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# Do dissatisfied patients have unrealistic expectations? A systematic review and best-evidence synthesis in knee and hip arthroplasty patients

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- End-stage osteoarthritis is commonly treated with joint replacement. Despite high clinical success rates, up to 28% of patients are dissatisfied with the outcome.
- This best-evidence synthesis aimed to review studies with different forms of study design and methodology that examined the relationship between (fulfilment of) outcome expectations of hip and knee patients and satisfaction with outcome.
- A literature search was performed in PubMed, Web of Science, PsycInfo, Cochrane, and Google Scholar to identify studies conducted up to November 2017. The methodological quality of studies was assessed using the Newcastle-Ottawa Scale.
- In this best-evidence synthesis systematic review, the following main results could be seen. In only half of all studies were preoperative expectations associated with level of satisfaction, while in almost all studies (93%), fulfilment of expectations was related to satisfaction. The effect of met expectations did not differ between hip and knee patients or study design.
- Fulfilment of expectations seems to be consistently associated with patient satisfaction with outcome. Emphasis in future research must be placed on the operationalization and measurement of expectations and satisfaction to determine the (strength of the) influence of these different forms of assessment on the (existence of the) relationship.

**Keywords:** expectations; fulfilment; PROMS; satisfaction; THA; TKA

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## Introduction

Osteoarthritis (OA) is the most common chronic joint disease, leading to limitations in activities of daily living (ADL).<sup>1-3</sup> Joint replacement is a commonly used treatment in orthopaedics for end-stage OA.<sup>4-9</sup> The risk of complications with joint replacement is usually low and clinical success rates are high.<sup>6,7,9</sup> Up to 90% of patients improve in function after the replacement of the affected joint.<sup>5</sup> However, up to 30% of all patients report some degree of dissatisfaction with the results of the replacement of the knee (i.e. total knee arthroplasty; TKA) or hip (i.e. total hip arthroplasty; THA).<sup>4,10-14</sup>

Dissatisfaction with the results of surgery could concern, for example, dissatisfaction with improvement in pain or function resulting from medical interventions.<sup>15</sup> Dissatisfaction with these outcomes has been found to result in non-adherence with medication and advice and delayed or insufficient physical improvement.<sup>16,17</sup> This type of dissatisfaction is commonly examined with the reliable and validated self-administered Patient Satisfaction Scale,<sup>18</sup> and thereby refers to overall satisfaction with surgery, with pain relief, and with the ability to perform work and recreational activities.<sup>19-22</sup> Some studies have indicated that low satisfaction with outcomes of treatment might be related to high preoperative expectations,<sup>23,24</sup> as it is found that patients commonly have very optimistic expectations about the results of surgery.<sup>23-26</sup> Nonetheless, other studies reported no relationship between preoperative expectations and patient satisfaction,<sup>21,24,27</sup> and some found that fulfilment of these expectations, rather than expectations themselves, could lead to satisfaction.<sup>13,22,25,26</sup> In fact, fulfilment of expectations was the most important factor linked with post-surgery satisfaction in several studies.<sup>22,25,28</sup>

Patients' outcome expectations particularly concern a belief or anticipation that certain actions (i.e. surgery) will achieve particular outcomes.<sup>29–31</sup> Postoperative fulfilled expectations, however, concern a consideration of whether surgery *did* achieve particular outcomes, that is, whether expectations have been met.<sup>32</sup> Although these concepts are clearly defined, assessment of these outcome expectations could focus on all different kinds of outcomes, such as, for example, general improvement,<sup>10,33–35</sup> or more specific pain level,<sup>36–38</sup> or functioning.<sup>26,36,38</sup> The Hospital for Special Surgery Hip (Fulfilment) Replacement Expectations Survey (HSS-H(F)RES)<sup>33</sup> or the Hospital for Special Surgery Knee (Fulfilment) Replacement Expectations Survey (HSS-K(F)RES)<sup>39</sup> are questionnaires commonly used to assess (fulfilled) expectations in THA and TKA patients, as they examine a broad range of possible outcomes on a continuous scale (i.e. the level of satisfaction) rather than a binary scale (i.e. expectations yes/no).<sup>20,25,32,40,41</sup>

Based on the literature, it is still not clear whether preoperative expectations or the level of fulfilled expectations are related to patient satisfaction with outcome after surgery. This may be due to differences in methodology. For instance, studies varied in the operationalization (i.e. the precise description of a concept to make it measurable, using, for example, questionnaires) of patients' outcome expectations and satisfaction with outcome. In addition, conflicted findings could have resulted from differences in study design. Specifically, while multiple studies found no relationship between preoperative expectations and satisfaction,<sup>36,38,42</sup> when examining it prospectively, one known study reported a relationship between expectations and satisfaction when examining preoperative expectations retrospectively.<sup>33</sup> Differences in study design might explain the relationship between postoperative expectations and satisfaction, as patients' recall of expectations might have changed due to the surgery and recovery process.<sup>43,44</sup> Moreover, emphasis in research is predominantly placed on TKA patients instead of THA patients.<sup>11,22,26,44</sup> Yet, satisfaction in THA patients could be low and determined by (fulfilment of) expectations as well.<sup>4,8</sup> Furthermore, few studies have examined (differences in) satisfaction and effects of expectations between TKA and THA patients, although there might be a variation in short-term and long-term satisfaction between these patient groups. For example, THA patients are often more satisfied and usually recover faster and to a larger extent than TKA patients,<sup>4,8,45</sup> even though function seems to return to the same level for both patient groups after six months.<sup>4</sup>

Several previously published systematic reviews have examined the relationship between preoperative expectations and satisfaction in orthopaedic patients.<sup>31,44,46–49</sup> Nonetheless, most of the systematic reviews did not include all relevant studies,<sup>31,46,49</sup> and they rarely focused

on fulfilment of these expectations,<sup>44,47,48</sup> or only on the relationship in TKA patients and not in THA patients.<sup>31,47</sup> Moreover, only one single systematic review examined the influence of differences in methodology.<sup>49</sup> This study therefore aims to systematically review all studies that have been performed on the relationship between (fulfilment of) expectations and satisfaction with outcome in TKA and THA patients, in order to determine what connection (fulfilled) expectations and satisfaction with outcome have in these patient groups. A best-evidence synthesis will be used and recommendations for future research and implications for clinical practice will be made.

## Materials and methods

In accordance with the PRISMA guidelines, this systematic review protocol was registered with the International Prospective Register of Systematic Reviews (PROSPERO) on 10 February 2017 (registration number: CRD42017052851).

### Search strategy

An electronic literature search was performed in PubMed, Web of Science, PsycInfo, Cochrane, and Google Scholar to identify eligible studies published in English or Dutch up to the end of October 2017. Search terms were developed using MeSH terms and consisted of text words related to (1) knee arthroplasty and/or hip arthroplasty, (2) expectations or expectancies, and (3) satisfaction (Table 1). The terms 'expectations' and 'expectancies' are both used in the literature to indicate that someone is 'expecting something for the future'. As Haanstra et al stated, expectancies could be defined as 'the act or state of expecting' and expectations as 'cognitions regarding probable future events'.<sup>31</sup> Although different concepts, the existing literature was followed and no distinction was made between these two terms.

### Eligibility criteria

The search results of all separate databases were combined, after which duplicates were removed (see Fig. 1). Titles and abstracts of the remaining articles were screened against the inclusion criteria. Full-text articles were assessed when, based on the abstract, they either appeared to meet the inclusion criteria, or it was unclear whether they met the criteria. Studies were found eligible and were included when meeting the following criteria: (1) the study included TKA and/or THA patients, (2) preoperative outcome expectations and/or postoperative fulfilled outcome expectations were measured, (3) satisfaction with outcome of treatment was measured, (4) the primary or secondary objective of the study was to evaluate the relationship between expectations and satisfaction with outcome of treatment, and (5) data on the relationship between expectations and satisfaction with outcome of treatment in

**Table 1.** Search strategy for each database.

Database	Search terms	Date of search	2nd date of search	3rd date of search
PubMed	((((((((((("tka" OR "tha") OR "total knee arthroplasty") OR "total hip arthroplasty") OR "hip replacement") OR "knee replacement") OR "tkr") OR "thr") OR "joint replacement") OR "joint prosthesis") OR "knee prosthesis") OR "hip prosthesis")) AND (((("pre operative expectations") OR "post operative expectations") OR "expectations") AND ((("satisfaction") OR "satisfied"))	3-10-2016	10-4-2017	30-10-2017
Cochrane library	#1 "TKA":ti,ab,kw or "THA":ti,ab,kw or "total knee arthroplasty":ti,ab,kw or "total hip arthroplasty":ti,ab,kw #2 joint prosthesis:ti,ab,kw or knee prosthesis:ti,ab,kw or hip prosthesis:ti,ab,kw #3 hip replacement:ti,ab,kw or knee replacement:ti,ab,kw or joint replacement:ti,ab,kw #4 expectations:ti,ab,kw or expectancies:ti,ab,kw #5 satisfaction:ti,ab,kw or satisfied:ti,ab,kw #6: #1 or #2 or #3 and #4 and #5	3-10-2016	10-4-2017	30-10-2017
Google Scholar	expectations AND satisfaction THA OR TKA OR "Total knee arthroplasty" OR "total hip arthroplasty" OR "joint prosthesis" OR "knee prosthesis" OR "hip prosthesis" OR "hip replacement" OR "knee replacement" OR "joint replacement"	3-10-2016	10-4-2017	30-10-2017
Web of Science	#1: TS=(tka) OR TS=(tha) OR TS=(total knee arthroplasty) OR TS=(total hip arthroplasty) OR TS=(hip replacement) OR TS=(knee replacement) OR TS=(tkr) OR TS=(thr) OR TS=(joint replacement) OR TS=(joint prosthesis) OR TS=(knee prosthesis) OR TS=(hip prosthesis) <i>Indexes=SCI-EXPANDED, SSCI, A&amp;HCI, CPCI-S, CPCI-SSH, BKCI-S, BKCI-SSH, ESCI Timespan=All years</i> #2: TS=(pre operative expectations) OR TS=(post operative expectations) OR TS=(expectations) OR TS=(expectancies) <i>Indexes=SCI-EXPANDED, SSCI, A&amp;HCI, CPCI-S, CPCI-SSH, BKCI-S, BKCI-SSH, ESCI Timespan=All years</i> #3: TS=(satisfaction) OR TS=(satisfied) OR TS=(dissatisfaction) OR TS=(dissatisfied) OR TS=(satisfy*) OR TS=(dissatisfy*) #4: #1 AND #2 AND #3	3-10-2016	10-4-2017	30-10-2017
PsycInfo	AB ( tka OR tha OR total knee arthroplasty OR total hip arthroplasty OR hip replacement OR knee replacement OR tkr OR thr OR joint replacement OR joint prosthesis OR knee prosthesis OR hip prosthesis ) AND AB ( pre operative expectations OR post operative expectations OR expectations OR expectancies ) AND AB ( satisfaction OR satisfied OR dissatisfaction OR dissatisfied OR satisf* OR dissatisf*	3-10-2016	10-4-2017	30-10-2017

TKA and/or THA patients were available in the study. OA is the most common indication for a total knee or hip replacement. However, studies including other conditions (e.g. avascular necrosis or rheumatoid arthritis) leading to TKA or THA were also included, as we were interested in the effects of TKA and THA and not of the underlying disease. Studies examining patients with revision TKA or THA were also included, as the aim of the study was not to examine levels of expectations (which could have been different in revision surgery), but to examine the relationship between expectations and satisfaction.

If a study examined TKA and/or THA patients in combination with other patient groups, yet did not report data on the different patient groups, the study was excluded, as we would otherwise be unable to make a distinction between the differences in patient groups. In line with the aims of our study, we chose to examine only studies that assessed satisfaction with outcome, and therefore excluded studies examining, for example, satisfaction with care, satisfaction with received information, and satisfaction with treatment choice. In addition, we chose to only examine studies which assessed outcome expectations, and not, for example, self-efficacy beliefs, or expectations about the process of treatment.<sup>29,31</sup> Even though

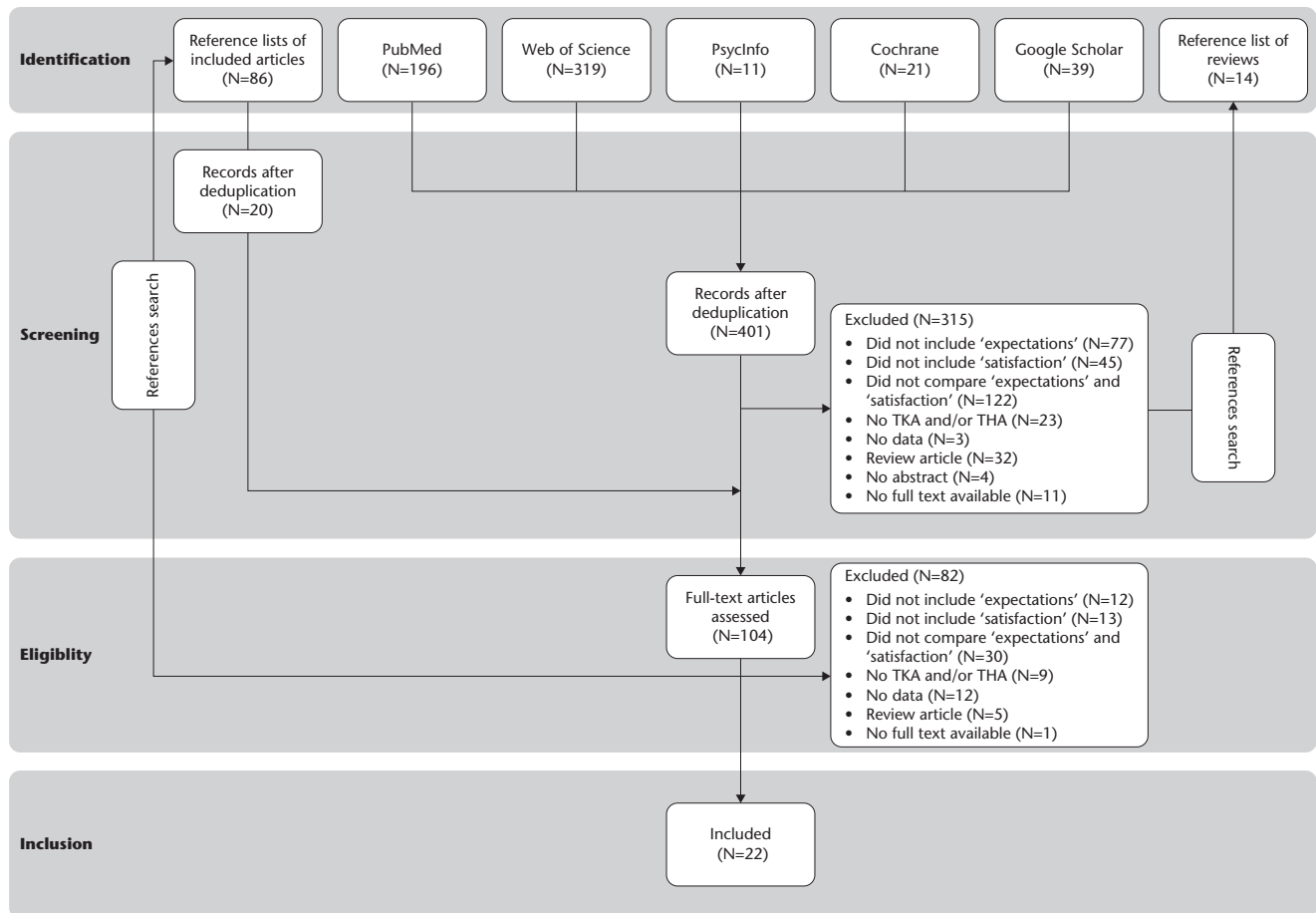
outcome expectations and satisfaction with outcome could be operationalized in different ways, we chose to include all studies that examined these concepts, regardless of the operationalization of these concepts.

*Data extraction*

Data were extracted from the included studies using a standardized extraction form (Table 2). If multiple articles had been written on the same dataset, only the most recent study was included. When a study included both TKA and THA patients, a comparison was made between these different patient groups. If no data on the different groups were available, authors were contacted to ask whether they had data on the different subgroups and, if so, to forward it. In addition, comparisons were also made between studies examining preoperative expectations with a retrospective and with a prospective design.

*Quality assessment*

The Newcastle-Ottawa Scale (NOS) for assessing the quality of nonrandomized studies in meta-analyses was used to assess the methodological quality of studies.<sup>50</sup> The NOS assesses studies on three different constructs (selection, comparability and exposure/outcome), with



**Fig. 1** Flowchart of study selection.

Note. TKA, total knee arthroplasty; THA, total hip arthroplasty.

eight questions on which studies could score a maximum of nine points in total (i.e., four points for selection, two points for comparability and three points for exposure/outcome). Studies with a score of six or more points on the NOS were regarded as qualitatively good.<sup>51</sup> In order to assure objective assessment, the quality assessment was independently conducted by two researchers. In case of disagreement between reviewers, points of disagreement were discussed in order to reach consensus.

#### Statistical analysis

A comparison was made between TKA and THA patients in terms of fulfilled expectations and satisfaction. All studies were compared based on average percentages of fulfilled expectations or as percentages of patients who were satisfied, or had all their expectations fulfilled, calculated as a weighted average across all studies examining respectively TKA or THA patients. The number of participants in studies with no separated data on TKA and THA patients were equally split between TKA and THA patients.

#### Data synthesis

Due to study heterogeneity, it was impossible to synthesize the data in a meta-analysis. An alternative to meta-analysis is the best-evidence synthesis, in which studies are classified based on level of internal and external validity.<sup>51</sup> Studies were identified as 'strong/high quality' when receiving 6 to 9 points on the NOS. Studies were identified as moderate quality or weak quality when receiving respectively 4 or 5, or 1 to 3 points.<sup>51</sup>

Studies were classified as either reporting a significant relationship between (fulfilment of) expectations and satisfaction or as reporting no significant relationship between these concepts based on their own findings and conclusions. Statistical values were, when reported, included in our systematic review. The levels of evidence regarding the significance or non-significance of a relationship among studies were ranked according to the following statements: (1) strong evidence: consistent findings (> 75% of the studies reported consistent findings) in multiple high-quality studies; (2) moderate evidence: consistent findings (> 75% of the studies reported

**Table 2.** Characteristics of included studies.

Author, year	TKA/ THA	N	Follow-up	Age	Operationalization of expectations	Study design/ measurement level	% fulfilled	% patients with fulfilled expectations	Operationalization of satisfaction	Measurement level	% satisfied patients
Anakwe et al, 2011 <sup>12</sup>	TKA	850	1 yr	68	One question about <i>fulfilment</i> of expectations, n.s.	4-point Likert scale	n/a	n/a	One question concerning satisfaction with the results of surgery. Additionally: a rating of the pain relief that is achieved, a rating of the success of operation in performance on heavy lifting, the likelihood of recommendation of the operation to a friend, willingness to have operation again, rating of the hospital.	4–5-point Likert scale	93.0%
Arden et al, 2011 <sup>36</sup>	THA	639	2 yrs	68	<i>Preoperative</i> questionnaire with questions about: expectations for postoperative pain and limitations in usual activities	Prospective 3–4-point Likert scale			One question about level of satisfaction with the result of the hip replacement.	Binary (satisfied vs. dissatisfied)	92.8%
Bourne et al, 2010 <sup>11</sup>	TKA	1708	1 yr	69	<i>Fulfilment</i> of expectations, n.s. Additionally: willingness to have surgery again	n.s.	n/a	n/a	Three questions concerning: satisfaction with the results of the knee replacement, satisfaction with pain reduction, and satisfaction with the ability to perform five functions (going up stairs, getting in/out of a car/bus, rising from bed, lying in bed, performing light domestic duties).	5-point Likert scale	81.0%
Clement et al, 2015 <sup>40</sup>	TKA	322	1 yr	71	<i>Fulfilment</i> of HSS-KFRES <sup>39</sup>	5-point Likert scale	n/a	56%	One question about level of satisfaction with the operated knee.	4-point Likert scale	86.0%
Eisler et al, 2002 <sup>37</sup>	THA	98	1 yr	70	Two questions about <i>fulfilment</i> of expectations with future pain, and walking ability	4-point Likert scale	n/a	55–69%	A grading of overall satisfaction.	6-point Likert scale	63.0%
Gandhi et al, 2009 <sup>42</sup>	TKA THA	1799	1 yr	69–74	Three questions regarding <i>preoperative</i> expectations about: time to fully recover, level of postoperative pain, and ability to perform usual activities	Prospective Responses collapsed into 3-point Likert scale			One question about level of satisfaction the results of the surgery.	Binary (satisfied vs. dissatisfied)	93.0– 95.0%
Hamilton et al, 2013 <sup>10</sup>	TKA THA	4709	1 yr	70 70	One questions about <i>fulfilment</i> of expectations, n.s.	6-point Likert scale	n/a	n/a	One question with a rating of overall satisfaction with operated hip or knee.	4–6-point Likert scale	86.6%

(continued)

Table 2 (continued)

Author, year	TKA/ THA	N	Follow-up	Age	Operationalization of expectations	Study design/ measurement level	% fulfilled	% patients with fulfilled expectations	Operationalization of satisfaction	Measurement level	% satisfied patients
Jain et al, 2017 <sup>19</sup>	THA	207	6 mo	65	<i>Preoperative</i> expectations: HSS- HRES <sup>33</sup>	Prospective 5-point Likert scale			Additionally, questions about: pain relieve after surgery, improvement in ability to perform regular activities, performance of heavy work or sport activities, rating of overall hospital experience, willingness to have operation again, the likelihood of recommendation of the operation to a friend. The Self- Administered Patient Satisfaction Scale. <sup>32</sup>	4-point Likert scale	94.5%
Jain et al, 2017 <sup>20</sup>	TKA	83	1 yr	70	<i>Fulfilment</i> of HSS- KFRES <sup>39</sup>	5-point Likert scale	76.7%	n/a	The Self- Administered Patient Satisfaction Scale. <sup>32</sup>	4-point Likert scale	92.3%
Kiran et al, 2015 <sup>38</sup>	TKA	365	2 yr	72	Two <i>preoperative</i> questions about expectations with: limitations in usual activities, pain after recovery	Prospective 4-point Likert scale			One question concerning satisfaction with the result of the knee replacement. Additionally, three questions regarding: improvement in overall function, reduction of pain, reduction of pain medication.	Binary (satisfied vs. dissatisfied)	83.8%
Lim et al, 2015 <sup>34</sup>	TKA THA	3488	> 2 yr	67 61	One question regarding: <i>fulfilment</i> of patient's expectations, n.s.	7-point Likert scale	n/a n/a	95.6% 94.9%	Rating of overall results of surgery.	6-point Likert scale	90.5% 91.9%
Lingard et al, 2006 <sup>21</sup>	TKA	525	1 yr	69	Four <i>preoperative</i> questions about expectations for: pain level, walking distance, limitation of recreational activity, and use of a walking aid	Prospective 5-point Likert scale			The Self- Administered Patient Satisfaction Scale. <sup>32</sup> Additionally, two questions about performance after surgery and willingness to have the same surgery again.	4-point Likert scale	n/a
Mancuso et al, 1997 <sup>33</sup>	THA	180	2–3 yr	65	Two <i>preoperative</i> questions about: expectations of surgery and hopes	Retrospective Open-ended questions			Three questions concerning: willingness to have operation again, meeting expectations, overall satisfaction with the results of hip arthroplasty.	Open-ended	89.0%
Mancuso et al, 2009 <sup>41</sup>	THA	405	6 yr	66	<i>Fulfilment</i> of HSS- HFRES <sup>33</sup>	5-point Likert scale	87%	75%	One question: 'If you were to spend the rest of your life with your hip symptoms just the way they have been in the last 24 hours, how would you feel?'	7-point Likert scale	94.0%

(continued)

Table 2 (continued)

Author, year	TKA/ THA	N	Follow-up	Age	Operationalization of expectations	Study design/ measurement level	% fulfilled	% patients with fulfilled expectations	Operationalization of satisfaction	Measurement level	% satisfied patients
Mannion et al, 2009 <sup>24</sup>	TKA	112	2 yr	67	Questions concerning <i>fulfilment</i> of expectations about: time to full recovery, pain after recovery, and limitations in everyday activities after recovery	Open-ended, Likert scale	n/a	30% / 47%	One question about satisfaction with surgery, n.s.	4-point Likert scale	90.1%
Noble et al, 2006 <sup>26</sup>	TKA	253	1 yr	68	One question about <i>fulfilment</i> of expectation concerning level of activity	Binary (fulfilled vs. not fulfilled)	n/a	n/a	One question about satisfaction with knee replacement.	Binary (satisfied vs. dissatisfied)	75.0%
Palazzo et al, 2014 <sup>25</sup>	THA	132	> 1 yr	64	<i>Fulfilment</i> of HSS-HFRES <sup>33</sup>	5-point Likert scale	73.1%	n/a	One question: 'If you were to spend the rest of your life with your hip symptoms just the way they have been in the last 24 hours, how would you feel?'	7-point Likert scale	91.9%
Scott et al, 2010 <sup>22</sup>	TKA	1141	1 yr	70	One question about <i>fulfilment</i> of expectations, n.s.	6-point Likert scale	n/a	n/a	The Self-Administered Patient Satisfaction Scale. <sup>32</sup>	4–6-point Likert scale	81.4%
Scott et al, 2012 <sup>32</sup>	TKA THA	669	1 yr	69 71	<i>Fulfilment</i> of HFSS-KRES <sup>39</sup> <i>Fulfilment</i> of HFSS-HRES <sup>33</sup>	5-point Likert scale	59% 72%	10% 21%	One question about satisfaction with the operated hip/knee.	4-point Likert scale	78.0% 88.0%
Gonzalez Saenz de Tejada et al, 2014 <sup>54</sup>	TKA THA	892	1 yr	69	Adapted version of HSS-KRES <sup>39</sup> /HSS-HRES <sup>33</sup> ( <i>preoperative</i> expectations)	Prospective 5-point Likert scale			One question: 'If you were to spend the rest of your life with your hip symptoms just the way they have been in the last 24 hours, how would you feel?'	4-point Likert scale	n/a
Thambiah et al, 2015 <sup>28</sup>	TKA	103	> 1 yr	64	Questionnaire assessing <i>preoperative</i> expectations about: improved mobility, reduced pain and better overall quality of life	Prospective n.s.			One question examining overall patient satisfaction. In addition, two questions about recommendations to others and willingness to undergo surgery again.	5-point Likert scale	92.8%
Vissers et al, 2010 <sup>35</sup>	TKA	44	6 mo	64	Four questions about <i>fulfilment</i> of expectations regarding: pain after surgery, limitations of activities of daily living after surgery, the overall success of the operation and likeliness of having complications	4-point Likert scale	n/a	n/a	One question about satisfaction with results of surgery.	5-point Likert scale	72.7%

Note. TKA, total knee arthroplasty; THA, total hip arthroplasty; HSS-K(F)RES, Hospital for Special Surgery Knee (Fulfilment) Replacement Expectations Survey; HSS-H(F)RES, Hospital for Special Surgery Hip (Fulfilment) Replacement Expectations Survey.



consistent findings) in one high-quality study and two or more moderate-quality studies, (3) limited evidence: generally consistent findings (> 75% of the studies reported consistent findings) in a high-quality study or in two or fewer moderate-quality studies, (4) no evidence: no studies could be found, (5) conflicting evidence: conflicting findings.<sup>52</sup>

## Results

### Study selection process

The search resulted in 586 records. After the removal of 185 duplicates, 401 unique studies were screened (see Fig. 1). Based on abstract and title, 315 articles were excluded. The reference lists of included articles and existing relevant reviews were scanned for additional articles. Another 82 articles were excluded after full-text assessment, leaving a remaining 22 included articles.

### Study characteristics

Twenty (90.9%) cohort studies and two cross-sectional studies<sup>26,33</sup> (9.1%) were included in this review (Table 2). One of the cohort studies was labelled as a cross-sectional study,<sup>11</sup> yet this study included multiple follow-up periods with multiple assessments within the same patients, so we considered it a prospective cohort study. Only one study examined revision surgery, instead of primary TKA or THA.<sup>37</sup>

### Expectations

The operationalization of expectation and satisfaction was quite diverse across studies (see Table 2). However, the majority used the HSS-K(F)RES or HSS-H(F)RES<sup>39,53</sup> or an adaptation of these scales (seven studies) or assessed fulfilment of expectations with one single question (six studies) (Table 2). Others focused on hopes or expectations regarding, for instance, limitations in daily living, pain and walking ability. Some studies examined the number of expectations patients have,<sup>24,33</sup> while others assessed the level of patients' expectations,<sup>21,38,42</sup> or a combination, in relationship with satisfaction.<sup>19,20,25,32,40,41,54</sup> For example, scores on the HSS-H(F)RES or HSS-K(F)RES represent the combined amount of (fulfilled) expectations the patient has and the level of these (fulfilled) expectations.<sup>39,53</sup>

Studies examining fulfilment of expectations either asked patients how many expectations were fulfilled,<sup>20,25,32</sup> or simply examined whether their expectations were fulfilled (yes/no).<sup>24,32,34,37,40,41</sup> Even though in the majority of studies examining fulfilment of expectations patients were also asked about their preoperative expectations prospectively (9/14), 13 of the 14 fulfilment studies (93%) did not compare preoperative expectations with postoperative fulfilment. In only one study patients were told what expectations they had cited before and asked how they were now fulfilled.<sup>34</sup>

### Satisfaction

Satisfaction with outcome was mostly examined with one question assessing overall satisfaction or satisfaction with the results of surgery (11 studies). Four studies asked questions about satisfaction with results of surgery, pain relief, and success of operation in increasing home/yard and recreational activities (i.e. the Patient Satisfaction Scale).<sup>18</sup> Others focused on, for example, likelihood of recommendation of surgery, the willingness to have surgery again and a rating of the hospital as a measure of satisfaction with outcome. Four studies assessed satisfaction with: a rating of the results of surgery<sup>34</sup> or asked patients the question 'If you were to spend the rest of your life with your hip symptoms just the way they have been in the last twenty-four hours, how would you feel?'.<sup>25,41,54</sup> Percentages are reported for the dichotomized proportion of patients that is classified as being satisfied with the results of surgery as compared to the proportion of patients that is classified as being dissatisfied with the results of surgery (Table 2).

### Methodical quality

Initially, scores on 12 items (6%) differed between the two reviewers. Disagreement was dissolved by consensus. The mean quality score was 6 out of 9 (range 4–9) (Table 3). A common methodological flaw was the lack of control for important demographic or clinical factors, or other important correlates of satisfaction. Other methodological shortcomings were the lack of description of number of patients who were lost to follow-up, or too large a number of patients (i.e. > 20%) lost to follow-up, and the absence of a description or operationalization of satisfaction.

### Expectations and satisfaction

Overall, 17 out of 22 (77%) studies found a significant positive relationship between preoperative expectations or fulfilment of expectations and satisfaction (Table 4, Fig. 2, Fig. 3). Moreover, 13 out of the 14 studies assessing fulfilment of expectations reported a significant association with satisfaction (93%) (Fig. 2, Fig. 3). As such, according to our best-evidence synthesis, strong evidence was found that fulfilled expectations were positively related to satisfaction after surgery. Only four out of eight studies examining *preoperative expectations* reported a significant association with satisfaction (50%) (Fig. 2, Fig. 3). Therefore, according to the guidelines, conflicting evidence was found for a positive link between preoperative expectations and satisfaction.

### Difference between TKA and THA patients

Of the 22 included studies, 11 (50%) studies focused on TKA patients, six (27%) on THA patients and five (23%) studies included both TKA and THA patients. Only two of these five studies reported separate data for TKA and THA patients (Fig. 2).<sup>22,34</sup> For both TKA and THA patients a

**Table 3.** Quality assessment with Newcastle-Ottawa Scale.

Author, year	Selection	Comparability	Outcome	Total	Quality
Anakwe et al, 2011 <sup>12</sup>	••	••	•••	7 / 9	High
Arden et al, 2011 <sup>36</sup>	••	••	•••	7 / 9	High
Bourne et al, 2010 <sup>11</sup>	••	••	•••	7 / 9	High
Clement et al, 2015 <sup>40</sup>	••	•	•••	6 / 9	High
Eisler et al, 2002 <sup>37</sup>	••	•	•••	6 / 9	High
Gandhi et al, 2009 <sup>42</sup>	••	••	••	4 / 9	Moderate
Hamilton et al, 2013 <sup>10</sup>	••	••	••	6 / 9	High
Jain et al, 2017 <sup>20</sup>	••••	••	•••	8 / 9	High
Jain et al, 2017 <sup>19</sup>	••	••	•••	7 / 9	High
Kiran et al, 2015 <sup>38</sup>	••	••	••	6 / 9	High
Lim et al, 2015 <sup>34</sup>	••	••	••	6 / 9	High
Lingard et al, 2006 <sup>21</sup>	••	••	•••	7 / 9	High
Mancuso et al, 1997 <sup>33</sup>	••	••	••	6 / 9	High
Mancuso et al, 2009 <sup>41</sup>	••	•	•	4 / 9	Moderate
Mannion et al, 2009 <sup>24</sup>	••	••	••	6 / 9	High
Noble et al, 2006 <sup>26</sup>	••	••	••	6 / 9	High
Palazzo et al, 2014 <sup>25</sup>	••	••	••	6 / 9	High
Scott et al, 2010 <sup>22</sup>	••	••	•••	7 / 9	High
Scott et al, 2012 <sup>32</sup>	••	••	•••	5 / 9	Moderate
Gonzalez Saenz de Tejada et al, 2014 <sup>54</sup>	••	••	••	6 / 9	High
Thambiah et al, 2015 <sup>28</sup>	••	••	••	6 / 9	High
Vissers et al, 2010 <sup>35</sup>	••	••	•••	7 / 9	High

Note. Each study could score a maximum of nine points in total (i.e. four points for selection, two points for comparability and three points for exposure/outcome). Studies with a score of six or more points were regarded as qualitatively good.

similar significant positive link between fulfilled expectations and satisfaction existed.<sup>34</sup>

Of the 14 fulfilment studies, eight (57%) reported values regarding fulfilment of expectations. Almost all hip (81%) and knee (77%) patients had *all* their expectations fulfilled at least six months post-surgery. On average, *all* expectations were fulfilled in hip patients in 79%, and in knee patients in 63%. Ninety-one per cent of the hip patients were satisfied with the outcome of surgery, while knee patients were satisfied with the outcomes of surgery in 86% of cases.

#### Retrospective versus prospective designs

Of the eight preoperative studies, seven studies (88%) prospectively assessed expectations before surgery. Only one study adopted a retrospective design in which patients were asked, after surgery, to recall their preoperative expectations.<sup>33</sup> Three out of seven studies (43%) which prospectively assessed preoperative expectations reported a significant positive association between expectations and satisfaction (Table 4). The one study examining preoperative expectations after surgery (i.e. retrospectively) also reported a significant positive relationship with satisfaction.<sup>33</sup> As such, according to the best-evidence synthesis, conflicting findings are reported as to whether preoperative expectations are related to satisfaction in a prospective design. Moreover, limited evidence existed for the relationship between preoperative expectations and satisfaction in a retrospective design.

#### Comparing differences in follow-up period

Most studies adopted a follow-up period of approximately one year (68%). The significance of the relationship between (fulfilment of) expectations and satisfaction varied largely between different follow-up times and did not point towards a fixed optimal follow-up period (Table 5). Therefore, limited evidence existed for the notion that fulfilment of expectations leads to satisfaction up to six months after surgery. However, strong evidence existed for up to one year after surgery, conflicting evidence for up to two years and strong evidence for up to six years.

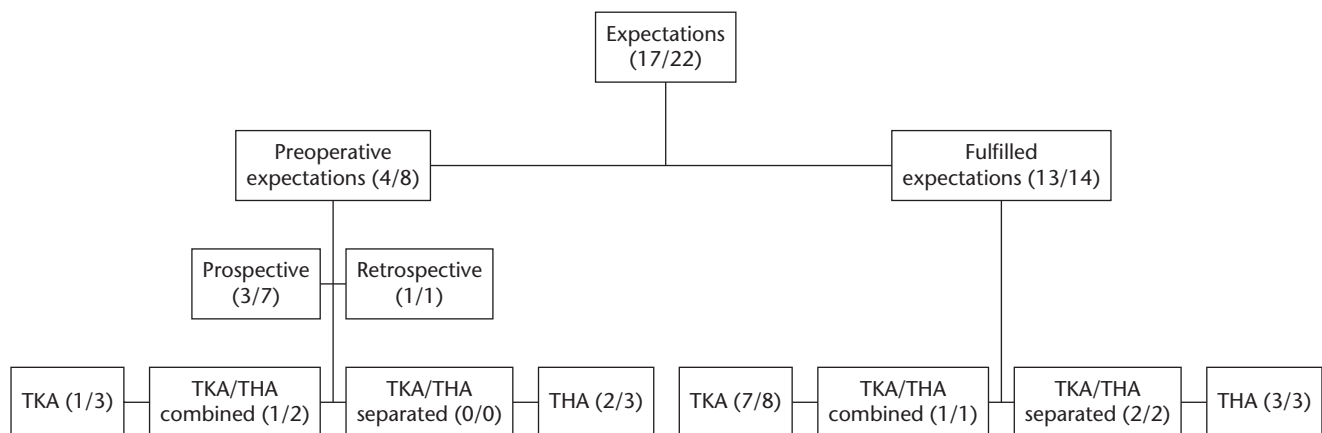
### Discussion

This best-evidence synthesis provides an overview of the literature regarding the relationship between (fulfilment of) outcome expectations and satisfaction with outcome, and the influence of used methodology and patient group on the (existence of the) relationship. Almost all studies assessing *fulfilment* of expectations reported a significant positive association with either level of satisfaction or the odds of being satisfied with the results of surgery (93%). In contrast, only half of the studies reported a significant relationship between *preoperative* expectations and satisfaction with outcomes of surgery.

One cross-sectional study found that preoperative expectations were generally related to a high level of satisfaction when assessing expectations retrospectively. Nonetheless, they did not state whether either low or high

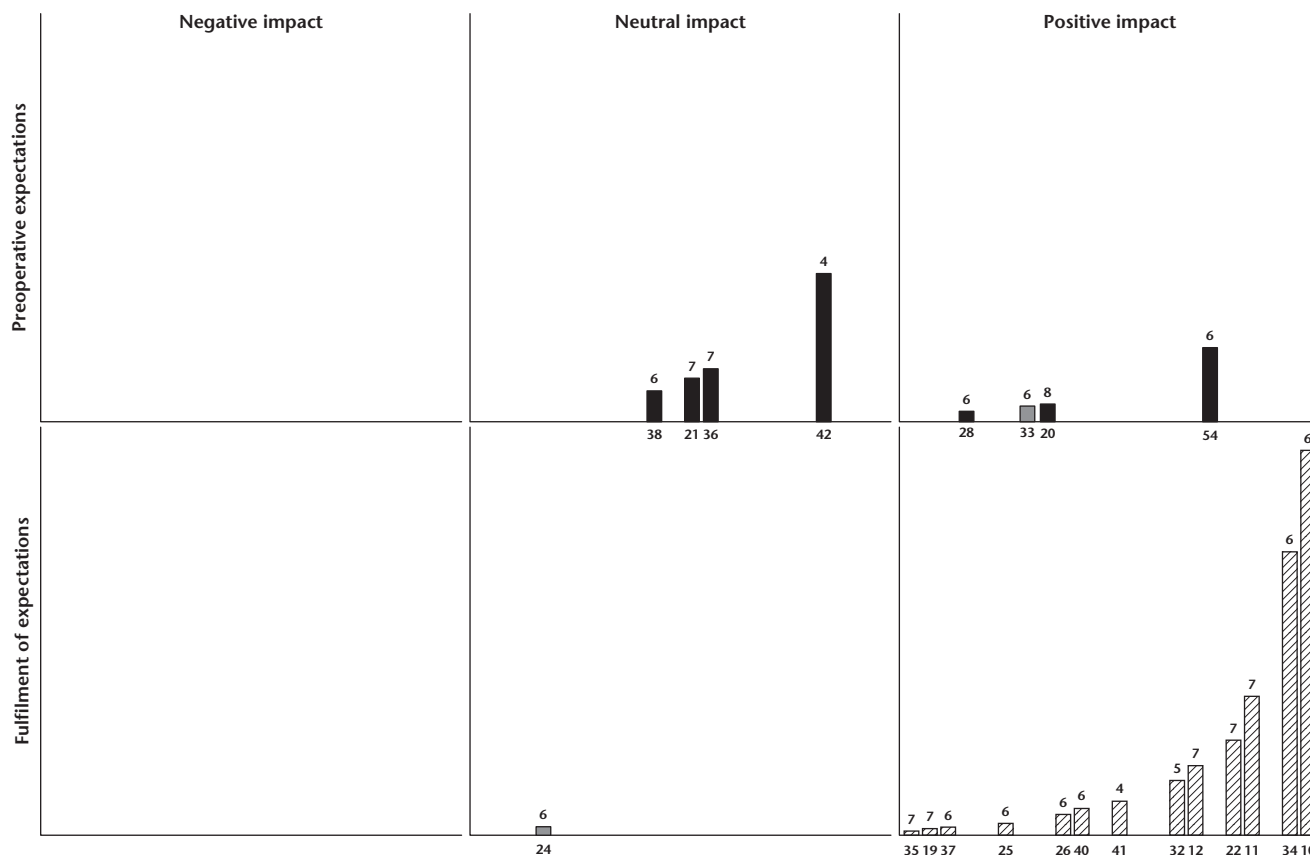
**Table 4.** Conclusions about relationship between expectations and satisfaction of included studies.

Author, year	Sig.	Conclusions	Statistics
Anakwe et al, 2011 <sup>12</sup>	Yes	A significant positive correlation between fulfilment of expectations and overall satisfaction	$r = .65, p \leq .001$
Arden et al, 2011 <sup>36</sup>	No	Preoperative expectations did not influence level of satisfaction at 12 months or 24 months post surgery	$p = .17$ $p = .96$
Bourne et al, 2010 <sup>11</sup>	Yes	Univariate statistical analysis showed that a significant difference existed between patients with met and unmet expectations in terms of satisfaction	$OR = 10.7, p \leq .001$
Clement et al, 2015 <sup>40</sup>	Yes	16 of 17 met expectations were significantly associated with higher satisfaction	$OR \geq 7.9, p \leq .08$
Eisler et al, 2002 <sup>37</sup>	Yes	Fulfilled expectations about pain and walking ability were moderately positively correlated with satisfaction	$r = .47$ $r = .46$
Gandhi et al, 2009 <sup>42</sup>	No	No differences in satisfaction were found between patients with high, moderate or low expectations	$p = .92$ $p = .62$ $p = .28$
Hamilton et al, 2013 <sup>10</sup>	Yes	Meeting patient expectations was significantly positively correlated with higher satisfaction	$r = .74, p \leq .001$
Jain et al, 2017 <sup>20</sup>	Yes	Preoperative expectations were positively associated with higher satisfaction at six months	$b = .17, p \leq .001$
Jain et al, 2017 <sup>19</sup>	Yes	More fulfilment of expectations is related to higher satisfaction	$r^2 = .29, p \leq .001$
Kiran et al, 2015 <sup>38</sup>	No	Preoperative expectations did not correlate with satisfaction	n/a
Lim et al, 2015 <sup>34</sup>	Yes	At two-year follow-up, met expectations were significantly associated with satisfaction	$OR = 105.3, p \leq .001$
Lingard et al, 2006 <sup>21</sup>	No	Satisfaction was not associated with level of preoperative expectations	n/a
Mancuso et al, 1997 <sup>33</sup>	Yes	A strong positive correlation was found between preoperative expectations and satisfaction	n/a
Mancuso et al, 2009 <sup>41</sup>	Yes	Patients who had a favourable response had a greater proportion of expectations fulfilled (90%) in comparison with those who did not have a favourable response (39%)	$p \leq .001$
Mannion et al, 2009 <sup>24</sup>	No	Expectations or met expectations did not contribute to the explained variance in satisfaction	n/a
Noble et al, 2006 <sup>26</sup>	Yes	Met expectations was, among five other variables, a significant contributor to satisfaction	$OR = 6.01, p \leq .001$
Palazzo et al, 2014 <sup>25</sup>	Yes	Fulfilment of expectations was associated with satisfaction	$OR = 1.08, p \leq .001$
Scott et al, 2010 <sup>22</sup>	Yes	Satisfaction correlated significantly with met expectation	$r = .77$
Scott et al, 2012 <sup>32</sup>	Yes	A significant difference was found between met expectations in terms of satisfaction in THA patients and TKA patients	$p = .003$ $p \leq .001$
Gonzalez Saenz de Tejada et al, 2014 <sup>54</sup>	Yes	High and very high expectations of daily activities were associated with a higher level of satisfaction	$p = .012$ $p \leq .001$
Thambiah et al, 2015 <sup>28</sup>	Yes	Preoperative expectations were significantly associated with higher satisfaction	$p = .033$
Vissers et al, 2010 <sup>35</sup>	Yes	Fulfilled expectations regarding limitations and overall success of treatment were significantly related to satisfaction ( $p \leq .001$ )	$OR = 13.6, p \leq .001$ $OR = 34.0, p \leq .001$



**Fig. 2** Schematic representation of methodological characteristics of included studies and number of studies reporting a significant correlation between (fulfilment of) preoperative expectations and satisfaction.

Note. TKA, total knee arthroplasty; THA, total hip arthroplasty.



**Fig. 3** Harvest plot: evidence for relationship between (fulfilment of) preoperative expectations and satisfaction, stratified by study design.

Note. Columns represent studies included in this systematic review with their reference number below. The height of columns corresponds to the number of patients examined within that study. Numbers above columns indicate the quality of study according to the Newcastle-Ottawa Scale. Grey shades were used for retrospective studies, black shades for prospective studies. Fulfilment studies are dashed, as they are not classified as either retrospective or prospective. The plot is split between studies examining preoperative expectations and studies examining fulfilment of expectations.

**Table 5.** Percentage of studies with a significant relationship between (fulfilled) expectations and satisfaction found across studies, stratified for follow-up period.

Relationship	Yes (percentage)	No (percentage)	Total (22)
Up to six months	2 (100%)	0 (0%)	2
Fulfilment	1 (50%)	0 (0%)	2
	1 (50%)	0 (0%)	
Up to one year	10 (80%)	2 (20%)	12
Fulfilment	9 (100%)	0 (0%)	12
	1 (25%)	2 (75%)	
Up to two years	3 (50%)	3 (50%)	6
Fulfilment	2 (67%)	1 (33%)	6
	1 (33%)	2 (67%)	
Up to six years	2 (100%)	0 (0%)	2
Fulfilment	1 (100%)	0 (0%)	2
	1 (100%)	0 (0%)	

expectations, or having expectations in general, was related to satisfaction.<sup>33</sup> Thereby, it seems that the findings regarding the relationship between preoperative expectations and satisfaction become more conflicted when assessing the relationship prospectively. Some patients

might not be able to recall their preoperative expectations after surgery as the amount of time between the actual expectation and the recall of this expectation, as well as the meaningfulness of the expectation for the patient, determines the accuracy of the recall.<sup>55</sup> Patients may even

experience some sort of recall bias or response shift. Due to this possible response shift, patients change their views about expectations to match their present status.<sup>43</sup> In fact, it is found that about 35% of all patients recalled their preoperative function as higher or lower than the actual level of functioning.<sup>56</sup>

The expectation-confirmation theory states that disconfirmation or dissatisfaction results from a lack of balance between expectations and fulfilled expectations.<sup>57</sup> Patients might therefore (unconsciously) change their preoperative expectations postoperatively in order to diminish imbalance between expectations and outcomes and to prevent dissatisfaction. Consequently, both high and low expectations could in essence lead to satisfaction when these expectations are fulfilled.<sup>58,59</sup> However, it can be noted that high expectations have an advantage over low expectations. It was proposed that patients with realistic high expectations might be more motivated to obtain the desired results in rehabilitation by adhering to instructions and training,<sup>54</sup> and might actually achieve these results through some sort of self-fulfilling prophecy<sup>60</sup> resulting in fulfilled expectations, leading to a high level of satisfaction. Moreover, as Eisler et al stated: 'The motivation to undergo surgery reflects its reward value and the expectation of success'.<sup>37</sup> It is therefore of great importance to create and maintain high expectations, considering that a delay, or even refusal of surgery may result from low expectations. Nevertheless, unrealistic high expectations (i.e. high expectations which are not in accordance with actual expected outcomes) could in turn lead to dissatisfaction and lower health-related quality of life<sup>61</sup> and, unfortunately, up to half of the patients have too optimistic expectations.<sup>24,26</sup> Summarizing the results of this systematic review, thereby taking into account the existing evidence regarding expectations in TKA and THA patients, it should be noted that patients should have high expectations in order to achieve optimal results, yet should be guarded from unrealistic high or low expectations, as they could lead to unfulfilled expectations and consequently to dissatisfaction.

The contradictory findings from studying only the effect of preoperative expectations on satisfaction were absent when fulfilment of expectations was studied instead. Almost all studies in which the relationship between fulfilment of expectations and satisfaction was examined, found a significant relationship. Only one study told patients what expectations they had cited before and asked how they were now fulfilled.<sup>34</sup> This study was the only study which found no relationship between fulfilment and satisfaction. Even though it was previously found that a possible response shift could not interfere with the significance of the relationship between fulfilled

expectations and satisfaction,<sup>46</sup> future research should examine the effects between recalled and actual fulfilled expectations on satisfaction.

The results in this review differ largely between follow-up times and do not point towards a fixed optimal follow-up period. As Barlow et al<sup>46</sup> pointed out, a form of timing bias could exist, as expectations may not be fulfilled up to two years after surgery, considering that function could progress up to two years after surgery. Furthermore, no large differences were found in terms of fulfilled expectations or percentage of satisfied patients when differentiating between hip and knee patients. In other studies, THA patients generally met more expectations and were more satisfied with the outcome than TKA patients.<sup>45</sup> It seems that these patients returned to function to a larger and faster extent than TKA patients.<sup>4,8,45</sup> Therefore, expectations might be met at an earlier stage. Nonetheless, after six months, improvement in function returned to the same level for both patient groups.<sup>4</sup> The return to the same level of improvement between hip and knee patients, which is found after six months, could explain why, in our review, fulfilled expectations and satisfaction rates are no different between hip and knee patients, as the majority of studies examined fulfilled expectations beyond six months post surgery. However, considering that there are differences between hip and knee patients, future research should examine whether the optimal level of expectations also differs between hip and knee patients.

This study has a number of limitations. The definition of 'satisfaction with outcome' might be a subject of debate since satisfaction is assessed with different instruments in the literature. Moreover, the operationalization of outcome expectations was quite diverse as well. Some studies do not report the method of assessment, while others thoroughly examined several domains of expectations (e.g. expectations regarding symptoms, pain, mobility, quality of life) and satisfaction (e.g. pain, function, hospital experience, and performing regular activities/sport). The lack of consensus on the operationalization of constructs may be a reason for contradictory findings in preoperative studies. Nonetheless, this explanation for contradictory findings seems unlikely, as there were no conflicting findings in fulfilment studies, while they also differed in operationalization of the constructs. The relationship between fulfilled expectations and satisfaction with outcome seems robust, despite differences in measurement and operationalization of the constructs. Another limitation might be the inclusion of a study with revision surgery.<sup>37</sup> Although the main objective of that study was not to examine level of expectations, findings might be confounded due to prior experiences, which

could have influenced the level of expectations. In addition, only statements regarding the significance of the relationships could be made and not regarding the strength or impact of the relationship, as we were unable to extract effect sizes.

In conclusion, fulfilment of expectations is consistently associated with satisfaction regardless of study design or patient group (i.e. hip or knee patients). Emphasis in future research should be placed on the operationalization and measurement of expectations and satisfaction to determine the (strength of the) influence of these different forms of assessment on the (existence of the) relationship between (fulfilled) expectations and satisfaction with outcome. It should be examined what the optimal level of expectations would, or could, be and how changes in (fulfilled) expectations relate to changes in satisfaction. Furthermore, research should be broadened to other patient groups as well to examine the generalizability of these results to ‘the patient’ in general.

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