

The Role of Hope on Outcomes Following Total Knee Replacement

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Faculty of Medicine and Biological Sciences,
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Doctorate in Clinical Psychology

By

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Declaration

I confirm that the literature review, research report and critical appraisal contained within this thesis are my own work and have not been submitted for any other academic award.

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Thesis Abstract

Total hip and knee replacement are increasingly common elective surgical procedures in the UK, performed primarily for the relief of osteoarthritis in the majority of cases. Research has shown that individual psychological variables play a part in determining outcomes following these procedures.

The literature review systematically examined the role played by patient expectations in outcomes following total hip and knee replacement. In addition, it examined the way in which both expectations and outcomes were conceptualised and measured in the literature. Finally, it sought to determine the theoretical underpinnings of expectations research. With the exception of one study, results showed that expectations do influence outcome. Weaknesses were identified in respect to the inconsistent approach used to measure both outcomes and expectations. A lack of theoretical underpinning of expectations was noted. Expectations may have implications for informing surgical selection and prognosis. Suggestions for future research in this area were made.

The empirical study examined the role that hope might play in determining outcomes following primary total knee replacement for osteoarthritis. Much previous research in this area has been conducted from a deficit model of health. In contrast, hope is a positive psychological construct, which identifies and builds on individuals' strengths. Pre-operative hope did not, as expected, directly influence outcome after surgery. It was found however, to be a significant unique predictor of pre-operative psychological morbidity and physical function, accounting for 9% and 10% of variance respectively. Both depression and function have been shown to influence outcome in this population. It could be argued that the pre-operative period is when the impact of osteoarthritis is most significant. Hope may be an important factor in delivering effective condition management at this time. Suggestions for future research and possible interventions based on these findings were advanced.

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Do Patient Expectations of Joint Replacement Surgery Affect Outcome After Total Knee Replacement and Total Hip Replacement?

1. Abstract

Purpose: This systematic review aimed to assess the role of patient expectations on outcomes following total hip replacement (THR) and total knee replacement (TKR) surgery; and to examine the conceptualisation and measurement of expectations and outcome in this field. Finally, the review sought to identify which theory, if any, underpinned expectations research.

Methods: Three electronic databases were searched for relevant studies. References from retrieved articles were searched and experts in the field were consulted. Data were extracted from identified studies using a data extraction tool. Due to the heterogeneity in methodology used in these studies, the data were synthesised using a narrative approach.

Results: A total of nine studies were eligible for review. With the exception of one study, results showed a positive relationship between expectations and outcome. This review revealed significant weaknesses in this area of research, notably in the lack of theoretical underpinning of expectations and the inconsistent approach to outcome and expectations measurement.

Conclusion: Patient expectations are important determinants of outcome following THR and TKR. They have implications for informing surgical selection, prognosis, rehabilitation strategies and beyond. Recommendations for future research in this area are made based on these findings.

2.0 Introduction

Total knee replacement (TKR) and total hip replacement (THR) are increasingly common elective surgical procedures most frequently performed to address the symptoms of osteoarthritis, the indication for surgery in over 90% of cases. In England and Wales in 2007, records revealed that there were 72 980 primary TKR's and 65 229 primary THR's performed (*The national joint registry for England and Wales. 7th Annual report 2010*). Surgery is advocated to alleviate symptoms of pain and stiffness and to promote mobility and function. Initial research regarding outcomes of joint replacement surgery have focused on issues pertaining to surgical process, such as prosthesis loosening, infection, design issues and surgical techniques (Dieppe et al., 2008). By contrast, patient-reported outcomes have been relatively neglected.

Although many patients publicly report positive outcomes following surgery, in reality many continue to experience ongoing pain and disability in their operated joint (Woolhead, Donovan, & Dieppe, 2005; Baker, van der Meulen, Lewsey, Gregg, & National Joint Registry for England and Wales, 2007; Wylde, Blom, Dieppe, Hewlett, & Learmonth, 2010). Research examining outcomes beyond purely surgical process has emerged over the past decade, with the development of a literature that has started to examine patient-reported outcomes and the psychological factors that may influence these outcomes (Dieppe et al., 2008). For example, depression, anxiety, pain catastrophising and low self-efficacy have all been found to be important variables, having a direct relationship to patient outcome following joint replacement (Howard, Ellis, & Khaleel, 2010).

The prominence of surgical outcomes may have arisen because of the difficulty in conceptualising and measuring patient-related outcomes in this field. Patient outcomes may be

measured in either disease specific (e.g. pain and range of movement) or general domains, such as quality of life. Dieppe and colleagues have suggested that effective outcome measures should have clear relationship to a theoretical model and should have the ability to measure a single construct (Dieppe et al., 2008). Many currently available measures fall short of these requirements (Pollard & Johnston, 2006; Pollard, Johnston, & Dieppe, 2006) Further, Pollard, Johnston and Dieppe have suggested that the use of the International Classification of Functioning, Disability and Health (ICF 28) (World Health Organisation, 2011) should be adopted as a theoretical framework on which outcome measures should be based. This biopsychosocial framework focuses on impairment (I), activity limitation (A) and participation restriction (P) (usually conceived of as an inability to participate in valued activities). Indeed, this pathway appeared to be articulated spontaneously when patients were asked about the most important things they were expecting from joint replacement. The most common pattern of responses reflected a sequential relationship between I, A and P, for example, first response related to I “I want to be pain free”, the second to A, “easier walking” and the third to P, “so I can play golf”. Patient outcome can thus be seen to be a result of the impact that impairment has on activity limitation, which would then influence participation.

However, in addition to this, individual factors may have a mediating effect on each of these constructs and it is therefore also important that these factors are conceptualised and measured. One such mediating factor may be patient beliefs of anticipated outcome, often constructed as patient expectations.

In relation to medical treatment, expectancies can be defined as (a) treatment-related outcome expectations (beliefs that treatments will have positive or negative effects on health status), (b)

patient-related self-efficacy expectations (beliefs that one can carry out the actions necessary for successful management of a disease or coping with the treatment) (Crow et al., 1999) or (c) process related expectations (Greenberg, Constantino, & Bruce, 2006) (beliefs about the nature and content of the treatment intervention). Patient expectations appear to be a significant factor in determining treatment outcome across a variety of different conditions as evidenced by a circumscribed literature, comprising two systematic reviews. Mondloch, Cole, and Frank, (2001) reviewed evidence relating to medical conditions, including myocardial infarction, cardiac surgery and chronic pain. Findings showed that positive expectations of outcome were associated with better health outcomes. Similarly, Greenberg et al (2006) reviewed evidence examining mental health conditions such as anxiety and depression, revealing a consistent and moderately strong positive correlation between patients' expectations and treatment outcome. Identifying and meeting patient expectations is important in improving both patient satisfaction with, and adherence to, treatment. It is also important for reducing the risk of health-care related litigation (Levinson, 1994).

Patient expectations seem variously described in healthcare and there appears to be little consensus as to which theories and concepts explain how patient expectations might operate in order to influence outcome. In order to examine existing constructions, an extensive review of the literature was undertaken. Three electronic databases, PsycINFO, Medline and Web of Science, were searched (Oct 2010) for published articles using "expectations" "expectation" and "patient expectations" as key words. Of those papers identified, titles and abstracts were scanned and full texts of those papers deemed relevant were obtained where available. Although not exhaustive, this review confirmed that much of the expectations literature made no reference to theory. However, in those papers where theory was mentioned, three theories were consistently advanced. These will be reviewed in turn.

2.1 Placebo Effect

The placebo effect has a long history, first used in a medical context as early as the 18th century and usually understood as "a change in a patient's illness, attributable to the symbolic import of a treatment rather than a specific pharmacologic or physiologic property" (Turner, Deyo, Loeser, & Von Korff, 1994). Although placebo is often construed regarding drug effects, there is evidence that it also influences surgical outcome (Roberts, Kewman, Mercier, & Hovell, 1993). For example, in groups of patients receiving sham surgery compared to real surgery in knee arthroscopy (Moseley, Wray, Kuykendall, Willis, & Landon, 1996), and angina pectoris (Dimond, Kittle, & Crockett, 1960) outcomes were comparable. There is substantial neurobiological research suggesting that expectation of clinical improvement influences the psychobiological placebo response (Benedetti, Mayberg, Wager, Stohler, & Zubieta, 2005). Modern imaging techniques have been able to show that when a patient expects a clinical improvement, specific brain networks are activated. Placebo analgesia appears to be mediated by a pain-modulating network using endogenous opioids as neuromodulators.

2.2 Dispositional Optimism

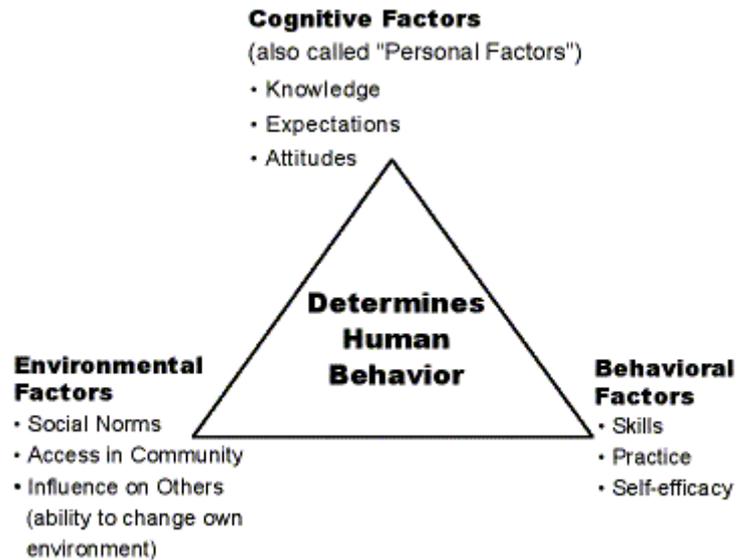
A further construct embodying patient expectations is that of dispositional optimism (Scheier & Carver, 1992). Dispositional optimism is a trait which embodies a global expectation of future beneficial outcomes. Optimistic personality types have been shown to report fewer physical symptoms, better health behaviours and better coping strategies (Carver, Scheier, & Segerstrom, 2010). Optimism is also associated with improved health outcomes, such as increased life satisfaction following coronary artery bypass surgery (Fitzgerald, Tennen, Affleck, & Pransky, 1993) and higher quality of life after treatment for cancer (Allison, Guichard, & Gilain, 2000). A recent meta-analysis confirmed that optimism was a significant predictor of health outcomes

including mortality, cardiovascular function and immune system function, in a range of conditions including cancer, pregnancy and chronic pain (Rasmussen, Scheier, & Greenhouse, 2009). Putative mechanisms advanced suggest that optimism influences outcome by altering behavioural responses. Expectations of a positive outcome for clinical intervention may increase participation in rehabilitation or physical activities thus promoting recovery and health. Alternatively, optimism may act through the production of positive emotions which mediate physiological effects on cardiovascular responsivity and immune system functioning, again enhancing outcome

2.3 Social Cognitive Theory

Social cognitive theory (SCT) (Bandura, 1986, 1997) also appears to incorporate a role for patient expectations. It argues for a dynamic and reciprocal interaction between individual factors, behaviour and environment to explain human behaviour (See Figure 1). Individual factors include knowledge, expectations and attitudes, which will influence behaviour. In turn, the way a person behaves will help to shape both their social and physical environment. The environment itself, as well as being influenced by the behaviour of an individual, will also help to shape the individual's behaviour and beliefs.

Figure 1, Social Cognitive Theory – Diagrammatic representation.



(Bandura, 1997)

Two key constructs within SCT are self-efficacy beliefs (belief in one's capabilities to organize and execute the course of action required to produce given attainments), shown to be predictive of health related outcomes (Sarkar, Ali, & Whooley, 2007), and outcome expectancies (a person's estimate that a given behaviour will lead to certain outcomes) (Bandura, 1986, p391). Self-efficacy determines a patient's motivation to perform a task such as the level of engagement in a rehabilitation programme, potentially affecting outcome. Consequences of behaviour will be used to develop expectations of behavioural outcome. In turn, these outcome expectations are used in future to predict behavioural outcomes and have been shown to be important to health-related outcome (Jensen, Turner, & Romano, 1991). Finally, although other constructs were used, they were not used in a consistent or coherent manner.

2.4 Review Aims and Rationale

A literature search undertaken by the author prior to this review, revealed only one systematic review to date, examining the effect of patient expectations on health-related outcome (Mondloch et al., 2001). Mondloch and colleagues examined expectations in relation to diverse health conditions and interventions including myocardial infarction, cardiac surgery, chronic pain and psychiatric conditions. However, the role of patient expectations in outcomes for those undergoing TKR and THR has not been systematically reviewed. This review aims to address this gap, by appraising and synthesising research looking specifically at the role that patient expectation may play in outcomes following THR and TKR. To meet this objective, the review sought to answer the following questions:

1. What theories have been applied and how explicitly?
2. How are patient expectations conceptualised and measured?
3. How are patient outcomes conceptualised and measured?
4. Do patient expectations of total hip and knee replacement influence outcome?

3.0 Method

Three electronic data bases were searched (Oct 2010, and repeated in Jan 2011) (PsycINFO, ISI Web of Science and Medline) for articles published between 1980 and the end of January 2011. The 1980 start point was chosen for two reasons; this was the point at which joint replacement became a high volume procedure in the NHS, and it captures the period at the end of the 20th century when the focus of research moved from surgical technique to patient reported outcomes.

Combinations of the following search terms were used: “arthroplasty” “hip replacement” “knee replacement” “expectations” “patient expectations” “outcome” or “treatment outcomes”.(For detailed search strategies see Appendix B).

The following inclusion criteria were set:

Studies should:

- Explicitly measure patient expectations regarding outcome following hip or knee replacement.
- Explicitly measure patient outcomes following hip replacement or knee replacement surgery.
- Measure the relationship between patient expectation and outcome.
- Apply to an adult population.
- Be published in English.
- Be available in full text.

An initial search returned 165 articles (Appendix B). After applying the above criteria, the number of relevant papers was reduced to 18. Of these, full text was reviewed and relevance confirmed. When duplicates were removed a total of five papers remained. Experts working in this field of research were consulted, resulting in one further paper which is currently “in press”.

References of all six papers identified at this stage were hand searched and duplicates removed. A further six papers were identified as relevant from the title and abstract. Of these, two papers were excluded as full text was not available; a third was excluded as it was published prior to 1980. Full text of the remaining three papers was obtained and reviewed. All papers met the inclusion criteria, thus leaving a further three papers for inclusion.

In total, nine papers were identified and were reviewed using the data extraction form in Appendix C as a tool.

3.1 Data Synthesis

Following data extraction, the information was summarised in a table, Tables 1 a) and 1 b). A quantitative meta-analysis of the data was not possible due to the heterogeneity in methodology and design of the identified studies. The data was therefore synthesised using a narrative approach.

4.0 Results

A summary of the main characteristics of the nine identified studies can be seen in tables 1a and b below. Five studies examined outcome following TKR studies 1 (Mannion, Kampfen, Munzinger, & Kramers, 2009) 2 (Noble, Conditt, Cook, & Mathis, 2006) 3, (Lingard, Sledge, Learmonth, & and The Kinemax Outcomes Group, 2006) 4 (Engel, Hamilton, Potter, & Zautra, 2004) and 5 (Nilsdotter, Toksvig-Larsen, & Roos, 2009)). Two after THR studies 6 (Judge et al.) and 7 (Mancuso, Salvati, Johanson, Peterson, & Charlson, 1997) and two examined outcome after both THR and TKR studies 8 (Gandhi, Roderick, & Mahomed, 2009) and 9 (Mahomed et al., 2002). A retrospective cross sectional design was employed in studies 2 and 7, and a prospective longitudinal design was employed in studies 1, 3, 4, 5, 6, 8, and 9 with measurement points ranging from 6 months to five years. All studies examined the relationship between expectations and outcome following surgery. The studies were conducted across North America, Australia and Europe. The total number of participants recruited was 5252, with the smallest study recruiting 74 (study 4) and the largest 2350 (study 8). A narrative synthesis of

the results are presented below and findings are presented in relation to each of the review questions.

Table 1a). Summary of studies:

Study ID/Author	Country	Hip or Knee	Study Design	Study aims	Inclusion/exclusion criteria	Gender	Sample size - (attrition rate)	Characteristics of “drop outs”	Measurement points
1. Mannion et al 2009	Switzerland	Knee	Prospective, longitudinal questionnaire study	To determine which of: baseline expectations, fulfilment of expectations or current symptoms and function most important determinant of global outcome/satisfaction	All patients scheduled for primary TKR ¹ at authors hospital in year of study invited, if willing and good understanding of German	69% female	146 (23%)	NS tendency to be older only	Pre-op and 2 years post-op
2. Noble et al 2006	USA	Knee	Retrospective cross sectional questionnaire study	Are patient expectations of outcome following TKR predictive of satisfaction with surgery?	All patients having undergone primary, unilateral TKR, at least 1 year previously, for any condition at authors hospital	59% female	253 Not reported	Not reported	At least 1 year post-op
3. Lingard et al	USA, UK and Australia	Knee	Prospective, longitudinal questionnaire study	Are pre-op expectations of TKR independent predictors of pain, functional outcome and satisfaction at 1 year post-op	All patients undergoing primary TKR for OA ² with the KINEMAX prosthesis. Exclusion: cognitive or language deficit, history of infection of previous surgery in index knee or bilateral or contra lateral replacement	57.5% female	598 (12.2%)	Not reported	6 weeks pre-op and 1 year post-op

Study ID/Author	Country	Hip or Knee	Study Design	Study aims	Inclusion/exclusion criteria	Gender	Sample size - (attrition rate)	Characteristics of “drop outs”	Measurement points
4. Engel et al 2004	USA	Knee	Prospective, longitudinal questionnaire study	Do generalised expectations influence the extent of improvement in physical and mental health in individuals receiving TKR?	All patients referred by rheumatologist for TKR	49.3% female	74 (27%)	No difference in pain, swelling, stiffness reported	Pre-op, 4-6 weeks and 6 months post-op
5. Nilsson et al 2009	Sweden	Knee	Prospective, longitudinal questionnaire study	Are patient expectations related to self-reported improvement in post-op pain and physical function?	123 consecutive patients on waiting list for primary TKR for OA at authors hospital	63% female	102 (14%)	Not reported	Pre-op and 6 months, 1 and 5 years post-op
6. Judge et al unpublished	12 European countries (not stated)	Hip	Prospective, longitudinal questionnaire study	Are patient expectations related to post-op pain, function and QOL ³ 1 year after THR ⁴ ?	Primary THR for OA. Exclusions – severe mental illness or dementia, or unwilling/unable to participate	Not reported	1327 (31.6%)	Not reported	Pre-op and 1 year post-op

Study ID/Author	Country	Hip or Knee	Study Design	Study aims	Inclusion/exclusion criteria	Gender	Sample size - (attrition rate)	Characteristics of “drop outs”	Measurement points
7. Mancuso et al 1997	USA	Hip	Retrospective cross sectional questionnaire study	To measure patients satisfaction with THR and assess relationship between expectations and satisfaction	All English speaking patients having undergone primary THR in index year at participating hospital that were available for follow up.	62% female	180 n/a	n/a	2-3 years post-op
8. Gandhi et al 2009	Canada	Hip & Knee	Prospective, longitudinal questionnaire study	To determine effect of patient expectations predicting surgical outcome at 1 year post-op	All patients undergoing primary TKR and THR for primary or secondary OA at participating hospital	62% female	2350 (23.4%)	No significant difference in age, BMI ⁵ sex or co-morbidity	Pre-op and 1 year post-op
9. Mahomed et al 2002	Canada and USA	Hip & Knee	Prospective, longitudinal questionnaire study	To determine relationship between patient expectations and post-op functional outcome	Patients of 50+ undergoing THR/TKR for primary or secondary OA at 2 participating hospitals	55% female	222 (13.5%)	No significant difference in baseline characteristics	Pre-op and 6 months post-op

¹Total knee replacement

²Osteoarthritis

³Quality of life

⁴Total hip replacement

⁵Body mass index

Table 1b) Summary of studies:

Study ID/ Author	Reference to theory	Expectation measures	Outcome measures	Findings	Comment
1. Mannion et al 2009	Yes Dispositional optimism (e)* Placebo (e) A priori	Expectations measured using THAOEQ ¹ . Multiple questions including: expectation of time to full recovery (open response in months), expected pain after surgery (none – very), expected limitation in day to day activities (not limited – greatly).	Global outcome: 4 point Likert scale, excellent - poor Global satisfaction: 4 point Likert scale, v satisfied-v dissatisfied. THAOEQ ¹ (modified for the knee)	Expectations NOT shown to predict global outcome or satisfaction	May need to examine interaction i.e. may show expectation related to outcome only if expectation is high? Questionnaire (THAOEQ) not validated for knee or use in German
2. Noble et al 2006	No	Expectations measured using TKFQ ² and additional items (not specified) asking about fulfilled expectations. Questions not specified, some answers dichotomised	TKFQ, plus additional questions re: activity levels, walking, symptoms and medication use Satisfaction dichotomised into satisfied v dissatisfied	Patient expectations of surgery correlate with satisfaction post-op. Strong association between satisfaction and fulfilment of expectations about activity levels.	Fairly large sample size. Very long questionnaire with low completion rates (typically 2/3) response rate not reported in this study. Satisfaction scores skewed. Not completely clear how expectations assessed
3. Lingard et al 2006	No	Expectations re: pain, walking distance, limitation of recreational activity and use of walking aid. Choice of 4 answers to each question. Answers dichotomised high v low expectation	Satisfaction measured using 4 questions scored using 4 point Likert scale ranging from v satisfied to v dissatisfied WOMAC ³ pain and function scores SF 36 ⁴	Expectation of no pain at 12/12 significantly correlated to less post operative pain and better mental health. Expectation of not using a walking aid at 12/12 was correlated to less pain and improved function post-op. Pre-op expectations not correlated with post-op satisfaction	Multi country research and large sample size increase generalisability. Only looked at final health status and not change over time.

Study ID/ Author	Reference to theory	Expectation measures	Outcome measures	Findings	Comment
4. Engel et al 2004	Yes Placebo (e) Dispositional optimism (e) Pessimism (e) SCT (i)** A priori	5 single item questions asked about expectations. Only 2 included in analysis i.e. chance of improvement in condition after surgery (visual analogue scale) and expected change in quality of life post-op on 4 point scale.	WOMAC pain and function scores SF 36 Clinician assessment of outcome using Diagnostic and therapeutic committee of the American rheumatism classification of OA knee, consisting of 5 measures	Expectancy beliefs accounted for almost 25% of the variance in post-op weight bearing pain and joint tenderness after controlling for initial disease. Expectancy beliefs also predicted post op pain and function	Very small sample size limiting power to detect small effects and reducing generalisability
5. Nilsdotter et al 2009	No	Expectations assessed re: 1.walking ability – assessed on 6 point Likert scale. 2.leisure activity – assessed on 7 point Likert scale 3. KOOS ⁵ domains – scored on 5 point Likert scale according to expected change in each subscale i.e. “much less – much more” or “much better – much worse”.	KOOS scored post-op on 5 point Likert scale according to actual change in each subscale i.e. “much less – much more” or “much better – much worse”. SF 36 Physical activity assessed re: walking and leisure activities: Both rated on ordinal scale 1 – 6 Satisfaction scored on 5 point Likert scale and assessed in relation to each of the KOOS domains on 5 point Likert scale	Patients with higher expectation of leisure activity had increased post-op involvement in leisure and increased walking ability	Small sample size at follow up reduces generalisability. Strength in 5 year follow up

Study ID/ Author	Reference to theory	Expectation measures	Outcome measures	Findings	Comment
6. Judge et al unpublished	No	Open question asked: “what things do you think you might be able to do in a years time, that you need to be able to do but cannot do now, if the operation is a total success” Response coded qualitatively, divided into themes and grouped.	WOMAC pain and function scores EQ5D ⁶	The more pre-op expectations a patient had, the more likely they were to improve post-op. Each expectation was associated with a 26% increase in probability of improvement	Large sample size with over 12 countries a strength, so increasing generalisability. Rigorous approach to measuring expectations but may have biased response to functional expectations at the expense of symptomatic outcome expectations
7. Mancuso et al 1997	No	Two open questions asked: 1. What did you expect the surgery would do for you? 2. What were you hoping for? Responses were grouped into 5 categories	Satisfaction measured with 3 open questions. Responses grouped into categories. SF 20 ⁷ HRQ ⁸	Expectations and satisfaction were strongly correlated in 91% of cases but not found to be statistically significant when analysis of variance / covariance performed.	Retrospective nature of the study a limitation as open to memory bias. Open ended questions and large sample size strength. Potential confusion-asking about hope in expectation question and expectation in satisfaction question.

Study ID/ Author	Reference to theory	Expectation measures	Outcome measures	Findings	Comment
8. Gandhi et al 2009	No	Expectations re: 1. time to fully recover from surgery (3 options) 2. pain level post-op (none, mod, very) 3. ability to perform usual activities (3 options) Answers dichotomised into high v low expectations	Satisfaction 4 options dichotomised into satisfied/dissatisfied WOMAC pain and function scores SF36	Expectations of greater pain relief from surgery, independently predicted greater reported improvement in WOMAC pain scores	Large sample size increases generalisability. Use of validated outcome measures
9. Mahomed et al 2002	Yes Placebo (i) Dispositional optimism (i) Social Cognitive theory (i) Post hoc	Expectations re: pain relief and limitation of activities of daily living rated on 4 point Likert scale and dichotomised into high v low. Questions about expected success of operation and expectation of complications scored on visual analogue scale and dichotomised.	WOMAC pain and function scores SF 36	Expectations of complete pain relief related to less pain and improved function (WOMAC) and improved physical function (SF 36) Expectations of less complications related to better function scores (WOMAC)	Patients' knowledge of joint arthroplasty and patient self efficacy and participation in rehab not explored. Population – white and highly educated therefore not representative of all who have surgery. Relatively large sample size.

¹ Total Hip Arthroplasty Outcome Evaluation Questionnaire

² Total knee function questionnaire

³ Western Ontario McMaster University Osteoarthritis Index

⁴ Medical Outcomes Study short form 36

⁵ Knee Injury and Osteoarthritis Outcome Score

⁶ European Quality of life measure 5 Dimensions

⁷ Medical Outcomes Study short form 20

⁸ Hip Rating Questionnaire

* (e) Theory explicitly offered ** (i) Theory implied

4.1 Theoretical Underpinning of Expectations Research

Consistent with the majority of published research in this area, only three of the nine articles reviewed made any reference to theoretical mechanisms by which patient expectations may influence outcome. Study 9, in a post hoc analysis, acknowledged that high expectations of pain relief may influence outcome relating to reduced pain perception post operatively, or alternatively through interpreting symptoms such as pain or stiffness more optimistically, enhancing physical functioning through increased participation in rehabilitation. Study 1 offered two mechanisms by which the relationship between expectations and outcome in medical care settings occurs. The nebulous construct of meeting patient expectations is argued as the most important determinant of satisfaction (Ross, Frommelt, Hazelwood, & Chang, 1987), however no theoretical construct is advanced to support this model. The second notion posits that higher expectations per se are associated with better outcome and explicitly suggest that dispositional optimism or placebo may account for this (Flood, Lorence, Ding, & McPherson, 1993; Koyama, McHaffie, Laurienti, & Coghill, 2005). Study 4 describes two types of expectancy; generalised expectations about the future, including expectations about surgical outcome, potentially underpinned by placebo, optimism and pessimism. They also describe individual expectations, which they call efficacy beliefs relating to expectations that one has the ability to affect a certain outcome. Clearly this alludes to Bandura's SCT (Bandura, 1986) although this theory is not explicitly mentioned by the authors. These theories are offered a priori and explicitly inform the choice of outcome measures that are used in this study.

4.2. Conceptualisation and Measurement of Patient Expectations

Four studies (studies 3, 4, 7 and 9) explicitly offer a definition of expectations. Studies 3 and 9 both define expectation as the anticipation of events happening during or after surgery and study 7 defines it as patient hopes of what they will achieve as a consequence of surgery. Study 7 appears to conflate hope with expectation. Although both describe future-orientated cognitions, expectations are probability-driven assessments of the most likely outcome whilst hope relates to the most desirable, but not necessarily the most probable, outcome (Leung, Silvius, Pimlott, Dalziel, & Drummond, 2009). Study 4 defined both general expectations about future events and individual expectations. The remaining studies provide no explicit definition. However, even where a definition is not stated, all studies appeared to frame their enquiries regarding expectations to capture future-oriented cognitions. Most were prospective studies and therefore were asking about patient expectations regarding post-operative outcome, prior to surgery. Studies 2 and 7 were conducted retrospectively, but still asked patients to recall what they had expected before they had surgery, introducing significant recall bias given that responses were based on memories for historical events.

This review highlighted the lack of a standardised tool to measure expectations in those receiving TKR and or THR (see Table 1 b) making comparison between studies very difficult. Standardised tools would ensure both validity and reliability, which would significantly increase the ability to replicate and generalise results between studies, thus increasing comparability. Only two studies, study 1 and study 2 used questions that were part of a validated tool to assess expectations, study 1 using the Total Arthroplasty Outcome Evaluation questionnaire and study 2 the TKFQ (see Appendix D for summary of measures).

The majority of studies reviewed, studies 1, 3, 4, 5, 8, and 9, used closed questions in pre-set categories, with limited response options to measure expectations. Whilst there was category overlap, no theoretical justification was given for choosing the questions asked. Studies 1 and 8 both measured expectations in the domains of recovery time, pain and function. Study 3 asked similar questions using the above domains, with the addition of a question about expectation about walking aid use after surgery. Study 9, asked about pain and functional activity as above, but also included two questions about expected success of the surgery and expectation of post-operative complications. Studies 3, 8 and 9 went on to dichotomise the responses into high or low expectations, perhaps losing some specificity by doing this. Study 4 asked about expectations of significant improvement following surgery, scored on a visual analogue scale and given a percentage score, and about expectation of improvement in quality of life after surgery.

In contrast, studies 6 and 7 chose open questions to measure expectations. Study 6 asked what the patient needed to do if the operation was a success; they coded answers qualitatively into themes and grouped them together. An ordinal variable was created of the number of expectations each patient reported. Whilst this is advantageous, not restricting patients to pre-defined responses, this question may be biased towards functional expectations at the expense of others such as symptoms. A further flaw may exist since an ordinal variable was created to reflect the number of pre-operative expectations each patient expressed, but this would not adequately weight each expectation. Similarly, study 7 asked open questions, with answers grouped into five broad categories. Again, this permitted breadth of response, allowing patients to initiate and volunteer expectations and therefore not restricting responses. Clearly open and closed questions possess advantages and disadvantages. Whilst open questions do not restrict responses, they require coding and inter-rater agreement. By contrast, closed

questions may not adequately capture diversity of responses but may be less time consuming (Wright, 2010).

4.3 Conceptualisation and Measurement of Patient Outcomes

The reviewed studies used diverse concepts and measured patient outcomes variably. Some studies used disease specific measures, (see Appendix D for summary of measures) measuring domains such as pain and function. Most commonly, the Western Ontario McMaster University Osteoarthritis Index (WOMAC), (used in studies 3, 4, 6, 8 and 9) an extensively used measure with validity and reliability widely reported in the literature, was utilised. Study 5 used the Knee injury and Osteoarthritis Outcome Score (KOOS), an extension of the WOMAC, developed for use with younger and/or more physically active patients, and again is a valid and reliable measure. Such extensively used measures have the advantage of allowing increased comparability between studies.

Studies 1, 2 and 7 used less well validated measures. Study 1 used the Total Arthroplasty Outcome Evaluation Questionnaire, however this questionnaire was of dubious value given it was developed and validated for the knee. Additionally, the questionnaire was administered in German but had not been subject to cross cultural adaptation. Study 2 used the Total Knee Function Questionnaire (TKFQ), developed and validated by the authors. This measure is long and time consuming, resulting in typically only a two third response rate. It is likely therefore to bias findings in favour of more positive responses, as those patients with a worse outcome are less likely to respond. Study 7 used the Hip Rating Questionnaire (HRQ), again a validated measure of hip function. These self-report questionnaires benefit from measuring outcome from a patient, rather than clinician perspective. However, patients may report overly positive results to please clinicians, a confound which could be reduced by anonymising

replies. Study 2 collected further disease specific data by simply asking extensive questions in relation to domains such as walking ability and symptoms. This may reduce reliability and validity both within and between studies. Finally, study 4, as well as using the WOMAC, also used a clinician assessment of outcome, The Diagnostic and Therapeutic Committee of the American Rheumatism Classification of OA of the Knee. In contrast to self-report measures, this would be subject to the bias of the clinician. Perhaps a combination of both patient and clinician reported outcome measures, if possible, would be the most reliable form of measure.

In contrast to disease specific measures, many studies also used general measures, assessing general health and well-being, including both physical and mental health domains, the primary measure being the Medical Outcomes Study Short-form General health Survey (SF 36 and SF 20). Studies 3, 4, 8 and 9 used the SF 36 and study 7 used its shorter version, the SF 20. Study 6 used the EQ 5D a measure of health state today covering mobility, self-care, usual activities, pain and anxiety. These are all self-report measures, the psychometric properties of which have been well established in the literature.

All of the above scales can be used to measure either final attained outcome e.g. in relation to pain or function, or can be used as measures of improvement or change when compared to pre-op scores. These two measures are very different and it is important to differentiate between them. In this review, studies 2, 3, 7 and 9 looked at final attained outcome, whilst studies 1, 4, 5, 6 and 8 measured improvement or change.

In addition to disease-specific measures or general measures of health and well-being, more global and non-specific measurement of outcome were also used. Study 1 rated global outcome on a 4 point scale from excellent to poor, perhaps too blunt a measure, since if

outcome in one domain was excellent and another poor, an overall outcome score would erase differences.

Finally, satisfaction was used as a measure of outcome in relation to expectations in studies 1, 2, 3 and 7. No standardised measure of satisfaction was used. Studies 1 and 3 measured satisfaction on a 4 point Likert scale. Similarly, study 8 also used a 4 point measure but dichotomised the results. Study 7 attempted to measure different aspects of satisfaction e.g. willingness to repeat operation, having expectations met and overall satisfaction. The responses were then categorised. In the context of this review, satisfaction may be a reflection of whether expectations were fulfilled, although alternative models suggest that satisfaction may be related to actual post-operative status rather than prior expectation (Mannion et al., 2009).

4.4 Do Patient Expectations of Joint Replacement Surgery Influence Outcome Post-operatively?

Two studies, 2 and 7 employed a retrospective cross sectional design. Use of this methodology may be a fundamental flaw, given expectations are future- based and retrospective enquiry would be subject to significant recall bias, likely to increase over time. In addition, recall of expectations could be influenced by the current levels of symptoms and the experience of surgery, both significant confounding variables. Study2 examined factors contributing to patient satisfaction following unilateral TKR, surveying patients a minimum of 1 year post-operatively, however did not state if data collection was time limited given change over time could influence the findings. Questionnaires assessed participation in activities involving the knee, satisfaction and expectation fulfilment. Questionnaires included the total Knee Function Questionnaire (TKFQ), criticisms of which are discussed above.

Results showed that fulfilled expectations were highly correlated with satisfaction. Study 7 examined the relationship between patient expectations and outcome, to satisfaction, in patients receiving THR. Outcome was measured using both generalised and disease-specific measures and in terms of satisfaction. Analysis revealed satisfaction and expectation to be strongly correlated, with satisfied patients having their expectations met and dissatisfied patients the reverse, in 91% of cases. However, these findings were not found to be statistically significant when analysis of variance and covariance was undertaken.

The remaining studies all used a prospective longitudinal design and despite different methodologies utilised, studies 3, 4, 8 and 9 reported similar findings. All found a positive correlation between expectations and post-operative pain. In addition, studies 3, 4 and 9 also found a positive correlation between expectations and post-operative function. Study 5, whilst finding no correlation between expectations and post-operative pain did find a relationship between expectations and post-operative function. Study 8 measured expectations in relation to recovery time, post-operative pain and usual activities, in patients undergoing THR and TKR, and revealed that level of pain relief expected post surgery, independently predicted greater pain relief at one year post-operatively after adjusting for other co-variants. Study 3, measured expectations dichotomously, with relation to post-operative pain, walking distance, recreational activities and need for a walking aid, using final attained score as a measure. They found expectations of no pain at one year, correlated with less post-operative pain. In addition expectations of no walking aid use at one year correlated with less post-operative pain and improved function. This study, in common with study 7 found no correlation between expectations and post-operative satisfaction which was strongly determined by actual post-op levels of pain and function. Study 9 measured the importance of expectations in respect to pain, function, expected success of surgery and likelihood of complications, in patients undergoing THR and TKR. Again, this study found that expectations of no pain after

surgery predicted less pain and improved function and predicted higher physical function.

Study 4 examined how baseline expectations regarding improvement in condition and quality of life affected outcome, finding that increased expectation of recovery correlated with less post-operative pain, improved mental health and reduced pain and joint tenderness in clinician assessment. Expectations regarding improved quality of life correlated with less post-operative pain and improved function and less clinician assessed weight bearing pain. Expectations accounted for between 9 and 13% of variance in outcome dependent on measure. However, the sample size (n=74) in this study was very small, with 27% attrition. The authors acknowledged that the small sample size led to low power to detect small effects, however they did not make power calculations explicit. Finally, study 5 examined the relationship between expectations and self-reported improvement in physical function after TKR. Researchers found that higher expectations of ability to take part in leisure activities were associated with improvement in leisure activities and walking ability at five year follow up.

Larger studies support these findings. Study 6, a large prospective cohort study (n = 1327) conducted across 20 centres in 12 European countries, found that the greater number of pre-operative expectations a patient had, the more likely they were to improve at one year post THR. Each incremental expectation was associated with a 26% increase in probability of improvement (95% CI 1% - 56%). This association was found to be strongest for joint stiffness and function. Study quality was high, with large sample size, robust statistical methodology and international data set. Attrition rate in this study was high, at 31.6% and characteristics of non-responders were not reported. However, overall quality was high giving confidence to the findings and supporting the case that expectations, and in particular the number of expectations held, do indeed influence outcome in this population.

As an outlier, study 1 found no relationship between expectations and outcome. Examining whether baseline expectations, actual status or expectations fulfilled, were best predictors of global outcome and global satisfaction, they found that expectations did not predict global outcome or satisfaction at two years. However, these findings are limited by small sample size ($n = 112$), and perhaps more importantly, global measures of outcome and satisfaction are possibly too blunt a measure, and will therefore be insensitive to change.

With the exception of study 1, all studies showed a positive relationship between expectations and outcome. Direct comparison between studies however, was constrained due to the considerable heterogeneity in study design and measures used.

5.0 Discussion

This review sought to determine whether patient expectations of joint replacement surgery affected outcome in those patients receiving total hip and knee replacement. The conclusion of this review is that expectations are important predictors of outcome, with all but one study (study 1) finding that patient expectations did indeed influence outcome in this population. The most common finding was that expectations were associated with post-operative pain and / or function (studies 3, 4, 5, 6, 8 and 9). Interestingly, study 6 also showed a clear relationship between the number of expectations held and improvement at 1 year. Each individual expectation was associated with a 26% increase in probability of improvement. Study 5 found that an expectation of improved leisure activity ability was indeed correlated to such an improvement, but also to an increase in walking ability.

Sample sizes varied considerably across studies, ($n = 74$ study 4, $n = 2350$ study 8) as did methodology. However, even though this was the case, the findings were fairly consistent.

The studies were conducted widely, including participants from North America, Australia and Europe. This adds to the generalisability of the findings. However, the results can only be generalized to such populations, all of which have similar standards of health care and similar Westernised cultural beliefs.

This review revealed significant weaknesses in this area of research, notably in the lack of theoretical underpinning of expectations and the inconsistent approach to outcome and expectations measurement. Future research could address these weaknesses. Greater recourse to psychological theories may explain the way in which expectations influence outcome with more sophistication and provide a more substantial basis to operationalise the construct. Only three studies (1, 4 and 9) seemed to allude to theory, including placebo, social cognitive theory and dispositional optimism. Research directed towards developing a sound theory would in turn assist in the development of a consistent and validated approach to the measurement of expectations. The lack of such a measurement tool was evident in this review, allowing little consistency in the way in which expectations were assessed. This ranged from asking a few questions, in set domains with dichotomised answers, to asking open ended questions in an attempt not to constrain replies. The former may be too simplistic and therefore be difficult to draw conclusions from, the latter open to potential bias through the way in which the questions are framed. Specific measurement tools have been developed, Judge et al (Judge et al.,) for example, refer to the recent development of a patient derived validated expectation questionnaire (the Hospital for Special Surgery Hip Replacement Expectations Survey) which should aid comparability for future research. The reviewed studies all measured expectations at one time point, usually before treatment. No account was taken of the possibility that expectations may change over the course of an intervention. Potential factors shaping expectations may include meeting other patients and staff, or experiencing treatment either positively or negatively, again an area for future research.

Finally, there was inconsistency in the way in which outcomes were conceptualised and measured through these studies. Inconsistent use of disease specific or general outcome measures, even when valid and reliable, made systematic review difficult. Future research could ensure the consistent use of valid and reliable measurement tools, increasing comparability between studies or should look towards developing and validating new measures of outcome.

5.1 Strengths and Limitations of the Review

This is the first to attempt to examine the role of patient expectations on outcome in TKR and THR, both high volume procedures in the NHS. Yet, clearly this review has limitations.

Including data from only published studies is likely to introduce bias, since absence of negative or inconclusive studies will tend to overestimate findings (Rosenthal, 1979). Bias may also have been introduced since the review was conducted by one researcher, although the use of a rigorous data extraction tool sought to minimise this. Finally, the reviewed studies were limited to those published in English and reporting data from westernised populations and again, limit the findings to such populations.

6.0 Conclusion

Data synthesis indicates that expectations do influence outcome after joint replacement. This has several important clinical implications. As an important prognostic factor for both patients and clinicians, greater understanding and assessment of patient expectations may help in selecting suitable patients for surgery. Furthermore, an increased understanding of expectations, the factors that determine them and their alteration over time, may have implications beyond just prognosis. This information may help to inform education

programmes in preparation for surgery in order to help patients to develop realistic expectations of their intervention and may also help to inform effective rehabilitation strategies post surgery. Such active interventions would benefit from cost appraisal to advance the case for routine assessment of expectations.

Finally, this review serves to highlight that the concept of patient expectations is complex and multifaceted. It may prove impossible to fully deconstruct and may be more usefully understood in the context of the theories that have been discussed earlier in this paper.

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* Denotes studies included in this review

The role of hope in outcomes following total knee replacement.

1. Abstract

Purpose: Total knee replacement is an increasingly common surgical procedure in the UK. Psychological factors have been shown to account for a proportion of the variance in outcome following surgery. Much past research has been conducted from a deficit model of health. In contrast, the aim of this study was to investigate the role played by hope, a positive psychological construct, on outcomes following knee replacement surgery.

Methods: A longitudinal, quantitative prospective study design was utilised. Participants were recruited from eight orthopaedic surgeons operating at one teaching hospital in the West-Midlands. Self-report questionnaires were administered pre-operatively and four months post-operatively, measuring the following outcomes: Anxiety, depression, function and health-related quality of life.

Results: One hundred and seventeen participants completed the pre-operative and fifty seven completed the post-operative questionnaire. Pre-operative hope was found to correlate in a theoretically consistent direction with pre-operative anxiety, depression and function and also with post-operative depression and quality of life. Post-operative hope was found to correlate with post-operative anxiety, depression and quality of life. Regression analysis revealed however, that whilst pre-operative hope was a significant unique predictor of pre-operative anxiety depression and function, with the exception of one measure of post-operative quality of life, it did not contribute to post-operative outcome.

Conclusion: Whilst pre-operative hope was not, with the exception of one measure, shown to contribute to post-operative outcome. It was shown to make a significant unique contribution to pre-operative psychological morbidity and function, contributing 9% and 10% respectively. It could be argued that the pre-operative period is when the impact of OA is highest. Hope may be an important factor in effective condition management at this time. Suggestions for further research have been made based on these findings.

2.0 Introduction

2.1 Knee Pain

In the UK knee pain is common, with prevalence rates being variously estimated at between 25% in older adults, to 21% of men and 35% of women of 45 or over, experiencing knee pain that lasted for more than a week in the previous month. (Peat, McCarney, & Croft, 2001). At least half of all older adults with knee pain report restriction in daily activities. With the inclusion of a younger population, estimates of knee pain-related disability in those over 55 vary from between 15% with restricted activity because of knee pain occurring on most days in one month during the past year, to 8% having problems lasting for more than six weeks in the previous three months (Peat et al., 2001). Prevalence rates vary as a result of many factors, including composition of study groups, variation in data collection methods and variation in case definition.

2.2 Osteoarthritis

Osteoarthritis (OA), the most common form of arthritis, is a common cause of knee pain. OA is a metabolically active, dynamic process involving all joint tissue including cartilage, synovium, capsule, ligament and muscle. Pathological changes involve loss of articular cartilage with remodelling of adjacent bone and osteophyte (new bone) formation at joint margins. It is characterised by joint pain, functional limitation and reduced quality of life and is one of the leading causes of pain and disability worldwide (National Institute for Health and Clinical Excellence, 2011). Although the knee is one of the most commonly affected joints, it is difficult to determine the exact incidence and prevalence of OA, given the marked discrepancy between clinical symptoms and structural changes as identified radiographically. Half of those adults over 50 with radiographic evidence of OA of the knee will have symptoms. Of the 25% of older adults with significant knee pain, this will be radiographically

apparent in two thirds (Peat et al. 2006). Although joint pain is more common than radiographic OA, it is conservatively estimated that in the UK approximately 10% of the population over 55 have evidence of painful, disabling radiographic knee OA, with more women being affected than men (National Institute for Health and Clinical Excellence, 2011). Others' estimates consider the prevalence of chronic knee pain, most commonly caused by OA, to be between 7 and 33% in the general adult population (Wylde, Dieppe, Hewlett, & Learmonth, 2007). These discrepancies reflect the difficulties in reconciling radiographic and clinical symptoms.

2.3 Osteoarthritis and Disability

The World Health Organisation, (WHO) estimate that OA was the eighth leading non-fatal burden of disease in the world in 1990, and the sixth leading cause of years of living with disability at the global level, accounting for 3% of the total global years of living with disability (Woolfe & Pflieger, 2011). Costs to both individual and society are immense. Many individuals suffer from persistent pain. OA knee often reduces mobility and is a significant cause of problems with stair climbing and walking. Older adults with joint pain are less able to leave the home, look after others and work, than those without (National Institute for Health and Clinical Excellence, 2011). Although not only related to the knee, two million adults in the UK visit their GP each year because of OA. Of all consultations for musculoskeletal conditions, in those 45 and over, 15% are for OA and this rises to 25% in individuals 75 years or older. The total cost of OA on the UK economy is estimated to be 1% GNP. In 1999-2000 36 million working days were lost to OA at an estimated cost of £3.2 billion in lost production. In this same period £43 million was spent on community services and £215 million was spent on social services for OA (National Institute for Health and Clinical Excellence, 2011).

There are many treatments available for the knee affected by osteoarthritis. Non-surgical therapeutic interventions include medications, self-management and physiotherapy; however evidence shows that these interventions only have a limited effect size on knee pain. Beyond conservative treatment, surgical interventions include osteotomy and arthroscopy, but again, these procedures have only a limited success in relieving pain (Wylde et al., 2007). The only intervention that has been shown to have a large effect size on relieving the chronic pain and disability caused by OA is total knee replacement (TKR) (Wylde et al., 2007).

2.4 Total Knee Replacement

Perhaps the most significant development in treating OA has been joint replacement. Total knee replacement (TKR) was first introduced in the 1960's, following the success of total hip replacement (Dieppe et al., 2008). Since the introduction of this procedure, its use has burgeoned with the number of TKR's performed in the NHS between 1991 and 2000 doubling (Dixon, Shaw, Ebrahim, & Dieppe, 2004). There were 72, 980 primary TKR's performed in 2009 in England and Wales (National Joint Registry, 2010). The initial focus of research in this field examined technical issues such as prosthesis loosening, infection, design issues and surgical techniques (Dieppe et al., 2008). However, even when good outcome had been publicly reported, many patients reported experience of ongoing pain and disability in their operated knee. (Woolhead, Donovan, & Dieppe, 2005). Over the past decade, the discrepancy between clinician and patient reported outcomes has been recognised and has started to be addressed, not least in NHS recognition with the introduction in 2009 of Patient Reported Outcome Measures (PROMs), measures of a patient's health status, or health-related quality of life. All NHS funded providers of TKR are required to collect this information (*NHS the information centre for health and social care: Patient reported outcomes measures (PROMS).*2011).

A body of research has started to examine patient-reported outcomes and the patient factors that may explain them (Dieppe et al., 2008) revealing a range of patient factors that correlate with outcome after TKR, including both socio-demographic and psychological factors. Socio-demographic factors that correlate to a poor post-operative outcome after TKR include female gender, (Fitzgerald et al., 2004; Fisher, Dierckman, Watts, & Davis, 2007) older age (Kennedy, Newman, Ackroyd, & Dieppe, 2003) and low socio-economic status (Fortin et al., 1999). Psychological factors that have been found to correlate with poor post-operative outcome include depression, anxiety, pain catastrophising and low self efficacy, all relating directly to increased post-operative pain and reduced function (Howard, Ellis, & Khaleel, 2010). For example, pain catastrophising was found to account for 8% of the variance in post-surgical pain following TKR (Sullivan et al., 2009) and pre-operative depression was found to account for 10.5% of variance in function at up to five years following TKR (Brander, Gondek, Martin, & Stulberg, 2007). Conversely, high perceived social support and high internal locus of control (Kendell, Saxby, Farrow, & Naisby, 2001; Orbell, Johnston, Rowley, Espley, & Davey, 1998), have been found to correlate with improved recovery post-TKR. Post-operative outcome has also been associated with patient expectations, with those individuals expecting complete pain relief experiencing less pain and improved function post-operatively (Mahomed et al., 2002).

Psychological factors do appear to have explanatory value in outcomes following TKR; however, in accounting for a small proportion of outcome variance, this explanation remains incomplete and as yet unexamined and other psychological factors may also have a role. In addition, much of the evidence to date has emerged from a deficit model of health and well-being, dominant in medicine, which focuses on pathological processes rather than examining positive patient resources. The last two decades has witnessed a growth in positive

psychology (Seligman, Steen, Park, & Peterson, 2005) taking a positivist view of health and wellbeing, recognising assets and building upon individuals' positive strengths and qualities. This approach gives professionals and patients alike a positive framework from which to work. This may be less threatening for both than traditional deficit based models.

2.5 Hope

Within positive psychology there has been an explicit focus on research to discover and promote the factors that allow individuals to thrive (Snyder, Lopez, & Pedrotti, 2010). One construct that is receiving increasing prominence is that of hope - a central tenet of positive psychology, emerging as an important characteristic in those with chronic illness. Snyder, in his theoretical treatise on hope conceptualises it as a positive motivational state which is characterized by goal-directed thinking (Snyder, 2002b). This consists of both *pathways thinking* (the perceived capacity to find routes to desired goals) and *agency thinking* (the motivations to use those routes in order to reach individual goals) (Snyder, Irving & Anderson, 1991). Snyder proposed that a person's dispositional hope or "trait hope" is established by the age of three. He proposes that it remains relatively stable over time (Snyder, Berg, Woodward, Gum, Rand, Wroblewski, Brown, & Hackman, 2005a) and is not affected by external circumstances. As such, it can be used as a framework to understand rehabilitation goals and outcomes. For example, in patients receiving TKR, goals may relate to activities such as walking or stair climbing. Pathways may relate to performing exercises in order to gain the necessary strength and range of movement to perform these activities. Finally, agency thinking may relate to how motivated the individual would be to exercise in order to achieve their goal. In contrast to trait hope, Snyder also proposes the construct of state hope, which reflects an individual's hope at one particular moment in time. Unlike trait

hope, state hope is likely to fluctuate dependent upon specific circumstances (Snyder et al., 1996).

The relationship between trait hope and a number of health-related outcomes has been demonstrated in a number of studies. Snyder et al, found hope to be predictive of pain tolerance in experimentally induced pain studies (Snyder, Berg, Woodward, Gum, Rand, Wroblewski, Brown, & Hackman, 2005a). Similar findings have emerged in clinical populations. Elevated hope has been shown to be beneficial when coping with and adapting to, long term illness, being uniquely predictive of the coping and self-reported functional ability of a visually impaired population on a rehabilitation programme (Jackson, Taylor, Palmatier, Elliott, & Elliott, 1998). Hope has also been found to predict positive adjustment to end stage renal disease (Billington, Simpson, Unwin, Bray, & Giles, 2008) and to amputation (Unwin, Kacpersek, & Clarke, 2009). A consistent finding across these clinical populations was that hope was inversely related to negative mood.

Snyder's hope theory is not the only psychological model for understanding hope, and may be criticised for its singularly cognitive explanation. Hope has been construed differently with a model of hope advanced by Scioli adopting more integrative approach, drawing on psychology, philosophy, anthropology, biology, art, literature, history and religion (Scioli & Biller, 2009). Scioli conceptualises hope as future-directed, consisting of four elements i.e. mastery, attachment, survival and spirituality. However, for the purpose of the current research, the Snyder Hope Theory (1991) was selected for two reasons. Firstly, because it provides a contained way to conceptualise and measure hope and is effectively operationalised and secondly, because this is the measure that has been used in the majority of research looking at the role of hope in physical health outcomes and thus, will give this present study some comparability to them.

2.6 Hope and Total Knee Replacement

To date, research focussing on outcomes in relation to TKR has utilised hope in only one study (Hartley, Vance, Elliott, Cuckler, & Berry, 2008a). Examining the relationship between hope and self-efficacy for rehabilitation, with depression and functional ability following hip and knee replacement surgery, this study found that hope significantly predicted pre-surgery depression, but predicted neither post-operative depression nor functional ability. The authors themselves identified that the reliability and validity of the functional outcome measures used were lacking and noted the study was underpowered recruiting only 100 patients, of whom 55 had TKR surgery and 45 had total hip replacement (THR). Using a population of both hip and knee replacement patients, and with low post-operative return rates, the power to detect significant results was undermined. Patients were only recruited from one surgeon, thus reducing generalisability of the results. The study recruited patients who were receiving both primary and revision joint replacement. The literature recognises that outcomes following surgery are different for TRK and THR and also different for primary and secondary joint replacement (Wylde et al., 2007). In addition, follow-up was observed at only six weeks, which may be too soon to make a realistic assessment of outcome, as tissue healing will not be complete at this point.

2.7 The Current Study

The aim of this study was to revisit the applicability of hope as a predictive factor in TKR outcomes and to address the weaknesses implicit in previous limited research (Hartley, Vance, Elliott, Cuckler, & Berry, 2008b). If hope is found to be a significant predictor of outcome, it would add to the body of knowledge regarding the role that psychological factors play in determining outcomes in this patient population. It could be used to inform patient

selection for TKR surgery. Pre and post-operative interventions could be more accurately targeted towards those at greater risk of poor outcome. It could also be used to target appropriate post-operative rehabilitation interventions, by helping patients to develop realistic and achievable post-operative goals, develop pathways to reach those goals and enhance greater individual agency. The ultimate goal would be to improve patient-reported outcome after TKR.

2.8 Research Questions and Hypotheses

This study investigated whether hope was a significant predictor of outcome in those patients receiving primary TKR for osteoarthritis. It also aimed to determine whether trait hope was stable over time. These questions were examined using six testable research hypotheses as follows:

1.7.1 Is hope significantly associated with pre and post-operative anxiety?

Hypothesis 1: There will be a significant negative correlation between hope and anxiety.

1.7.2 Is hope significantly associated with pre and post-operative depression?

Hypothesis 2: There will be a significant negative correlation between hope and depression.

1.7.3 Is hope significantly associated with pre and post-operative function (pain, range of movement and ability to perform activities of daily living)?

Hypothesis 3: There will be a significant positive correlation between hope and function.

1.7.4 Is hope significantly associated with pre and post-operative quality of life?

Hypothesis 4: There will be a significant positive correlation between hope and quality of life.

1.7.5 Is hope stable over time?

Hypothesis 5: There will be no significant difference between hope scores at time 1 and time 2 and there will be a significant positive correlation between hope at time 1 and time 2.

1.7.6 Is hope a significant unique predictor of outcome variables when other factors are controlled for?

Hypothesis 6: Hope will be a significant unique predictor of outcome variables (anxiety, depression, post-operative function and quality of life) when participant demographics, perceived social support and health related locus of control are controlled for.

3.0 Method

This section describes the study design, research participants and procedure, including measures used and rationale for their selection.

3.1 Study Design

The study comprised a longitudinal, quantitative prospective study of patients receiving primary unilateral TKR, at two time points. The first time point was pre-operatively (maximum time before surgery was three months, with range between one to three months) and the second was four months post-surgery. A four month time point was chosen because it

is beyond the point of soft tissue healing which should be complete by approximately three months. Participants completed a battery of self-report questionnaires at each time point. The following predictor variables were assessed: demographic details (age and sex), perceived social support, locus of control and trait hope. The following outcome variables were assessed: quality of life and levels of physical and psychological functioning. In designing this study, an empirical positivist position was adopted. This assumed that variables of interest could be objectively measured in a robust, meaningful, reliable and valid way.

A pilot study was undertaken to determine both the timing and acceptability of the questionnaires. Pre-operative and post-operative questionnaire packs were completed by 10 patients with current knee pain. No concerns were raised about the acceptability of the questions posed. Timings were collated and an average completion time of 20 minutes for the pre-operative and 10 minutes for the post-operative questionnaires was established.

3.2 Participants

All patients due to receive a primary TKR for osteoarthritis at one NHS teaching hospital in the West Midlands during the period of this study were eligible to participate, subject to the following criteria: that participants should be a minimum of 18 years old, should be able to read and understand written English and have the capacity to provide informed consent. Patients were recruited from eight orthopaedic surgeons who perform TKR at this hospital. Since all prospective surgical candidates were screened for suitability, (and implying that those with significant co-morbidity would be declined surgery), no further assessment of physical co-morbidity was deemed necessary. One hundred and seventeen participants were recruited at time 1 and fifty-seven at time 2.

An a priori power calculation was undertaken to estimate the desired sample size required. Given limited previous research in this area, a medium effect size was assumed. The statistical significance criteria were set at 0.05 and the power level was set at the standard convention of 0.8 (Field, 2009). The sample size needed for the Pearson correlation was found to be 70. In addition, a maximum of 7 variables were to be used in five hierarchical regression equations to assess predictors of outcome. The maximum sample size required for this regression was found to be 61 (Soper, 2011). Therefore, given anticipated attrition at follow-up, recruitment of 120 participants was sought.

3.3 Research Procedure

2.3.1 Ethical approval.

Ethical approval was granted for the study by the local research ethics committee and by the hospital trust's research and development department (See Appendix E). Other than the burden of time, it was not anticipated that participants would suffer any distress or disadvantage from participating in the study or by allowing access to their responses. However, all participants were given local contact numbers for both the Patient Advice and Liaison Service (PALS) and the Nurse Consultant in Trauma and Orthopaedics, should they have any questions or concerns relating to the study. Patient confidentiality was assured as all questionnaires were anonymous and identified only by their study ID number.

2.3.2 Obtaining the sample.

All patients due to undergo TKR at the study hospital, follow a standard patient pathway. The decision to undergo surgery is made at the initial appointment with the orthopaedic consultant. Patients were recruited from all eight orthopaedic surgeons who operate at this hospital. Following this initial consultation, all patients are invited to attend a second follow-

up appointment. This consists of a group education session, in preparation for surgery, and an individual pre-operative screening appointment. These clinics are run by senior nurses. Patients will attend one further pre-operative screening appointment prior to their surgery. All eligible patients were informed of this study via receipt of a patient information letter giving information about the study and inviting participation (See Appendix F). This was sent by the orthopaedic secretary, along with the appointment for their second follow-up appointment.

At the end of each group education session, the principal investigator delivered a short presentation to the group, explaining the nature and purpose of the study. Patients were given an opportunity to ask questions and to decide if they wished to participate. Inclusion criteria were confirmed for those patients who agreed to participate and each patient completed a form giving written consent (See Appendix G). For those patients who consented, their GP was sent a copy of the patient information and was advised of their patient's participation in the study (See Appendix H).

2.3.3 Data collection.

Patients completed the pre-operative questionnaire battery on site at the hospital, either whilst waiting for, or after their individual appointment with the nurse. Completion of the questionnaire took approximately 20 minutes. During this time the principal investigator was available to help with any queries in relation to the questionnaire or the study. The post-operative questionnaire battery was mailed to the patients' home four months after surgery, with an enclosed stamped addressed envelope. A secretary in the orthopaedic department was responsible for this task. This questionnaire took approximately 10 minutes to complete. All questionnaires were returned to the principal investigator. Patient confidentiality was maintained as all questionnaires were anonymous and identified only by their study ID

number. All returns were logged by the secretary. Those patients not returning questionnaires were contacted by the principal investigator after two weeks, by telephone. Patients were asked if they still wished to participate in the study and were given the opportunity at this point to withdraw, complete the questionnaire by telephone or agree to return their questionnaire by post.

3.4 Measures

The following measures were used to collect data on predictor and outcome variables:

2.4.1 Demographic information. (Appendix I)

The following information was collected:

1. Age
2. Gender

2.4.2 Social support. (Appendix J)

Self reported levels of social support were assessed using the Multidimensional Scale of Perceived Social Support (MSPSS) (Zimet, Dahlem, Zimet, & Farley, 1988), a 12 item scale. It comprises a seven point Likert-type rating scale for each item which ranges from “very strongly disagree” (score of 1) to “very strongly agree” (score of 7). The scale assesses perceived social support in three sub-scales, i.e. friends, family and significant others. The scores in each sub-scale can be summed. The highest possible score, indicating high perceived social support is 84, and the lowest, indicating low perceived social support is 12. Dimensions have been confirmed as separate by factor analysis (Zimet et al., 1988), and the measure has

good internal ($\alpha = .88$) and test-retest reliability (.85) as well as moderate construct validity.

2.4.3 Locus of control. (Appendix K)

Locus of control was measured using the Multidimensional Health Locus of Control Scales (Form C) (MHLC) (Wallston, Stein, & Smith, 1994). Health-related locus of control encompasses the beliefs an individual holds about where the control over his or her health lies i.e. whether controlled by the self (internal) or by external events or factors or by other people (external). This self report measure consists of 18 items. Form C of the scale measures condition specific locus of control and has four subscales; self, doctors, others, and chance. Each item is rated from one “strongly disagree” to six “strongly agree”. Internal and chance subscale scores, range from 6 to 36. Doctors and others subscale scores, range from 3 to 18. Test- retest reliability is not high for this scale as health beliefs would be expected to change with experience. Studies have demonstrated considerable concurrent and construct validity (Wallston et al., 1994)

2.4.4. Hope. (Appendix L)

Hope was measured using the adult Trait Hope Scale (Snyder et al., 1991). This is a self report measure consisting of four items assessing agency (goal-directed determination), four items assessing pathways (planning ways to meet goals) and four distracter, or filler, items. Each item is rated on an 8 point scale from “definitely false” to “definitely true”. Pathways and agency are rated as separate items, with scores ranging from 4 to 32 for each item, higher scores indicating higher trait hope. The scale has good internal reliability (Cronbach’s alpha ranges from .74 -.88 for the overall scale, .70 - .84 for agency, and .63 - .86 for pathways

subscales separately). Test- retest reliability ranges from .85 at 3 weeks to .82 at 10 weeks. Factor analysis has shown the agency and pathways constructs to be related but separate. Convergent and discriminant validity has also been demonstrated with related constructs for example optimism and hopelessness.

2.4.5 Functional outcome. (Appendix M)

Functional outcome following knee replacement was measured using the Oxford Knee Score (Dawson, Fitzpatrick, Murray, & Carr, 1998). This measure is currently being used for the assessment of all TKR operations carried out in the NHS. It forms part of the nationwide Patient Reported Outcome Measure (PROMS) program launched by the UK Department of Health (DH) in April 2009, and as such gives this study comparability to national outcomes. The measure is a 12-item self-report questionnaire, measuring pain, physical function and activities of daily living. Each question has five categories of response and is scored from 0 to 4 with 4 being the best outcome and 0 being the worst outcome. The sum of the scores produces a single score which ranges from 0 (worst outcome) to 48 (best outcome). The questionnaire is laid out so that response categories denoting least or no symptoms are on the left of the page and those denoting greater severity are towards the right of the page. Cronbach's alpha was .87 pre-operatively and .93 at 6 months post-operatively. Test retest reliability was high. Content validity was good, particularly for pain and physical function, with significant agreement demonstrated with related measures including the SF36 and the HAQ (Dawson et al., 1998). When this questionnaire was originally devised, the scoring system used a method whereby each question was scored from 1 to 5 with 1 representing the best outcome and 5 the worst. The scores were summed to produce a single score from 12 to 60 with 12 being the best outcome. This method of scoring was found to be unintuitive, and

therefore the new method of scoring, as used in this study, is now recommended (Murray et al., 2007).

2.4.6 Quality of life. (Appendix N)

Health-related quality of life was measured using the EQ-5D (Brooks & De Charro, 1996), a generic self report, measure of health status. It consists of two parts: the EQ 5D descriptive system and the EQ visual analogue scale (EQ VAS). The EQ 5D consists of five dimensions: mobility, self-care, usual activities, pain/discomfort and anxiety/depression. Each dimension has three levels: no problems, some problems and severe problems. EQ-5D health states, defined by the EQ-5D descriptive system, are converted into a single summary index by applying a formula that attaches values (also called weights) to each of the levels in each dimension. The EQ VAS is a measure of self rated health on a vertical visual analogue scale. The end points are “best imaginable health state” and “worst imaginable health state”. This gives a self reported quantitative measure of health status. This measure is also being used nationally as part of the DH PROMS initiative, as discussed above, thus aiding comparability between this study and national outcome measures.

2.4.7 Psychological morbidity. (Appendix O)

Anxiety and depression were assessed as measures of psychological morbidity, and were measured using the Hospital Anxiety and Depression Scale (HADS) (Zigmond & Snaith, 1983). The scale was devised for, and is widely used in, medical populations. Questions were developed so that symptoms of anxiety and depression that could also be associated with physical illness, (e.g. dizziness, headache, fatigue) or serious mental illness, were excluded. It has the benefit of being relatively brief, is quick to administer and has demonstrated robust psychometric properties. The HADS is a self-report questionnaire, comprising 14 questions, 7

each to assess anxiety and depression. Items are rated on a 4-point Likert scale (0 – 3) with five items being reverse scored. Scores on each subscale range from 0 to 21 with the higher scores indicating higher levels of psychological morbidity. The scale has shown good internal consistency with Cronbach’s alpha reported at .8 to .9 for both subscales (Herrmann, 1997). High test-retest reliability has been reported at .89 for anxiety and .86 for depression over a three week period (Spinoven, Ormel, Sloekers, & Kempen, 1997) Concurrent validity of HADS has been reported as 0.8 which is good to very good (Bjelland, Dahl, Haug, & Neckelmann, 2002) and is similar to the longer General Health Questionnaire. The cut off for clinical caseness was suggested in the original paper (Zigmond & Snaith, 1983) to be 8, for both subscales and this was confirmed in a more recent review (Bjelland et al., 2002)

4.0 Results

4.1 Data Analysis

Data were analysed using the Statistics Package for the Social Sciences (SPSS) version 16.0. Individual item scores for all measures were entered for each participant into the database. Descriptive data are presented for the predictor and outcome variables (Table 2). Reliability analysis was undertaken for all measures used, using Cronbach’s alpha (Table 5).

Correlational analyses were used to determine whether hope was associated with pre and post-operative anxiety, depression, function or quality of life (hypotheses 1, 2, 3 and 4). Spearman’s *rho* correlational analyses were conducted between predictor variables (age, social support – MSPSS, internal and external locus of control - MHLC form C and hope – total hope scale score time 1 and time 2) and outcome variables (anxiety and depression – HADS time 1 and time 2, function - OKS time 1 and time 2, quality of life- EQ 5D and VAS

time 1 and time 2). A non-parametric correlation was chosen, as variables tended to be either positively or negatively skewed.

The stability of hope over time (hypothesis 5) was analysed using a repeated measures t-test and Spearman's *rho* correlational analysis.

Multiple hierarchical regression analyses were conducted to determine the unique contribution of hope on outcome (hypothesis 6) (anxiety, depression, function and quality of life – EQ 5D and EQ VAS). Regression analyses were conducted for those outcome variables that had been found at the bivariate level to correlate with hope. Initial data exploration confirmed that the necessary assumptions for regression analysis of the data were met (Field, 2009). The standardised residuals were normally distributed for all regression analyses. No transformations were performed. Variance inflation factors (VIF values) ranged between 1 and 1.6 indicating that there was no multicollinearity in the data. All Cook's distances were less than 1, indicating that no individual cases were influencing the models. No data were excluded from the analysis. Predictor variables were entered into the regression model as follows: Block 1 (previously established predictors) age, sex, internal and external locus of control and social support). Block 2, hope. The final data set comprised 57 participants.

4.2 Descriptive Data

A total of one hundred and forty two patients attended the education sessions. Of these, twelve declined to participate in the study and thirteen were excluded as they did not meet the study inclusion criteria. This left one hundred and seventeen participants who completed the initial pre-operative questionnaires. Post-operative questionnaires were returned by fifty-seven participants; hence the final sample comprised fifty-seven. Of the original one hundred

and seventeen respondents, eleven had surgery cancelled or postponed, one patient died, thirty-five had surgery but the four months post-operative period fell after the end of the study and thirteen patients failed to return their questionnaires. This represents a post-operative return rate of 49% based on the total number of patients recruited, and a 70% return rate of all those who received a post-operative questionnaire. Demographic characteristics and summary scores from both predictor and outcome variables can be seen in Table 2 below.

Table 2. Demographics and Summary Scores

Variable	Pre-surgery (n) = 117	Pre-surgery measures for those participants completing post-surgery questionnaire (n) = 57	Post-surgery (n) = 57
Predictor Variables			
Age <i>M</i> (<i>SD</i>) (range)	70 (10) (43-90)	71 (8.95) (46 – 87)	68 (10) (43-90)
Gender Men (n) (%)	59 (50.4)	29 (50.8)	30 (50)
MSPSS <i>M</i> (<i>SD</i>)	74.65 (11.33)	74.43 (10.83)	N/A
MHLC – C (I) MHLC – C (E) <i>M</i> (<i>SD</i>)	25.24 (7.79) 44.90 (12.85)	26.86 (6.87) 46.61 (13.49)	N/A N/A
Hope Agency sub-scale Pathways sub-scale <i>M</i> (<i>SD</i>)	51.78 (8.20) 26.41 (4.49) 25.38 (4.61)	51.52 (7.76) 26.40 (4.36) 25.14 (4.33)	50.19 (8.77) 24.98 (4.72) 25.21 (4.34)
Outcome Variables			
HADS – A HADS – D <i>M</i> (<i>SD</i>)	7.32 (4.43) 5.09 (3.05)	6.91 (4.25) 5.20 (3.01)	5.80 (4.07) 5.15 (3.23)
OKS <i>M</i> (<i>SD</i>)	19.50 (8.33)	20.05 (7.54)	30.82 (9.82)
EQ 5D EQ (VAS) <i>M</i> (<i>SD</i>)	0.40 (0.32) 6.72 (1.93)	0.44 (0.29) 7.01 (1.73)	0.64 (0.25) 6.95 (1.81)

Note: N/A = not applicable, MSPSS = Multidimensional Scale of Perceived Social Support; MHLC –C = Multidimensional Health Locus of Control Scales form C (I) = Internal (E) = External; HADS =Hospital Anxiety and Depression Scale A = Anxiety D = Depression; OKS = Oxford Knee Score; EQ 5D = European Quality of Life 5 Dimensions, EQ VAS = Visual Analogue Scale.

In order to assess for bias that may result from sample attrition, characteristics between those who remained in the study were compared to those who dropped out using an independent samples t-test. No significant differences were found for age, sex, social support, locus of control, hope, anxiety, depression, function or quality of life.

4.3 Comparison of Sample Population to National Data

Study participants were compared with national data. Data from the national joint registry for England and Wales (*The national joint registry for England and Wales. 7th annual report 2010*) shows that in 2009 in England and Wales, the average age for patients undergoing primary TKR was 67.5 and that 57% of patients were female. In comparison, the average age of the current study participants was 70 pre-operatively and 68 post-operatively and at both time points 50% of participants were female. Comparison of pre-operative PROMS measures were obtained from the Hospital Episode Statistics (HES) online (*Hospital episode statistics online.2011*). These measures relate to the period April 2009 to November 2010 inclusive and can be seen in Table 3 below. Findings show that the study population was representative of patients undergoing TKR nationally with the exception of gender, with slightly fewer females being represented in the study data in comparison.

Table 3. Comparison of pre-operative PROMS measures – national data v study population

Measure	National data from HES	Study population
OKS	18.76	19.49
EQ 5D	0.40	0.40
EQ VAS	68.55	67.15

Note: OKS = Oxford Knee Score; EQ 5D = European Quality of Life 5 Dimensions, EQ VAS = Visual Analogue Scale.

Levels of psychological morbidity in the study population (measured with HADS) were compared to normative data obtained from a large community sample (Crawford, Henry, Crombie, & Taylor, 2001). Findings can be seen in Table 4 below. Using a cut-off score of 8, this shows that the sample population had higher levels of both anxiety and depression than community norms. There was generally a decrease in anxiety following surgery as might be expected, however depression increased slightly after surgery.

Table 4. Psychological morbidity measured with HADS - study population in comparison to normative data.

	Pre-operative scores	Post-operative scores	Community sample
Anxiety M (SD)	7.32 (4.43)	5.80 (4.07)	6.14 (3.76)
Depression M (SD)	5.09 (3.05)	5.15 (3.23)	3.68 (3.07)
Anxiety % of sample above cut-off	38.9%	34.5%	33%
Depression % of sample above cut-off	23.3%	24.1%	11.4%

4.4 Reliability analysis

Internal consistency was calculated (using Cronbach's α) for all outcome measures since they had not previously been applied to the study population. Results are summarised in Table 5.

Table 5. Summary of reliability analysis

Measures	Cronbach's α	
	Pre-op	Post-op
MSPSS	0.92	N/A
MHLC – C Internal	0.83	N/A
MHLC – C External	0.84	N/A
Trait Hope Scale	0.84	0.91
Trait Hope – Agency	0.81	0.85
Trait Hope – Pathways	0.72	0.81
OKS	0.88	0.92
EQ 5D	0.64	0.75
HADS – Anxiety	0.85	0.87
HADS – Depression	0.75	0.78

Note: MSPSS = Multidimensional Scale of Perceived Social Support; MHLC –C = Multidimensional Health Locus of Control Scales form C; HADS =Hospital Anxiety and Depression Scale; OKS = Oxford Knee Score; EQ 5D = European Quality of Life 5 Dimensions, VAS = Visual Analogue Scale.

With the exception of the EQ 5D pre-operative measure, the analysis suggests that internal reliability of all measures exceeded the accepted minimum value of 0.7 (DeVellis, 2003).

4.5 Correlation Analyses: Hypotheses 1, 2, 3 and 4

Hypotheses 1, 2, 3 and 4 are re-stated below:

1. There will be a significant negative correlation between hope and pre and post-operative anxiety.

2. There will be a significant negative correlation between hope and pre and post-operative depression.
3. There will be a significant positive correlation between hope and pre and post-operative function.
4. There will be a significant positive correlation between hope and pre and post-operative quality of life.

A summary of all of the correlations between predictor and outcome variables can be seen in Appendix P. One-tailed tests were used, as specific predictions had been made. There was a small correlation in the expected direction, between pre-operative hope and pre-operative anxiety and function ($\rho = -.163$ $p < 0.05$, $\rho = .241$ $p < 0.005$). There was a medium negative correlation between pre-operative hope and pre-operative depression ($\rho = -.338$ $p < 0.005$). Pre-operative hope was also found to correlate with two post-operative outcomes, depression and quality of life as measured by the EQ VAS ($\rho = -.229$ $p < 0.05$, $\rho = .249$ $p < 0.05$). Post-operative hope was negatively correlated with both post-operative anxiety and depression ($\rho = -.249$ $p < 0.05$, $\rho = -.332$ $p < 0.05$). There was a medium correlation between post-operative hope and post-operative quality of life as measured by the EQ VAS ($\rho = .371$ $p < 0.005$).

No significant association was found between pre-operative hope and pre-operative quality of life, or between pre-operative hope and post-operative anxiety, function or quality of life as measured by the EQ 5D. No significant association was found between post-operative hope and post-operative function or quality of life as measured by the EQ 5D.

4.6 Stability of Hope – T-test and spearman's *rho* correlation: Hypothesis 5

Hypothesis 5 is re-stated below:

There will be no significant difference between hope scores at time 1 and time 2.

Table 6 below shows hope scores at time 1 and time 2.

Table 6. Hope scores at time 1 and time 2

	Mean	N	SD	SE Mean
Hope Time 1	51.30	46	7.91	1.17
Hope Time 2	50.06	46	8.77	1.30

There was no significant difference between hope at time 1 and time 2 ($t = 1.18 (45) p = .244$) suggesting that hope is stable over time. In addition, correlational analysis showed a moderately strong correlation between hope at time 1 and time 2 ($rho = .581 p < 0.01$).

4.7 Multiple Regression Analysis: Hypothesis 6

Hypothesis 6 is re-stated below:

Hope will be a significant unique predictor of outcome variables (anxiety, depression, function and quality of life) when participant demographics, perceived social support and health related locus of control are controlled for.

Hierarchical regression equations were performed in two stages to test the above hypotheses. The first stage was to test the relationship between pre-operative hope and pre-operative variables. Correlational analysis had demonstrated a relationship between hope and anxiety, depression and function. Therefore, three regression equations were conducted for these outcomes. Variables were entered into the equations in the following blocks: Block 1, age, sex, social support and locus of control – internal and external. Block 2, hope. Tables 7, 8,

and 9 below show the results of the regression analyses conducted with pre-operative variables.

The second stage was to test the relationship between pre-operative hope and post-operative variables. Correlational analysis had demonstrated a relationship between hope and depression and quality of life as measured by EQ VAS. Therefore, two regression equations were conducted for these outcomes. Variables were entered into the equations in the following blocks: Block 1, age, sex, social support and locus of control – internal and external and the pre-operative variable, (pre-operative depression and pre-operative EQ VAS respectively) to account for change. Block 2, hope. Tables 10 and 11 below show the results of the regression analyses conducted with post-operative variables.

Table 7. Results of multiple regression analysis showing relationship between pre-operative hope and pre-operative depression.

Model	B	SE B	β
Step 1.			
(Constant)	13.52	2.28	
Sex	.17	.55	.03
Age	-.35	.27	-.12
Social support	-.13	.04	-.32**
Locus of control – internal	.07	.03	.30**
Locus of control – external	-.09	.02	-.33***
Step 2.			
(Constant)	16.43	2.55	
Sex	.36	.54	.06
Age	-.37	.27	-.12
Social support	-.10	.04	-.26*
Locus of control – internal	.07	.03	.28*
Locus of control – external	-.08	.02	-.29**
Hope – time 1	-.08	.03	-.21*

* Dependant variable: Depression
 Note: $R^2 = .21$ for step 1. $\Delta R^2 = .04$ for step 2 ($p < .05$) * $p < .05$
 ** $p < .01$ *** $p < .001$

Table 8. Results of multiple regression analysis showing relationship between pre-operative hope and pre-operative anxiety

Model	B	SE B	β
Step 1.			
(Constant)	13.21	3.39	
Sex	2.27	.81	.26**
Age	-1.33	.41	-.30****
Social support	-.02	.03	-.05
Locus of control – internal	-.09	.06	-.15
Locus of control – external	.08	.04	.25*
Step 2.			
(Constant)	17.74	3.79	
Sex	2.56	.80	.29**
Age	-1.36	.40	-.31****
Social support	-.00	.03	-.01
Locus of control – internal	-.05	.06	-.08
Locus of control – external	.08	.04	.23*
Hope – time 1	-.12	.05	-.23*

*Dependant variable: Anxiety

Note: $R^2 = .17$ for step 1. $\Delta R^2 = .05$ for step 2 ($p < .05$) * $p < .05$

** $p < .01$ *** $p < .001$ **** $p = .001$

Table 9. Results of multiple regression analysis showing relationship between pre-operative hope and pre-operative function

Model	B	SE B	β
Step 1.			
(Constant)	17.69	6.93	
Sex	-1.58	1.66	-.09
Age	-.21	.83	-.03
Social support	.01	.07	.01
Locus of control – internal	.10	.13	.09
Locus of control – external	.02	.08	-.03
Step 2.			
(Constant)	29.96	7.55	
Sex	-.79	1.60	-.05
Age	-.30	.79	-.04
Social support	.05	.07	.07
Locus of control – internal	.21	.13	.19
Locus of control – external	.00	.08	.00
Hope – time 1	-.34	.10	-.33****

* Dependant variable: Function

Note: $R^2 = .02$ for step 1. $\Delta R^2 = .10$ for step 2 ($p = .001$) **** $p = .001$

3.7.1. Depression.

Results found that age, sex, social support and locus of control, explained 21% of the variance in pre-operative depression (Table 7). After entry of hope, the total variance explained by the model as a whole was 25% $F(6, 103) = 5.69$ $p < .001$. Hope independently explained an additional 4% of the variance, R^2 change = .040 F change (1,103) = 5.52 $p < 0.05$.

3.7.2. Anxiety.

Results found that age, sex, social support and locus of control, explained 17% of the variance in pre-operative anxiety (Table 8). After entry of hope, the total variance explained by the model as a whole was 22% $F(6, 103) = 4.74$ $p < .001$. Hope independently explained an additional 5% of the variance, R^2 change = .046 F change (1,103) = 6.10 $p < 0.05$.

3.7.3. Function.

Results found that age, sex, social support and locus of control, explained 2% of the variance in pre-operative function (Table 9). After entry of hope, the total variance explained by the model as a whole was 12% $F(6, 103) = 2.27$ $p < .001$. Hope independently explained an additional 10% of the variance, R^2 change = .097 F change (1,103) = 11.256 $p < 0.001$.

Table 10. Results of multiple regression analysis showing relationship between pre-operative hope and post-operative health-related quality of life (EQ VAS)

Model	B	SE B	β
Step 1.			
(Constant)	-1.02	1.96	
Sex	.38	.39	.10
Age	.02	.02	.09
Social support	.02	.02	.14
Locus of control – internal	-.04	.03	-.17
Locus of control – external	.05	.02	.36**
EQ VAS time 1	.54	.10	.58***
Step 2.			
(Constant)	-2.98	2.08	
Sex	.27	.38	.07
Age	.02	.02	.09
Social support	.02	.02	.10
Locus of control – internal	-.06	.03	-.24
Locus of control – external	.05	.02	.38**
EQ VAS time 1	.57	.09	.61***
Hope – time 1	.05	.02	.24*

* Dependant variable: EQ VAS time 2

Note: $R^2 = .50$ for step 1. $\Delta R^2 = .05$ for step 2 ($p < .05$) * $p < .05$

** $p < .01$ *** $p < .001$

Table 11. Results of multiple regression analysis showing relationship between pre-operative hope and post-operative depression

Model	B	SE B	β
Step 1.			
(Constant)	-2.71	3.73	
Sex	.80	.67	.12
Age	.07	.04	.21*
Social support	-.01	.03	-.05
Locus of control – internal	.10	.05	.25
Locus of control – external	-.07	.03	-.26
Depression time 1	.77	.12	.73***
Step 2.			
(Constant)	-1.01	4.23	
Sex	.84	.68	.13
Age	.07	.04	.21
Social support	-.01	.03	-.05
Locus of control – internal	.11	.05	.26
Locus of control – external	-.07	.03	-.26
Depression time 1	.76	.12	.71***
Hope – time 1	-.02	.04	-0.05

* Dependant variable: Depression time 2

Note: $R^2 = .55$ for step 1. $\Delta R^2 = .00$ for step 2 (n/s) * $p < .05$ *** $p < .001$

3.7.4. Quality of life - EQ VAS.

Results found that age, sex, social support and locus of control, and time 1 EQ VAS, explained 50% of the variance in post-operative quality of life (EQ VAS) (Table 10). After entry of hope, the total variance explained by the model as a whole was 55% $F(7, 46) = 8.078$ $p < .001$. Hope independently explained an additional 5 % of the variance, R^2 change = .05 F change (1, 46) = 4.962 $p < 0.05$

3.7.5. Depression.

Regression showed that pre-operative hope was not a significant unique predictor of post-operative depression, after controlling for other variables (Table 11).

5.0 Discussion

This study examined the role of hope in outcomes following total knee replacement. A longitudinal, self-report questionnaire study was utilised, with measures taken at two time points. The first time point required respondents to report pre-operatively and the second, four months after surgery. Participants were recruited from lists of all eight orthopaedic surgeons operating at one NHS teaching hospital in the West Midlands. In total, one hundred and seventeen participants were recruited pre-operatively and post-operative questionnaires were returned from fifty seven. The results of the study will be discussed with reference to the research questions and subsequent hypotheses that were posed in the introduction. The clinical implications of the findings will be discussed. In addition, the strengths and limitations of the current study will be addressed, along with the implications of this study for future research.

5.1 Hypotheses 1, 2, 3 and 4

It was hypothesised that hope would be negatively correlated to pre-operative and post-operative anxiety and depression and positively correlated to pre-operative and post-operative function and quality of life. The hypotheses were partly supported. Pre-operative hope was found to be correlated with pre-operative anxiety, depression and function in a theoretically consistent direction. However, there was no association between pre-operative hope and quality of life. Similarly, post-operative hope was correlated with post-operative anxiety, depression and quality of life as measured by the EQ VAS, but not with quality of life measured by EQ 5D. Initial correlational analysis also showed that pre-operative hope was correlated with post-operative depression and quality of life as measured by EQ VAS, but not with anxiety, function or quality of life measured by EQ 5D.

5.2 Hypothesis 5

Hope theory proposes that hope is a trait-like characteristic and as such was hypothesised to remain stable over time. Analysis using a repeated measures t-test confirmed that there was no significant difference between pre and post-operative hope thus this hypothesis was supported. Correlational analysis showed a moderately strong correlation between hope at time1 and time 2 suggesting that although hope is relatively stable, it is not immutable.

5.3 Hypothesis 6

It was hypothesised that hope would be a significant and unique predictor of both pre-operative and post-operative outcome variables. Again, the hypothesis was only partly supported, with regression analyses confirming that pre-operative hope made a significant unique contribution to pre-operative anxiety depression and function, after controlling for other variables. However, with the exception of quality of life measures by EQ VAS, pre-operative hope made no significant or unique contribution to outcome following TKR.

5.4 Anxiety and Depression

Hope is considered to be an important construct in relation to physical health conditions. Research, much of which has been correlational, has consistently shown that there is a relationship between hope and psychological adjustment, with hope being related to better adjustment (Kwon, 2002).

The current study measured psychological adjustment using the constructs of anxiety and depression. This was measured using HADS, a valid and reliable measure. In accordance with previous findings and consistent with hope theory (Snyder, Lehman, Kluck, & Monsson, 2006) the current study also found a cross sectional relationship between hope and psychological morbidity, with hope being predictive of both anxiety and depression. Pre-operative hope correlated in the

expected direction with both anxiety and depression, as did post-operative hope. There was also a correlation found between pre-operative hope and post-operative depression, but not anxiety. Although hope is understood primarily as a cognitive construct, there is a link to emotion. High hope individuals are more likely to be able to generate agency and pathways thinking which lead to future goal pursuit. If a goal is perceived as achievable, then the cognitive appraisal of this will lead to further positive emotion, which will reinforce hopeful thinking. In patients undergoing TKR, many will have been dealing with the pain and suffering of OA for many months or years prior to surgery. This may have impacted on agentic and pathways thinking, and possibly created barriers to desired goals.

As discussed above, much of the previous research into the role of hope in relation to physical health outcomes, has been cross sectional, exploring this relationship across a single time point. More recently, the role played by hope over time has started to be questioned and researched (Thio & Elliott, 2005). Unwin and colleagues, in a longitudinal study, found that hope at the beginning of rehabilitation was associated with positive mood and general adjustment at follow-up, in patients after amputation (Unwin et al., 2009). In contrast, Hartley and colleagues found that, in patients undergoing TKR and THR, although hope was predictive of pre-surgery depression, it did not predict either post-surgery depression or functional ability (Hartley, Vance, Elliott, Cuckler, & Berry, 2008a). The current study found an initial correlation between pre-operative hope and post-operative depression, but not with anxiety. However, consonant with Hartley and colleagues, regression analysis revealed that, although pre-operative hope did make a significant unique contribution to pre-operative anxiety and depression, it did not contribute to post-operative psychological morbidity.

; It has been suggested (Hartley, Vance, Elliott, Cuckler, & Berry, 2008a; Horton & Wallander, 2001) that hope may exert a palliative effect in times of stress. Waiting for a TRK could be

considered a stressful time from both the perspective of enduring pain and suffering and the stress and anxiety of anticipating major surgery. Thus, hope may act as a buffer at this time and be related to both physical and psychological functioning pre-operatively. According to hope theory, individuals with higher hope would be more able to conceive different pathways to achieve valued goals if their medical condition was acting as a barrier to achieving those goals. They would also be more motivated to pursue those pathways to achieve their goals. If original goals were not achievable, higher hope individuals would be more able to develop alternative goals and thus, as a result would act as a protective buffer to negative mood that may result if important goals were thwarted. However, in terms of hope predicting longer term outcome, it is possible that the intervention and experience of surgery could be a more important short term predictor of outcome, thus overriding the effect of pre-operative hope in determining this. This may be especially true for anxiety, as contemplating major surgery is highly anxiety provoking and this stressor is likely to have been alleviated after surgery.

5.5 Function

Previous research, again mostly cross sectional, has shown hope to be predictive of functional ability in those with physical health problems such as blindness (Jackson et al., 1998) and spinal cord injuries (Elliott, Witty, Herrick, & Hoffman, 1991). The recent research by Hartley and colleagues (Hartley, Vance, Elliott, Cuckler, & Berry, 2008b) using an observational measure of functional ability, found that hope was not predictive of post-operative function in patients undergoing THR and TKR. The current study measured function using a valid and reliable self-report measure, the Oxford Knee Score, and found pre, but not post-operative hope to be correlated with function. Regression analysis revealed that hope made a unique and significant contribution to function pre-operatively, contributing to 10% of the variance in function at this time. However, in

line with the findings of Hartley et al, the present study found that it was not a significant predictor of post-operative function.

Past research has shown a relationship between hope and health-related behaviour. Snyder (Snyder et al., 2006) cites a study of homosexual men which found that those with high hope were less likely to engage in risky sexual activity (Floyd & McDermott, 1998) and similarly a further study (Harney, 1990) found that high hope individuals were more likely to engage in preventative health behaviours such as physical exercise. According to hope theory, high hope individuals have been shown not only to generate more goals than low hope individuals, but those goals have also been found to be more realistic (Snyder et al., 1991). In relation to physical health, high hope individuals are more likely to generate goals that would allow them to either adapt to, or recover from their condition. Suffering from OA knee can have a significant impact on physical function, as discussed earlier. It could be hypothesised that high hope individuals are more able to generate alternate pathways to valued goals, and to generate the motivation to pursue them. If keeping fit is a valued goal and weight bearing exercise became too painful because of OA, an individual with high hope may generate an alternative pathway to achieve this goal. For example, a non-weight bearing exercise such as swimming or cycling could be substituted and hence function maintained. Past research has also shown that high hope individuals are more able to tolerate physical pain (Snyder, Berg, Woodward, Gum, Rand, Wroblewski, Brown, & Hackman, 2005b) which again could be a factor which enables continued activity and therefore maintaining a level of function, in spite of pain.

The relationship between pre-operative hope and function found in the current study could be explained by the above factors. It does appear however, that in patients receiving TKR, hope is not directly predictive of longer term functional outcome. It may be that because outcome following joint replacement is generally very good, that there remains little to predict in this population.

However, it should also be recognised that follow-up at four months post-operatively is still relatively early in the recovery process and that the utility of hope to predict functional outcome may re-emerge in the longer term. Individuals at four months post surgery will still be recovering physically and will not have achieved their optimal outcome. Belief in the ability of surgery to relieve symptoms may at this time be a more powerful predictor of outcome. In the longer term, hope may determine factors such as how effectively individuals engage with the ongoing process of rehabilitation and may thus re-emerge as a determinant of longer term outcome. Also, there is evidence that pre-operative function is an important predictor of post-operative functional recovery following THR and TKR (Kennedy, Hanna, Stratford, Wessel, & Gollish, 2006). It is possible that hope may influence outcome indirectly, through its influence on functional ability. Finally, it should be noted that although the present study concluded that hope was predictive of both mood and function, an equally plausible hypothesis would be that function and mood may affect hope.

5.6 Quality of life

Previous research has shown that hope is an important predictive factor of quality of life in individuals with medical conditions. In a cross sectional study of a community based sample of cancer patients, hope was shown to be an important resource, impacting on quality of life. Hope was found to mediate the relationship between psychological distress and health status and partially mediate the effect between psychological distress and life satisfaction, both impacting on quality of life (Rustøen, Cooper, & Miaskowski, 2010). Kortte and colleagues found, in a longitudinal study, that hope was a significant predictor of life satisfaction following spinal cord injury (Kortte, Gilbert, Gorman, & Wegener, 2010).

The current study found no relationship between hope and health-related quality of life as measured by the EQ 5D. It did find a correlation between both pre-operative and post-operative hope and post-operative quality of life measured by EQ VAS. Further, regression analysis showed that hope

made a unique and significant contribution to quality of life post-operatively measured by EQ VAS, contributing to 5% of the variance in outcome. The lack of association between quality of life measured by the EQ 5D is unexpected. A study examining the role of hope in adapting to end stage renal failure (Billington et al., 2008) found that physical quality of life was most strongly determined by satisfaction with physical support and number of co-morbid illnesses, which may also be the case in this population, thus accounting for the unexpected results. In addition, it is surprising that there was no relationship between pre-operative hope and quality of life measured by EQ VAS. EQ VAS is a very blunt instrument, measuring “perceived health state today” on a visual analogue scale. It may be that pre-operatively, a global perception of health state was influenced more by the prospect of imminent surgery than by hope. This factor was removed post-operatively, thus potentially, the influence of hope re-emerged.

5.7 Stability of Hope Over Time

Snyder proposed that hope was a trait-like concept and as such would remain stable over time (Snyder, 2002a). The current study found that hope indeed did not change over time and therefore adds support to this proposition. If hope can be measured, it remains stable over time, and is related to health status such as anxiety, depression and function in patients with OA knee; it is possible that it could be used as a preliminary screening tool early in the disease process in order to guide proactive interventions.

5.8 Clinical Implications

Although, with the exception of EQ VAS, this study did not, as hypothesised, show pre-operative hope to be a predictor of outcome following TKR. It did however show that pre-operatively there was a significant correlation between hope and anxiety, depression and function. In addition, regression analysis confirmed that hope was a significant and unique predictor of pre-operative

variables contributing 5% of unique variance to anxiety, 4% to depression and perhaps most importantly contributing 10% of variance to function.

The importance of these findings is that many people suffer for years with symptoms of OA knee before finally undergoing surgery. The pre-operative rather than the post-operative period could be argued to be the time that OA costs the most, both in terms of personal suffering and in terms of needing both health and social support. Many patients will be conservatively managed during this time by professionals such as GPs or physiotherapists. It is possible, that within the current limited financial resources of the NHS that patients will have to wait for longer periods before being eligible for surgery. Effective condition management at this time therefore is of utmost importance. Hope could be used to optimise goal setting strategies, alongside developing realistic pathways and instilling individual agency towards reaching those goals.

The current study suggests that screening for hope may have some utility in predicting those “low hope” patients with OA knee who are at greatest risk of becoming anxious and / or depressed, both of which can lead to reduced function and in the longer term worse outcome following surgery. More importantly, screening may identify those patients at most direct risk of functional decline and therefore enable more accurate targeting of resources in order to address this in a pro-active, preventative manner. The current study has demonstrated that screening for hope using the Trait Hope scale is relatively simple and takes little time. It could easily be incorporated into routine assessment by GPs and physiotherapists.

There is burgeoning evidence that suggests that hope can be taught (Snyder, 1995; Snyder, 1994). Many patients with OA knee, who are conservatively managed, attend education and exercise groups run by physiotherapists. The incorporation of hope-enhancing strategies into these groups could potentially add to their effectiveness. Snyder and colleagues (Snyder et al., 2006) suggest that

this may include facilitation of optimal goal selection and definition, ensuring that such goals are individually valued. Goals should be achievable, but not too easy and they should be specific and measurable. Pathways towards those goals should be developed that are feasible, with the option of alternative pathways. Techniques such as visualisation have been used to facilitate pathways thinking. Finally, it is important to instil a strong belief that progress is possible. Skills such as developing positive self-talk can be instrumental to this end. Such a positively framed approach would not only encourage patients to build on their strengths, but also offers health professionals a non-threatening framework from which to incorporate psychological variables into patient management. It is likely that those patients who are most functionally able and psychologically well adjusted, will have longer term improved outcome following TKR.

5.9 Strengths and Limitations

4.9.1 Strengths.

The current study has several strengths in relation to previous research conducted in this area. Previous research by Hartley and colleagues (Hartley, Vance, Elliott, Cuckler, & Berry, 2008a) examined the role of hope in outcomes following both THR and TKR. In addition, they included patients undergoing both primary and revision joint replacement, recovery time and outcomes are different in these groups. The current study examined hope in relation to outcomes in patients undergoing primary TKR for OA, thus studying a more homogenous clinical population. The previous study recruited patients from one surgeon which was recognised as a limitation. The present study recruited patients from eight orthopaedic surgeons, thus increasing the generalisability of the findings.

Much of the previous research related to hope and outcomes in patients with physical health problems has been cross sectional, precluding more detailed analysis of the role of hope over time. The current study was a longitudinal study which therefore did examine the predictive role of hope over time. In addition, the current study examined outcome four months post-operatively, thus considerably extending the follow-up period of six weeks in the Hartley et al. study and gaining a longer term understanding of the role of hope in outcome over time.

This study has examined the role of hope on outcomes following total knee replacement, an area that has previously been largely neglected. Although the findings did not support the initial hypotheses that hope will determine outcome in this group, the findings are nonetheless clinically important. Osteoarthritis of the knee is a debilitating condition with high personal and social costs. Treatment and management of this condition is largely based on the deficit model. This research offers clinicians and patients a theoretically sound framework for managing this condition from a positive position, in a more proactive manner.

4.9.2 Limitations.

Although the follow-up period in this study was four months, which considerably advanced that of previous research, it would have been advantageous to extend this further. Most patients take one year to recover from TKR and previous research has shown, for example, that psychological factors such as depression can influence outcome up to five years following surgery (Brander et al., 2007).

A further limitation of the current study was the underlying epistemology. An empirical positivist position was adopted to examine hope, using quantitative methodology. Hope was reduced to a cognitive-motivational construct devoid of individual meaning and context. Findings should be

considered with this in mind. In reality, hope is a complex and multifaceted construct and will be unique to the individual in the context of their life.

Although pre-operatively sufficient participants were recruited for this study and therefore pre-operative analyses were adequately powered, there were fewer than anticipated post-operative participants. Many patients had their surgery cancelled or postponed beyond the timeframe of the present study. This may have resulted in the post-operative analyses having insufficient power to detect significant results.

Although recruiting from eight orthopaedic surgeons will increase the generalisability of the findings, the study may be limited in that it recruited from only one hospital site, thus being limited to the demographics of that location and reducing generalisability as a result.

Although the measures used were established as valid and reliable tools, limitations were noted in aspects of two tools. Some patients expressed a degree of confusion when completing the health-related locus of control measures (HRLC – form C). The confusion arose around the distinction between ongoing day-to-day control of managing their condition, versus the control of the surgeon in operating on their knee, which may influence findings. In addition, it was noted that, of the returned post-operative questionnaires, 11 / 57 (19%) were returned without completing the Trait Hope Scale. This may reflect a difficulty in understanding this measure. Again, this has implications for analysis.

5.10 Future Research

This study raises several questions that may be addressed in future longitudinal research. The utility of hope in predicting outcomes in a range of physical health conditions could be explored. It would be interesting to determine if the role of hope differed consistently between patients undergoing surgery, in comparison to those adapting to long term chronic conditions. Previous research has

consistently found hope to be predictive of both positive mood and functional ability (Snyder et al., 2006). However, as noted previously, much of this research had been cross sectional. In addition, when hope has been examined in relation to physical health, the clinical populations studied have been largely those adapting to long term physical health conditions, rather than undergoing what patients may perceive as a discrete surgical intervention which may be curative. The current study, in cross sectional analysis, also found that hope was a significant and unique predictor of both positive mood and function pre-operatively and found that hope was associated with positive mood post-operatively. Following surgery however, hope was not correlated to function and pre-operative hope did not predict either mood or function after surgery. The role of hope may differ in a patient population undergoing what they consider to be curative surgery in comparison to a population adapting to ongoing management of a long term condition. It is possible that in those undergoing surgery, the expectation and the effect of surgery becomes a more important predictor of outcome than hope. Preliminary research investigating a hope scale developed for patients with anal fissures, found evidence that condition-specific hope scales may potentially highlight ways in which agency, pathways, and goals components relate to a particular condition (Vernberg, Snyder, & Schuh, 2005). The findings indicate it may be beneficial for clinicians to tailor their hope interventions to specific conditions.

In addition, it would be interesting to explore whether the role of hope changes over time. The Hartley et al. study (Hartley, Vance, Elliott, Cuckler, & Berry, 2008b) and the current study explored outcome after joint replacement at six weeks and four months respectively. It is known that outcome following knee replacement is driven by psychological variables, for example pre-operative depression has been shown to influence outcome at up to five years following surgery, mainly through worse function (Brander et al., 2007). It may be that the effect of hope may re-emerge after a significantly longer time period as the individual, having undergone surgery, is essentially adapting to living with a long term condition.

The findings of the current study do suggest that hope is a stable trait; however stable traits are not immutable. Undergoing major surgery may affect a person's trait hope and thus alter its influence on outcome. There is evidence that it is possible to teach hope (Snyder, 1994; Snyder, 1995), and evidence in similar fields that benefit finding, positive affect, and optimism can be impacted by cognitive-behavioural interventions (Antoni et al., 2001; Penedo et al., 2006). Future research might investigate whether it is possible to teach hope in those patients living with OA and who are awaiting surgery and determine if this has a positive influence on both psychological and physical function and perceived health status.

The current study has been one of the first to explore the role of positive psychological constructs in outcome following TKR. Although hope was not found to predict long-term outcome after surgery, with the exception of EQ VAS, however, it did explain a significant proportion of the variance in anxiety, depression and function pre-operatively. Future research could build on this and explore the role that other positive psychological constructs e.g. optimism, may have on outcomes in these patients.

Finally, there has been a wealth of previous research that has determined that depression is an important factor in outcomes following TKR. The current research did find that there was a correlation between hope and depression. It would be interesting to explore whether hope is an indirect mediator of outcome post TKR via its relationship with depression.

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Critical Appraisal

1.0 Origins of the Project

Prior to entering clinical psychology training, my background had been as a physiotherapist. During this time I became increasingly aware of the importance of individual psychological factors, in recovery from, or adaptation to, physical illness. In fact, it was my interest in this which drew me into the psychology profession. I had become aware that, although sensitive to psychological factors relating to health, many medically or nursing trained colleagues were reluctant to address them for fear of opening a “can of worms” that they felt were beyond their competence. In addition, I had noticed that within the health care system, the dominant language was one of deficit. Patients were constantly made aware of what they were unable to do, or of what they had lost, remediation of which was then often the focus of any intervention.

When initially embarking on my clinical training, I did not have a clear research idea in mind, other than knowing that I was interested in the role of psychology in physical health. The idea for this research project came as a result of discussion with my research supervisor. She had been aware of recent research looking at the role of hope in the field of physical health, specifically in adapting to end stage renal failure and amputation. We further explored where else this may have utility and the idea of joint replacement came to mind for several reasons. This was a patient group that I had had extensive experience of working with. During this time, my clinical experience suggested that individual patient characteristics played a substantial role in the success or not of the surgical outcome. The orthopaedic culture was very much entrenched in the medical model, taking very much a singularly biomedical view. On a more practical note, I thought that this was a well defined clinical population, and it was a population that I felt I could easily access, having many contacts in this field.

A literature search revealed that there had been only one published study looking at the role of hope in outcomes following both total hip and knee replacement. This paper had identified several limitations and had made suggestions for future research in this area, based on these. Although I was nervous to do so, I approached a leading world expert in the field of osteoarthritis research, to ask his opinion on this research area. He said that hope was something that had been highlighted as important in much of the research that he had been involved in previously, but as yet the area had been neglected in relation to joint replacement. He gave enthusiastic support for the project and I learned that even the most prominent researchers are often generous in giving time and sharing expertise.

I hoped that the benefits of this research might be threefold. Firstly, that it may add to the increasing body of knowledge about the importance of individual psychological factors in outcomes in physical health conditions. Secondly that it may give health professionals a non-threatening way of addressing psychological aspects of a patient's health by recognising and building on their strengths rather than their deficits, by orienting care to patient assets and informing the interventions that may be offered. Thirdly, that it would offer patients a more positive way of framing their difficulties, through recognising and building on their strengths and incorporating this into rehabilitation.

2.0 Development of Research Idea

My initial idea was to conduct a multi-centre study. There were two reasons for this. Firstly, a single centre recruitment process had emerged as a limitation of the paper previously identified, limiting the generalisability of the findings. Secondly, I considered that conducting research across several centres would give me the best opportunity to access sufficient patient numbers. I thus embarked on the process of developing contacts and having conversations with various professionals to ascertain their interest and willingness in principle, to participate.

This was a very slow and time consuming process in the midst of also managing ongoing academic assignments, clinical placement and family commitments. I was constantly aware of striking the correct balance between being patient and pestering people. By the end of February 2010 I had managed to develop contacts with four NHS hospitals, three in the West Midlands and one in the North West, three of whom had agreed to help with the study and the fourth was still considering if they had sufficient staff resources to be able to help. Reaching this point had involved numerous conversations with consultant anaesthetists, consultant orthopaedic surgeons, physiotherapy managers, senior physiotherapists, consultant nurses, research nurses and research and development directors at each of the various hospitals. It had taken much longer than I had anticipated and it became clear that the research process required my focussed energy, persistence and self-confidence. I was unable to proceed with submission to ethics until these local arrangements had been finalised

As there was no dedicated funding for this project, and in order to cause minimum disruption to those services who had offered their help, it was important to fit this research, as much as possible into the existing patient pathways at each site. This meant that patients would necessarily be approached at different points on their surgical journey. This ranged from being seen and completing questionnaires 3 months before surgery, in a group education session, to being seen as an in-patient on the morning of their surgery. I was aware that this obviously had implications for comparability of results between the different patient groups, but could see no way to circumvent the problem.

In March 2010 I was approached by a consultant nurse from Russells Hall Hospital who had initially agreed to help with my research as a multi-site project. She was very interested in this study as it complemented research that she had recently completed as part of her PhD. She asked if I was interested in conducting a single site project and offered her full support to help with this. Clearly

this offer implied both benefits and compromises. The main gain would be that of increasing methodological rigour, in that all patients would be seen at the same point in their surgical pathway. An additional benefit would be needing to coordinate research at only one site, thus reducing the number of people I would need to communicate with and the time I would need to spend travelling between sites. It also simplified the forthcoming process of obtaining ethical approval. The disadvantages were that using one site reduced the generalisability of the results; however I considered that the resulting improved methodological rigour more than compensated for this. In addition, the study would be recruiting patients from eight different surgeons, thus extending generalisability. In reviewing patient surgical throughput over the proposed time frame of the study with this research nurse and my supervisor, I was reassured that the requisite sample size could be accessed.

A single centre study was thus agreed. Submission was made to the local ethics committee shortly after this, with the first available meeting date in May 2010. Approval was given, paperwork finalised and data collection ready to start in June 2010.

3.0 Preparation

Through one of the research and development directors that I had previously been in contact with, I was offered the opportunity to access quality assurance training for Good Clinical Practice in Research and completed the Level 2 Intermediate training. This was invaluable preparation for the forthcoming research process. The training familiarised me with the ethical principles stated in the Declaration of Helsinki, which then explicitly informed every step of my research project.

4.0 Choice of Measures

Choice of measures was informed by a variety of sources. Two outcome measures, i.e. the Oxford Knee Score (function) and EQ 5D (generic quality of life measure) were used at the recommendation of a leading expert in this field of research. These measures are both currently being used nationally, as part of the DH patient-reported outcomes measures (PROMS) initiative for all patients undergoing NHS funded knee replacement. This would give the current study comparability to national data. In addition, the validity and reliability of these measures is well established.

The Hospital Anxiety and Depression Scale was chosen as a measure of psychological morbidity. This measure was chosen for three reasons; it is specifically designed for use in medical populations, reliability and validity is well established and it is user friendly in being quick and easy to complete.

The choice of hope measure was well explored and considered. I attended a conference on hope presented by Anthony Scioli, Professor of Clinical psychology and hope researcher. He presented an integrated model of hope, drawing on psychology, philosophy, anthropology, biology, art, literature, history and religion. Based on this model a Comprehensive Hope Scale (CHS) has been developed. However, the development of this scale is in its infancy. Also, although the scale was comprehensive, the focus was too broad for the requirements of the current study. Much of the research in the field of hope had used Snyder's Trait Hope Scale. Although recognising that this scale has limitations as it only measures one aspect of hope, i.e. the cognitive construct of mastery, it was considered the best choice for three reasons. The choice of this measure would enable comparability with previous studies, the reliability and validity of this measure had been established and finally, it was simple and straightforward to administer.

Additional measures were used to measure social support (MSPSS) and health related locus of control (MHLC form C). These measures had been used in similar studies. After review of their psychometric properties they were chosen as the most suitable measures.

5.0 Data Collection

Before data collection began, I had the opportunity to meet the clinical team at Russells Hall hospital, comprising the nurse consultant in trauma and orthopaedics with whom I had made contact, two advanced nurse practitioners with whom she ran the clinic and also the team secretary. I was able to explain my background and the research project and answer any questions that they had. At this time, I sat in on a group education session and the individual patient appointments in order to familiarise myself with the process that the patients followed once they attended the hospital. Time was invested in establishing a clear protocol for everyone involved in the research project, which ensured an efficient and problem free process. This involved the research nurse and I planning step by step, what needed to be done, at what time and who would take on each task. In addition, consideration was made about safe storage of and access to, patient information. This careful planning ensured that no problems were encountered once the recruitment process started as all eventualities had been considered. The fact the nurses at the hospital were all involved in research on a regular basis was especially advantageous. I was able to benefit from their experience.

It had been agreed with the team that I would initially attend each clinic (which ran twice per week) in order to establish a system for giving verbal information to patients, taking written consent from those willing to participate, handing out and collecting completed questionnaires. The aim was that ultimately the nurses would then be able to take over this process in my absence. It soon became apparent that this process was much more time consuming than initially envisaged. Patients needed help to complete both the consent form and the questionnaires. It was necessary to coordinate

completion and collection of questionnaires before and after individual appointments, in order to retain the maximum number of participants. Individual details then needed to be entered in a patient log on completion. There was no spare capacity for the nurses to take on this role in addition to their clinical role and therefore I had to continue to do so for the duration of the data collection period. This highlighted the practical difficulties of conducting research in a busy NHS setting, with no funding for additional support. It reduced access to participants, thus limiting the potential sample size for this study, which had not been envisaged. It also served to vindicate my decision to conduct a single centre study, even though this had not been one of my initial considerations.

In retrospect, the advantage of collecting the data myself, meant that I was able to personally speak to every participant and had the opportunity to explain the value and purpose of the study. I was able to answer questions and was able to thank them individually for their time and help. I reminded every participant that they would receive a follow up questionnaire and explained the importance of completing this. I think that this played a vital role in achieving a low post-operative attrition rate from the study.

Collection of data was slower than had been anticipated for several reasons. Once data collection had started in mid June 2010, those patients who were recruited had a potential wait of three months before having surgery. This meant that it could be up to seven months later before being able to collect the first post-operative data. I had not anticipated this wait. Although this may be seen as an oversight on my part, the time consuming process of negotiating with everyone involved to get a viable research project off the ground, meant that there was nothing that I could have done to reach this point any sooner. It made me consider how, even with considerable planning, some elements of the research process may be overlooked. In addition to this, I took three weeks of pre-planned holiday during this period and therefore missed several potential clinics. Nursing staff also took

holiday and further clinics were cancelled for this. Finally, clinics were cancelled due to departmental audit which also fell during this period. NHS research could be considered to suffer from the pragmatics of patient care and primacy of the governance process.

Post-operative questionnaires were mailed to all patients at four months post surgery with a stamped addressed envelope for their return. I was fortunate to be allocated secretarial time from the service in order to do this. Time was spent writing a detailed protocol for the steps involved to ensure the smooth running of this in my absence. Having this help was an enormous benefit to me in terms of my time and energy and I was extremely grateful for the support. I believe that this offer of extra help was as a result of having established a positive working alliance with the team.

6.0 Personal Challenge

The biggest personal challenge of the entire research process has been my fear of statistics. However, with guidance and encouragement of others and with extensive reading, I have been able to tackle the statistical analysis that was required for this project. I have developed a sound understanding of the process and confidence in using SPSS. I feel confident that I would be able to conduct statistical analysis in future research projects.

7.0 Learning outcomes

My previous experiences of conducting research had been limited to undergraduate projects. This was my first experience of conducting research at this level and I believe I have learned numerous competencies:

- I have gained a sound understanding of Good Clinical Practice in research and have endeavoured to apply all of these principles in my research, in particular in giving clear information, taking informed consent, ensuring patient confidentiality, keeping an accurate record of information and safe storage of data.
- I have learnt that no matter how well organised you may be, conducting research in the real world is also dependent on the schedules and priorities and timetables of others and of the system in which you are working and over these you have little or no control. It has been important as far as possible to anticipate all eventualities and have a contingency plan in place. Where this has not been possible, it has been important to manage my own stress.
- I have developed good project management skills including time management, record keeping, meticulous planning and organisation, good communication and team working and flexibility.
- Increased awareness of the importance of good communication, networking, team working skills and generosity of spirit. Although eventually I did not conduct a multi-site project, I had managed to secure the agreement of three sites with a possible fourth. The offers of help and support that I did receive were humbling. Many of which came from professionals who themselves had been or were involved in the research process and therefore understood not only the importance of it but also the challenges that it presents. It will certainly make me more willing in future to offer my help to others who are in a similar position. The success of my research project was largely down to successful team working, good communication and the enormous help and generosity of others.
- The importance of having the help, support and belief of others. Without the support from my husband and family, research supervisor and research nurse, this would not have been possible.

- Without the generous help of the participants that this research would not have happened and I am grateful to all for giving up their time. During this process I became aware of the ethics of ensuring that this research is published and that the knowledge that is generated through this research is disseminated to the wider community in return for this help. This was something that I had not previously considered.
- I have gained an increased knowledge of the factors influencing outcome following knee replacement and the possible interventions that may help to improve them.
- Conducting research at this level had been an unknown quantity that filled me with anxiety and made me doubt my abilities. An initial desire to run away from this project was curbed and my self-belief as a researcher has been immeasurably improved. I have learnt much, learnt where my strengths lie, i.e. networking project management, have tackled my greatest fear i.e. statistics and found that with help and through necessity, discovered that it was something I was capable of tackling and understanding. I have grown in confidence as a result and feel that I have a positive contribution to make to research projects in the future.
- In conducting this research and adopting an empirical positivist position, I am acutely aware that this is not the only way to study the complicated concept and human experience that is hope. This research could be criticised for reducing human experience to a psychometric scale, simplifying a multi-faceted domain and diminishing spiritual elements. Conducting this research has made me think about the need to reconcile the generalisable truths of empirical research with the complexity of individual meaning and experience.

Appendices

Appendix A: British Journal of Health Psychology – Author Guidelines

The aim of the British Journal of Health Psychology is to provide a forum for high quality research relating to health and illness. The scope of the journal includes all areas of health psychology across the life span, ranging from experimental and clinical research on aetiology and the management of acute and chronic illness, responses to ill-health, screening and medical procedures, to research on health behaviour and psychological aspects of prevention. Research carried out at the individual, group and community levels is welcome, and submissions concerning clinical applications and interventions are particularly encouraged.

The types of paper invited are:

- papers reporting original empirical investigations;
- theoretical papers which may be analyses or commentaries on established theories in health psychology, or presentations of theoretical innovations;
- review papers, which should aim to provide systematic overviews, evaluations and interpretations of research in a given field of health psychology; and
- methodological papers dealing with methodological issues of particular relevance to health psychology.

1. Circulation

The circulation of the Journal is worldwide. Papers are invited and encouraged from authors throughout the world.

2. Length

Papers should normally be no more than 5000 words (excluding the abstract, reference list, tables and figures), although the Editor retains discretion to publish papers beyond this length in cases where the clear and concise expression of the scientific content requires greater length.

3. Editorial policy

The Journal receives a large volume of papers to review each year, and in order to make the process as efficient as possible for authors and editors alike, all papers are initially examined by the Editors to ascertain whether the article is suitable for full peer review. In order to qualify for full review, papers must meet the following criteria:

- the content of the paper falls within the scope of the Journal
- the methods and/or sample size are appropriate for the questions being addressed
- research with student populations is appropriately justified
- the word count is within the stated limit for the Journal (i.e. 5000 words)

4. Submission and reviewing

All manuscripts must be submitted via <http://www.editorialmanager.com/bjhp/>. The Journal operates a policy of anonymous peer review. Authors must suggest three reviewers when submitting their manuscript, who may or may not be approached by the Associate Editor dealing with the paper.

5. Manuscript requirement

- Contributions must be typed in double spacing with wide margins. All sheets must be numbered.
- Tables should be typed in double spacing, each on a separate page with a self-explanatory title. Tables should be comprehensible without reference to the text. They should be placed at the end of the manuscript with their approximate locations indicated in the text.

- Figures can be included at the end of the document or attached as separate files, carefully labelled in initial capital/lower case lettering with symbols in a form consistent with text use. Unnecessary background patterns, lines and shading should be avoided. Captions should be listed on a separate sheet. The resolution of digital images must be at least 300 dpi.
- For articles containing original scientific research, a structured abstract of up to 250 words should be included with the headings: Objectives, Design, Methods, Results, Conclusions. Review articles should use these headings: Purpose, Methods, Results, Conclusions.
- For reference citations, please use APA style. Particular care should be taken to ensure that references are accurate and complete. Give all journal titles in full.
- SI units must be used for all measurements, rounded off to practical values if appropriate, with the imperial equivalent in parentheses.
- In normal circumstances, effect size should be incorporated.
- Authors are requested to avoid the use of sexist language.
- Authors are responsible for acquiring written permission to publish lengthy quotations, illustrations, etc. for which they do not own copyright. For guidelines on editorial style, please consult the [APA Publication Manual](#) published by the American Psychological Association.

6. Supporting Information

BJHP is happy to accept articles with supporting information supplied for online only publication. This may include appendices, supplementary figures, sound files, videoclips etc. These will be posted on Wiley Online Library with the article. The print version will have a note indicating that extra material is available online. Please indicate clearly on submission which material is for online only publication. Please note that extra online only material is published as supplied by the author in the same file format and is not copyedited or typeset. Further information about this service can be found at <http://authorservices.wiley.com/bauthor/suppmat.asp>

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Colour illustrations can be accepted for publication online. These would be reproduced in greyscale in the print version. If authors would like these figures to be reproduced in colour in print at their expense they should request this by completing a Colour Work Agreement form upon acceptance of the paper. A copy of the Colour Work Agreement form can be downloaded [here](#).

9. Pre-submission English-language editing

Authors for whom English is a second language may choose to have their manuscript professionally edited before submission to improve the English. A list of independent suppliers of editing services can be found at http://authorservices.wiley.com/bauthor/english_language.asp. All services are paid for and arranged by the author, and use of one of these services does not guarantee acceptance or preference for publication.

10. Author Services

Author Services enables authors to track their article – once it has been accepted – through the production process to publication online and in print. Authors can check the status of their articles online and choose to receive automated e-mails at key stages of production. The author will receive an e-mail with a unique

link that enables them to register and have their article automatically added to the system. Please ensure that a complete e-mail address is provided when submitting the manuscript. Visit <http://authorservices.wiley.com/bauthor/> for more details on online production tracking and for a wealth of resources including FAQs and tips on article preparation, submission and more.

11. The Later Stages

The corresponding author will receive an email alert containing a link to a web site. A working e-mail address must therefore be provided for the corresponding author. The proof can be downloaded as a PDF (portable document format) file from this site. Acrobat Reader will be required in order to read this file. This software can be downloaded (free of charge) from the following web site:

<http://www.adobe.com/products/acrobat/readstep2.html>. This will enable the file to be opened, read on screen and annotated direct in the PDF. Corrections can also be supplied by hard copy if preferred. Further instructions will be sent with the proof. Hard copy proofs will be posted if no e-mail address is available. Excessive changes made by the author in the proofs, excluding typesetting errors, will be charged separately.

12. Early View

British Journal of Health Psychology is covered by the Early View service on Wiley Online Library. Early View articles are complete full-text articles published online in advance of their publication in a printed issue. Articles are therefore available as soon as they are ready, rather than having to wait for the next scheduled print issue. Early View articles are complete and final. They have been fully reviewed, revised and edited for publication, and the authors' final corrections have been incorporated. Because they are in final form, no changes can be made after online publication. The nature of Early View articles means that they do not yet have volume, issue or page numbers, so they cannot be cited in the traditional way. They are cited using their Digital Object Identifier (DOI) with no volume and issue or pagination information. Eg Jones, A.B. (2010). Human rights Issues. *Journal of Human Rights*. Advance online publication. doi:10.1111/j.1467-9299.2010.00300.x

Further information about the process of peer review and production can be found in this document. [What happens to my paper?](#)

Appendix B: Search strategy

Search strategy

Data base	Terms used:	Returned	Identified as possibly relevant from title and abstract	Identified as relevant after review of full text and removal of duplicates
PsycINFO	(S1) “arthroplasty” or “hip replacement” or “knee replacement”	263	n/a	0
	(S2) “expectations” or “patient expectations”	53367	n/a	
	(S3) “treatment outcome” or “outcome”	173765	n/a	
	(S4) S1 and S2 and S3	11	1	
Medline	(S1) arthroplasty. mp. or Arthroplasty, Replacement/ or Arthroplasty, Replacement, knee/ or Arthroplasty/ or Arthroplasty, Replacement, Hip/	36721	n/a	5
	(S2) outcome, mp. or “outcome Assessment (health care)”/ or “Outcome and Process Assessment (Health Care)”/ or Treatment Outcome/	864825	n/a	
	(S3) Health Knowledge, Attitudes, Practice/ or Attitude to Health/ or “patient expectation,”mp	110783	n/a	
	(S4) S1 and S2 and S3	55	9	
Web of Science	(S1) Topic (arthroplasty) Or Topic (“hip replacement”) OR Topic (“knee replacement”)	58,502	n/a	
	(S2) Topic (health	>100,000	n/a	

	knowledge”) OR Topic (“attitude to health”) OR Topic (patient expectations”)			
	(S3) Topic (outcome) OR Topic (“treatment outcome”)	>100,000	n/a	
	(S4) S1 and S2 and S3	99	8	0

Expert opinion = 1 paper

Hand searching reference lists of above 7 papers = 3 papers

Appendix C: Data Extraction Pro-forma

Data extraction pro-forma

Article Number:
Review Date:
Title:
Author(s):
Publication date:
Journal:
Volume: Number: Pages:
Keywords:
<p>Aims:</p> <ul style="list-style-type: none"> • <i>What are the study aims?</i> • <i>Were aims clearly stated?</i>
<p>Method:</p> <ul style="list-style-type: none"> • <i>Design (Is it appropriate?)</i> • <i>How were patient expectations measured? (Are measures valid?)</i> • <i>How were patient outcomes measured? (Are measures valid?)</i> • <i>Is there mention of theory underpinning the study? - If so what?</i> • <i>Are statistical methods described?</i>
<p>Sampling / Participants:</p> <ul style="list-style-type: none"> • <i>Total number of participants?</i> • <i>Age Range?</i> • <i>Gender?</i> • <i>TKR/ THR or both?</i> • <i>Country of research?</i> • <i>How sample obtained?</i> • <i>Response Rate?</i>
<p>Analysis Used:</p> <ul style="list-style-type: none"> • <i>Which statistical tests were run?</i> • <i>Was power calculated?</i>
<p>Results:</p> <ul style="list-style-type: none"> • <i>Was the data correctly described?</i> • <i>Were the statistics used appropriate?</i> • <i>Were significance levels identified?</i>
Findings:
Strengths / Limitations:
Conclusions:

Appendix D: Table of Outcome Measures

Outcome measures

Measurement Tool	Full Name	Description
WOMAC	Western Ontario McMaster University Osteoarthritis Index	A disease specific measure of pain, stiffness and function
SF 36	Medical Outcomes Study short form 36	A generic health status measure with physical and mental health component scores.
SF 20	Medical outcomes Study short form 20	A generic health status measure with physical and mental health component scores.
TKFQ	Total Knee Function Questionnaire	55 multiple choice questions relating to symptoms and functional abilities involving the knee and questions about satisfaction
HRQ	Hip Rating Questionnaire	Disease specific measure of overall impact of arthritis, pain, walking and activities of daily living
THAOEQ	Total Hip Arthroplasty Outcome Evaluation Questionnaire baseline and history forms	Extensive questionnaire re: pain, function, other symptoms, expectations and socio-demographic data.
EQ 5D	European Quality of life measure 5 Dimensions	Global measure of health state today and specific questions re: mobility, self-care, usual activities, pain and anxiety
KOOS	Knee Injury and Osteoarthritis Outcome Score	Extension of WOMAC developed for use with younger and / or physically active patients with knee injury and / or osteoarthritis.

Appendix E: Ethics approval

File

The Dudley Group of Hospitals

NHS Trust

RESEARCH & DEVELOPMENT DIRECTORATE
CLINICAL RESEARCH UNIT, 1ST FLOOR, NORTH WING
Tel/Fax: 01384 321024/ 01384 456111 Ext 1024

Russells Hall Hospital
Dudley
West Midlands
DY1 2HQ

4 June 2010

Mrs Cindy Taylor
Trainee Clinical Psychologist
c/o Clinical Psychology
Leicestershire Partnership NHS Trust
104 Regent Road
Leicester
LE1 7LT

Dear Cindy

Re: ID 878 – The role of hope on outcomes following total knee replacement.

I confirm that the Trust is agreeable to this study proceeding according to the approved protocol, Version 1 dated 12/04/2010.

The Trust has no concerns regarding the potential risks of this study and you will be supported by the Trust in the event of any claim made, as would be the case for any claim made in the normal course of your duties.

The following documents should be used:

Questionnaire: Multidimensional scale of perceived social support:	Version 1, dated 12/04/10
Questionnaire: Multidimensional health locus of control scales:	Version 1, dated 12/04/10
Questionnaire: Trait hope scale	Version 1, dated 12/04/10
Questionnaire: Oxford knee score	Version 1, dated 12/04/10
Questionnaire: EQ-5D	Version 1, dated 12/04/10
Participant Information Sheet	Version 1, dated 12/04/10
Participant Consent Form	Version 1, dated 12/04/10
GP/ Consultant Information Sheets	Version 1, dated 12/04/10
Questionnaire: HADS	Version 1, dated 12/04/10
Questionnaire: Pre-op questionnaire pack	Version 1, dated 12/04/10
Questionnaire: Post-op questionnaire pack	Version 1, dated 12/04/10

With this letter you will find copies of policies relevant to undertaking research in the Trust:

- (a) the Trust's policy for taking and documenting informed consent for research studies;
- (b) the Trust's Policy for addressing fraud and misconduct in research
- (c) PI checklist

Please complete and return the PI checklist to the R&D office at your earliest convenience in order to comply with the Trust's research governance policy.

**A Teaching Trust of
The University of Birmingham**

Chairman: Alfred Edwards

Chief Executive: Paula Clark WZZ 34403

In order to provide documentary evidence that patients have consented to take part in research, the Research & Development Directorate now requires an entry to be made, and a copy of the consent form to be filed in the medical notes of ALL patients participating in research. It is also important to ensure the consent form is completed in its entirety.

RDD acknowledges this requirement will place an extra burden on researchers and therefore undertakes to produce sticky labels for non interventional trials. The label will give a description of the project and nature of the patient's involvement, can be stuck in the patient notes, then signed and dated by the researcher. A sample text for your project is attached and a supply can be provided by Margaret Marriott, tel: 01384 321024 or ext 1024.

I wish you and your collaborators well in your investigations.

Best regards

Yours sincerely



Professor George Kitas
Research & Development Director

cc. Mr Davis, Consultant Trauma and Orthopaedic surgeon
Gail Parsons, Nurse Consultant in Trauma and Orthopaedics



National Research Ethics Service

Birmingham, East, North and Solihull Research Ethics Committee

REC Offices
Osprey House
Albert Street
Redditch
B97 4DE

Telephone: 01527 587528
Facsimile: 01527 587501

20 May 2010

Mrs Cindy Taylor
Trainee Clinical Psychologist
c/o Clinical Psychology
Leicestershire Partnership NHS Trust
104 Regent Road
LEICESTER
LE1 7LT

Dear Mrs Taylor

Study Title: The role of hope on outcomes following total knee replacement.
REC reference number: 10/H1206/37
Protocol number: 1

The Research Ethics Committee reviewed the above application at the meeting held on 12 May 2010. Thank you for attending to discuss the study.

Ethical opinion

You are using the incentive of a shopping draw, why did you choose this?

This was included following advice from the University tutor. It was felt it may increase the return rate and was included as a thank you gesture.

The members of the Committee present gave a favourable ethical opinion of the above research on the basis described in the application form, protocol and supporting documentation, subject to the conditions specified below.

Ethical review of research sites

The favourable opinion applies to all NHS sites taking part in the study, subject to management permission being obtained from the NHS/HSC R&D office prior to the start of the study (see "Conditions of the favourable opinion" below).

Conditions of the favourable opinion

The favourable opinion is subject to the following conditions being met prior to the start of the study.

Management permission or approval must be obtained from each host organisation prior to the start of the study at the site concerned.

This Research Ethics Committee is an advisory committee to West Midlands Strategic Health Authority
The National Research Ethics Service (NRES) represents the NRES Directorate within
the National Patient Safety Agency and Research Ethics Committees in England

For NHS research sites only, management permission for research ("R&D approval") should be obtained from the relevant care organisation(s) in accordance with NHS research governance arrangements. Guidance on applying for NHS permission for research is available in the Integrated Research Application System or at <http://www.rdforum.nhs.uk>. Where the only involvement of the NHS organisation is as a Participant Identification Centre, management permission for research is not required but the R&D office should be notified of the study. Guidance should be sought from the R&D office where necessary.

Sponsors are not required to notify the Committee of approvals from host organisations.

Other conditions specified by the REC

Participant Information Sheet

- Change the print so that the section titles are in bold and the text not in bold. Ensure all text is in the same font type and font size.
- Include the telephone number for PALS.

It is responsibility of the sponsor to ensure that all the conditions are complied with before the start of the study or its initiation at a particular site (as applicable).

Approved documents

The documents reviewed and approved at the meeting were:

<i>Document</i>	<i>Version</i>	<i>Date</i>
Covering Letter		13 April 2010
REC application	2.5	13 April 2010
Protocol	1	12 April 2010
Investigator CV		14 April 2010
Referees or other scientific critique report		
Questionnaire: Multidimensional Scale of Perceived Social Support - Appendix B	1	12 April 2010
Questionnaire: Multidimensional Health Locus of Control Scales (Form C) - Appendix C	1	12 April 2010
Questionnaire: Trait Hope Scale - Appendix D	1	12 April 2010
Questionnaire: Oxford Knee Score - Appendix E	1	12 April 2010
Questionnaire: EQ-5D - Appendix F	1	12 April 2010
CV for Supervisor		
Demographic Information - Appendix A	1	12 April 2010
Participant Information Sheet: Appendix H	1	12 April 2010
Participant Consent Form: Appendix I	1	12 April 2010
GP/Consultant Information Sheets	1	12 April 2010
Questionnaire: HADS - Appendix G	1	12 April 2010
Questionnaire: Pre-Op Questionnaire Pack	1	12 April 2010
Questionnaire: Post-Op Questionnaire Pack	1	12 April 2010
Patient Identification Log - Appendix J	1	12 April 2010

Membership of the Committee

The members of the Ethics Committee who were present at the meeting are listed on the attached sheet.

Statement of compliance

The Committee is constituted in accordance with the Governance Arrangements for Research Ethics Committees (July 2001) and complies fully with the Standard Operating Procedures for Research Ethics Committees in the UK.

After ethical review

Now that you have completed the application process please visit the National Research Ethics Service website > After Review

You are invited to give your view of the service that you have received from the National Research Ethics Service and the application procedure. If you wish to make your views known please use the feedback form available on the website.

The attached document "After ethical review – guidance for researchers" gives detailed guidance on reporting requirements for studies with a favourable opinion, including:

- Notifying substantial amendments
- Adding new sites and investigators
- Progress and safety reports
- Notifying the end of the study

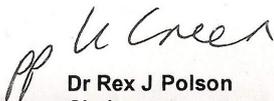
The NRES website also provides guidance on these topics, which is updated in the light of changes in reporting requirements or procedures.

We would also like to inform you that we consult regularly with stakeholders to improve our service. If you would like to join our Reference Group please email referencegroup@nres.npsa.nhs.uk.

10/H1206/37 **Please quote this number on all correspondence**

With the Committee's best wishes for the success of this project

Yours sincerely



Dr Rex J Polson
Chair

Email: Karen.Green@westmidlands.nhs.uk

Enclosures: *List of names and professions of members who were present at the meeting and those who submitted written comments*

"After ethical review – guidance for researchers"

Copy to: *Dave Clarke*
R&D Office
Leicestershire Partnership NHS Trust
Daisy Peake Building
Gipsy Lane
Leicester LE5 0TD

✓ *sent addy/w*

Birmingham, East, North and Solihull Research Ethics Committee

Attendance at Committee meeting on 12 May 2010

Committee Members:

<i>Name</i>	<i>Profession</i>	<i>Present</i>	<i>Notes</i>
Dr S George	Consultant Psychiatrist	Yes	
Mrs Lynne Gray	Senior Biomedical Scientist	No	
Mrs Rosemary Harris	Lay Member	Yes	
Mrs Theresa Hyde	Lay Member	Yes	
Mrs Irene Linder	Lay Member	Yes	
Ms Veronica Morgan	Midwife	Yes	
Dr Richard Mupanemunda	Consultant Paediatrician	Yes	
Dr David O'Brien	GP	Yes	
Dr Rex J Polson	Consultant Physician	Yes	
Dr Timothy Priest	Consultant in Anaesthesia & Pain Management	No	
Mr Rajeshwar Singh	Lay Member	Yes	
Mrs Margaret Sparrey	Lay Member	Yes	
Ms Gill Tomlinson	Head of Radiology, Solihull Hospital	Yes	

Appendix F: Patient information letter

TO BE PRINTED ON LETTER HEADED PAPER

A prospective study of factors involved in outcome following total knee replacement

PATIENT INFORMATION SHEET

You are being invited to take part in a research study. Before you decide it is important for you to understand why the research is being done and what it will involve. Please read the following information carefully and if you have any queries, please discuss them with friends, relatives, hospital doctors or your GP if you wish. Ask us if there is anything that is not clear or if you would like more information.

What is the purpose of the study?

We know that there are many factors that influence how well people do after having a total knee replacement. This study is planning to look in more detail which individual factors help patients' to have a good outcome after their knee replacement. This will help us to understand what is important for a successful outcome.

Why have I been chosen?

We are asking all adult patients, who are to receive a primary (first) total knee replacement for osteoarthritis, to take part in this study.

Do I have to take part?

No. It is up to you to decide whether or not you would like to take part in the study. If you decide to take part you will be given this information sheet to keep and be asked to sign a consent form. If you decide to take part you are still free to withdraw (come out of the study) at any time and without giving a reason. A decision to withdraw at any time, or a decision not to take part, will not affect the standard of care you receive.

What will happen if I take part?

If you decide to take part in the study, you will be asked to complete two sets of questionnaires. The first will be before your operation and will take approximately 20 minutes to complete. The second will be four months after your operation and will take approximately 10 minutes to complete. The first questionnaire should be completed before your surgery and will be either at a clinic appointment before your surgery, or will be on the day that you are admitted to hospital for your surgery. The second will be posted to your home address for completion at home. You will be

asked to post this back (a pre-paid return envelope will be included). If the return questionnaires have not been received after 4 weeks, you may receive a telephone call to follow this up. All those who return their post-operative questionnaires will be entered into a draw to win £50 shopping vouchers (of your choice).

What are the benefits of taking part in this study?

Whilst you may not benefit directly from taking part in this study, you will help add to a body of knowledge that will help improve the outcome of people receiving a total knee replacement. This may benefit you in the future, should you receive a further total knee replacement.

What are the disadvantages of taking part?

We do not believe there are any major disadvantages or risks to taking part. However, your time will be needed in order to complete the questionnaires.

What if something goes wrong?

Things can go wrong in hospital just as in any other part of life but this happens very rarely. If you feel that your treatment in hospital has not been right or has harmed you in some way, you may ask the hospital to make amends. If you take part in this research project, the usual compensation systems which apply to all patients in all hospitals in England will still apply to you. You do not lose any rights by being in this research. If you wish to complain about any aspect of the way you have been approached or treated during the course of this study, the normal National Health Service complaints system will be available to you

Will my taking part in this study be kept confidential?

All information which is collected about you during the course of the research will be kept strictly confidential. Any information about you which leaves the hospital will have your name and address removed so that you cannot be recognised from it.

Your own GP will be notified of your participation in the trial

What will happen to the results of the research study?

The results of the research will be published in about 3 years as it takes time to analyse the results. We will send you a copy of the results if you wish at that time. You will not be identified in any report/publication.

Who is organising and funding the research?

This research is being carried out by a Trainee Clinical Psychologist at the University of Leicester as part of a Doctorate in Clinical Psychology. No pharmaceutical company is involved in this research. None of us are paid for looking after you as part of this research

Who should I contact for further information?

Whenever you want to get more information about this study, please contact:

Cindy Taylor
Trainee Clinical Psychologist
University of Leicester
104, Regent Road
Leicester
LE1 7LT
Telephone number: 0116 223 1639
E-mail: ct146@le.ac.uk

If you have any concerns or complaints, then please contact:

Gail Parsons
Consultant Nurse in Trauma and Orthopaedics
Hospital Address
Telephone number

Or

Patient Advice and Liaison Services
Hospital Address
Telephone number

Thank you for taking the time to read this information.

Appendix G: Consent form

A prospective study of factors involved in outcome following total knee replacement

CONSENT FORM

Protocol Version
Patient Identification Number:
Name of Researcher:

Patient please initial box

1. I confirm that I have read and understood the information sheet for the above study.
2. I have had the opportunity to ask questions and all my questions have been answered to my satisfaction.
3. I understand that my participation is voluntary and that I am free to withdraw at any time, without giving any reason, without my medical care or legal rights being affected.
4. I understand that sections of any of my medical notes may be looked at by responsible individuals from regulatory authorities or the Trust, where it is relevant to my taking part in research. I give permission for these individuals to have access to my records and for the data to be transferred to them.
5. I agree that my GP can be informed of my participation in this study.
6. I agree to take part in the above study.

Name of Patient

Date

Signature

Name of Person

Date

Signature

taking consent

Each individual who signs this document must PERSONALLY date his or her signature.
1 for patient, 1 for researcher, 1 to be kept with hospital notes.
Date:/...../.....

Notification of patient entry into a prospective study of factors involved
in outcome following total knee replacement

Appendix H: GP letter

Dear Dr

Re: Patient name:..... D.O.B

Address:.....

The above-named patient from your practice has consented to enter a prospective study to examine the factors involved in outcome following primary total knee replacement.

The patient has been given the information leaflet (a copy of which is enclosed) and is aware that they can withdraw from the study at any time without giving a reason.

If you require any further details about this study, please do not hesitate to contact *Cindy Taylor* at ct146@le.ac.uk

Yours sincerely

Cindy Taylor

Principal Investigator

Enc

Appendix I: Demographic information

Please complete the following details:

Sex: M

F

Age:

Appendix J: Multidimensional scale of perceived social support

Error! Objects cannot be created from editing field codes.

Appendix K: Multidimensional Health Locus of Control Scales (Form C)

Multi dimensional health locus of control

Form C

Instructions: Each item below is a belief statement about your medical condition with which you may agree or disagree. Beside each statement is a scale which ranges from strongly disagree (1) to strongly agree (6). For each item we would like you to circle the number that represents the extent to which you agree or disagree with that statement. The more you agree with a statement, the higher will be the number you circle. The more you disagree with a statement; the lower will be the number you circle. Please make sure that you answer **EVERY ITEM** and that you circle **ONLY ONE** number per item. This is a measure of your personal beliefs; obviously, there are no right or wrong answers.

		1=STRONGLY DISAGREE (SD)		2=MODERATELY DISAGREE (MD)		3=SLIGHTLY DISAGREE (D)		4=SLIGHTLY AGREE (A)		5=MODERATELY AGREE (MA)		6=STRONGLY AGREE (SA)	
		SD	MD	D	A	MA	SA						
1	If my knee worsens, it is my own behaviour which determines how soon I will feel better again.	1	2	3	4	5	6						
2	As to my knee, what will be will be.	1	2	3	4	5	6						
3	If I see my doctor regularly, I am less likely to have problems with my knee.	1	2	3	4	5	6						
4	Most things that affect my knee happen to me by chance.	1	2	3	4	5	6						
5	Whenever my knee worsens, I should consult a medically trained professional.	1	2	3	4	5	6						
6	I am directly responsible for my knee getting better or worse.	1	2	3	4	5	6						
7	Other people play a big role in whether my knee improves, stays the same, or gets worse.	1	2	3	4	5	6						
8	Whatever goes wrong with my knee is my own fault.	1	2	3	4	5	6						
9	Luck plays a big part in determining how my knee improves.	1	2	3	4	5	6						
10	In order for my knee to improve, it is up to other people to see that the right things happen.	1	2	3	4	5	6						
11	Whatever improvement occurs with my knee is largely a matter of good fortune.	1	2	3	4	5	6						
12	The main thing which affects my knee is what I myself do.	1	2	3	4	5	6						
13	I deserve the credit when my knee improves and the blame when it gets worse.	1	2	3	4	5	6						
14	Following doctor's orders to the letter is the best way to keep my knee from getting any worse.	1	2	3	4	5	6						
15	If my knee worsens, it's a matter of fate.	1	2	3	4	5	6						
16	If I am lucky, my knee will get better.	1	2	3	4	5	6						
17	If my knee takes a turn for the worse, it is because I have not been taking proper care of myself.	1	2	3	4	5	6						
18	The type of help I receive from other people determines how soon my knee improves.	1	2	3	4	5	6						

Appendix L: Trait Hope Scale

The Trait Hope Scale

Directions: Read each item carefully. Using the scale shown below, please select the number that best describes YOU and put that number in the blank provided.

- 1. = Definitely False
- 2. = Mostly False
- 3. = Somewhat False
- 4. = Slightly False
- 5. = Slightly True
- 6. = Somewhat True
- 7. = Mostly True
- 8. = Definitely True

- ___ 1. I can think of many ways to get out of a jam.
- ___ 2. I energetically pursue my goals.
- ___ 3. I feel tired most of the time.
- ___ 4. There are lots of ways around any problem.
- ___ 5. I am easily downed in an argument.
- ___ 6. I can think of many ways to get the things in life that are important to me.
- ___ 7. I worry about my health.
- ___ 8. Even when others get discouraged, I know I can find a way to solve the problem.
- ___ 9. My past experiences have prepared me well for my future.
- ___ 10. I've been pretty successful in life.
- ___ 11. I usually find myself worrying about something.
- ___ 12. I meet the goals that I set for myself.

Note. When administering the scale, it is called The Future Scale. The agency subscale score is derived by summing items 2, 9, 10, and 12; the pathway subscale score is derived by adding items 1, 4, 6, and 8.

The total Hope Scale score is derived by summing the four agency and the four pathway items.

Appendix M: Oxford Knee Score

Isis Project Number:	2712
----------------------	------

**ISIS INNOVATION LIMITED
COPYRIGHT LICENCE AGREEMENT FOR HEALTH OUTCOMES QUESTIONNAIRE**

PARTIES:

(1) Licensor:	Isis Innovation Limited with a principal place of business situated at Ewert House, Ewert Place, Summertown, Oxford, OX2 7SG
(2) Licensee:	The University of Leicester with a principal place of business situated at University Road, Leicester, LE1 7RH, United Kingdom

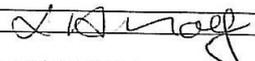
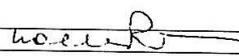
The Licensor and Licensee are together referred to as "Parties" and individually as "Party"

AGREEMENT

Commercial Terms:

Commencement Date	7 th December 2009
Contact details for Licensee	Name of Manager: Cindy Taylor Job Title: Doctoral Research Scientist Tel. No.: 0116 223 1639 Fax. No.: 0116 223 1639 E-Mail: ct146@le.ac.uk
Questionnaire	The health outcomes questionnaire titled: The Oxford Knee Score (OKS)
Required Quantity	The number of copies of the Questionnaire that as at the date of this Licence Agreement Licensee expects to make in connection with the Permitted Use, being: 250 (" Initial Quantity ") plus any additional copies subsequently purchased on payment of the Supplemental Fee
Signing Fee	Free of charge
Study	The Licensee's clinical trial study to be carried out in accordance with the study protocol titled: A longitudinal prospective study of the role of hope in predicting outcome following total knee replacement at trial centres located in the Territory. The Study will be completed by the end of 2011.
Supplemental Fee	Free of charge for each additional 1 - 50 copies made above the Initial Quantity
Territory	United Kingdom

This Licence Agreement comprises the Commercial Terms above and the General Conditions of Licence set out below.

Signed on behalf of Licensor:	Sign:  Print Name and Job Title: Linda Naylor Date: 8.11.10 Head of Technology Transfer Group Isis Innovation Ltd
Signed on behalf of Licensee:	Sign:  Print Name and Job Title: DR NICOLE ROBERTSON RESEARCH DIRECTOR Date: 14/12/09

During the past 4 weeks..

✓tick one box
for every question

1	<p>During the past 4 weeks.....</p> <p>How would you describe the pain you <u>usually</u> have from your knee?</p> <p>None <input type="checkbox"/> Very mild <input type="checkbox"/> Mild <input type="checkbox"/> Moderate <input type="checkbox"/> Severe <input type="checkbox"/></p>
2	<p>During the past 4 weeks.....</p> <p>Have you had any trouble with washing and drying yourself (all over) <u>because of your knee</u>?</p> <p>No trouble at all <input type="checkbox"/> Very little trouble <input type="checkbox"/> Moderate trouble <input type="checkbox"/> Extreme difficulty <input type="checkbox"/> Impossible to do <input type="checkbox"/></p>
3	<p>During the past 4 weeks.....</p> <p>Have you had any trouble getting in and out of a car or using public transport <u>because of your knee</u>? (whichever you would tend to use)</p> <p>No trouble at all <input type="checkbox"/> Very little trouble <input type="checkbox"/> Moderate trouble <input type="checkbox"/> Extreme difficulty <input type="checkbox"/> Impossible to do <input type="checkbox"/></p>
4	<p>During the past 4 weeks.....</p> <p>For how long have you been able to walk before <u>pain from your knee</u> becomes severe? (<i>with or without a stick</i>)</p> <p>No pain/ More than 30 minutes <input type="checkbox"/> 16 to 30 minutes <input type="checkbox"/> 5 to 15 minutes <input type="checkbox"/> Around the house <u>only</u> <input type="checkbox"/> Not at all - pain severe when walking <input type="checkbox"/></p>
5	<p>During the past 4 weeks.....</p> <p>After a meal (sat at a table), how painful has it been for you to stand up from a chair <u>because of your knee</u>?</p> <p>Not at all painful <input type="checkbox"/> Slightly painful <input type="checkbox"/> Moderately painful <input type="checkbox"/> Very painful <input type="checkbox"/> Unbearable <input type="checkbox"/></p>
6	<p>During the past 4 weeks.....</p> <p>Have you been limping when walking, <u>because of your knee</u>?</p> <p>Rarely/ never <input type="checkbox"/> Sometimes, or just at first <input type="checkbox"/> Often, not just at first <input type="checkbox"/> Most of the time <input type="checkbox"/> All of the time <input type="checkbox"/></p>

During the past 4 weeks...

✓tick one box
for every question

7	During the past 4 weeks..... Could you kneel down and get up again afterwards?	Yes, Easily <input type="checkbox"/>	With little difficulty <input type="checkbox"/>	With moderate difficulty <input type="checkbox"/>	With extreme difficulty <input type="checkbox"/>	No, Impossible <input type="checkbox"/>
8	During the past 4 weeks..... Have you been troubled by <u>pain from your knee</u> in bed at night?	No nights <input type="checkbox"/>	Only 1 or 2 nights <input type="checkbox"/>	Some nights <input type="checkbox"/>	Most nights <input type="checkbox"/>	Every night <input type="checkbox"/>
9	During the past 4 weeks..... How much has <u>pain from your knee</u> interfered with your usual work (<i>including housework</i>)?	Not at all <input type="checkbox"/>	A little bit <input type="checkbox"/>	Moderately <input type="checkbox"/>	Greatly <input type="checkbox"/>	Totally <input type="checkbox"/>
10	During the past 4 weeks..... Have you felt that your knee might suddenly 'give way' or let you down?	Rarely/ never <input type="checkbox"/>	Sometimes, or just at first <input type="checkbox"/>	Often, not just at first <input type="checkbox"/>	Most of the time <input type="checkbox"/>	All of the time <input type="checkbox"/>
11	During the past 4 weeks..... Could you do the household shopping <u>on your own</u> ?	Yes, Easily <input type="checkbox"/>	With little difficulty <input type="checkbox"/>	With moderate difficulty <input type="checkbox"/>	With extreme difficulty <input type="checkbox"/>	No, Impossible <input type="checkbox"/>
12	During the past 4 weeks..... Could you walk down one flight of stairs?	Yes, Easily <input type="checkbox"/>	With little difficulty <input type="checkbox"/>	With moderate difficulty <input type="checkbox"/>	With extreme difficulty <input type="checkbox"/>	No, Impossible <input type="checkbox"/>

Appendix N: EQ 5D

Health Questionnaire

English version for the UK

(validated for Ireland)

By placing a tick in one box in each group below, please indicate which statements best describe your own health state today.

Mobility

- I have no problems in walking about
- I have some problems in walking about
- I am confined to bed

Self-Care

- I have no problems with self-care
- I have some problems washing or dressing myself
- I am unable to wash or dress myself

Usual Activities (*e.g. work, study, housework, family or leisure activities*)

- I have no problems with performing my usual activities
- I have some problems with performing my usual activities
- I am unable to perform my usual activities

Pain/Discomfort

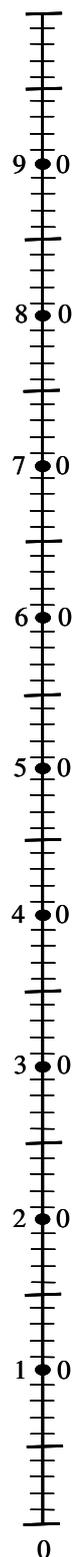
- I have no pain or discomfort
- I have moderate pain or discomfort
- I have extreme pain or discomfort

Anxiety/Depression

- I am not anxious or depressed
- I am moderately anxious or depressed
- I am extremely anxious or depressed

Best
imaginable
health state

100



Worst
imaginable
health state

To help people say how good or bad a health state is, we have drawn a scale (rather like a thermometer) on which the best state you can imagine is marked 100 and the worst state you can imagine is marked 0.

We would like you to indicate on this scale how good or bad your own health is today, in your opinion. Please do this by drawing a line from the box below to whichever point on the scale indicates how good or bad your health state is today

**Your own
health state
today**

Appendix O: Hospital Anxiety and Depression Scale

The Hospital Anxiety and Depression Scale

Name..... Date.....

Read each item, & tick the reply closest to how you have been feeling in the past week.

Don't take too long over your replies; your immediate reaction to each item will probably be more accurate than a long thought-out response.

	A	I feel tense or wound up...
	3	Most of the time
	2	A lot of the time
	1	From time to time, occasionally
	0	Not at all

	D	I feel as if I am slowed down
	3	Nearly all the time
	2	Very often
	1	Sometimes
	0	Not at all

	D	I still enjoy the things I used to enjoy
	0	Definitely as much
	1	Not quite as much
	2	Only a little
	3	Hardly at all

	A	I get a sort of frightened feeling like 'butterflies' in the stomach
	0	Not at all
	1	Occasionally
	2	Quite often
	3	Very often

	A	I get a sort of frightened feeling as if something awful is about to happen
	3	Very definitely and quite badly
	2	Yes, but not too badly
	1	A little, but it doesn't worry me
	0	Not at all

	D	I have lost interest in my appearance
	3	Definitely
	2	I don't take as much care as I should
	1	I may not take quite as much care
	0	I take just as much care as ever

	D	I can laugh and see the funny side of things
	0	As much as I always could
	1	Not quite as much now
	2	Definitely not so much now
	3	Not at all

	A	I feel restless as if I have to be on the move
	3	Very much indeed
	2	Quite a lot
	1	Not very much
	0	Not at all

	A	Worrying thoughts go through my mind
	3	A great deal of the time
	2	A lot of the time
	1	From time to time but not too often
	0	Only occasionally

	D	I look forward with enjoyment to things
	0	As much as I ever did
	1	Rather less than I used to
	2	Definitely less than I used to
	3	Hardly at all

	D	I feel cheerful
	3	Not at all
	2	Not often

	A	I get sudden feelings of panic
	3	Very often indeed
	2	Quite often

1	Sometimes
0	Most of the time

1	Not very often
0	Not at all

A	I can sit at ease and feel relaxed
0	Definitely
1	Usually
2	Not often
3	Not at all

D	I can enjoy a good book or radio or TV programme:
0	Often
1	Sometimes
2	Not often
3	Very seldom

Now check that you have answered all the questions

For office use only:

D:		Normal 0 - 7	Borderline/Mild 8 - 10	Moderate 11-14	Severe 15-21
A:					

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Appendix P: Correlations between predictor and outcome variables.

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1. Age															
2. LOC int	.157*														
3. LOC ext	.276**	.570**													
4. Soc sup	.016	.136	.089												
5. Anxiety 1	-.183*	.006	.246**	-.041											
6. Anxiety 2	-.167	.117	.111	-.161	.823**										
7. Depress 1	-.123	-.213*	.070	-.305**	.481**	.289*									
8. Depress 2	.032	.027	.015	-.328**	.596**	.498**	.720**								
9. Function 1	-.020	.108	.073	.005	.196*	-.034	-.232**	-.197							
10. Function 2	.133	.173	.123	.351**	.398**	-.344**	-.444**	-.592**	.269*						
11. QOL 1	-.090	.177*	.050	.044	.280**	-.223	-.369**	-.444**	.727**	.463**					
12. QOL 2	.256*	.324**	.355**	-.284*	.364**	-.460**	-.413**	-.559**	.344**	.725**	.487**				
13. QOL vas 1	.026	.163*	.100	.170*	-.196*	-.181	-.316**	-.382**	.291**	.459**	.457**	.518**			
14. QOL vas 2	.235*	.173	.371**	.386**	-.379**	-.354**	-.511**	-.693**	.142	.572**	.459**	.628**	.640**		
15. Hope 1	.009	.292**	.123	.279**	-.163*	-.094	-.338**	-.229*	-.241**	-.068	-.084	.114	-.025	.249*	
16. Hope 2	.162	.049	.022	.427**	-.259*	-.249*	-.428**	-.332*	-.047	-.066	.072	.007	.209	.371**	.581**

Note: LOC int = internal locus of control, LOC ext = external locus of control, Soc sup = social support, 1 denotes time 1 measure, 2 denotes time 2 measure, QOL = quality of life, vas = visual analogue scale. * $p < 0.05$ (1 tailed) ** $p < 0.005$ (1 tailed)

Appendix Q: Statement of epistemological position

In designing this study to examine the role of hope in outcomes following total knee replacement, an empirical positivist position was adopted. This assumed that variables of interest could be objectively measured in a robust, meaningful, reliable and valid way. Valid and reliable measures were available to measure both predictor and outcome variables alike. This position has also been adopted in similar studies, examining the role of hope in adapting to a wide range of medical conditions and as such allows comparability of the present study to previous research.

Appendix R: Chronology of research process

June 2009	Research proposal submitted and panel attended
Dec 2009	Peer review process
May 2010	Ethical submission and panel
June 2010	Collected pilot data
June 2010- Oct 2010	Collected survey data
Nov 2011	Literature review
April 2011	Data analysis
May 2011	Writing of thesis