The role of preoperative self-efficacy and outcome expectancies in predicting short-term functional recovery and length of hospital stay after total hip replacement or total knee replacement: a prospective, observational study.

Masterthesis

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“ONDERGETEKENDE

Anouck Narada Bletterman,

bevestigt hierbij dat de onderhavige verhandeling mag worden geraadpleegd en vrij mag worden gefotokopieerd. Bij het citeren moet steeds de titel en de auteur van de verhandeling worden vermeld.”

SUMMARY

Background: A substantial group of patients who have undergo a total hip replacement (THR) or total knee replacement (TKR) shows a delayed short-term functional recovery and prolonged length of hospital stay (LoS). Knowledge about preoperative predictors is crucial to select these high risk patients prior to surgery. There has been a growing awareness of the predictive value of preoperative psychosocial factors on functional recovery and LoS after THR or TKR. However, the predictive value of preoperative self-efficacy and outcome expectancies on functional recovery during hospital stay and LoS has not yet been determined in patients after THR or TKR.

Objectives: Primary: To investigate the predictive value of preoperative self-efficacy and outcome expectancies on postoperative functional recovery during hospital stay, measured with the Modified Iowa Assistance Scale, after THR or TKR. Secondary: To investigate the predictive value of preoperative self-efficacy and outcome expectancies on LoS after THR or TKR.

Design: Prospective, longitudinal, observational design.

Methods: Patients, diagnosed with hip or knee osteoarthritis, undergoing a primary, elective THR or TKR at a general district hospital with an age greater than 18 years and knowledge of the Dutch language were recruited. Preoperatively, patients completed the Dutch translation of the Self-Efficacy for Rehabilitation Outcome Scale and the Hip or Knee Replacement Expectations Survey. Besides, demographic, anthropometric, medical and functional indices were registered. Postoperatively, functional recovery during hospital stay, objectified by Modified Iowa Levels of Assistance Scale, and LoS in postoperative days were recorded. Predictive value of candidate predictors was determined by multiple regression analysis.

Results: Sixty-six patients awaiting THR and 48 patients awaiting TKR were recruited into this study. The mean age of patients awaiting THR was 67.9 years (SD=9.2) and 28.8 % were male. The mean age of patients awaiting TKR was 69.5 years (SD=9.2) and 37.5% were male. In the multiple regression analysis, preoperative self-efficacy was a significant predictor of functional recovery after THR, indicating that a higher self-efficacy is associated with a decrease in days to be functional recovered.

Conclusion: The results of this longitudinal prospective observational study suggest that preoperative self-efficacy is a significant predictor of functional recovery after THR. Future

research is needed to compare the predictive value of pre- and postoperative self-efficacy and outcome expectancies on functional recovery during hospital stay and LoS.

Key words: total hip arthroplasty, total knee arthroplasty, treatment outcome, recovery of function, preoperative psychosocial factor.

SAMENVATTING

Achtergrond: Een essentiële groep patiënten heeft na een totale heupprothese (THP) of totale knieprothese (TPK) een vertraagd functioneel herstel op de korte termijn en een verlengde opnameduur. Kennis over preoperatieve voorspellers is belangrijk om deze hoog risicopatiënten vóór de operatie te selecteren. Er is toenemende aandacht voor de voorspellende waarde van preoperatieve psychosociale factoren op functioneel herstel en opnameduur na een THP of TKP. Tot dusver is de voorspellende waarde van preoperatieve eigen effectiviteit en verwachtingen op functioneel herstel tijdens de ziekenhuisfase en opnameduur nog niet onderzocht onder patiënten die een THP of TKP ondergaan.

Doelstellingen: Primair: Het onderzoeken van de voorspellende waarde van preoperatieve eigen effectiviteit en verwachtingen op postoperatief functioneel herstel tijdens de ziekenhuisfase, gemeten met de Modified Iowa Assistance Scale, na een THP of TKP. Secundair: Het onderzoeken van de voorspellende waarde van preoperatieve eigen effectiviteit en verwachtingen op opnameduur na THP of TKP.

Studie design: Prospectief, longitudinaal, observationeel design.

Methode: Patiënten, gediagnosticeerd met heup- of knieartrose, die een primaire, electieve THP of TKP ondergingen in een algemeen district ziekenhuis in de leeftijd van 18 jaar en ouder met kennis van de Nederlandse taal werden geworven. Preoperatief vulden patiënten de Nederlandse versie van de Self-Efficacy for Rehabilitation Outcome Scale en de Hip of Knee Replacement Expectations Survey in. Daarnaast werden demografische, antropometrische, medische en functionele gegevens verzameld. Postoperatief werd functioneel herstel, gemeten met Modified Iowa Levels of Assistance Scale, en opnameduur in postoperatieve dagen in kaart gebracht. Voorspellende waarde van gekozen predictoren werd middels multiple regressie analyse geanalyseerd.

Resultaten: Zesenzestig patiënten wachtende op een THP en 48 patiënten wachtende op een TKP werden geworven in deze studie. De gemiddelde leeftijd van patiënten die op een

THP wachtten was 67.9 jaar (SD=9.2) en 28.8% was man. De gemiddelde leeftijd van patiënten die op een TKP wachtten was 69.5 jaar (SD=9.2) en 37.5% was man. In de multiple regressieanalyse was preoperatieve eigen effectiviteit een significante voorspeller van functioneel herstel na een THP, wat aangeeft dat een hogere preoperatieve eigen effectiviteit geassocieerd is met een afname in dagen om functioneel te herstellen.

Conclusie: De resultaten van deze longitudinale prospectieve observationele studie suggereren dat preoperatieve effectiviteit een significante voorspeller is van functioneel herstel na een THP. Vervolgonderzoek zou zich moeten richten op het verschil in voorspellende waarde tussen pre- en postoperatieve eigen effectiviteit en verwachtingen op functioneel herstel tijdens de ziekenhuisfase en opnameduur.

Kernwoorden: totale heup arthroplastiek, totale knie arthroplastiek, behandelingsuitkomst, herstel van functie, preoperatieve psychosociale factor.

INTRODUCTION

In 2010, 21,685 total hip replacements (THR) and 21,475 total knee replacements (TKR) were performed in the Netherlands (1). THR and TKR are routinely performed on older patients. Although these procedures can improve functional status in patients with osteoarthritis of the hip or knee (2,3), adverse events and complications related to the procedure and postoperative period could occur. Development of complications are associated with declined functional recovery, increased length of hospital stay (LoS), increased discharge to chronic care facilities and increased mortality (4).

The literature shows preoperative predictors of declined functional recovery and increased LoS in patients undergoing a THR or TKR. Important predictors concern not only classical medical patient related factors as age, but also preoperative functional status like walking capacity and functional mobility (4-7). Knowledge of preoperative predictors has implications for selecting patients at risk for delayed functional recovery and increased LoS. Preoperative exercises could be beneficial to optimize the preoperative physical status of high-risk patients awaiting THR or TKR. Therefore, risk stratification is an important step to select the right patients for preoperative exercises. However, a meta analysis about the effect of preoperative intervention on postoperative functional recovery concluded that almost all studies did not select patients at risk based on a risk model (8).

To develop such a risk model, it could be useful to use a worldwide accepted model. Physical therapists use the International Classification of Functioning, Disability and Health (ICF) (9). To cover the complete ICF, the risk model should not only include classical medical patient related factors and preoperative functional status in older patients, but also psychosocial factors.

In the past years, there has been a growing awareness of the predictive value of preoperative psychosocial factors on functional recovery and LoS after TKR or THR (10,11). There are numerous psychosocial factors to explore. Concerning patients awaiting THR or TKR, psychosocial constructs within the health-action process approach (HAPA) are of interest. The HAPA consists of various constructs which explain and predict individual changes in health behaviors (12). Self-efficacy, as defined by Bandura (13) and one of the constructs of the HAPA is a relevant factor in the process of rehabilitation (14). Pre- and postoperative self-efficacy are identified as predictors of long-term, from six months postoperatively, physical functioning after THR or TKR (15,16). Outcome expectancies is another construct of the HAPA. Outcome expectancies is the outcome that is expected as a result of the surgery (17). Preoperative outcome expectancies is a predictor of long-term, six months postoperatively, physical functioning after THR or TKR (18).

However, neither the predictive value of preoperative self-efficacy or outcome expectancies on functional recovery during hospital stay and LoS after THR or TKR have yet been investigated. The aim of the study was to investigate the predictive value of these factors. If these factors are predictive, psychosocial factors could be added in the risk model to select high risk patients prior to surgery. This could enhance patient care even more. Moreover may this lead to a faster functional recovery, decrease in LoS and the need of chronic care facilities. Finally, insight in psychosocial factors could be valuable in developing preoperative interventions in the future.

The primary objective of the study was to investigate the predictive value of preoperative self-efficacy and outcome expectancies on postoperative functional recovery during hospital stay, measured with the Modified Iowa Assistance Scale, after THR or TKR. A secondary objective was to investigate the predictive value of preoperative self-efficacy and outcome expectancies on LoS after THR or TKR. It was hypothesized that psychosocial factors would be significant predictors of functional recovery during hospital stay and LoS.

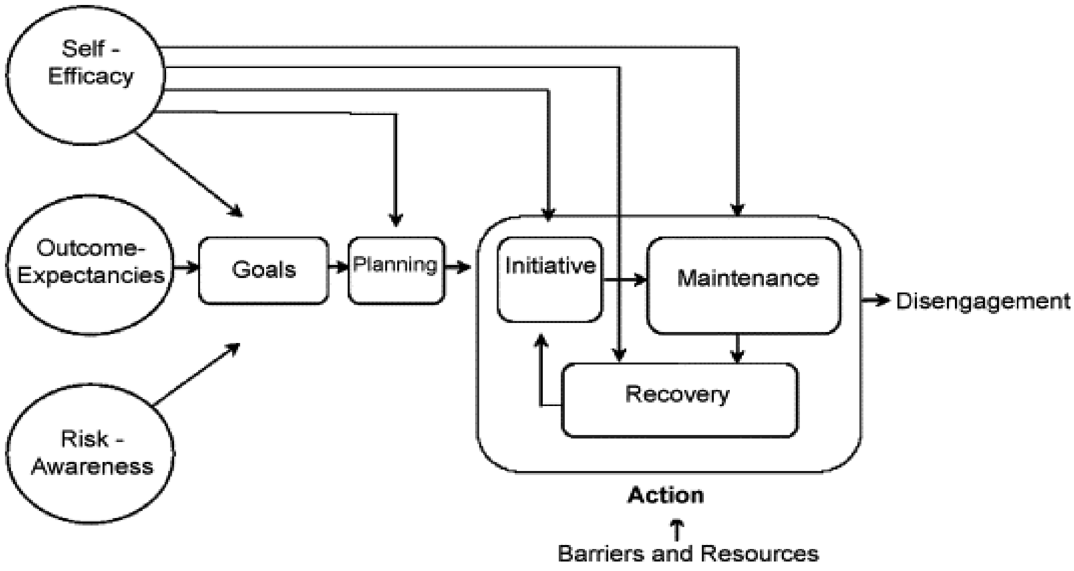


Figure 1: The health action process approach (HAPA) developed by Schwarzer (12), acquired from Krutulyte et al. (19).

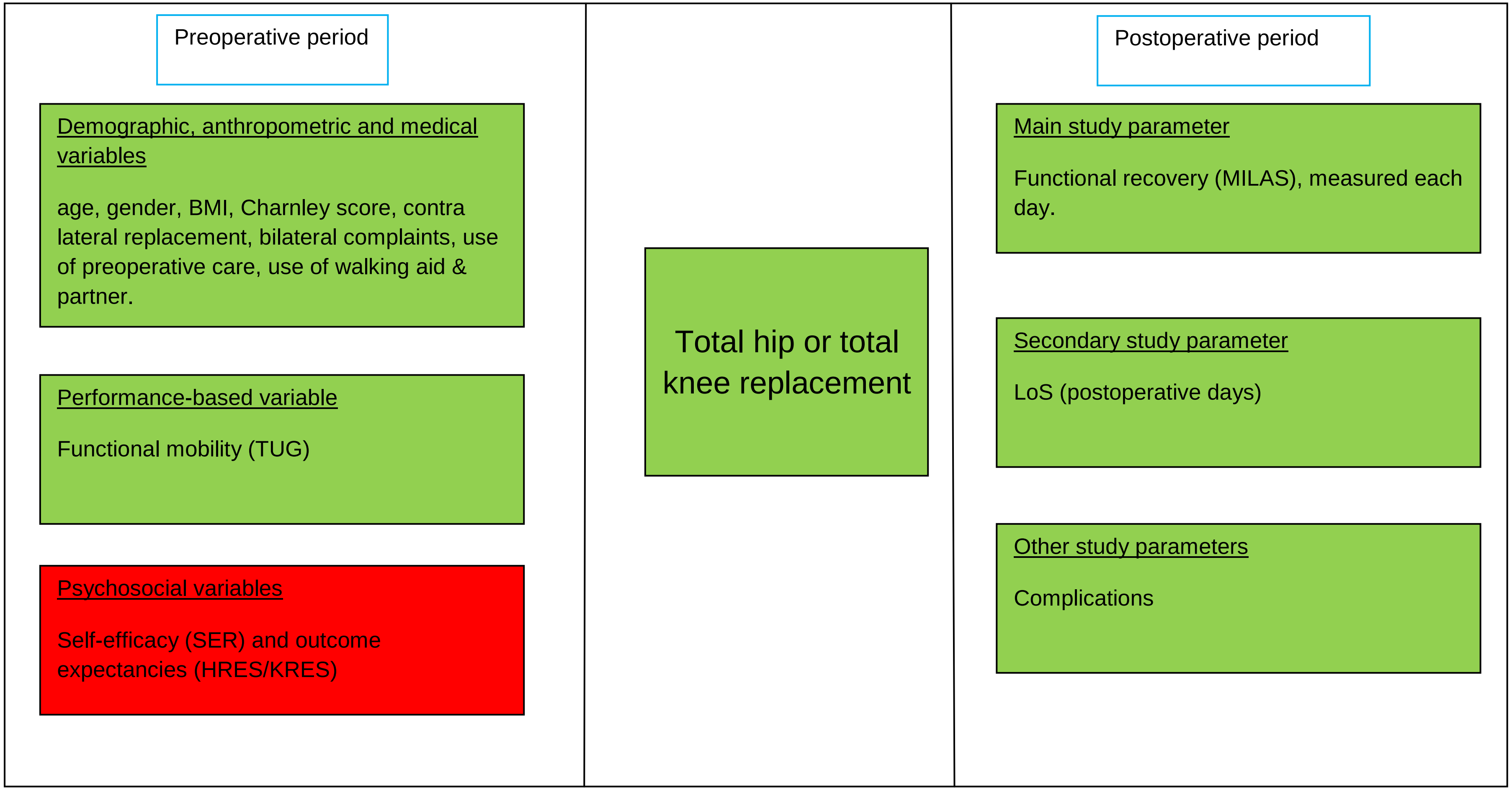
PATIENTS AND METHODS

Participants

Potential participants consisted of patients awaiting THR or TKR. In order to be eligible to participate in this study, a participant had to meet the following criteria: 1) diagnosed with hip or knee osteoarthritis; 2) awaiting primary, elective THR or TKR at Nij Smellinghe hospital and 3) age ≥18 years. Participants who did not understood the Dutch language were excluded. Physical therapists performing the preoperative screening checked these criteria. All participants received written information about the aim of the study and gave informed consent prior to the study.

Study design

A prospective, longitudinal, observational design was used. Data collection was performed within the routine setting of primary THR and TKR at Nij Smellinghe, a general district hospital in Drachten, the Netherlands. The study was approved by the medical ethical committee of Nij Smellinghe hospital. All patients placed on the waiting list for a primary, elective THR or TKR were preoperatively assessed by an anaesthetist, physical therapist and nurse practitioner. To evaluate their surgical risk all patients underwent extensive preoperative screening (demographic, anthropometric, medical and functional indices). In addition to this standard preoperative screening, preoperative self-efficacy and outcome expectancies were assessed. The postoperative functional recovery, LoS as well as postoperative complications were registered (see figure 2). Data were collected between November 2012 and May 2013.



BMI=Body Mass Index. TUG= timed up and go test. SER=Self-Efficacy for Rehabilitation Outcome Scale. HRES=Hip Replacement Expectations Survey. KRES=Knee Replacement Expectations Survey. MILAS=M(odified) Iowa Assistance Scale LoS=Length of hospital Stay.

Usual Care
Study procedures

Figure 2: Flowchart study design.

Preoperative variables

Besides the two psychosocial variables, in patients who underwent a THR or TKR, respectively five and four variables were taken into account in the statistical analysis. These variables constitute the best prediction model so far at Nij Smellinghe hospital. The variables of THR are: gender, age, Body Mass Index (BMI), Charnley score and timed up and go test (TUG). The variables of TKR are: gender, age, BMI and TUG.

Self-efficacy

Self-efficacy was measured with the Dutch translation of the Self-Efficacy for Rehabilitation Outcome Scale (SER) (20,21). The 12-item SER assesses patients' beliefs about their ability to perform activities that are typical for physical rehabilitation. Items are rated on an 11-point Likert scale ranging from 0 (I cannot do it) to 10 (certain I can do it) The total score is recoded into a 100-point scale, with a higher score representing higher self-efficacy. The Dutch version of the SER is a reliable and valid questionnaire to assess self-efficacy in patients undergoing a THR or TKR (20).

Outcome expectancies

Outcome expectancies was measured with the Dutch translation of the Hip Replacement Expectations Survey (HRES) and Knee Replacement Expectations Survey (KRES) (22,23)These questionnaires determine preoperative expectations of outcome of THR or TKR. The Dutch HRES consists of 18 items, the Dutch KRES of 19 items. Expectations are related to symptoms, physical activity, work and psychological well-being. The answer options are: 1) complete improvement or back to normal; 2) a lot of improvement; 3) a moderate amount of improvement; 4) a little improvement or 5) this expectations does not apply to me/I do not have this expectation. The total score is recoded into a 100-point scale, with a higher score representing higher outcome expectancies. The Dutch HRES and KRES are reliable and valid questionnaires to assess outcome expectancies in patients awaiting THR or TKR (23).

Demographic, anthropometric and medical variables

A variety of demographic, anthropometric and medical data were collected. The Charnley score categorizes patients into three groups: a) unilateral hip/knee involvement with no other condition that interferes with walking; b) bilateral hip/knee involvement with no other condition that interferes with walking; c) uni- or bilateral hip/knee involvement with other conditions interfering normal locomotion, such as hemiplegia or respiratory disability (24).

Performance-based variable

Functional mobility was measured with the TUG. This test assesses the time (in seconds) to raise from a 43 cm high chair with armrests, walk to a marked point on three meter distance, turn, walk back and sit down on the chair again. The TUG test is a reliable and valid test for quantifying functional mobility in frail old people. The intra- and interrater reliability are both excellent (25).

Postoperative rehabilitation

After surgery, patients were postoperatively treated by the “fast track” rehabilitation principles (26) to minimize postoperative immobilisation. After TKR, the knee was placed in a Continuous Passive Motion (CPM) soon after surgery to eliminate the problem of stiffness. Postoperatively, patients were allowed to stay in bed for maximum four hours. Postoperative physical therapy consisted of: 1) exercises to improve the range of motion (ROM) of the knee or hip (excluding movements which could cause dislocation of the hip); 2) exercises in sitting and standing position to regain muscle feeling/power and 3) exercises related to functional milestones to retrieve functional independence (27,28). Physical therapy started one day after surgery until discharge, ranging from one to four times daily according to the patients capability to execute the relevant functional activities. Intention of the rehabilitation during hospital stay was that the patient could be independently discharged home.

Postoperative outcomes

Functional recovery

Functional recovery was measured with an extended version of the Iowa Assistance Scale (ILAS). The ILAS is a a reliable, valid and responsive measurement of functional recovery during hospital stay (27,28). The interrater reliability of the total score is high (29). The ILAS assesses the capability of patients to perform safely four activities of daily life (supine to sit, sit to stand, walking and stair climbing). At Nij Smellinghe hospital, the M(odified)ILAS is used which includes a fifth activity: transfer form sit to supine. Each item of the MILAS is scored on an ordinal scale, ranging from 0 (independent, no supervision or assistance necessary) to 6 (not tested due to medical reasons or reasons of safety) (27,28). The sub- and total MILAS score was registered by a physical therapist each day.

The time interval (in days) from the day of surgery to the day on which a total MILAS score of 0 or 6 was achieved was recorded. A total MILAS score of 6 was allowed in case a patient did not have to climb stairs at the discharge destination. This item of the MILAS was therefore not tested and scored as 6.

Length of hospital stay

LoS was defined by the time interval, in days, from the day of surgery to hospital discharge. Discharge criteria were: 1) medical treatment by the orthopaedic surgeon was completed; 2) patient is functional recovered for the discharge destination according to the MILAS and 3) adequate care was provided at the discharge destination.

Statistical methods

Descriptive statistics

Data was quantitatively analysed using the Statistical Package for the Social Sciences software, version 20.0 for Windows (SPSS Inc., Chicago, USA). Characteristics of patients were described using counts and percentages for categorical variables, and means and standard deviations (SD) for continue variables. Normal probability plots were used to evaluate the distribution of the data.

Univariate and multivariate analysis

Pearson's or Spearman's rank correlation coefficient was used to determine if there were significant correlations between preoperative self-efficacy and outcome expectancies and the outcome variables.

In this study, the rule of ten variables per independent variable was used in the multivariate analysis (30). Variables of the prediction model so far at Nij Smellinghe hospital would possibly be excluded. Inclusion of predictors was based on the highest Pearson's or Spearman's rank correlation coefficient with the outcomes of the study. Multiple linear regression analysis was used to examine the value of preoperative self-efficacy and outcome expectancies in predicting functional recovery and LoS after THR or TKR. In the first step, the variables which constitute the best prediction model so far at Nij Smellinghe hospital were entered into the hierarchical regressions. Preoperative self-efficacy and outcome expectancies were entered as a block in the last step of each equation to determine their unique influence on each outcome. Hierarchical regression is a recommended procedure in case predictors are known from previous work. Unstandardised coefficients B, standard error(SE), p-values, 95% Confidence Interval for B, explained variance (R^2) and significance of change in R^2 were calculated. P-values <0.05 were considered statistically significant.

Dealing with missing data

Individual mean imputation was used to complete the SER, HRES and KRES. The imputed value was the mean of complete responses to other questions of that patient. Concerning the SER, a maximum of five missing answers may be imputed (20). Regarding the HRES and KRES, the maximum is four and seven respectively (23). Questionnaires with more missing answers than the mentioned maximum were coded as missing value.

RESULTS

Patient characteristics

A total of 76 patients awaiting THR and 50 patients awaiting TKR were eligible for the study. Sixty-six patients awaiting THR and 48 patients awaiting TKR consented to take part and completed one or both psychosocial questionnaires. All patients completed follow-up.

Table 1 shows the characteristics of the study sample. The mean age of patients awaiting THR was 67.9 years (SD=9.2) and 28.8% were male. The mean self-efficacy score was 65.0 (SD=17.1) and the mean outcome expectancies score 73.7 (SD=17.6). The mean days to be functional recovered was 3.4 (SD=1.0) and the mean LoS 3.8 days (SD=1.1).

The mean age of patients awaiting TKR was 69.5 years (SD=9.2) and 37.5% were male. The mean self-efficacy score was 65.1 (SD=17.7) and the mean outcome expectancies score 71.2 (SD=19.2). The mean days to be functional recovered was 3.2 (SD=0.8) and the mean LoS 3.8 days (SD=1.0).

Postoperative complications after THR or TKR are displayed in table 2. In patients after THR, 12.1% (n=8) postoperative complications occurred and in patients after TKR 12.5% (n=6).

Individual mean imputation

Concerning patients awaiting THR, a total of nine (13.6%) SER and a total of six HRES (9%) is imputed. Among patients awaiting TKR, numbers were nine (18.7%) and twelve (25%) respectively.

Table 1: Characteristics of the study sample.

	THR			TKR		
Preoperative variables	**n**	**mean**	**SD**	**n**	**mean**	**SD**
Age (yr)	66	67.9	9.2	48	69.5	9.2
BMI (kg/m^2)	66	28.0	4.2	48	30.0	4.9
TUG score (s)	66	10.4	5.1	45	10.3	5.9
Self-efficacy (0-100)	57	65.0	17.1	41	65.1	17.7
Outcome expectancies (0-100)	62	73.7	17.6	46	71.2	19.2
Postoperative variables						
Functional recovery (days)	61	3.4	1.0	42	3.2	0.8
LoS (days)	64	3.8	1.1	48	3.8	1.0
Interval between screening and surgery (days)	66	22.8	16.2	48	32.1	24.7

	THR				TKR			
Preoperative variables	**n total**		**n**	**%**	**n total**		**n**	**%**
Gender	66	*Male*	19	28.8	48	*Male*	18	37.5
Charnley score	66	*A* *B* *C*	43 10 13	65.1 15.2 19.7	44	*A* *B* *C*	24 13 7	54.5 29.6 15.9
Bilateral complaints	66	*Yes*	26	39.4	47	*Yes*	30	63.8
Contra lateral replacement	66	*Yes*	17	25.8	47	*Yes*	8	17.0
Use of preoperative care	66	*Yes*	10	15.2	47	*Yes*	5	12.8
Use of walking aid	66	*Yes*	21	31.8	47	*Yes*	16	34.0
Partner	66	*Yes*	52	78.8	47	*Yes*	32	68.1

Table 2: Postoperative complications after THR or TKR.

Complication	THR (n=66)	TKR (n=48)
Fever		1 (2.1%)
Fissure trochantor major	1 (1.5%)	
Wound blister		1 (2.1%)
Wound leakage	7 (10.6%)	4 (8.3%)

Univariate analysis

Correlation coefficients

The correlation between preoperative self-efficacy and functional recovery after THR (p=0.005) and the correlation between preoperative outcome expectancies and LoS after TKR (p=0.025) were significant (table 3).

Table 3: Pearson's correlation coefficients between the two psychosocial factors and functional recovery and LoS.

	THR		TKR	
	Functional Recovery	LoS	Functional Recovery	LoS
Self-efficacy	r= -0.387** p= 0.005 n= 52	r= -0.257 p= 0.059 n= 55	r= -0.229 p= 0.172 n=37	r= -0.222 p= 0.162 n= 41
Outcome expectancies	r= -0.168 p= 0.211 n= 57	r= -0.153 p= 0.242 n= 60	r= -0.163 p= 0.316 n= 40	r= -0.330* p= 0.025 n= 46

* p < 0.05

** p < 0.01

Multivariate analysis

Predicting postoperative functional recovery in patients who underwent THR

Preoperative self-efficacy (p=0.043) and TUG (p=0.002) were significant predictors of functional recovery in the second step after controlling for gender and outcome expectancies, indicating that a higher self-efficacy is associated with a decrease in days to be functional recovered after THR (table 4). Increased (slower) scores of TUG are associated with an increase in days to be functional recovered after THR. The R^2-value of the model without the two psychosocial factors was 0.331 and with the two psychosocial factors 0.405 indicating that 40.5% of the variation in functional recovery after THR could be accounted for by the variables in the second regression model. The change in R^2 was not significant (p=0.079).

Table 4: Multiple regression analysis of the preoperative variables on functional recovery in patients who underwent THR.

Step	Variable	B	SE	p value variable	95% Confidence Interval for B	R^2	p value model
1	TUG*	0.100	0.023	<0.001	0.053 – 0.147	0.331	<0.001
	gender (M=0,F=1)*	0.236	0.274	0.393	-0.315 – 0.787		
2	TUG*	0.079	0.024	0.002	0.030 – 0.129	0.405	<0.001
	gender (M=0,F=1)*	0.296	0.265	0.270	-0.238 – 0.831		
	Self-efficacy	-0.015	0.007	0.043	-0.030 – -0.001		
	Outcome expectancies	-0.006	0.007	0.441	-0.021 – 0.009		

N= 48. M=male. F=female.

* Variable was entered based on the highest correlation coefficient with functional recovery after THR.

Predicting postoperative functional recovery in patients who underwent TKR

None of the preoperative variables was a significant predictor of functional recovery after TKR after controlling for the other variables in the second step (table 5). The R^2-value of the model without and with the two psychosocial factors was 0.086 and 0.130 respectively. A total of 13% of the variation in functional recovery after TKR could be accounted for by the variables in the second regression model. The change in R^2 was not significant (p=0.486).

Table 5: Multiple regression analysis of the preoperative variables on functional recovery in patients who underwent TKR.

Step	Variable	B	SE	p value variable	95% Confidence Interval for B	R^2	p value model
1	TUG*	0.057	0.033	0.098	-0.011 – 0.124	0.086	0.098
2	TUG*	0.038	0.037	0.317	-0.038 – 0.113	0.130	0.249
	Self-efficacy	-0.007	0.007	0.354	-0.022 – 0.008		
	Outcome expectancies	-0.006	0.008	0.451	-0.022 – 0.010		

N=33.

* Variable was entered based on the highest correlation coefficient with functional recovery after TKR.

Predicting LoS in patients who underwent THR

The following variables were entered in the first step: TUG, age and BMI (table 6). After controlling for these variables, both preoperative self-efficacy and outcome expectancies were not a significant predictor of LoS after THR. TUG (p=0.003) was a significant preoperative predictor after controlling for the other variables in the second step, indicating that increased (slower) scores of TUG are associated with an increase in LoS. The R^2-value of the model without the two psychosocial factors was 0.284 and with the two psychosocial factors 0.303, indicating that 30.3% of the variation in LoS after THR could be accounted for by all variables in the second regression model. The change in R^2 was not significant (p=0.556).

Table 6: Multiple regression analysis of preoperative variables on LoS in patients who underwent THR.

Step	Variable	B	SE	p value variable	95% Confidence Interval for B	R^2	p value model
1	TUG*	0.109	0.029	0.001	0.050 – 0.168	0.284	0.001
	age*	0.013	0.017	0.425	-0.020 – 0.047		
	BMI*	-0.038	0.036	0.289	-0.109 – 0.033		
2	TUG*	0.099	0.031	0.003	0.036 – 0.161	0.303	0.005
	age*	0.014	0.019	0.484	-0.025 – 0.053		
	BMI*	-0.045	0.037	0.228	-0.119 – 0.029		
	Self-efficacy	-0.010	0.009	0.291	-0.029 – 0.009		
	Outcome expectancies	0.000	0.010	0.963	-0.021 – 0.020		

N= 51.

* Variable was entered based on the highest correlation coefficient with LoS after THR.

Predicting LoS in patients who underwent TKR

None of the preoperative variables was a significant predictor after controlling for the other variables in the second step (table 7). The R^2-value of the model without and with the two psychosocial factors was 0.100 and 0.215 respectively. A total of 21.5% of the variation in LoS after TKR could be accounted for by the variables in the second regression model. The change in R^2 was not significant (p=0.111).

Table 7: Multiple regression analysis of preoperative variables on LOS in patients who underwent TKR.

Step	Variable	B	SE	p value variable	95% Confidence Interval for B	R^2	p value model
1	TUG*	0.075	0.039	0.060	-0.003 – 0.154	0.100	0.060
2	TUG*	0.029	0.043	0.503	-0.058 – 0.117	0.215	0.049
	Self-efficacy	-0.010	0.008	0.228	-0.028 – 0.007		
	Outcome expectancies	-0.015	0.008	0.080	-0.032 – 0.002		

N= 36.

* Variable was entered based on the highest correlation coefficient with LoS after TKR.

DISCUSSION

This study has made a first step in investigating the predictive value of preoperative self-efficacy and outcome expectancies on functional recovery during hospital stay and LoS after THR or TKR. The results show that preoperative self-efficacy is a significant predictor of functional recovery after THR after controlling for TUG, gender and outcome expectancies.

Several studies have been conducted into the role of preoperative self-efficacy and outcome expectancies in predicting outcome after THR or TKR (15,16,18,31,32). These studies measured the outcome on the middle- or long term postoperatively. Moreover, the outcomes varied from self-report to performance-based outcome measures. The predictive value of self-efficacy and outcome expectancies on functional recovery during hospital stay, measured by the MILAS, was not determined in patients after THR or TKR until now. Besides, the current study adds LoS as secondary outcome to the literature. Because of these differences, it is not possible to compare the results of the mentioned studies with our results.

This study shows that a higher preoperative self-efficacy is associated with a faster functional recovery after THR measured by the MILAS. This result is in line with our hypothesis and the construct of self-efficacy as defined by Bandura (13). Believing that a future action is within one's capabilities is likely to generate actions to complete the task. Also the HAPA shows that self-efficacy plays a crucial role in all stages of explaining and predicting individual changes in health behaviors (12). However, this result should be interpreted with caution since the explained variance did not increased significantly after adding the two psychosocial factors. It is arguable that the explained variance would increase significantly when the self-efficacy will be measured after surgery. Studies investigating long-term functional outcome after THR found that short-term postoperative self-efficacy seems a better predictor than preoperative self-efficacy (15,33).

The smaller sample size in patients awaiting TKR could be an explanation for no significant result between preoperative self-efficacy and functional recovery after TKR.

The lack of a predictive value of preoperative self-efficacy with LoS after THR or TKR was unexpected. This result can be explained by the fact that LoS depends on several factors, like medical factors (e.g. blood values) and discharge variables (e.g. available volunteer aid). In situations where competence of one's own performance is less closely tied to outcome, self-efficacy will be less predictive of outcome (17).

Despite of a significant correlation between preoperative outcome expectancies and LoS after TKR in the univariate analysis, the results of the multivariate analyses show that preoperative outcome expectancies was not a significant predictor of functional recovery and LoS after THR or TKR. One explanation regards items of the outcome expectancies questionnaire. Not all items are applicable during hospital stay, like participating in work. It is suggested that long-term outcome expectancies are harder to estimate preoperatively, and therefore not associated with short-term functional recovery and LoS. However, we have chosen the HRES and KRES because in our knowledge these are the only reliable and valid Dutch questionnaires measuring outcome expectancies in patients awaiting THR or TKR.

Another explanation concerns the timing of measuring preoperative outcome expectancies. The mean interval between preoperative screening and THR or TKR surgery in this study was 22.8 and 32.1 days respectively, because the data was collected within the routine setting of primary THR or TKR. Expectations could be influenced by the information provided and the interaction with physicians, other patients or relatives. It is arguable that the later expectations are measured, the more realistic they are and therefore will be stronger associated with outcomes which was also suggested by Haanstra et al. (34).

The last explanation is the difficulty is estimating outcome expectancies. This was also found in a study of Woolhead et al. (35) who measured long-term outcomes. It seems that experience of failure and success in performing activities are needed to be capable of establishing expectations, which is only possible postoperatively (35).

One of the strongest point of the study was that there was no loss to follow-up. Besides, reliable and valid questionnaires were used to measure preoperative self-efficacy and outcome expectancies. These factors are also part of a theoretical model, the health-action process approach (HAPA) (12), and are therefore well argued chosen. Another strong point was that functional recovery was measured each day. Especially in the early postoperative days changes in functioning is going fast. Moreover, functional recovery was measured in an objective way using a valid and reliable questionnaire. Further, this study was performed within the routine setting of primary THR or TKR at Nij Smellinghe hospital where data is structured and evidence-based collected. Despite the presence of missing data, this study shows that it is possible to perform a study in daily practice. Therefore, organizing a research setting was not necessary for answering the study objectives. An advantage for the patient is that an additional visit to the hospital is not required. Finally, only one exclusion criteria was set which maximizes the heterogeneity of the study sample.

The present study does have some limitations that must be kept in mind. First, in both patient groups, not all patients completed both the SER and HRES or KRES. One explanation concerns the timing of filling in the psychosocial questionnaires, namely during preoperative screening in the hospital. Questionnaires were completed while waiting for the different examinations. The advantage is the possibility for asking clarification. The disadvantage is incomplete questionnaires in case the patient could go to the next examination fluently. Besides, some patients did not complete a part of the questionnaire(s). Therefore, we performed individual mean imputation. Although multiple imputation is probably the most accurate and valid imputation method, the method is complex. Moreover, individual mean imputation is also an appropriate method for dealing with missing data (36). Unfortunately, data of the psychosocial measures was not totally complete in this study sample and should be kept in mind. This namely could cause biased estimates and a decrease of power (37).

Another limitation is the small sample size due to the relatively short recruiting period, especially in patients awaiting TKR. Therefore, not all variables of the best prediction model so far at Nij Smellinghe hospital were entered in the multiple regression, because there is a risk of overestimating the predictive performance of the model when all variables with small sample sizes would be included (30).

Although the explained variance of functional recovery after THR did not increased significantly after adding the two psychosocial factors in, the results of this study suggest that preoperative self-efficacy is of value in predicting functional recovery after THR. Therefore, it is recommended to measure preoperative self-efficacy in patients awaiting THR. This does have implications for the process of clinical decision making, like selecting high risk patients for preoperative exercises. For future research it is needed to investigate if self-efficacy can be strengthened prior to surgery.

This study has aroused the curiosity to the difference in predictive value between pre- and postoperative self-efficacy and outcome expectancies on functional recovery during hospital stay and LoS after THR or TKR. It is advisable to develop and use a valid and reliable outcome expectancies questionnaire which include expectancies relevant during hospital stay. In this future study, sample sizes in both groups should extend to include all preoperative variables in the multivariate analysis.

CONCLUSION

The results of this longitudinal prospective observational study suggest that preoperative self-efficacy is a significant predictor of functional recovery after THR. Future research is needed to compare the predictive value of pre- and postoperative self-efficacy and outcome expectancies on functional recovery during hospital stay and LoS.

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APPENDICES

1) Dutch translation of the Self-Efficacy for Rehabilitation Outcome Scale.

2) Dutch translation of the Hip Replacement Expectations Survey.

3) Dutch translation of the Knee Replacement Expectations Survey.

Eigen Effectiviteit

Bij de volgende vragen dient u een inschatting te maken van uw vermogen om verschillende activiteiten te doen tijdens uw revalidatie. Wilt u het nummer omcirkelen dat het beste overeenkomt met uw overtuiging om de activiteiten omschreven in ieder item daadwerkelijk te doen? U kunt kiezen uit de volgende antwoorden:

0 – ik kan het zeker niet

1 –

2 –

3 –

4 –

5 – redelijk zeker dat ik het kan

6 –

7 –

8 –

9 –

10 – ik kan het zeker

1. Ik ben ervan overtuigd dat ik tijdens mijn revalidatie in staat ben activiteiten te doen waarbij ik mijn been moet strekken.

ik kan het zeker niet	**redelijk zeker dat ik het kan**	**zeker dat ik het kan**
↓	↓	↓

0 1 2 3 4 5 6 7 8 9 10

2. Ik ben ervan overtuigd dat ik tijdens mijn revalidatie in staat ben activiteiten te doen waarbij ik mijn been op moet tillen.

ik kan het zeker niet	**redelijk zeker dat ik het kan**	**zeker dat ik het kan**
↓	↓	↓

0 1 2 3 4 5 6 7 8 9 10

3. Ik ben ervan overtuigd dat ik tijdens mijn revalidatie in staat ben activiteiten te doen waarbij ik mijn been moet buigen.

ik kan het zeker niet	**redelijk zeker dat ik het kan**	**zeker dat ik het kan**
↓	↓	↓

0 1 2 3 4 5 6 7 8 9 10

4. Ik ben ervan overtuigd dat ik tijdens mijn revalidatie in staat ben activiteiten te doen waarbij ik moet staan.

ik kan het zeker niet	**redelijk zeker dat ik het kan**	**zeker dat ik het kan**
↓	↓	↓

0 1 2 3 4 5 6 7 8 9 10

5. Ik ben ervan overtuigd dat ik tijdens mijn revalidatie in staat ben activiteiten te doen waarbij ik moet lopen.

ik kan het zeker niet	**redelijk zeker dat ik het kan**	**zeker dat ik het kan**
↓	↓	↓

0 1 2 3 4 5 6 7 8 9 10

6. Ik ben ervan overtuigd dat ik tijdens mijn revalidatie in staat ben al mijn activiteiten te doen.

ik kan het zeker niet	**redelijk zeker dat ik het kan**	**zeker dat ik het kan**
↓	↓	↓

0 1 2 3 4 5 6 7 8 9 10

7. Ik ben ervan overtuigd dat ik tijdens mijn revalidatie in staat ben activiteiten te doen op iedere dag dat die gepland staan.

ik kan het zeker niet	**redelijk zeker dat ik het kan**	**zeker dat ik het kan**

↓ ↓ ↓

0 1 2 3 4 5 6 7 8 9 10

8. Ik ben ervan overtuigd dat ik in staat ben de activiteiten te doen die mijn fysiotherapeut/arts mij zegt te doen, ook al begrijp ik niet hoe het mij helpt.

ik kan het zeker niet	**redelijk zeker dat ik het kan**	**zeker dat ik het kan**

↓ ↓ ↓

0 1 2 3 4 5 6 7 8 9 10

9. Ik ben ervan overtuigd dat ik in staat ben mijn activiteiten te doen onafhankelijk van hoe ik mij emotioneel voel.

ik kan het zeker niet	**redelijk zeker dat ik het kan**	**zeker dat ik het kan**

↓ ↓ ↓

0 1 2 3 4 5 6 7 8 9 10

10. Ik ben ervan overtuigd dat ik in staat ben mijn activiteiten te doen onafhankelijk van hoe moe ik mij zou voelen.

ik kan het zeker niet	**redelijk zeker dat ik het kan**	**zeker dat ik het kan**

↓ ↓ ↓

0 1 2 3 4 5 6 7 8 9 10

11. Ik ben ervan overtuigd dat ik in staat ben mijn activiteiten te doen ook al zou ik nog andere ziektes hebben.

ik kan het zeker niet	**redelijk zeker dat ik het kan**	**zeker dat ik het kan**

0 1 2 3 4 5 6 7 8 9 10

12. Ik ben ervan overtuigd dat ik in staat ben activiteiten te doen ongeacht de mate van pijn die ik voel.

ik kan het zeker niet	**redelijk zeker dat ik het kan**	**zeker dat ik het kan**

0 1 2 3 4 5 6 7 8 9 10

Vragenlijst Verwachtingen van een Totale Heupvervanging

Wilt u alstublieft het nummer omcirkelen dat uw antwoord op de vraag het beste omschrijft.

Hoeveel verlichting of verbetering verwacht u op de volgende gebieden als gevolg van uw totale heupvervanging?

	Terug naar normaal of totale verbetering	**Niet terug naar normaal, maar ...**			Ik heb deze verwachting niet of deze verwachting is niet op mij van toepassing
		Veel verbetering	Middelmatige verbetering	Een kleine verbetering	
Verlichting van pijn die overdag optreedt	1	2	3	4	5
Verlichting van pijn tijdens slapen	1	2	3	4	5
Verbeteren van het loopvermogen	1	2	3	4	5
Verbeteren van het vermogen te staan	1	2	3	4	5
Niet langer mank lopen	1	2	3	4	5
Het niet meer nodig hebben van een stok of andere hulpmiddelen	1	2	3	4	5
Verbeteren van het vermogen trappen op te lopen	1	2	3	4	5
Verbeteren van het vermogen in of uit bed, stoel of auto te komen	1	2	3	4	5
Verbeteren van het vermogen dagelijkse activiteiten rond het huis te verrichten (bijvoorbeeld, huishoudelijke klusjes, tuinieren)	1	2	3	4	5
Verbeteren van het vermogen dagelijkse activiteiten buiten het huis te verrichten (bijvoorbeeld, winkelen, vrijwilligerswerk)	1	2	3	4	5
Het niet langer nodig hebben van medicijnen	1	2	3	4	5
Betaald werk kunnen doen	1	2	3	4	5
Verbeteren van seksuele activiteit	1	2	3	4	5
Verbeteren van het vermogen lichamelijk actief te zijn of deel te nemen aan sport	1	2	3	4	5
Verbeteren van het vermogen deel te nemen aan sociale of recreatieve activiteiten	1	2	3	4	5
Verbeteren van het vermogen schoenen en sokken aan te trekken	1	2	3	4	5
Verbeteren van het vermogen teennagels te knippen	1	2	3	4	5
Verbeteren van psychologisch welzijn	1	2	3	4	5

▪ Vertaling van vragenlijst gemaakt door het Hospital for Special Surgery (New York, NY, USA).
Nederlandse versie door Van den Akker-Scheek et al. 2008. Universitair Medisch Centrum Groningen.

Vragenlijst Verwachtingen van een Totale Knievervanging

Wilt u alstublieft het nummer omcirkelen dat uw antwoord op de vraag het beste omschrijft.

Hoeveel verlichting of verbetering verwacht u op de volgende gebieden als gevolg van uw totale knievervanging?

	Terug naar normaal of totale verbetering	**Niet terug naar normaal, maar ...**			Ik heb deze verwachting niet of deze verwachting is niet op mij van toepassing
		Veel verbetering	Middelmatige verbetering	Een kleine verbetering	
Verlichting van pijn	1	2	3	4	5
Verbeteren van het loopvermogen op: ** korte afstanden (binnenshuis, een huizenblok)	1	2	3	4	5
** middellange afstanden (een stukje lopen, tot 1,5 km)	1	2	3	4	5
** lange afstanden (meer dan 1,5 km)	1	2	3	4	5
Het niet meer nodig hebben van een stok, kruk of rollator	1	2	3	4	5
Het strekken van knie of been	1	2	3	4	5
Verbeteren van het vermogen trappen op te gaan	1	2	3	4	5
Verbeteren van het vermogen trappen af te gaan	1	2	3	4	5
Verbeteren van het vermogen om te knielen	1	2	3	4	5
Verbeteren van het vermogen te hurken	1	2	3	4	5
Verbeteren van het vermogen om van het openbaar vervoer gebruik te maken of te rijden	1	2	3	4	5
Betaald werk kunnen doen	1	2	3	4	5
Verbeteren van het vermogen deel te nemen aan recreatieve activiteiten (bijvoorbeeld dansen, plezierreisjes)	1	2	3	4	5
Verbeteren van het vermogen dagelijkse activiteiten uit te voeren (bijvoorbeeld huishoudelijke werkzaamheden, dagelijkse routine)	1	2	3	4	5
Verbeteren van het vermogen lichamelijk actief te zijn of deel te nemen aan sport	1	2	3	4	5
Verbeteren van het vermogen om van positie te veranderen (bijvoorbeeld van zitten naar staan of van staan naar zitten)	1	2	3	4	5
Verbeteren van het vermogen om te gaan met anderen (bijvoorbeeld voor iemand zorgen, spelen met kinderen)	1	2	3	4	5
Verbeteren van seksuele activiteit	1	2	3	4	5
Verbeteren van psychologisch welzijn	1	2	3	4	5

▪ Vertaling van vragenlijst gemaakt door het Hospital for Special Surgery (New York, NY, USA).
Nederlandse versie door Van den Akker-Scheek et al. 2008. Universitair Medisch Centrum Groningen.