	Has the problem stopped you doing things?
a)	Heart disease	☐	☐	☐	☐
b)	High blood pressure	☐	☐	☐	☐
c)	Lung disease	☐	☐	☐	☐
d)	Diabetes	☐	☐	☐	☐
e)	Ulcer or stomach disease	☐	☐	☐	☐
f)	Kidney disease	☐	☐	☐	☐
g)	Liver disease	☐	☐	☐	☐
h)	Anaemia or other blood disease	☐	☐	☐	☐
i)	Cancer	☐	☐	☐	☐
j)	Depression	☐	☐	☐	☐
k)	Osteoarthritis, degenerative arthritis	☐	☐	☐	☐
l)	Back pain	☐	☐	☐	☐
m)	Rheumatoid arthritis	☐	☐	☐	☐
	Other medical problem *(Please write in)*				
n)	_____	☐	☐	☐	☐
o)	_____	☐	☐	☐	☐

22. **Have you used any Home Care service in the past 12 months?** *(If Yes, please indicate the number of hours per week paid for by Social Services and/or paid by Yourself):*

No ☐[i] Yes ☐[ii] Hours a week by **Social Services** *(on average)*: _____ each week

Hours a week paid by **Yourself** *(on average):* _____ each week

22A. **Have you received any Unpaid care (e.g. from family or friends) in the past 12 months?**

No ☐[i] Yes ☐[ii] Hours a week of **Unpaid** care *(on average)*: _____ each week

Coast Study ID: _____ Pre Operative Patient Self Assessment - Knee

23. Below is a list of problems people sometimes have. **Please read each one carefully and circle the number that best describes how much that problem has distressed or bothered you during the past 7 days including today**. *(Please circle only one number for each problem)*

	Items	Not at all	A little bit	Moderately	Quite a bit	Extremely
a)	Faintness or dizziness	0	1	2	3	4
b)	Pains in the heart or chest	0	1	2	3	4
c)	Nausea or upset stomach	0	1	2	3	4
d)	Trouble getting your breath	0	1	2	3	4
e)	Numbness or tingling in parts of your body	0	1	2	3	4
f)	Feeling weak in parts of your body	0	1	2	3	4
g)	Hot or cold spells	0	1	2	3	4

Current employment status

24. **Which of the following best describes your current work situation?** *(Tick one box)*

a) Employed (at work) ☐ b) Self-employed (at work) ☐

c) Employed (off sick) ☐ d) Self-employed (off sick) ☐

e) No paid job ☐ *If you are not in a job at present, please go to Question 41*

For those currently in a paid job

Please complete the following questions only if you currently hold a paid job (whether or not you are off sick from this work). *If you do not have a job now, then please go to Question 41*

25. **What is your current occupation?**
*(If you have more than one job, please answer with the details of your **main** job)* _____

Industry (e.g. farming, shipyard, car factory, shoe shop, hospital, insurance office) _____

26. **When did you start working in your main job?** M M Y Y Y Y

27. **Do you work in the public or private sector?** *(Tick one box)*

a) **Public sector/local government** (e.g. local authority, NHS, fire service, police, ambulance service) ☐

b) **Private sector** ☐

28. **Approximately how many people work in your organisation, in total?** *(Tick one box)*

Just me ☐ 2-9 ☐ 10-29 ☐ 30-499 ☐ 500+ ☐

29. **Do you have access to an occupational health service in your main job?** *(Tick one box)*

a) No ☐ b) Yes ☐ c) Don't Know ☐

Normal content of your job

*The next set of questions relate to the **normal demands of your job**. If you've altered what you do because of your knee problem, please tell us what the work would normally be like without this problem.*

30. **Approximately how many hours do you normally work each week?** ☐☐ hours

31. **In an average day, does your main job normally include:** *(Tick one box on each line)*

	No	Yes
a) Standing/walking for more than 2 hours in total?	☐	☐
b) Walking for more than 1 mile in total?	☐	☐
c) Kneeling or squatting?	☐	☐
d) Climbing more than 30 flights of stairs?	☐	☐
e) Climbing ladders?	☐	☐
f) Lifting 10kg (20lbs) or more by hand?	☐	☐

32. **Is driving normally part of your main job?** *(Tick one box)*

a) Essential to the job ☐ b) A part of the job, but not essential ☐ c) No ☐

32A. **Is driving important for you to be able to get to or from your main place of work?** *(Tick one box)*

a) Essential for getting to or from workplace ☐ b) Useful but not essential ☐ c) No ☐

33. **Is using public transport important for you to be able to get to or from your main place of work?** *(Tick one box)*

a) Essential for getting to or from workplace ☐ b) Useful but not essential ☐ c) No ☐

The next set of questions are about how your knee problem may affect you at work

34. **Has your joint problem affected your ability to do your current job?**

a) No, not at all ☐ b) Yes, a little ☐ c) Yes, a lot ☐

35. **Have you reduced your working hours (either completely or partly) due to your knee problem?** No ☐ Yes ☐

Coast Study ID: _____ Pre Operative Patient Self Assessment - Knee

36. **Have you been at work in the past 4 weeks?** No ☐ Yes ☐

36.1 **If No, when were you last at work?** D D M M Y Y

36.2 **If Yes, did you take any time off sick (either completely or partly) because of <u>your knee problem</u> in these 4 weeks?** No ☐[i] Yes ☐[ii]

36.3 **How much time have you taken off in total over the past 4 weeks?**

None ☐ Days ☐☐ Weeks ☐☐

36.4 **How much time have you taken off in total over the past 6 months (including the past 4 weeks)?**

None ☐ Days ☐☐ Weeks ☐☐

37. **Have any of the following changes been made at work to help you cope with your joint problem?** *(Please tick No or Yes for each item)*

	No	Yes
a) Your duties have been altered or reduced	☐	☐
b) Some of your duties have been given to another person	☐	☐
c) You have moved to another job within the same business	☐	☐
d) You have moved to a different workplace in the same business	☐	☐
e) Your working hours have changed (temporarily or permanently)	☐	☐
f) Work equipment obtained, or old equipment modified or changed	☐	☐
g) Alteration(s) have been made to the premises	☐	☐
If self-employed, go to Question 38. If employed, please continue		
h) New training has been provided	☐	☐
i) Extra supervision has been provided for you	☐	☐

38. **After your operation, will you be eligible for any sick pay from your employer (or an insurance scheme)?** *(Tick one box)*

a) No ☐ b) Yes ☐ c) Don't Know ☐

39. **If Yes, for how many weeks ...**

a) ... at full pay? ☐☐ weeks

b) ... at reduced pay? ☐☐ weeks

Coast Study ID: _____ Pre Operative Patient Self Assessment - Knee

40. **Roughly how much of the total household income comes from money which you personally earn in a paid job?** Please do not include any money that you receive from pensions or investments *(Tick one box)*

a) None ☐ b) Less than a quarter ☐ c) Between a quarter and a half ☐ d) Half or more ☐

Please now go to Question 42

For those NOT currently in a paid job

41. **If you are not currently in paid work, what was your last paid job?** *Reason for leaving included problem with your knee(s)?*

Occupation	Industry	Date Left	Mainly	Partly	Not at all
_____	_____	M M Y Y Y Y	☐	☐	☐

41A. **If you left work because of a problem with your knee, please give further details:**

_____

Returning to work after surgery

42. **How soon do you hope to return to paid work after your surgery?**

☐☐ weeks

43. **What type of work do you hope to do after your joint replacement?** *(Tick one box)*

a) Same as my current or last job-***just the same*** ☐

b) Same as my current or last job-***with changes*** ☐ Please describe _____

c) Different from my current or last job ☐ Please describe _____

44. **Thinking about the work you plan to do after surgery, how much do you expect your joint replacement to affect your ability to work …**
(If you think the knee problem will affect your work activities only a little, choose a low number. Choose a high number if you expect your knee problem will affect your work activities a great deal)

… 6 weeks after surgery? Knee problem will have no effect on my work	1	2	3	4	5	6	7	8	9	10	Knee problem will completely prevent me from working
					(Circle a number)						
… 12 weeks after surgery? Knee problem will have no effect on my work	1	2	3	4	5	6	7	8	9	10	Knee problem will completely prevent me from working
					(Circle a number)						
… 26 weeks after surgery? Knee problem will have no effect on my work	1	2	3	4	5	6	7	8	9	10	Knee problem will completely prevent me from working
					(Circle a number)						
… 12 months after surgery? Knee problem will have no effect on my work	1	2	3	4	5	6	7	8	9	10	Knee problem will completely prevent me from working
					(Circle a number)						

Coast Study ID: _____ Pre Operative Patient Self Assessment - Knee

45. **How important is it to you as an individual that you return to work?**
(If it is very important to you, choose a high number. Choose a low number if is not very important to you)

Not important 1 2 3 4 5 Very important
(Circle a number)

46. **Please indicate how much you agree or disagree with each of the following statements**	Strongly agree	Agree	Disagree	Strongly disagree
	(Please tick one box on each line)			
a) If I don't have a job, I don't feel right …	☐	☐	☐	☐
b) A person should work in a job in order to keep the respect of family and friends …	☐	☐	☐	☐
c) I really can't think well of myself unless I have a job …	☐	☐	☐	☐
d) The most important things that happen to me involve work …	☐	☐	☐	☐

Your <u>current health</u>

47. **By placing a tick in one box in each group below, please indicate which statement best describes your health <u>today</u>:**

47.1 **Mobility**
- a) I have no problems in walking about ☐
- b) I have slight problems in walking about ☐
- c) I have moderate problems in walking about ☐
- d) I have severe problems in walking about ☐
- e) I am unable to walk about ☐

47.2 **Self-Care**
- a) I have no problems washing or dressing myself ☐
- b) I have slight problems washing or dressing myself ☐
- c) I have moderate problems washing or dressing myself ☐
- d) I have severe problems washing or dressing myself ☐
- e) I am unable to wash or dress myself ☐

47.3 **Usual Activities** (e.g. Work, study, housework, family or leisure activities)
- a) I have no problems doing my usual activities ☐
- b) I have slight problems doing my usual activities ☐
- c) I have moderate problems doing my usual activities ☐
- d) I have severe problems doing my usual activities ☐
- e) I am unable to do my usual activities ☐

47.4 **Pain/Discomfort**
- a) I have no pain or discomfort ☐
- b) I have slight pain or discomfort ☐
- c) I have moderate pain or discomfort ☐
- d) I have severe pain or discomfort ☐
- e) I have extreme pain or discomfort ☐

47.5 **Anxiety/Depression**
- a) I am not anxious or depressed ☐
- b) I am slightly anxious or depressed ☐
- c) I am moderately anxious or depressed ☐
- d) I am severely anxious or depressed ☐
- e) I am extremely anxious or depressed ☐

Coast Study ID: _____ Pre Operative Patient Self Assessment - Knee

48. **The following questions concern your social life.** For each of the following situations please indicate how restricted you have been because of your knee problem in the last 4 weeks. For each question tick the box that describes you best.

48.1 How does your joint problem restrict you getting on with people (friends and family)?

Not at all ☐ i A little ☐ ii Moderately ☐ iii Severely ☐ iv Extremely ☐ v

48.2 How does your joint problem restrict you having friends or relatives over to your home?

Not at all ☐ i A little ☐ ii Moderately ☐ iii Severely ☐ iv Extremely ☐ v

48.3 How does your joint problem restrict you visiting friends or relatives?

Not at all ☐ i A little ☐ ii Moderately ☐ iii Severely ☐ iv Extremely ☐ v

48.4 How does your joint problem restrict you telephoning friends or relatives?

Not at all ☐ i A little ☐ ii Moderately ☐ iii Severely ☐ iv Extremely ☐ v

48.5 How does your joint problem restrict you showing affection?

Not at all ☐ i A little ☐ ii Moderately ☐ iii Severely ☐ iv Extremely ☐ v

48.6 How does your joint problem restrict you doing your usual social activities?

Not at all ☐ i A little ☐ ii Moderately ☐ iii Severely ☐ iv Extremely ☐ v

48.7 How does your joint problem restrict your opportunities for leisure activities?

Not at all ☐ i A little ☐ ii Moderately ☐ iii Severely ☐ iv Extremely ☐ v

48.8 How does your joint problem restrict you affording things you need?

Not at all ☐ i A little ☐ ii Moderately ☐ iii Severely ☐ iv Extremely ☐ v

48.9 How much of the time has your physical health or emotional problems interfered with your social activities (like visiting your friends, relatives, etc.)?

Not at all ☐ i A little ☐ ii Moderately ☐ iii Severely ☐ iv Extremely ☐ v

48.10 Has your joint problem made you avoid taking part in things in your home, social and leisure activities?

Not at all ☐ i A little ☐ ii Moderately ☐ iii Severely ☐ iv Extremely ☐ v

48.11 Does your joint problem restrict you taking part in vigorous leisure activities?

Not at all ☐ i A little ☐ ii Moderately ☐ iii Severely ☐ iv Extremely ☐ v

48.12 Has your joint problem made you less interested in taking part in things in your home, social and leisure activities?

Not at all ☐ i A little ☐ ii Moderately ☐ iii Severely ☐ iv Extremely ☐ v

48.13 Has your joint problem been distracting while you were taking part in things in your home, social and leisure activities?

Not at all ☐ i A little ☐ ii Moderately ☐ iii Severely ☐ iv Extremely ☐ v

48.14 Has your joint problem reduced your enjoyment of taking part in things in your home, social and leisure activities?

Not at all ☐ i A little ☐ ii Moderately ☐ iii Severely ☐ iv Extremely ☐ v

48.15 Has your joint problem affected how much you enjoy life?

Not at all ☐ i A little ☐ ii Moderately ☐ iii Severely ☐ iv Extremely ☐ v

Coast Study ID: _____ Pre Operative Patient Self Assessment - Knee

49. Oxford Knee Score

49.1 *During the past 4 weeks .....*
How would you describe the pain you usually have from your knee?

None ☐ i Very mild ☐ ii Mild ☐ iii Moderate ☐ iv Severe ☐ v

49.2 *During the past 4 weeks .....*
Have you had any trouble with washing and drying yourself (all over) because of your knee?

No trouble at all ☐ i Very little trouble ☐ ii Moderate trouble ☐ iii Extreme difficulty ☐ iv Impossible to do ☐ v

49.3 *During the past 4 weeks .....*
Have you had any trouble getting in and out of a car or using public transport because of your knee (whichever you tend to use)?

No trouble at all ☐ i Very little trouble ☐ ii Moderate trouble ☐ iii Extreme difficulty ☐ iv Impossible to do ☐ v

49.4 *During the past 4 weeks .....*
For how long have you been able to walk before pain from your knee becomes severe (with or without a stick)?

No pain/ more than 30 minutes ☐ i 16 to 30 minutes ☐ ii 5 to15 minutes ☐ iii Around the house *only* ☐ iv Not at all – pain severe on walking ☐ v

49.5 *During the past 4 weeks .....*
After a meal (sat at a table), how painful has it been for you to stand up from a chair because of your knee?

Not at all painful ☐ i Slightly painful ☐ ii Moderately painful ☐ iii Very painful ☐ iv Unbearable ☐ v

49.6 *During the past 4 weeks .....*
Have you been limping when walking, because of your knee?

Rarely/ Never ☐ i Sometimes or just at first ☐ ii Often, not just at first ☐ iii Most of the time ☐ iv All of the time ☐ v

49.7 *During the past 4 weeks .....*
Could you knee down and get up again afterwards?

Yes easily ☐ i With little difficulty ☐ ii With moderate difficulty ☐ iii With extreme difficulty ☐ iv No, impossible ☐ v

49.8 *During the past 4 weeks .....*
Have you been troubled by pain from your knee in bed at night?

No nights ☐ i Only 1 or 2 nights ☐ ii Some nights ☐ iii Most nights ☐ iv Every night ☐ v

49.9 *During the past 4 weeks .....*
How much has pain from your knee interfered with your usual work (including housework)?

Not at all ☐ i A little bit ☐ ii Moderately ☐ iii Greatly ☐ iv Totally ☐ v

49.10 *During the past 4 weeks .....*
Have you felt that your knee might suddenly 'give way' or let you down?

Rarely/ Never ☐ i Sometimes or just at first ☐ ii Often, not just at first ☐ iii Most of the time ☐ iv All of the time ☐ v

49.11 *During the past 4 weeks .....*
Could you do household shopping on your own?

Yes, easily ☐ i With little difficulty ☐ ii With moderate difficulty ☐ iii With extreme difficulty ☐ iv No, impossible ☐ v

49.12 *During the past 4 weeks .....*
Could you walk down one flight of stairs?

Yes, easily ☐ i With little difficulty ☐ ii With moderate difficulty ☐ iii With extreme difficulty ☐ iv No, impossible ☐ v

Coast Study ID: _____ Pre Operative Patient Self Assessment - Knee

50. **Please circle the option for each item that best describes how you have been feeling during the past week:**

50.1 **I feel tense or 'wound up':**
a) Most of the time
b) A lot of the time
c) From time to time, occasionally
d) Not at all

50.2 **I still enjoy the things I used to enjoy:**
a) Definitely as much
b) Not quite so much
c) Only a little
d) Not at all

50.3 **I get a sort of frightened feeling like something awful is about to happen:**
a) Very definitely and quite badly
b) Yes, but not too badly
c) A little, but it doesn't worry me
d) Not at all

50.4 **I can laugh and see the funny side of things:**
a) As much as I always could
b) Not quite so much now
c) Definitely not so much now
d) Not at all

50.5 **Worrying thoughts go through my mind:**
a) A great deal of the time
b) A lot of the time
c) From time to time but not too often
d) Only occasionally

50.6 **I feel cheerful:**
a) Not at all
b) Not often
c) Sometimes
d) Most of the time

50.7 **I can sit at ease and feel relaxed:**
a) Definitely
b) Usually
c) Not often
d) Not at all

50.8 **I feel as if I am slowed down:**
a) Nearly all of the time
b) Very often
c) Sometimes
d) Not at all

50.9 **I get a sort of frightened feeling like 'butterflies in the stomach':**
a) Not at all
b) Occasionally
c) Quite often
d) Very often

50.10 **I have lost interest in my appearance:**
a) Definitely
b) I don't take as much care as I should
c) I may not take quite as much care
d) I take just as much care as ever

50.11 **I feel restless as if I have to be on the move:**
a) Very much indeed
b) Quite a lot
c) Not very much
d) Not at all

50.12 **I look forward with enjoyment to things:**
a) As much as I ever did
b) Rather less than I used to
c) Definitely less than I used to
d) Hardly at all

50.13 **I get sudden feelings of panic:**
a) Very often indeed
b) Quite often
c) Not very often
d) Not at all

50.14 **I can enjoy a good book or radio or TV programme:**
a) Often
b) Sometimes
c) Not often
d) Very seldom

Coast Study ID: _____ Pre Operative Patient Self Assessment - Knee

Thank you for completing this booklet

Please post back in the prepaid envelope supplied

For Office use only	A	B	1	2	3	4

Appendix K :

Coast Study ID: _____ Post Operative Six Week Follow up - Hip

University Hospital Southampton NHS
NHS Foundation Trust

COASt
Clinical Outcomes in Arthroplasty Study

Post operative: Six week follow up

Total Hip Replacement (THR)

Please complete this booklet as soon as possible and return it in the enclosed envelope – No stamp required

1.1 **Study Number:** _____

1.2 **Date of Birth:** _____

1.3 **Date of surgery:** _____

1.4 **Please tick relevant option:**

Type of operation: THR ☐[i] THR Revision ☐[ii]

Side of Operation:

Right ☐[i] Left ☐[ii] Bilateral ☐[ii]

1.5 **Date Sent:** _____

1.6 **Date received:** _____

Coast Study ID: _____ Post Operative Six Week Follow up - Hip

Please fill in today's date: | D | D | M | M | Y | Y | Y | Y |

2. **Since you left the hospital, have you used any of the following services for problems *related to your hip and the operation you had?***

2.1 General Practitioner (GP):

No [ ]i Yes [ ]ii No. of times seen in NHS [ ][ ]ii No. of times seen privately [ ][ ]iv

2.2 Hospital Doctor:

No [ ]i Yes [ ]ii No. of times seen in NHS [ ][ ]ii No. of times seen privately [ ][ ]iv

2.3 Physiotherapist:

No [ ]i Yes [ ]ii No. of times seen in NHS [ ][ ]ii No. of times seen privately [ ][ ]iv

2.4 Nurse/Practitioner:

No [ ]i Yes [ ]ii No. of times seen in NHS [ ][ ]ii No. of times seen privately [ ][ ]iv

If Yes, please state nurse/practitioner seen: _____

2.5 Alternative practitioners (e.g. Chiropractor, Osteopath etc.):

No [ ]i Yes [ ]ii No. of times seen in NHS [ ][ ]ii No. of times seen privately [ ][ ]iv

If Yes, please state type of practitioner seen: _____

2.6 Accident and Emergency (A & E):

No [ ]i Yes [ ]ii No. of times seen [ ][ ]ii

If Yes, please specify: _____

2.7 Home Care:

No [ ]i Yes [ ]ii Hours a week by **Social Services** (on average): _____ each week

No [ ]i Yes [ ]ii Hours a week paid by **Yourself** (on average): _____ each week

No [ ]i Yes [ ]ii Hours a week **Unpaid** care (e.g. from friends and family) (on average): _____ each week

2.8 Other NHS services or health care professionals:

No [ ]i Yes [ ]ii

If Yes, please state type of service or professional seen: _____

Coast Study ID: _____ Post Operative Six Week Follow up - Hip

3. **Have you had any of the following problems since you left the hospital <u>after your hip operation</u>?** *Please tick the relevant option and give details.*

3.1 **Have you received any antibiotics for an infection in your hip *since you left the hospital after your hip operation?*** No ☐ Yes ☐

If Yes, please give details: _____

3.2 **Have you had a clot in your leg (known as DVT or Deep Vein Thrombosis) *since you left the hospital after your hip operation?*** No ☐ Yes ☐

If Yes, please give details: _____

3.3 **Have you had a clot in your lungs (known as PE or Pulmonary Embolism) *since you left the hospital after your hip operation?*** No ☐ Yes ☐

If Yes, please give details: _____

3.4 **Have you been seen or treated for any new heart or chest problems *since you left the hospital after your hip operation?*** No ☐ Yes ☐

If Yes, please give details: _____

3.5 **Have you experienced any problems with moving your leg or foot on the operated side *since you left the hospital after your hip operation?*** No ☐ Yes ☐

If Yes, please give details: _____

3.6 **Have you experienced any falls *since you left the hospital after your hip operation?*** No ☐ Yes ☐

If Yes, please give details _____

3.7 **Have you experienced any fractures *since you left the hospital after your hip operation?*** No ☐ Yes ☐

If Yes, please give details: _____

Coast Study ID: _____ Post Operative Six Week Follow up - Hip

4. Please tick relevant options and give details if possible.

4.1 **Have you been re-admitted to the hospital where you had your hip operation *because of problems with your operated hip*?** No ☐ Yes ☐
If Yes, please give reason for admission: _____

Date of admission: _____ For how many days: _____

4.2 **Have you been admitted to any other hospital since your discharge from hospital following your hip operation, *because of problems with your operated hip*?** No ☐ Yes ☐
If Yes, please give reason for admission: _____

Date of admission: _____ For how many days: _____

Your work after your operation

5. **Which of the following best describes your current work situation?** *(Tick one box)*

a) Employed (at work) ☐ b) Self-employed (at work) ☐
c) Employed (off sick) ☐ d) Self-employed (off sick) ☐
e) No paid job ☐ f) Retired ☐

6. **Have you gone back to work or undertaken any paid work (employed or self-employed) since your joint surgery?** No ☐ Yes ☐
If No, go to Question 19, Page 6. If Yes, please continue:

7. **When did you first return to work after the operation?** D D M M Y Y

8. **Are you still in paid work (whether or not you are currently off sick)?** No ☐ Yes ☐
If Yes, go to Question 11. If No, please continue

9. **When did you leave paid work after your operation?** D D M M Y Y

10. **And did you leave paid work because of the hip problem for which you had surgery?** *(Tick one box)* Mainly ☐ Partly ☐ Not at all ☐

10A. **If you left work because of a problem with your hip, please give further details:**
_____

Please now go to Question 19, Page 6

11. **Approximately how many hours do you usually work each week?** ☐☐ hours

11A. **Since going back to work after the operation, have you taken any days or weeks off because of your joint problem?** No. of days ☐☐ No. of weeks ☐☐

Coast Study ID: _____ Post Operative Six Week Follow up - Hip

12. **Since your hip operation, has your joint problem affected how well you could do your job when you were at work?** *(Tick one box)*

a) No, not at all ☐ b) Yes, a little ☐ c) Yes, a lot ☐

13. **Were you at work in the past 7 days?** No ☐ Yes ☐

If No, please go to Question 16, If Yes, please continue

14. **What impact has your joint problem had on your work during the past 7 days?** *(Please tick No or Yes for each activity)*

a) During the past 7 days, has your hip problem meant that you struggled or taken longer over tasks that you used to manage before?	No ☐	Yes ☐
b) During the past 7 days, has your hip problem meant that the quality of work you did was poorer than normal?	No ☐	Yes ☐
c) During the past 7 days, has your hip problem meant that you have felt you were letting down your boss or colleagues?	No ☐	Yes ☐

15. **During the past 7 days, how much did your joint problem affect your ability to do your work?**

Think about days you were limited in the amount or kind of work you could do, days you accomplished less than you would like, or days you could not do your work as carefully as usual. If your HIP PROBLEM affected your work a great deal, choose a high number. If your HIP PROBLEM affected your work only a little, choose a low number (or zero if it hasn't affected your work at all).

Consider only how much your HIP PROBLEM affected your ability to work

HIP PROBLEM had no effect on my work — 0 1 2 3 4 5 6 7 8 9 10 — HIP PROBLEM completely prevented me from working

(Circle a number)

16. **Since your hip operation, have any of the following changes been made at work to help you cope with your joint problems?** *(Please tick No or Yes for each item)*

	No	Yes
a) Your duties have been altered or reduced	☐	☐
b) Some of your duties have been given to another person	☐	☐
c) You have moved to another job within the same business	☐	☐
d) You have moved to a different workplace in the same business	☐	☐
e) Your working hours have changed (temporarily or permanently)	☐	☐
f) Work equipment obtained, or old equipment modified or changed	☐	☐
g) Alteration(s) have been made to the premises	☐	☐
If self-employed, go to Question 17. If employed, please continue		
h) New training has been provided	☐	☐
i) Extra supervision has been provided for you	☐	☐

Coast Study ID: _____ Post Operative Six Week Follow up - Hip

17. **If you answered Yes to any of the items in Question 16, were the change(s) made before or after your hip operation?** *(Tick one box)*

a) Before ☐ b) After ☐ c) Before and after ☐ d) Not applicable ☐

18. **Please tell us about anything else that helped you return to work after surgery and/or any problems you encountered when returning to work.**

_____

_____

_____

Advice on working

19. **Since your hip operation, have you had any contact with an Occupational Health (OH) service provided by your employer?** *(Tick one box)*

a) No ☐ b) Yes ☐ c) No OH Service ☐ d) Don't know ☐ e) Not applicable (self-employed) ☐

If Yes, what support and/or advice did you receive from the OH service?

_____

_____

_____

_____

20. **Have you discussed work after your joint surgery with any member of the healthcare team?** No ☐ Yes ☐

If No, go to Question 25, If Yes, please indicate which healthcare professional(s) you have discussed work after your surgery with: *(Please tick all that apply)*

21. **In a hospital setting (either at outpatient clinic or as an inpatient)**

a) Surgeon ☐

b) Nurse ☐

c) Physiotherapist ☐

d) Occupational therapist ☐

e) Other health professional at hospital *(please state)* _____ ☐

22. **At the GP surgery or in the community**

a) General Practitioner (GP) ☐

b) Nurse ☐

c) Physiotherapist ☐

d) Other health professional *(please state)* _____ ☐

23. **When did you receive this advice about work after surgery?** *(Please tick all that apply)*

a) Before being admitted to hospital for surgery ☐ b) While staying in hospital (inpatient) before/after your operation ☐ c) After being discharged from hospital following surgery ☐

24. **What advice have you been given?** *(If you received advice from more than one healthcare professional, please indicate **who** gave you **what** advice and **when**)*

_____

_____

_____

_____

_____

_____

_____

_____

25. **Have you found out about what to expect concerning work after joint surgery from any other sources?** (e.g. Family and friends, TV/radio programmes, web sites, etc.) No ☐ Yes ☐

*If Yes, please provide details about **where** (e.g. web site) you found out about return to work after joint surgery and **what** that information was:*

_____

_____

_____

_____

The joint problem – <u>how things are right now</u>

26. **During the <u>past 7 days</u>, how much did your HIP PROBLEM affect your ability to do your regular daily activities (other than work at a job)?**

By regular activities, we mean the usual activities you do, such as work around the house, shopping, childcare, exercising, studying, etc. Think about times you were limited in the amount or kind of activities you could do and times you accomplished less than you would like. If your HIP PROBLEM affected your activities only a little, choose a low number. Choose a high number if your HIP PROBLEM affected your activities a great deal.

Consider only how much your <u>HIP PROBLEM</u> affected your ability to do regular daily activities, other than work at a job

HIP PROBLEM had no effect on my daily activities — 0 1 2 3 4 5 6 7 8 9 10 — HIP PROBLEM completely prevented me from doing my daily activities

(Circle a number)

27. **Does your joint problem currently prevent you from driving?** (*Tick one box)*

a) Yes, all of the time ☐ b) Yes, some of the time ☐ c) Only rarely or not at all ☐

Coast Study ID: _____ Post Operative Six Week Follow up - Hip

New job?

*Please complete this section ONLY if you have a **new employer** or a **completely new work position** since your operation.*

*If you **do not have a job** currently, or you have the **same job** with the same or altered hours and duties, go to Question 36*

28. **What is your current occupation?**
(If you have more than one job, please answer with the details of your main job) _____

Industry (e.g. farming, shipyard, car factory, shoe shop, hospital, insurance office) _____

29. **When did you start working in this job?** M M Y Y Y Y

30. **Do you work in the public or private sector?**
a) **Public sector/local government** (e.g. local authority, NHS fire service, police, ambulance service) ☐
b) **Private sector** ☐

31. **Approximately how many people work in your organisation in total?** *(Tick one box)*

a) Just me ☐ b) 2-9 ☐ c) 10-29 ☐ d) 30-499 ☐ e) 500+ ☐

32. **Approximately how many hours do you normally work each week?** ☐☐ hours

33. **In an average day, does your main job normally include:** *(Tick one box on each line)*

	No	Yes
a) Standing/walking for more than 2 hours in total?	☐	☐
b) Walking for more than 1 mile in total?	☐	☐
c) Kneeling or squatting?	☐	☐
d) Climbing more than 30 flights of stairs?	☐	☐
e) Climbing ladders?	☐	☐
f) Lifting 10 kg (20lbs) or more by hand?	☐	☐

34. **Is driving normally part of your main job?** *(Tick one box)*

a) Essential to the job ☐ b) A part of the job, but not essential ☐ c) No ☐

34A. **Is driving important for you to be able to get to or from your main place of work?** *(Tick one box)*

a) Essential for getting to workplace ☐ b) Useful, but not essential ☐ c) No ☐

35. **Is using public transport important for you to be able to get to or from your main place of work?** *(Tick one box)*

a) Essential for getting to workplace ☐ b) Useful, but not essential ☐ c) No ☐

Coast Study ID: _____ Post Operative Six Week Follow up - Hip

36. **The following questions concern your social life.** For each of the following situations please indicate how restricted you have been because of your hip problem in the last 4 weeks. For each question tick the box that describes you best.

36.1 How does your joint problem restrict you getting on with people (friends and family)?

Not at all ☐ i A little ☐ ii Moderately ☐ iii Severely ☐ iv Extremely ☐ v

36.2 How does your joint problem restrict you having friends or relatives over to your home?

Not at all ☐ i A little ☐ ii Moderately ☐ iii Severely ☐ iv Extremely ☐ v

36.3 How does your joint problem restrict you visiting friends or relatives?

Not at all ☐ i A little ☐ ii Moderately ☐ iii Severely ☐ iv Extremely ☐ v

36.4 How does your joint problem restrict you telephoning friends or relatives?

Not at all ☐ i A little ☐ ii Moderately ☐ iii Severely ☐ iv Extremely ☐ v

36.5 How does your joint problem restrict you showing affection?

Not at all ☐ i A little ☐ ii Moderately ☐ iii Severely ☐ iv Extremely ☐ v

36.6 How does your joint problem restrict you doing your usual social activities?

Not at all ☐ i A little ☐ ii Moderately ☐ iii Severely ☐ iv Extremely ☐ v

36.7 How does your joint problem restrict your opportunities for leisure activities?

Not at all ☐ i A little ☐ ii Moderately ☐ iii Severely ☐ iv Extremely ☐ v

36.8 How does your joint problem restrict you affording things you need?

Not at all ☐ i A little ☐ ii Moderately ☐ iii Severely ☐ iv Extremely ☐ v

36.9 How much of the time has your physical health or emotional problems interfered with your social activities (like visiting your friends, relatives, etc.)?

Not at all ☐ i A little ☐ ii Moderately ☐ iii Severely ☐ iv Extremely ☐ v

36.10 Has your joint problem made you avoid taking part in things in your home, social and leisure activities?

Not at all ☐ i A little ☐ ii Moderately ☐ iii Severely ☐ iv Extremely ☐ v

36.11 Does your joint problem restrict you taking part in vigorous leisure activities?

Not at all ☐ i A little ☐ ii Moderately ☐ iii Severely ☐ iv Extremely ☐ v

36.12 Has your joint problem made you less interested in taking part in things in your home, social and leisure activities?

Not at all ☐ i A little ☐ ii Moderately ☐ iii Severely ☐ iv Extremely ☐ v

36.13 Has your joint problem been distracting while you were taking part in things in your home, social and leisure activities?

Not at all ☐ i A little ☐ ii Moderately ☐ iii Severely ☐ iv Extremely ☐ v

36.14 Has your joint problem reduced your enjoyment of taking part in things in your home, social and leisure activities?

Not at all ☐ i A little ☐ ii Moderately ☐ iii Severely ☐ iv Extremely ☐ v

36.15 Has your joint problem affected how much you enjoy life?

Not at all ☐ i A little ☐ ii Moderately ☐ iii Severely ☐ iv Extremely ☐ v

Coast Study ID: _____ Post Operative Six Week Follow up - Hip

37. Oxford Hip Score

37.1 *During the past 4 weeks .....*
How would you describe the pain you usually have from your hip?

None ☐ i Very mild ☐ ii Mild ☐ iii Moderate ☐ iv Severe ☐ v

37.2 *During the past 4 weeks .....*
Have you had any trouble with washing and drying yourself (all over) because of your hip?

No trouble at all ☐ i Very little trouble ☐ ii Moderate trouble ☐ iii Extreme difficulty ☐ iv Impossible to do ☐ v

37.3 *During the past 4 weeks .....*
Have you had any trouble getting in and out of a car or using public transport because of your hip (whichever you tend to use)?

No trouble at all ☐ i Very little trouble ☐ ii Moderate trouble ☐ iii Extreme difficulty ☐ iv Impossible to do ☐ v

37.4 *During the past 4 weeks .....*
Have you been able to put on a pair of socks, stockings or tights?

Yes, easily ☐ i With little difficulty ☐ ii With moderate difficulty ☐ iii With extreme difficulty ☐ iv No, impossible ☐ v

37.5 *During the past 4 weeks .....*
Could you do household shopping on your own?

Yes easily ☐ i With little difficulty ☐ ii With moderate difficulty ☐ iii With extreme difficulty ☐ iv No, impossible ☐ v

37.6 *During the past 4 weeks .....*
How long have you been able to walk before pain from your hip becomes severe (with or without a stick)?

No pain/ more than 30 minutes ☐ i 16 to 30 minutes ☐ ii 5 to 15 minutes ☐ iii Around the house *only* ☐ iv Not at all – pain severe on walking ☐ v

37.7 *During the past 4 weeks .....*
Have you been able to climb a flight of stairs?

Yes easily ☐ i With little difficulty ☐ ii With moderate difficulty ☐ iii With extreme difficulty ☐ iv No, impossible ☐ v

37.8 *During the past 4 weeks .....*
After a meal (sat at a table), how painful has it been for you to stand up from a chair because of your hip?

Not at all painful ☐ i Slightly painful ☐ ii Moderately painful ☐ iii Very painful ☐ iv Unbearable ☐ v

37.9 *During the past 4 weeks .....*
Have you been limping when walking, because of your hip?

Rarely/ Never ☐ i Sometimes or just at first ☐ ii Often, not just at first ☐ iii Most of the time ☐ iv All of the time ☐ v

37.10 *During the past 4 weeks .....*
Have you had any sudden, severe pain – 'shooting', 'stabbing', or 'spasms' – from the affected hip?

No days ☐ i Only 1 or 2 days ☐ ii Some days ☐ iii Most days ☐ iv Every day ☐ v

37.11 *During the past 4 weeks .....*
How much has pain from your hip interfered with your usual work (including housework)?

Not at all ☐ i A little bit ☐ ii Moderately ☐ iii Greatly ☐ iv Totally ☐ v

37.12 *During the past 4 weeks .....*
Have you been troubled by pain from your hip in bed at night?

No nights ☐ i Only 1 or 2 nights ☐ ii Some nights ☐ iii Most nights ☐ iv Every night ☐ v

Coast Study ID: _____ Post Operative Six Week Follow up - Hip

38. **By placing a tick in one box in each group below, please indicate which statement best describes your health <u>today</u>:**

38.1 **Mobility**

a) I have no problems in walking about ☐
b) I have slight problems in walking about ☐
c) I have moderate problems in walking about ☐
d) I have severe problems in walking about ☐
e) I am unable to walk about ☐

38.2 **Self-Care**

a) I have no problems washing or dressing myself ☐
b) I have slight problems washing or dressing myself ☐
c) I have moderate problems washing or dressing myself ☐
d) I have severe problems washing or dressing myself ☐
e) I am unable to wash or dress myself ☐

38.3 **Usual Activities** (e.g. Work, study, housework, family or leisure activities)

a) I have no problems doing my usual activities ☐
b) I have slight problems doing my usual activities ☐
c) I have moderate problems doing my usual activities ☐
d) I have severe problems doing my usual activities ☐
e) I am unable to do my usual activities ☐

38.4 **Pain/Discomfort**

a) I have no pain or discomfort ☐
b) I have slight pain or discomfort ☐
c) I have moderate pain or discomfort ☐
d) I have severe pain or discomfort ☐
e) I have extreme pain or discomfort ☐

38.5 **Anxiety/Depression**

a) I am not anxious or depressed ☐
b) I am slightly anxious or depressed ☐
c) I am moderately anxious or depressed ☐
d) I am severely anxious or depressed ☐
e) I am extremely anxious or depressed ☐

Coast Study ID: _____ Post Operative Six Week Follow up - Hip

Thank you for completing this booklet

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For Office use only	A	B	1	2	3	4

Appendix L :

Coast Study ID: _____ Post Operative 3 Month [telephone] Follow up - Knee

University Hospital Southampton NHS
NHS Foundation Trust

COASt
Clinical Outcomes in Arthroplasty Study

Post operative: Three month [telephone] follow up

Unicompartmental Knee Replacement (UKR) /

Total Knee Replacement Surgery (TKR)

Please complete this booklet as soon as possible and return it in the enclosed envelope – No stamp required

1.1 **Study Number:** _____

1.2 **Date of Birth:** _____

1.3 **Date of surgery:** _____

1.4 **Please tick relevant option:**

Type of operation: UKR ☐[i] TKR ☐[ii]

UKR revised to TKR ☐[iii] TKR Revision ☐[iv]

Side of Operation:

Right ☐[i] Left ☐[ii] Bilateral ☐[iii]

1.5 **Date Sent:** _____

1.6 **Date received:** _____

Coast Study ID: _____ Post Operative 3 Month [telephone] Follow up - Knee

Please fill in today's date: D D M M Y Y Y Y

Your work after your operation

2. **Which of the following best describes your current work situation?** *(Tick one box)*

a) Employed (at work) ☐ b) Self-employed (at work) ☐

c) Employed (off sick) ☐ d) Self-employed (off sick) ☐

e) No paid job ☐ f) Retired ☐

3. **Have you gone back to work or undertaken any paid work (employed or self-employed) since your joint surgery?** No ☐ Yes ☐
If No, go to Question 17, Page 4. If Yes, please continue:

4. **When did you first return to work after the operation?** D D M M Y Y

5. **Are you still in paid work (whether or not you are currently off sick)?** No ☐ Yes ☐
If Yes, go to Question 8. If No, please continue

6. **When did you leave paid work after your operation?** D D M M Y Y

7. **And did you leave paid work because of the knee problem for which you had surgery?** *(Tick one box)* Mainly ☐ Partly ☐ Not at all ☐

Please now go to Question 17, Page 4

8. **Approximately how many hours do you usually work each week?** ☐☐ hours

9. **Since going back to work after the operation, have you taken any days or weeks off because of your joint problem?** No. of days ☐☐ No. of weeks ☐☐

10. **Since your knee operation, has your joint problem affected how well you could do your job when you were at work?** *(Tick one box)*

a) No, not at all ☐ b) Yes, a little ☐ c) Yes, a lot ☐

11. **Were you at work in the <u>past 7 days</u>?** No ☐ Yes ☐

If No, please go to Question 14, If Yes, please continue

12. **What impact has your joint problem had on your work during the <u>past 7 days</u>?**
(Please tick No or Yes for each activity)

a) During the past 7 days, has your knee problem meant that you struggled or taken longer over tasks that you used to manage before? No ☐ Yes ☐

b) During the past 7 days, has your knee problem meant that the quality of work you did was poorer than normal? No ☐ Yes ☐

c) During the past 7 days, has your knee problem meant that you have felt you were letting down your boss or colleagues? No ☐ Yes ☐

13. **During the <u>past 7 days</u>, how much did your joint problem affect your ability to do your work?**
Think about days you were limited in the amount or kind of work you could do, days you accomplished less than you would like, or days you could not do your work as carefully as usual. If your KNEE PROBLEM affected your work a great deal, choose a high number. If your KNEE PROBLEM affected your work only a little, choose a low number (or zero if it hasn't affected your work at all).

Consider only how much your <u>KNEE PROBLEM</u> affected your ability to work

KNEE PROBLEM had no effect on my work	0	1	2	3	4	5	6	7	8	9	10	KNEE PROBLEM completely prevented me from working

(Circle a number)

14. **<u>Since your knee operation</u>, have any of the following changes been made at work to help you cope with your joint problems?** *(Please tick No or Yes for each item)*

	No	Yes
a) Your duties have been altered or reduced	☐	☐
b) Some of your duties have been given to another person	☐	☐
c) You have moved to another job within the same business	☐	☐
d) You have moved to a different workplace in the same business	☐	☐
e) Your working hours have changed (temporarily or permanently)	☐	☐
f) Work equipment obtained, or old equipment modified or changed	☐	☐
g) Alteration(s) have been made to the premises	☐	☐
If self-employed, go to Question 15. If employed, please continue		
h) New training has been provided	☐	☐
i) Extra supervision has been provided for you	☐	☐

Coast Study ID: _____ Post Operative 3 Month [telephone] Follow up - Knee

15. **If you answered Yes to any of the items in Question 14, were the change(s) made before or after your knee operation?** *(Tick one box)*

a) Before ☐ b) After ☐ c) Before and after ☐ d) Not applicable ☐

16. **Please tell us about anything else that helped you return to work after surgery and/or any problems you encountered when returning to work.**

_____

_____

_____

Advice on working

17. **Since your knee operation, have you had any contact with an Occupational Health (OH) service provided by your employer?** *(Tick one box)*

a) No ☐ b) Yes ☐ c) No OH Service ☐ d) Don't know ☐ e) Not applicable (self-employed) ☐

If Yes, what support and/or advice did you receive from the OH service?

_____

_____

_____

_____

18. **Have you discussed work after your joint surgery with any member of the healthcare team?** No ☐ Yes ☐

If No, go to Question 23, If Yes, please indicate which healthcare professional(s) you have discussed work after your surgery with: *(Please tick all that apply)*

19. **In a hospital setting (either at outpatient clinic or as an inpatient)**

a) Surgeon ☐

b) Nurse ☐

c) Physiotherapist ☐

d) Occupational therapist ☐

e) Other health professional at hospital *(please state)* _____ ☐

20. **At the GP surgery or in the community**

a) General Practitioner (GP) ☐

b) Nurse ☐

c) Physiotherapist ☐

d) Other health professional *(please state)* _____ ☐

21. **When did you receive this advice about work after surgery?** *(Please tick all that apply)*

a) Before being admitted to hospital for surgery ☐ b) While staying in hospital (inpatient) before/after your operation ☐ c) After being discharged from hospital following surgery ☐

22. **What advice have you been given?** *(If you received advice from more than one healthcare professional, please indicate **who** gave you **what** advice and **when**)*

_____

_____

_____

_____

_____

23. **Have you found out about what to expect concerning work after joint surgery from any other sources?** (e.g. Family and friends, TV/radio programmes, web sites, etc.) No ☐ Yes ☐

*If Yes, please provide details about **where** (e.g. web site) you found out about return to work after joint surgery and **what** that information was:*

_____

_____

_____

_____

_____

The joint problem – <u>how things are right now</u>

24. **During the <u>past 7 days</u>, how much did your KNEE PROBLEM affect your ability to do your regular daily activities (other than work at a job)?**

By regular activities, we mean the usual activities you do, such as work around the house, shopping, childcare, exercising, studying, etc. Think about times you were limited in the amount or kind of activities you could do and times you accomplished less than you would like. If your KNEE PROBLEM affected your activities only a little, choose a low number. Choose a high number if your KNEE PROBLEM affected your activities a great deal.

Consider only how much your <u>KNEE PROBLEM</u> affected your ability to do regular daily activities, other than work at a job

KNEE PROBLEM had no effect on my daily activities	0	1	2	3	4	5	6	7	8	9	10	KNEE PROBLEM completely prevented me from doing my daily activities

(Circle a number)

25. **Does your joint problem currently prevent you from driving?** (*Tick one box)*

a) Yes, all of the time ☐ b) Yes, some of the time ☐ c) Only rarely or not at all ☐

25A. **Does your joint problem currently prevent you from using public transport?** (*Tick one box)*

a) Yes, all of the time ☐ b) Yes, some of the time ☐ c) Only rarely or not at all ☐

Coast Study ID: _____ Post Operative 3 Month [telephone] Follow up - Knee

New job?

*Please complete this section ONLY if you have a **new employer** or a **completely new work position** since your operation.*

*If you **do not have a job** currently, or you have the **same job** with the same or altered hours and duties you do not have to complete any more questions. **Thank you**.*

26. **What is your current occupation?** *(If you have more than one job, please answer with the details of your main job)* _____

Industry (e.g. farming, shipyard, car factory, shoe shop, hospital, insurance office) _____

27. **When did you start working in this job?** M M Y Y Y Y

28. **Do you work in the public or private sector?**
   a) **Public sector/local government** (e.g. local authority, NHS fire service, police, ambulance service) ☐
   b) **Private sector** ☐

29. **Approximately how many people work in your organisation in total?** *(Tick one box)*

a) Just me ☐ b) 2-9 ☐ c) 10-29 ☐ d) 30-499 ☐ e) 500+ ☐

30. **Approximately how many hours do you normally work each week?** ☐☐ hours

31. **In an average day, does your main job normally include:** *(Tick one box on each line)*

	No	Yes
a) Standing/walking for more than 2 hours in total?	☐	☐
b) Walking for more than 1 mile in total?	☐	☐
c) Kneeling or squatting?	☐	☐
d) Climbing more than 30 flights of stairs?	☐	☐
e) Climbing ladders?	☐	☐
f) Lifting 10 kg (20lbs) or more by hand?	☐	☐

32. **Is driving normally part of your main job?** *(Tick one box)*

a) Essential to the job ☐ b) A part of the job, but not essential ☐ c) No ☐

33. **Is driving important for you to be able to get to or from your main place of work?** *(Tick one box)*

a) Essential for getting to workplace ☐ b) Useful, but not essential ☐ c) No ☐

34. **Is using public transport important for you to be able to get to or from your main place of work?** *(Tick one box)*

a) Essential for getting to workplace ☐ b) Useful, but not essential ☐ c) No ☐

Thank you for completing this booklet

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Appendix M :

Coast Study ID: _____ Post Operative 6 Month [telephone] Follow up - Hip

University Hospital Southampton NHS
NHS Foundation Trust

COASt
Clinical Outcomes in Arthroplasty Study

Post operative: Six month [telephone] follow up

Total Hip Replacement (THR)

Please complete this booklet as soon as possible and return it in the enclosed envelope – No stamp required

1.1 **Study Number:** _____

1.2 **Date of Birth:** _____

1.3 **Date of surgery:** _____

1.4 **Please tick relevant option:**

Type of operation: THR ☐[i] THR Revision ☐[ii]

Side of Operation:

Right ☐[i] Left ☐[ii] Bilateral ☐[iii]

1.5 **Date Sent:** _____

1.6 **Date received:** _____

		Page
Hip Specific Assessment	Six month follow-up information	2 – 8

Coast Study ID: _____ Post Operative 6 Month [telephone] Follow up - Hip

Please fill in today's date: D D M M Y Y Y Y

Your work after your operation

2. **Which of the following best describes your current work situation?** *(Tick one box)*

a) Employed (at work) ☐ b) Self-employed (at work) ☐

c) Employed (off sick) ☐ d) Self-employed (off sick) ☐

e) No paid job ☐ f) Retired ☐

3. **Have you gone back to work or undertaken any paid work (employed or self-employed) since your joint surgery?** No ☐ Yes ☐
If No, go to Question 17, Page 4. If Yes, please continue:

4. **When did you first return to work after the operation?** D D M M Y Y

5. **Are you still in paid work (whether or not you are currently off sick)?** No ☐ Yes ☐
If Yes, go to Question 8. If No, please continue

6. **When did you leave paid work after your operation?** D D M M Y Y

7. **And did you leave paid work because of the hip problem for which you had surgery?** *(Tick one box)* Mainly ☐ Partly ☐ Not at all ☐

Please now go to Question 17, Page 4

8. **Approximately how many hours do you usually work each week?** ☐☐ hours

9. **Since going back to work after the operation, have you taken any days or weeks off because of your joint problem?** No. of days ☐☐ No. of weeks ☐☐

10. **Since your hip operation, has your joint problem affected how well you could do your job when you were at work?** *(Tick one box)*

a) No, not at all ☐ b) Yes, a little ☐ c) Yes, a lot ☐

11. **Were you at work in the <u>past 7 days</u>?** No ☐ Yes ☐

If No, please go to Question 14, If Yes, please continue

12. **What impact has your joint problem had on your work during the <u>past 7 days</u>?**
(Please tick No or Yes for each activity)

a) During the past 7 days, has your hip problem meant that you struggled or taken longer over tasks that you used to manage before? No ☐ Yes ☐

b) During the past 7 days, has your hip problem meant that the quality of work you did was poorer than normal? No ☐ Yes ☐

c) During the past 7 days, has your hip problem meant that you have felt you were letting down your boss or colleagues? No ☐ Yes ☐

13. **During the <u>past 7 days</u>, how much did your joint problem affect your ability to do your work?**
Think about days you were limited in the amount or kind of work you could do, days you accomplished less than you would like, or days you could not do your work as carefully as usual. If your HIP PROBLEM affected your work a great deal, choose a high number. If your HIP PROBLEM affected your work only a little, choose a low number (or zero if it hasn't affected your work at all).

Consider only how much your <u>HIP PROBLEM</u> affected your ability to work

HIP PROBLEM had no effect on my work	0	1	2	3	4	5	6	7	8	9	10	HIP PROBLEM completely prevented me from working

(Circle a number)

14. **<u>Since your hip operation</u>, have any of the following changes been made at work to help you cope with your joint problems?** *(Please tick No or Yes for each item)*

	No	Yes
a) Your duties have been altered or reduced	☐	☐
b) Some of your duties have been given to another person	☐	☐
c) You have moved to another job within the same business	☐	☐
d) You have moved to a different workplace in the same business	☐	☐
e) Your working hours have changed (temporarily or permanently)	☐	☐
f) Work equipment obtained, or old equipment modified or changed	☐	☐
g) Alteration(s) have been made to the premises	☐	☐
If self-employed, go to Question 15. If employed, please continue		
h) New training has been provided	☐	☐
i) Extra supervision has been provided for you	☐	☐

Coast Study ID: _____ Post Operative 6 Month [telephone] Follow up - Hip

15. **If you answered Yes to any of the items in Question 14, were the change(s) made before or after your hip operation?** *(Tick one box)*

a) Before ☐ b) After ☐ c) Before and after ☐ d) Not applicable ☐

16. **Please tell us about anything else that helped you return to work after surgery and/or any problems you encountered when returning to work.**

_____

_____

_____

Advice on working

17. **Since your hip operation, have you had any contact with an Occupational Health (OH) service provided by your employer?** *(Tick one box)*

a) No ☐ b) Yes ☐ c) No OH Service ☐ d) Don't know ☐ e) Not applicable (self-employed) ☐

If Yes, what support and/or advice did you receive from the OH service?

_____

_____

_____

_____

18. **Have you discussed work after your joint surgery with any member of the healthcare team?** No ☐ Yes ☐

If No, go to Question 23, If Yes, please indicate which healthcare professional(s) you have discussed work after your surgery with: *(Please tick all that apply)*

19. **In a hospital setting (either at outpatient clinic or as an inpatient)**

a) Surgeon ☐

b) Nurse ☐

c) Physiotherapist ☐

d) Occupational therapist ☐

e) Other health professional at hospital *(please state)* _____ ☐

20. **At the GP surgery or in the community**

a) General Practitioner (GP) ☐

b) Nurse ☐

c) Physiotherapist ☐

d) Other health professional *(please state)* _____ ☐

21. **When did you receive this advice about work after surgery?** *(Please tick all that apply)*

a) Before being admitted to hospital for surgery ☐ b) While staying in hospital (inpatient) before/after your operation ☐ c) After being discharged from hospital following surgery ☐

22. **What advice have you been given?** *(If you received advice from more than one healthcare professional, please indicate **who** gave you **what** advice and **when**)*

_____

_____

_____

_____

_____

23. **Have you found out about what to expect concerning work after joint surgery from any other sources?** (e.g. Family and friends, TV/radio programmes, web sites, etc.) No ☐ Yes ☐

*If Yes, please provide details about **where** (e.g. web site) you found out about return to work after joint surgery and **what** that information was:*

_____

_____

_____

_____

_____

The joint problem – <u>how things are right now</u>

24. **During the <u>past 7 days</u>, how much did your HIP PROBLEM affect your ability to do your regular daily activities (other than work at a job)?**

By regular activities, we mean the usual activities you do, such as work around the house, shopping, childcare, exercising, studying, etc. Think about times you were limited in the amount or kind of activities you could do and times you accomplished less than you would like. If your HIP PROBLEM affected your activities only a little, choose a low number. Choose a high number if your HIP PROBLEM affected your activities a great deal.

Consider only how much your <u>HIP PROBLEM</u> affected your ability to do regular daily activities, other than work at a job

HIP PROBLEM had no effect on my daily activities — 0 1 2 3 4 5 6 7 8 9 10 — HIP PROBLEM completely prevented me from doing my daily activities

(Circle a number)

25. **Does your joint problem currently prevent you from driving?** (*Tick one box)*

a) Yes, all of the time ☐ b) Yes, some of the time ☐ c) Only rarely or not at all ☐

25A. **Does your joint problem currently prevent you from using public transport?** (*Tick one box)*

a) Yes, all of the time ☐ b) Yes, some of the time ☐ c) Only rarely or not at all ☐

Coast Study ID: _____ Post Operative 6 Month [telephone] Follow up - Hip

New job?

*Please complete this section ONLY if you have a **new employer** or a **completely new work position** since your operation.*

*If you **do not have a job** currently, or you have the **same job** with the same or altered hours and duties, please go to Question 35.*

26. **What is your current occupation?** *(If you have more than one job, please answer with the details of your main job)* _____

Industry (e.g. farming, shipyard, car factory, shoe shop, hospital, insurance office) _____

27. **When did you start working in this job?** M M Y Y Y Y

28. **Do you work in the public or private sector?**
   a) **Public sector/local government** (e.g. local authority, NHS fire service, police, ambulance service) ☐
   b) **Private sector** ☐

29. **Approximately how many people work in your organisation in total?** *(Tick one box)*

a) Just me ☐ b) 2-9 ☐ c) 10-29 ☐ d) 30-499 ☐ e) 500+ ☐

30. **Approximately how many hours do you normally work each week?** ☐☐ hours

31. **In an average day, does your main job normally include:** *(Tick one box on each line)*

	No	Yes
a) Standing/walking for more than 2 hours in total?	☐	☐
b) Walking for more than 1 mile in total?	☐	☐
c) Kneeling or squatting?	☐	☐
d) Climbing more than 30 flights of stairs?	☐	☐
e) Climbing ladders?	☐	☐
f) Lifting 10 kg (20lbs) or more by hand?	☐	☐

32. **Is driving normally part of your main job?** *(Tick one box)*

a) Essential to the job ☐ b) A part of the job, but not essential ☐ c) No ☐

33. **Is driving important for you to be able to get to or from your main place of work?** *(Tick one box)*

a) Essential for getting to workplace ☐ b) Useful, but not essential ☐ c) No ☐

34. **Is using public transport important for you to be able to get to or from your main place of work?** *(Tick one box)*

a) Essential for getting to workplace ☐ b) Useful, but not essential ☐ c) No ☐

35. **Please briefly describe what your job involves, and what impact total joint replacement surgery has had on your day-to-day tasks at work since going back after your operation ...**

36. **What were the most important things you needed to consider when you were deciding when to return to work after your operation?**

37. **What do you wish you had known about returning to work after total joint replacement surgery from the beginning (before your operation)?**

38. **What (if anything) could have made the experience of returning to work better for you?**

39. **Is there anything else about your experience of returning to work after total joint replacement that you would like to tell us about?**

Thank you for completing this booklet

Please post back in the prepaid envelope supplied

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