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A prospective cohort study examining medical and social factors associated with engagement in life activities following total hip replacement

C. MacKay † *, F. Webster ‡, V. Venkataramanan §, J. Bytautas ||, A.V. Perruccio § ¶, R. Wong §, L. Carlesso #, A.M. Davis ‡ § †† ‡‡

† Toronto Rehabilitation Institute, University Health Network, Toronto, Ontario, Canada
‡ Institute of Health Policy, Management and Evaluation, Dalla Lana School of Public Health, University of Toronto, Toronto, Ontario, Canada
§ Division of Health Care and Outcomes Research, Krembil Research Institute, University Health Network, Toronto, Ontario, Canada
|| Department of Public Health, University of Helsinki, Helsinki, Finland
¶ Arthritis Program, Division of Orthopaedics, Toronto Western Hospital, University Health Network, Toronto, Ontario, Canada
# School of Rehabilitation, Université de Montréal, Montreal, Quebec, Canada
†† Department of Physical Therapy, University of Toronto, Toronto, Ontario, Canada
‡‡ Rehabilitation Science Institute, University of Toronto, Toronto, Ontario, Canada

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SUMMARY

Objectives: Studies show limited improvement in the frequency of engaging in life activities after joint replacement. However, there is a paucity of research that has examined factors, including other life events, which influence engagement following total hip replacement (THR). This research sought to identify factors associated with engaging in life activities following THR.
Methods: A prospective cohort study was conducted with 376 people who had a THR for osteoarthritis (OA). Data were collected pre-surgery and 1 year post-surgery. The primary outcome was change in frequency in engagement in life activities (Late Life Disability Index (LLDI): higher scores indicate higher frequency of engagement (range 0–80)). Analyses included multivariable regression. Factors considered included: positive/negative life events, a new comorbidity, another joint replacement and complications post-surgery.
Results: Participants' mean age was 64 years; 46% were male. 68% of participants had at least one co-morbidity pre-surgery; 36% reported at least one new comorbidity after surgery. The mean change in LLDI frequency was an increase of 6.29 (±8.10). 36% reported one or more positive impact life events in the year following surgery; 63% reported one or more negative life events. The number of positive life events (beta = 1.24; 95% CI: 0.49, 1.99) was significantly associated with change in LLDI frequency after adjusting for age, sex, education, body mass index (BMI), comorbidities pre-surgery, number of symptomatic joints and pre-surgery pain and function, LLDI limitations and depression.
Conclusions: These findings highlight the significant influence of social factors and life circumstances on engagement in life activities following THR.
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Introduction

Total hip replacement (THR) is a well-established cost-effective procedure for end-stage hip osteoarthritis (OA)[1]. The number of THRs performed in North America has increased steadily over the past decade[2] and researchers have projected that growth in demand will continue[3,4]. The prevalence of THR in the US population has reached 0.83%, corresponding to 2.5 million people living with a THR[5]. Several studies have shown that THR is effective in

* Address correspondence and reprint requests to: C. MacKay, Department of Physical Therapy, University of Toronto, 160-500 University Ave., Toronto, ON, M5G 1V7, Canada. Fax: 1 416 946 8562.
E-mail addresses: crystal.mackay@utoronto.ca (C. MacKay), Fiona.Webster@utoronto.ca (F. Webster), viji.venkataramanan@sickkids.ca (V. Venkataramanan), jessica.bytautas@helsinki.fi (J. Bytautas), perrucci@uhnres.utoronto.ca (A.V. Perruccio), rwong@uhnresearch.ca (R. Wong), lccarlesso@gmail.com (L. Carlesso), adavis@uhnresearch.ca (A.M. Davis).

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decreasing pain and improving function, mobility and health-related quality of life[6–8]. However, in spite of improvements in pain and function, there appears to be limited improvement in the frequency of engaging in life activities, such as social and leisure activities, exercise and household and personal management roles in the year following joint replacement surgery[9]. This lack of increase in engagement of activities following joint replacement is concerning. Studies have shown that engaging in life activities such as socializing with friends and family, participating in leisure and social activities, volunteering, and performing regular physical activities has benefits for mental and physical health and well-being, health related quality of life, life satisfaction and can reduce mortality[10–15]. Moreover, patients expect to recover valued activities following THR[16] and with patients presenting for THR at younger ages[2–4], the expectations to return to life activities that are physically demanding will likely increase[17,18].

To date, outcome assessment following THR has primarily focused on pain and function and pre-surgical factors associated with these outcomes[19–21]. Given the known benefits of engaging in life activities, it is important to further understand people's engagement in life activities before and after THR and what influences change in engagement in life activities following surgery. In a longitudinal grounded theory study of people undergoing hip and knee replacements, it was reported that there was a high variability in return to activities following surgery, which could be accounted for by several factors[22]. In particular, the findings emphasized the role of sociocultural factors, including significant life changes following surgery (e.g., death of a spouse or a geographical move), in determining participants' engagement in activity following joint replacement[22]. There is a paucity of quantitative research which has considered a comprehensive range of factors, including significant non-health related events, which may influence engagement in life activities following THR. This study, guided by the findings from the previous qualitative research[22], sought to address this gap. Specifically, the study aimed to describe people's engagement in life activities before and after THR and the life events experienced in the year following surgery, and to identify factors associated with change in frequency in engagement in life activities in the year following THR.

Methods

Study design and sample

A prospective cohort of people undergoing primary THR for OA from four tertiary care centres in Toronto, Canada was established. Participants were followed longitudinally for 1 year post-surgery. Details of the cohort have been described previously[9]. The inclusion criteria were: having a joint replacement for OA, fluency in English and consent to participate. For the present study, the sample was restricted to participants who had a THR and had pre-surgery (within 1 month of surgery) and 1 year post-surgery data for the primary outcome, the Late Life Disability Index (LLDI). The study was approved by the research ethics boards of each participating hospital: University Health Network, St. Michael's Hospital, Sunnybrook Health Sciences Centre and Mount Sinai Hospital in Toronto, Canada. All participants provided informed written consent.

Data collection

Participants received pre-surgery questionnaires at their pre-admission clinic visit and returned the questionnaires by mail prior to their surgery. Post-surgery questionnaires were completed by mail.

Primary outcome

The primary outcome was change in frequency in engaging in life activities as measured by the frequency subscale of the disability component of the Late-Life Function and Disability Instrument. The LLDI measures disability across a wide variety of life tasks and roles that extend beyond activities of daily living[23]. The LLDI has been shown to be valid and reliable across a range of clinical populations of community dwelling older adults[24]. Respondents indicated their frequency of participating in 16 life tasks (e.g., take care of local errands, take part in a regular exercise program, take care of your own health, visit with family and friends, work at a volunteer job). Each item has response options scaled from one (never) to five (very often). The score ranges from 0 to 100, with higher scores indicating a higher frequency of engagement in life tasks. Change scores were calculated as the 1 year post-surgery score minus the pre-surgery score, with positive scores representing improvement.

Predictor variables

Life events

Life events were measured using the modified Life Experiences Survey at 3, 6 and 12 months. This is a valid and reliable measure of positive and negative life experiences and a rating of the extent of impact of these events[25]. The survey has 12 items and includes the following events: marriage, marital separation, marital reconciliation, change of residence, change of work situation, retirement from work, major personal illness/injury, serious illness/injury of a family member, serious illness/injury of a close friend, death of a spouse/close family member or friend, major change in financial status, and major change in social activities. Respondents indicate if an event occurred in the past 3 months (yes/no) and the extent to which it impacted their life (7-point scale anchored by “extremely negative” and “extremely positive” and centred at “no impact”). The number of each of the positive and negative life events experienced over the year following surgery was summed. Events were counted only once (e.g., death of a spouse/close family member or friend was counted once if there was at least one death). The impact scale was used to determine whether the event was positive or negative.

Comorbidity

The American Academy of Orthopaedic Surgeons's Comorbidity Scale was used to identify comorbidity (if participants had or were treated for a specific condition). New comorbidities were identified following surgery at 3, 6 and 12 months[26]. A comorbidity was considered new if the respondent indicated “yes” to a comorbidity in the checklist that they reported as “no” prior to surgery. This was a dichotomous variable (new comorbidity yes/no).

Another hip or knee replacement

At 1 year, respondents indicated “yes” or “no” to a question asking if they had surgery on another hip or knee, and if yes, had the joint been replaced.

Complications within 3 months of surgery

At 3 months following surgery, participants were asked whether they experienced complications following surgery. Respondents answered yes/no to whether they had a hip dislocation, infection, blood clot or other (with space for text to explain the type of complication).

Covariates

Prior to surgery, data were collected on age, sex, education (high school or less or greater than high school), living alone (yes/no),

body mass index (BMI), number of comorbidities, and number of symptomatic joints. The number of symptomatic joints was determined by respondents indicating on a homunculus if they had pain, stiffness or swelling on most days of the past month (the number of symptomatic joints respondents indicated on the homunculus was totalled). Depression was measured using the Hospital Anxiety and Depression Scale (HADS) (score range from 0 to 21; higher scores indicate more depressive symptoms)[27]. Limitations in 16 life tasks were measured using the limitations subscale of the LLDI (scores 0–80, with higher scores indicating less limitation). Pain and function was measured using the Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC) pain and function subscales (the subscale scores were 0–20 and 0–68 respectively; high scores indicate more pain and functional limitations)[28]. The LLDI limitations subscale of the LLDI and WOMAC were completed pre-surgery and 1 year following surgery. Change scores were calculated as the 1 year score minus the baseline score. The WOMAC scores were reversed so that positive scores for all measures represented improvement.

Analysis

Descriptive statistics (with 95% confidence intervals) were calculated on the overall sample for each variable. Descriptive statistics were also generated for groups based on whether participants reported decreased, no change (0 change score), or increased frequency in engagement of activities. After testing for multicollinearity among all independent variables, multivariable regression was used to determine if the number of positive and negative life events, complications (yes/no at least one new complication), another joint replacement and new comorbidity (yes/no at least one new comorbidity) were associated with change in frequency of engagement in life activities (continuous variable). We then adjusted the regression model for factors that may influence change in frequency of engagement in life events: age, sex, education, pre-surgery BMI, number of symptomatic joints, pre-surgery number of comorbidities, pre-surgery WOMAC pain and function, pre-surgery LLDI limitations and pre-surgery depression to evaluate if these factors confounded the effects in the first model.

Results

The sample included 376 individuals. The mean age of the sample was 64 years, 46% were male and 77% had greater than high school education. Forty-eight percent had three or more symptomatic joints (excluding the index hip) and 68% had at least one comorbidity. On average, participants were overweight (BMI was 28.4). Eighty two individuals from the original cohort were excluded from the present study due to missing data. The characteristics of individuals excluded from the current study were similar to the study sample (Table I shows characteristics of the sample and excluded individuals). There was minimal missing data from participants who were included in the study (Table in Appendix).

The mean LLDI frequency subscale score pre-surgery was 54.6 out of 100 (SD 9.38) (Table I). The mean LLDI frequency change score by 1 year was 6.3 (SD 8.1), indicating improvement in frequency of engaging in life activities. The mean LLDI limitations score pre-surgery was 54.2 (SD 12.8); the mean change score by 1 year was 15.8 (SD 12.6). The mean WOMAC pain score pre-surgery was 10.4 (SD 3.6) and the mean WOMAC function score pre-surgery was 36.2 (SD 11.9). WOMAC pain scores changed a mean of 8.2 points (SD 3.9) and the WOMAC function changed a mean of 19.4 points (SD 12.2). Thirty six percent of individuals reported at least one new comorbidity in the year following surgery. This included hypertension (5%), cardiovascular disease (5%), lung disease (3%) and diabetes (1%). At 3 months, 9% of people reported surgical complications and 33 people (9%) went on to have a new joint replacement surgery over the course of the year. Table II displays the data on comorbidities, life events following surgery, a new joint replacement, and complications from the index THR by change in frequency of engaging in life activities (LLDI score change) following THR.

Participants reported high numbers of life events. The total number of positive events reported by participants in the year following surgery was 210 events. The number of negative life events totalled 499. The most commonly reported life events which participants indicated had a positive impact were: major change in social activities such as attending parties, movies or visiting (53 events), changed work situation such as different work responsibilities, a major change in working conditions or hours (44 events) and a major change in financial status which could mean being a lot better off or a lot worse off (27 events). The most common life events which had a negative impact on life were death of a spouse, close family member or friend (107 events), serious illness/injury of a close family member (90 events), major change in financial status (70 events) and major change in social activities (70 events). Table III shows the positive and negative life events based on change in frequency of activities. For example, 16% of people with increased LLDI frequency reported a major change in social activities as a positive event following THR compared to 8% of people with decreased LLDI frequency.

In unadjusted multivariable analysis, the number of positive life events (unstandardized beta = 1.27; 95% CI: 0.53 to 2.00) was significantly associated with change in LLDI frequency (Table IV). At least one comorbidity, complications within 3 months, negative life events, or a new surgery within the year were not significantly associated with change in LLDI frequency. After adjusting for covariates, pre-surgery WOMAC pain and function, pre-surgery LLDI Limitations, pre-surgery depression, age, sex, education, pre-surgery BMI, number of comorbidities preoperatively and the number of symptomatic joints, the findings were consistent (Table IV). Pre-surgery LLDI Limitations was statistically significant in the adjusted model.

Discussion

There are a multitude of health benefits associated with engaging in life activities[10–15] and people undergoing joint replacement want to return to participation in higher demand activities and engage in meaningful social roles, leisure activities and community interactions following their surgery[29,30]. Our research found that despite improvements in pain and function, frequency of engagement in life activities improved to a lesser extent. This research provides new insights on factors associated with change in engagement in life activities following THR. Key to our findings was that the number of positive life events experienced over the year following surgery was significantly associated with the change in frequency of engaging in life activities following THR. These findings support our previous qualitative results which suggested that issues beyond medical factors alone, such as socio-cultural factors, determine participation in activity following joint replacement[22]. However, in contrast to the qualitative findings which identified issues of multi-morbidity, including painful joints, as an important theme that augmented other social circumstances, health-related factors (number of comorbidities, complications, new surgery) were not statistically significant in the multivariable regression.

Our findings highlight the importance of social factors and life circumstances in determining change in engagement in life activities following surgery. Positive life events were associated with a

Table I
Descriptive data and measures for study sample (pre- and 1 year post-surgery) and excluded individuals

Variables	Study sample ($n = 376$)			Excluded individuals ($n = 82$)
	Pre-surgery		Post-surgery	
	Mean (±SD) or n (percentage)		Mean (±SD) or n (percentage)	Mean (±SD) or n (percentage)
Age	63.99 (±12.08)			63.29 (±14.17)
Gender: Male	173 (46%)			35 (43%)
Education: Higher than high school	291 (77%)			54 (66%)
Number of symptomatic joints	3.15 (±3.20)			4.3 (±3.67)
Comorbidities				
No comorbidities	121 (32%)		111 (29%)	24 (29%)
At least one comorbidity	255 (68%)		265 (70%)	58 (71%)
		At least one new comorbidity	135 (36%)	
Hypertension	157 (42%)		19 (5%)	38 (46%)
Cardiovascular	28 (7%)		19 (5%)	5 (6%)
Diabetes	31 (8%)		4 (1%)	7 (8%)
Lung disease	19 (5%)		12 (3%)	7 (8%)
Other*	170 (45%)		111 (29%)	39 (47%)
BMI	28.42 (±6.39)			28.02 (±6.21)
LLDI frequency	54.60 (±9.38)			50.66 (±12.21)
LLDI limitation	54.24 (±12.83)			51.59 (±16.65)
WOMAC pain	10.38 (±3.56)			10.59 (±3.89)
WOMAC function	36.24 (±11.91)			34.47 (±13.69)
Depression subscale	5.24 (±3.38)			6.42 (±4.08)
		Life events (within a year)†		
		Positive impact events	134 (36%)	
		Negative impact events	237 (63%)	
		New joint replacement	33 (9%)	
		Complications (index surgery)‡	34 (9%)	

* Example: Cancer, liver disease, kidney disease, etc. [These participants could also have one or more of the specific diseases mentioned above].
† Number of participants who experienced either one or more positive or negative impacting event.
‡ Example: dislocation, infection, blood clot, etc.

Table II
Distributions of variables of interest based on the change in frequency of engaging in life activities

Variables post-surgery	LLDI frequency					
	Decreased ($n = 72$, 19%)		No change ($n = 8$, 2%)		Increased ($n = 296$, 79%)	
	n	%	n	%	n	%
Comorbidities						
No comorbidities	21	29%	4	50%	86	29%
At least one comorbidity	51	71%	4	50%	210	71%
At least one new comorbidity*	24	33%			111	38%
Hypertension*	4	6%			15	5%
Cardiovascular*	2	3%			17	6%
Diabetes*					4	1%
Lung disease*					12	4%
Other*,†	20	28%			91	31%
Life events‡						
Positive impact events [≥1]	25	35%	1	13%	108	36%
Negative impact events [≥1]	48	67%	4	50%	185	63%
New joint surgery	10	14%	1	13%	22	7%
Complications from surgery [at 3 months]§	9	13%			25	8%

* Newly developed over the year.
† Example: Cancer, liver disease, kidney disease, etc. [These participants could also have one or more of the specific diseases mentioned above].
‡ Number of participants who experienced either one or more positive or negative impacting event.
§ Example: dislocation, infection, blood clot, etc.

change in frequency of engagement in life activities and the most common positive event reported by participants was a change in social activities. Other research has demonstrated significant benefits of social interactions and relationships on health, such as improved survival and mental health[31,32]. Much of the literature in chronic conditions focuses on the effects of social support (e.g., support from friends, family), indicating that social support improves health outcomes and may promote positive health behaviours (e.g., physical activity)[33,34]. Findings are also consistent with findings from our qualitative study which suggested that supportive spouses and friends were important to recovery from THR[22]. These findings have implications for how we plan supportive interventions for people in the year following THR, suggesting more emphasis needs to be placed on addressing social factors, such as fostering social support and engagement in the community. Since people often report giving up activities prior to surgery, it may also be important to consider what can be done preoperatively to ensure people have not already given up many opportunities for social engagement prior to surgery (e.g., offering surgery before people give up activities).

People also reported changed work situation as a common positive life event. Studies suggest that most people return to employment following THR[35–37]. While the specific changes in work reported as positive life events are unclear, the item includes

Table III
Post-surgery incidence of life event that had a *positive* and *negative impact* on life by frequency in activity

Life events*	Positive impact						Negative impact					
	LLDI frequency											
	Decreased ($n = 72$, 19%)		No change ($n = 8$, 2%)		Increased ($n = 296$, 79%)		Decreased ($n = 72$, 19%)		No change ($n = 8$, 2%)		Increased ($n = 296$, 79%)	
	n	%	*n*	%	*n*	%	*n*	%	*n*	%	*n*	%
Marriage					3	1%						
Marital separation†					2	1%	1	1%			2	1%
Marital reconciliation					5	2%					2	1%
Change of residence	6	8%			10	3%	2	3%			4	1%
Changed work situation‡	12	17%			32	11%	6	8%			32	11%
Retirement from work	5	7%			11	4%					9	3%
Major personal illness/injury	2	3%			10	3%	12	17%	2	25%	33	11%
Serious illness of close family member					4	1%	16	22%	2	25%	72	24%
Serious illness/injury of close friend	2	3%			8	3%	10	14%			47	16%
Death§	2	3%			16	5%	21	29%	1	13%	85	29%
Major change in financial status‖	5	7%			22	7%	16	22%	3	38%	51	17%
Major change in social activities¶	6	8%	1	13%	46	16%	22	31%			48	16%

* Total number of events experienced in a year.
† Due to conflict.
‡ Example: different work responsibility, major change in working conditions/hours.
§ Spouse, close family member or friend.
‖ Lot better off or lot worse off.
¶ Example: parties, movies, visiting – increased or decreased participation.

Table IV
Factors associated with change in frequency in engagement in life activities following THR

Variable	Unadjusted analysis			Adjusted analysis		
	Parameter estimate	95% Confidence intervals	Pr > |t|	Parameter estimate	95% Confidence intervals	Pr > |t|
At least one new comorbidity post-surgery	0.14	(−1.62, 1.90)	0.87	0.33	(−1.51, 2.17)	0.73
Number of positive life events	**1.27**	**(0.53, 2.00)**	**0.00**	**1.24**	**(0.49, 1.99)**	**0.00**
Number of negative life events	−0.15	(−0.55, 0.25)	0.47	−0.22	(−0.65, 0.22)	0.33
Another hip or knee replaced	−1.13	(−4.02, 1.77)	0.44	−2.06	(−4.95, 0.82)	0.16
Complications within 3 months of surgery	−1.22	(−4.14, 1.69)	0.41	−1.52	(−4.46, 1.42)	0.31
WOMAC pain pre-surgery				0.05	(−0.33, 0.44)	0.80
WOMAC function pre-surgery				0.13	(−0.00, 0.26)	0.05
LLDI limitations pre-surgery				**−0.09**	**(−0.19, −0.00)**	**0.04**
HADS depression pre-surgery				−0.30	(−0.60, 0.01)	0.06
Age				−0.03	(−0.11, 0.04)	0.40
Sex: Male				−0.56	(−2.30, 1.12)	0.53
Education: more than high school				0.09	(−1.96, 2.13)	0.93
BMI pre-surgery				−0.03	(−0.16, 0.11)	0.68
Number of comorbidities pre-surgery				0.01	(−0.73, 0.76)	0.97
Number of symptomatic joints pre-surgery				−0.29	(−0.59, 0.01)	0.06

Statistically significant results are in bold print.
The significance threshold was set at $P < 0.05$.

different work responsibility and major change in working conditions/hours. Further research is warranted to investigate how working conditions/responsibility may influence engagement in life activities following THR. Another commonly reported positive life event was major change in financial status. Other studies have shown that high income and higher socioeconomic status were associated with better outcomes following total joint replacement[38,39].

Participants in this study reported a rather high number of both positive and negative life events in the year following THR. The same event was perceived as negative by some and positive by others, reflecting the complexity of how events are experienced within one's overall life context. It is unclear if the number of life events in our study is higher than one would expect in this age group. The number of life events found in our study is higher than those reported in a study using the Australian Longitudinal Study of Women's Health[40]. In their research, 28% of women aged 51–56 years reported illness and 24.2% reported death of a close family member in a 3 year follow-up. No data were available for women aged 52–72 years but women aged 73–78 years or more reported experiencing death (24.6%) or major decline in the health of a family member (17.9%) or major personal illness/injury (13.7%) over a 3 year period. The reasons for differences are unclear but it is possible that in our study people had better recall of life events due to a shorter follow-up period. In a cohort of 2411 individuals (mean age 75 years) with disabling knee or hip OA in Canada, 72% of people reported at least one negative major life event in the past year while 14% reported at least one positive major life event[41]. While the measures were different, this suggests fewer of our participants reported negative life events and more reported positive life events.

One of our covariates, pre-surgery LLDI limitations, was associated with change in frequency of engagement in life activities following THR. People with more limitations experienced greater improvement in LLDI frequency 1 year after surgery. This is

consistent with literature showing that preoperative function is associated with postoperative clinical outcomes, with those experiencing worse preoperative function having greater improvements postoperatively[39,42–44].

Health-related factors were not significant predictors of change in engagement in life activities. This is in contrast to some of our qualitative findings that suggested that multimorbidity and complications following surgery made people less likely to take part in activities[22]. In the existing quantitative literature, several studies have examined the influence of comorbidity on joint replacement outcomes. However, in a recent systematic review examining factors which influence functional and clinical outcomes after THR, researchers found that results related to the influence of comorbidity were conflicting. Comorbidity was associated with worse outcomes in seven studies and six studies did not find any association between various comorbidities and outcomes, such as pain and function, after THR[39].

Strengths and limitations

This research was guided by our prior qualitative findings including the selection of variables of interest. We considered a wide range of variables which may influence engagement in life activities including what is happening in people's lives in the year following surgery. We were also guided by our prior qualitative findings in selecting the primary outcome (change in LLDI frequency). LLDI frequency was selected rather than LLDI limitations as participants suggested that they had already begun to give up and change their level of engagement in life activities prior to surgery[22].

There are limitations to the study. First, all data were self-reported and verification of new comorbidity or life events was not possible. Also, participants were recruited from academic tertiary care centres and the generalizability of findings to populations in community-based centres may be limited. However, it has been reported that THR outcomes are similar between academic and community centres[45]. Moreover, there were a relatively high number of people who were excluded from the study as they did not have the requisite data for our primary outcome (82 people of possible 458). This may be due to the questionnaire being at end of a package of questionnaires which took 30–45 min to complete. Comparisons of the characteristics of people who were included and excluded suggest they were similar. Finally, it is possible that participants had differential recall of life events depending on their frequency of engagement following THR. However, the immediacy of reporting life events (3, 6 and 12 month) should have reduced the potential for bias.

Conclusion

This study evaluated the influence of a range of factors on changes in the frequency of engaging in life activities following THR. We found that the number of positive life events within the year following surgery was associated with the amount of change in frequency with which individuals engaged in life activities 1 year after surgery. Health-related factors, such as comorbidity, complications after surgery and a new surgery, were not associated with change in frequency of engaging in life activities. These findings underscore the importance of including socio-cultural factors, which are often neglected, in future research of health outcomes following joint replacement. Findings also have implications for care delivery. To improve engagement in life activities after surgery, we need to embrace a more holistic approach which supports the person within the context of their life circumstances and facilitates community and social engagement.

Author contributions

Conception and design: Webster, Venkataramanan, Bytautas, Perruccio, Carlesso, Wong, Davis.
Data acquisition: Davis, Wong.
Analysis and interpretation of the data: MacKay, Webster, Venkataramanan, Bytautas, Perruccio, Carlesso, Wong, Davis.
Drafting of the article: MacKay.
Critical revision of the article for important intellectual content: Webster, Venkataramanan, Bytautas, Perruccio, Carlesso, Wong, Davis.
Final approval of the article: MacKay, Webster, Venkataramanan, Bytautas, Perruccio, Carlesso, Wong, Davis.
Dr. Davis (adavis@uhnresearch.ca) takes responsibility for the integrity of the work as a whole.

Competing interests

None of the authors have any conflicts of interests in relation to this work.

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Appendix

Table AI
Number of participants with available data by variable

	Pre-surgery		Post-surgery
	N		N
Age	376		
Gender: Male	376		
Education: Higher than high school	376		
Number of symptomatic joints	376		
Comorbidities	376		
		At least one new comorbidity	376
BMI	372		
LLDI Frequency	376		
LLDI Limitation	376		
WOMAC pain	374		
WOMAC function	373		
Depression subscale	376		
		Life events (within a year)*	376
		New joint replacement	376
		Complications (index surgery)†	376

* Total number of events experienced in a year.
† Example: dislocation, infection, blood clot, etc.

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