

# Empowering knowledge and its connection to health-related quality of life: a cross-cultural study

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## Accepted Manuscript

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## Empowering knowledge and its connection to health-related quality of life: a cross-cultural study

A concise and informative title: Empowering knowledge and its connection to health-related quality of life

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## **Empowering knowledge and its connection to health-related quality of life: a cross-cultural study**

A concise and informative title: Empowering knowledge and its connection to health-related quality of life

### **Acknowledgments**

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### **Abbreviations**

<b>EK<sub>hp</sub></b>	Expected knowledge (hospital patients)
<b>EQ-5D</b>	EuroQoL 5-dimensional classification component scores ( <a href="http://www.euroqol.org">www.euroqol.org</a> )
<b>HRQoL</b>	Health-related quality of life
<b>OA</b>	Osteoarthritis
<b>RK<sub>hp</sub></b>	Received knowledge (hospital patients)
<b>THA</b>	Total hip arthroplasty
<b>TKA</b>	Total knee arthroplasty

**Abstract**

*Aims:* Assess the association between patient education (i.e. empowering knowledge) and preoperative health-related quality of life, 6 months postoperative health-related quality of life, and the increase in health-related quality of life in osteoarthritis patients who underwent total hip or total knee arthroplasty.

*Method:* This is a cross-cultural comparative follow-up study using structured instruments to measure the difference between expected and received patient education and self-reported health-related quality of life (EQ-5D) in Finland, Greece, Iceland, Spain and Sweden.

*Results:* The health-related quality of life was significantly increased 6 months postoperatively in all countries due to the arthroplasties. In the total sample, higher levels of empowering knowledge were associated with a higher health-related quality of life, both pre- and postoperatively, but not with a higher increase in health-related quality of life. On the national level, postoperative health-related quality of life was associated with higher levels of empowering knowledge in Finland, Iceland and Sweden. The increase in health-related quality of life was associated with levels of empowering knowledge for Greece.

*Conclusions:* Overall, it can be concluded that the level of empowering knowledge was associated with high postoperative health-related quality of life in the total sample, even though there is some variation in the results per country.

**Keywords:** Health-related quality of life, Osteoarthritis, Empowerment, Empowering knowledge, Patient-centred education, Cross-cultural

## 1. Introduction

Osteoarthritis (OA) is a worldwide problem, listed among the top 10 most disabling diseases in developed countries. It has an estimated prevalence of 9.6% of men and 18% of women aged 60 or older (World Health Organisation, 2014). The symptoms of OA consist of pain, fatigue, stiffness, joint deformity and loss of physical function. Regarding these symptoms, a negative impact on the quality of life is apparent (Mariconda, Galasso, Costa, Recano, & Cerbas, 2011). In the progressively aging population, the number of patients with advanced hip and knee OA undergoing total hip arthroplasty (THA) and total knee arthroplasty (TKA) are increasing (Jones, Voaklander, Johnston, & Suarez-Almazor, 2001; Rand, Trousdale, Ilstrup, & Harmsen, 2003; Rolfson, Kärrholm, Dahlberg, & Garellick, 2011; Singh, 2011).

Patient education, defined as the informing, counseling, and training of patients, has become a relevant field in nursing care in recent years. In varying countries such as Finland, Iceland and Sweden the right to patient education and information are obliged by law (Finlex, 1992; Althingi, 1997; Sveriges Riksdag, 1982). THA and TKA surgery patients need to have knowledge in order to manage their recovery at home successfully. This is especially important since the length of hospital stays is decreasing (Eurostat, 2012). This means that in most cases, THA and TKA surgery patients are discharged home after only a few days in hospital (Fagermoen, & Hamilton, 2006; Sendir, Büyükyılmaz, & Muşovi, 2013). In this regard, empowering patients is the main goal of patient-centred education. In empowering patient education, the educational structure and methods are based on a patient-centred approach and patient participation is the core of these educational activities. (Leino-Kilpi, Mäenpää, & Katajisto, 1999.) Thus, the first essential step in empowering patients is the provision of knowledge that meets patients' expectations. The health professionals' role is to encourage patients to voice their knowledge expectations and to hear the patients' voice

(Klemetti, Leino-Kilpi, Cabrera, Copanitsanou, Ingadottir, Istomina, Katajisto, Papastavrou, Unosson, & Valkeapää, 2014; Johansson Stark, Ingadottir, Salanterä, Sigurdardottir, Valkeapää, Bachrach-Lindström, & Unosson, 2014).

Previous research has stated that THA and TKA surgery patients that have received tailored information instead of the standard education, were more knowledgeable (Johansson, Salanterä, & Katajisto, 2007; Heikinen, Leino-Kilpi, Nummela, Kaljonen, & Salanterä, 2008) and more certain of care-related issues (Baumann, Rat, Mainard, Cuny, & Guillemin, 2011) than the control group. In addition, patients that were more satisfied with the medical information they received had higher HRQoL scores after total joint arthroplasty (Leino-Kilpi, Johansson, Heikinen, Kaljonen, Virtanen, & Salanterä, 2005); and patients that had received more knowledge had higher HRQoL scores at discharge (Lawless, Greene, Slover, Kwon, & Malchau, 2012). A review of the literature by Strupeit *et al.* (2013) shows that approximately 70% of the studies included showed no effects of nurse-delivered patient education interventions on quality of life of outpatients. It has been found that THA and TKA operations have proven to be beneficial in many domains of health related quality of life (HRQoL) (Montin, Leino-Kilpi, Suominen, & Lepistö, 2006; Brandes, Ringling, Winter, Hillmann, & Rosenbaum, 2011; Clement, MacDonald, Howie, & Biant, 2011), up to 7 years' follow-up (Bruyère, Ethgen, Neuprez, Zégels, Gille, Huskin, & Reginster, 2012). However, most studies which try to uncover determinant of HRQoL focus on the postoperative HRQoL (EuroQol\_Group, 1990; Brooks, 1996; Mahomed, Liang, Cook, Daltroy, Fortin, Fossel, & Katz, 2002; Jones, 2003; Mariconda, Galasso, Costa, Recano, & Cerbas, 2011; Ryhänen, Rankinen, Siekkinen, Saarinen, Korvenranta, & Leino-Kilpi, 2012) rather than the difference or increase in HRQoL. The increase in HRQoL can possibly be more informative since it corrects for the effect of the preoperative health status, which has been shown to be related to postoperative HRQoL (Mariconda, Galasso, Costa, Recano, & Cerbas, 2011; Lawless, Greene, Slover, et al., 2012;

Ryhänen, Rankinen, Siekkinen, Saarinen, Korvenranta, & Leino-Kilpi, 2012). However, there is a lack of research on empowering knowledge and HRQoL in OA patients who have had a total hip or knee arthroplasty. In this study, we hypothesized that patients who receive the amount of patient education they expect to receive are more likely to be empowered. Consequently, these patients will be able to manage their condition more adequately, which in turn would lead to higher HRQoL compared to patients that have not received a sufficient amount of patient education according to their own needs or expectations. Therefore, the difference between received patient education and expected patient education will be referred to as the level of empowering knowledge.

## **2. Purpose**

The purpose of this study was to test the hypothesis that smaller dissimilarities between expected and received knowledge (i.e., higher levels of empowering knowledge) are associated with a higher postoperative HRQoL in OA patients undergoing total hip or knee arthroplasty. The following research questions were formulated: (1) What was the possible increase in health-related quality of life?, (2) What was the level of empowering knowledge? and (3) Was empowering knowledge associated with the preoperative, postoperative health-related quality of life and the possible increase in health-related quality of life?

## **3. Methods**

### *3.1. Study sample*

The data were collected from 1,286 (n = 762, response rate = 59%) OA patients who have had a total hip or knee arthroplasty from Finland, Iceland, Greece, Spain and Sweden (during 2009-2012). This study is a part of a European project on empowering patient education for osteoarthritis patients undergoing hip or knee replacement (Valkeapää, Klemetti, Cabrera et al., 2014). The



inclusion criteria for participants were the following: attending elective knee or hip replacement surgery for OA; able to understand Finnish, Greek, Icelandic, Spanish, or Swedish; able to complete self-administered questionnaires; 18 years or older; and no diagnosed cognitive disorders.

### 3.2. Data collection

The data were collected at two points in time; preoperatively (3 – 1 weeks) and postoperatively (6 months). The hospital nurse who was responsible for the allocation of surgery appointments was informed about the study and asked to notify eligible patients. Combined with the invitation to surgery, patients received information about the research, an informed consent form, the first questionnaire, and a postage-paid return envelope. Patients send their informed consent and the first questionnaire to the researcher by mail. During the follow-up measurement, patients received the second questionnaire at home by mail and were requested to return it by mail.

### 3.3. Measures

In order to measure HRQoL preoperatively and postoperatively, the EuroQol 5-dimensional classification component score (EQ-5D) was chosen. The EQ-5D (Lawless, Greene, Slover, Kwon J-M, Malchau, 2012; Ryhänen, Rankinen, Siekkinen, Saarinen, Korvenranta, & Leino-Kilpi, 2012) is a generic measure that has been proven to be a valid and reliable tool for various diseases (Rankinen, Salanterä, Heikkinen et al., 2007). It measures five dimensions of health: mobility, self-care, usual activities, pain/discomfort, and anxiety/depression. Respondents have three possibilities to answer for the specific issue: No problems, Some problems, or Extreme problems. This gives 243 possible combinations of response. The score of the EQ-5D was calculated to make one single score called the EQ-5D<sub>index</sub>. Index values take into account the respondents' opinions on the relative importance of the different domains. Therefore, each of the domains was weighted differently in the calculation of the index. In this case, mobility and anxiety/depression were given the highest

weighting. The EQ-5D<sub>index</sub> ranges from zero (worst possible health state) to one (best possible health state). In addition, to the five dimensions, the EQ-5D includes the EQ-5D<sub>VAS</sub> (Visual Analogue Scale) which allows people to assign a number to their current health state, ranging from 0 to 100 (i.e., worst to best imaginable health state). The EQ-5D is a widely used tool and was already translated in Finnish, Greek, Icelandic, Spanish and Swedish. All translations of EQ-5D were produced with the use of specific guidelines. This standardized translation protocol consists of a forward/backward translation process and cognitive debriefing.

The level of empowering knowledge was measured by calculating the difference between expected knowledge and received knowledge. Expected knowledge was measured preoperatively by the Expected Knowledge (hospital patients) scale (EK<sub>hp</sub>), and received knowledge was measured postoperatively by the Received Knowledge (hospital patients) scale (RK<sub>hp</sub>). Both scales have previously been tested and validated (Leino-Kilpi, Johansson, Heikkinen, Kaljonen, Virtanen, & Salanterä, 2005; Rankinen, Salanterä, Heikkinen, Johansson, Kaljonen, Virtanen, & Leino-Kilpi, 2007). The scales are parallel, either asking patients about their knowledge expectations or their perception of the knowledge they received regarding six dimensions of empowering knowledge: bio-physiological (e.g. illness and treatment), functional (e.g. mobility and nutrition), experiential (e.g. emotions and experiences), ethical (e.g. rights and confidentiality), social (e.g. support and patient organisations) and financial dimension (e.g. costs and benefits). The items are ranked on a 4-point scale (1 = fully disagree, 2 = disagree a little, 3 = agree a little 4 = fully agree). Separately, the mean score of the EK<sub>hp</sub> and the RK<sub>hp</sub> were calculated. The mean score of the expected knowledge scale was subtracted from the mean score of the received knowledge scale, resulting in the level of empowering knowledge. Therefore, a score of 0 represents a patient whose knowledge expectations were perfectly met. A negative score represents a patient who did not receive as much information as he or she expected to. Consequently, a positive score represents a patient who received more information than he or she expected.

### 3.4. Statistical analyses

A paired sample T-test was used to test whether there is a significant increase in the EQ-5D<sub>index</sub> and the EQ-5D<sub>VAS</sub> postoperatively. A one-way ANOVA was conducted to compare the HRQoL between the different countries. The between-country differences regarding the level of empowering knowledge were tested by means of a one-way ANOVA. A general linear model was conducted to assess the association between the level of empowering knowledge and the preoperative and postoperative EQ-5D<sub>index</sub> and EQ-5D<sub>VAS</sub>. This procedure was repeated to assess the association between empowering knowledge and the increase in EQ-5D<sub>index</sub> as well as the increase in EQ-5D<sub>VAS</sub>. All analysis included the patients that completed both questionnaires; pre- and postoperatively (n = 762).

### 3.5. Ethical considerations

The study was approved by the regional ethical authorities in each country. The approvals are based on national standards (reference numbers of ethical approvals: Finland ETMK:102/180/2008; Greece 3029/17.08.2010; Iceland 09-084-SI; Spain 2010/5955; Sweden Dnr. M69-09). Participants were informed of the purpose and procedure of the study and the principles of voluntariness and confidentiality. A written informed consent was obtained from all participants.

## 4. Results

### 4.1. Sample Characteristics

The participants were on average 67.9 years old, more often female, retired, had low levels of vocational education, and underwent their first arthroplasty (Table 1).

Table 1 here

### 4.2. Pre- and postoperative health-related quality of life

OA patients' HRQoL improved throughout the study population. In the total sample, after 6 months a significant increase was seen, both in the EQ-5D<sub>index</sub> (0.61 to 0.83,  $p = <0.001$ ) and in the EQ-5D<sub>VAS</sub> (58.5 to 69.8,  $p = <0.001$ ). The mean increase in HRQoL was 0.21 in the EQ-5D<sub>index</sub> score

Every country shows this significant increase between preoperative and postoperative HRQoL, both in the EQ-5D<sub>index</sub> and in the EQ-5D<sub>VAS</sub> (except Spain). However, there were statistically significant variations between the countries in the level of HRQoL, both preoperatively and postoperatively.

Table 2 shows that Finland had the highest HRQoL preoperatively and Sweden had the highest HRQoL postoperatively. The findings are not clear about the lowest scores.

The increase in EQ-5D<sub>index</sub> was highest in the Spanish data (mean = 0.28) and lowest in the Finnish data (mean = 0.14). On the other hand, the increase in EQ-5D<sub>VAS</sub> was lowest in the Spanish data (mean = 0.1) and was highest in the Swedish data (mean = 23.8).

Table 2 here

#### 4.3. Level of empowering knowledge

In the total sample, patients had rather high preoperative knowledge expectations ( $EK_{hp}$  mean = 3.6). However, after six months, patients perceived that these expectations were not fulfilled ( $RK_{hp}$  mean = 2.9). In every country, except Spain, patients had higher expectations for knowledge than they actually received (i.e. empowering knowledge), and the differences were statistically significant (Table 3).

On a national level, there was statistically significant variation in the expectations and received knowledge. Greek participants had the highest knowledge expectations (mean = 3.9) whereas Spanish participants had the lowest expectations (mean = 3.3). The Spanish participants felt that they received most knowledge (mean = 3.3), while the Greek and Swedish participants felt that they received the lowest amount of knowledge (mean = 2.8). In the difference between expected and received knowledge (i.e., the empowering knowledge), Spain was the only country where the knowledge expectations were met (difference = 0). The Greek sample perceived to have had the lowest level of empowering knowledge (difference = -1).

Table 3 here

#### 4.4. Empowering knowledge and health-related quality of life

In the total sample, smaller differences between expected and received knowledge (i.e., higher levels of empowering knowledge) were significantly associated with higher pre- and postoperative EQ-5D<sub>index</sub> ( $p = <0.001$  and  $p = <0.001$ , respectively) and higher pre- and postoperative EQ-5D<sub>VAS</sub> ( $p = 0.05$  and  $p = 0.03$ , respectively) (Table 4). There was no association between the increase in

EQ-5D<sub>index</sub> and EQ-5D<sub>VAS</sub> and the level of empowering knowledge ( $p = 0.32$  and  $p = 0.72$ , respectively).

On the national level, results differed concerning the preoperative HRQoL. The data from Iceland showed that higher levels of empowering knowledge were significantly associated with a higher preoperative EQ-5D<sub>index</sub> and preoperative EQ-5D<sub>VAS</sub> ( $p = 0.002$  and  $p = 0.03$ , respectively). In Finland, the same association could be seen for the EQ-5D<sub>index</sub> ( $p = 0.03$ ), whereas in Sweden, a higher EQ-5D<sub>VAS</sub> was significantly associated with higher levels of empowering knowledge ( $p = 0.02$ ).

In postoperative HRQoL, every country except Spain and Greece showed the association between higher levels of empowering knowledge and higher levels of postoperative EQ-5D<sub>index</sub>. The postoperative EQ-5D<sub>VAS</sub> was also significantly associated with higher levels of empowering knowledge in all countries except Spain. Concerning the increase in the EQ-5D<sub>index</sub> and the EQ-5D<sub>VAS</sub>, no significant outcomes can be found on the national level. The only exception was the EQ-5D<sub>VAS</sub> in Greece, which increased more when the level of empowering knowledge was higher ( $p = 0.04$ ).

Table 4 here

## 5. Discussion

The aim of this study was to test the hypothesis that smaller dissimilarities between expected and received knowledge (i.e., higher levels of empowering knowledge) are associated with a higher postoperative HRQoL in OA patients undergoing a total hip or knee arthroplasty. Naturally, the HRQoL improved significantly due to the TKA and THA, which is in line with previous research

(Montin, Leino-Kilpi, Suominen, & Lepistö, 2006; Brandes, Ringling, Winter, Hillmann, & Rosenbaum, 2011; Clement, MacDonald, Howie, & Biant, 2012; Bruyère, Ethgen, Neuprez, Zégels, Gillet, Huskin, & Reginste, 2012). What has not been proven before is that higher levels of empowering knowledge were associated with a higher postoperative HRQoL in this study, which verifies our hypothesis and confirms the results of Leino-Kilpi's *et al.* (1999) study, in which patients that had received more knowledge had higher HRQoL scores. Our finding showed that the HRQoL is likely to be improved by meeting patients' knowledge expectations with patient-centred education. However, the increase in HRQoL was not significantly associated with the level of empowering knowledge. These findings were not consistent among all countries. Higher postoperative HRQoL scores were associated with higher levels of empowering knowledge in Finland, Iceland and Sweden, but not in Spain and Greece. The increase in HRQoL was not associated with the level of empowering knowledge in any country except for Greece.

Countries differed significantly from each other. Spain was the only country in which the knowledge expectations were actually met, which seems to be in line with its high postoperative EQ-5D<sub>index</sub>. It would be interesting to find out how the Spanish health care professionals go about providing patient education and how this differs from the other participating countries, in order to learn from the Spanish customs. The low postoperative EQ-5D<sub>VAS</sub> in the Spanish sample could have multiple causes. It might be due to cross-cultural differences in response style, in perception of health status, or in health-state valuation (König, Bernert, Angermeyer, Matschinger, Martinez, Vilagut, Haro, de Girolamo, de Graaf, Kovess, & Alonso, 2009). In addition, knowledge is a small step in the acquisition of empowerment. Empowerment does not merely entail the provision of knowledge that results in individual action or change. It is a process in which people are being aided in asserting control over the factors which affect their health (Gibson, 1991). This also includes environmental change and the acquisition of skills. Even though Spanish patients – or any other

patient, for that matter – had received sufficient knowledge according to their expectations, this might not have translated in actual empowerment and consequently in a better HRQoL.

Greece had the lowest HRQoL both pre- and postoperatively. There are multiple explanations for this. First, the Greek population was the oldest and was more often female. These are both characteristics that are known to influence HRQoL in a negative manner (Montin, Leino-Kilpi, Katajisto, Lepistö, Kettunen, & Suominen 2007; Rolfson, Dahlberg, Nilsson, Malchau, & Garellick, 2009). The low level of postoperative HRQoL could also be related to the low levels of empowering knowledge in the Greek population. On the other hand, the Greek sample showed a rather high increase in HRQoL compared to most countries. However, it is impossible to increase the HRQoL up to a certain point since it is not an infinite concept. For example, in Finland the preoperative HRQoL was highest; therefore they also had the smallest change. But this does not necessarily mean that Finnish patients feel less empowered.

Some limitations should be taken into account while interpreting these results. The sampling strategy was purposive. Therefore, the results might not be generalizable to all OA patients with hip and knee surgeries, and the samples per country are not comparable. Many studies use the postoperative HRQoL to assess the relation between HRQoL and possible determinants (Mariconda, Galasso, Costa, Recano, & Cerbas, 2011; Ryhänen, Rankinen, Siekkinen, Saarinen, Korvenranta, & Leino-Kilpi, 2012). Therefore, it appears to be a valid and accepted method. However, the increase in HRQoL can possibly be more informative since it corrects for the effect of the surgery itself and preoperative health status, which has shown to be related to postoperative HRQoL (Mariconda, Galasso, Costa, Recano, & Cerbas, 2011; Mahomed, Liang, Cook, Daltroy, Fortin, Fossel, & Katz, 2002). This study shows that the results differ between the two dependent variables. The association between postoperative HRQoL and empowering knowledge might be due to a confounding factor, since the preoperative HRQoL was similarly associated with the level of



empowering knowledge in the total sample and more specifically in Finland, Iceland and Sweden. The Nordic countries were better educated and more often employed than people from Greece and Spain. Thus, a possible confounder could be socioeconomic status (SES). People with a higher SES are generally healthier (Montin, Leino-Kilpi, Katajisto, Lepistö, Kettunen, & Suominen, 2007) than people with a lower SES. This could imply that people with higher SES interact more effectively with health care providers and possess the skills to have a better understanding of the information they get. This leads to higher levels of empowerment, which in turn leads to higher levels of HRQoL. In that case, the level of empowering knowledge would be a side effect of another characteristic or variable. This variable should be taken into account during future studies.

On the other hand, the lack of an association between the increase in HRQoL and the level of empowering knowledge might be due to the fact that the countries differed significantly regarding their levels of HRQoL. For example, in Finland, the preoperative HRQoL was highest; therefore they also had the smallest change. Thus, the increase in HRQoL might therefore not be the correct way of assessing the association between HRQoL and empowering knowledge since it might not be able to detect the additional value (other than the surgery itself) of empowering knowledge for HRQoL in groups that differ too much at baseline.

## **6. Conclusion and Implications for Practice**

To conclude, this study found a positive effect of levels of empowering knowledge on the postoperative HRQoL in the total sample. On the national level, the association with postoperative HRQoL was found in most countries as well. This indicates that the HRQoL is likely to be improved by meeting patients' knowledge expectations with patient-centred education. As is well known, orthopaedic hospital care periods have become shorter during the last decade. In practice, it is important that healthcare professionals support patients' active participation in patient education,

because not all patients need the same knowledge, and it is therefore important that education for patients is individually tailored as far as possible, which is likely to affect patient outcomes in positive ways. Since the increase in HRQoL was not associated with empowering knowledge, future research should focus on this apparent contradiction in outcomes.

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### **Author contributions**

K.V., H.L.-K. were responsible for the study conception and design, K.K. for the drafting of the manuscript. K.V., E.P., and N.I., A.S., Å. J. S. performed the data collection and J.K. the data analysis. All authors K.K., H.L.-K., E.C., N.I., Å.J.S., J.K., C.L., E.P., S.S., A.S., K.V. and S.E. have made their critical revisions and approved the final version.

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Table 1. Demographic characteristics of the participants presented according to nationality

		<b>Total sample n = 762</b>	<b>Finland n = 128</b>	<b>Greece n = 123</b>	<b>Iceland n = 206</b>	<b>Spain n = 112</b>	<b>Sweden n = 193</b>
<b>Age (years)</b>	Mean (range)	67.9 (28-91)	64.5 (30-89)	72.2 (46-91)	66.4 (37-87)	71.2 (38-87)	67.2 (28-85)
<b>Sex</b>	Female	463 61%	71 56%	94 76%	114 55%	76 68%	108 56%
	Male	299 39%	57 44%	29 24%	92 45%	36 32%	85 44%
<b>Vocational education</b>	No vocational education	318 47%	39 31%	100 84%	58 31%	79 83%	42 29%
	Secondary vocational degree	154 23%	34 27%	10 8%	59 32%	10 11%	41 28%
	College level vocational degree	110 16%	36 29%	7 6%	40 21%	2 2%	25 17%
	Academic degree	91 14%	16 13%	2 2%	30 16%	4 4%	39 26%
<b>Employment status</b>	Employed	204 28%	34 27%	3 3%	90 44%	15 14%	62 33%
	Retired	425 58%	85 67%	70 60%	93 46%	63 60%	114 61%
	Stay-at-home	72 10%	3 2%	40 34%	3 1%	25 24%	1 1%
	Unemployed/job applicant	11 1%	4 3%	3 3%	0	1 1%	3 2%
	Other	26 3%	1 1%	0	18 9%	1 1%	6 3%
<b>Current surgery</b>	Hip arthroplasty	303 40%	64 50%	43 36%	96 47%	0	100 52%
	Knee arthroplasty	457 60%	65 50%	77 64%	110 53%	112 100%	93 48%
<b>First/second arthroplasty</b>	First	588 77%	96 74%	92 76%	136 66%	116 100%	148 77%
	Second or more	176 23%	33 26%	29 24%	69 34%	0	45 23%

Table 2. Within and between country comparison of preoperative -, postoperative - and increase in HRQoL

	Total sample		Finland		Greece		Iceland		Spain		Sweden		Between country comparison	
	EQ-5D <sub>index</sub> <sup>a</sup>	EQ-5D <sub>VAS</sub> <sup>b</sup>	EQ-5D <sub>index</sub>	EQ-5D <sub>VAS</sub>	EQ-5D <sub>index</sub>	EQ-5D <sub>VAS</sub>	EQ-5D <sub>index</sub>	EQ-5D <sub>VAS</sub>	EQ-5D <sub>index</sub>	EQ-5D <sub>VAS</sub>	EQ-5D <sub>index</sub>	EQ-5D <sub>VAS</sub>	EQ-5D <sub>index</sub>	EQ-5D <sub>VAS</sub>
Preoperative	0.61	58.5	0.68	62.4	0.48	60.5	0.65	59.6	0.58	60.2	0.62	54.8	<0.001	<0.001
Postoperative*	0.83*	69.8*	0.82*	72.8*	0.77*	71.7*	0.83*	72*	0.85*	60.3	0.85*	78.7*	0.001	<0.001
Increase	0.21	13.4	0.14	10.4	0.27	11.2	0.18	12.4	0.28	.1	0.22	23.8	<0.001	<0.001

a. EQ-5D<sub>index</sub> = Index value of the five items of the EuroQol 5-dimensional classification score. 0 = worst possible health state, 1 = best possible health state

b. EQ-5D<sub>VAS</sub> = Visual analogue scale. 0 = worst possible health state, 100 = best possible health state.

\* Difference in pre- and postoperative HRQoL at the national level (within group comparison) was statically significant at the level of  $p < 0.001$



Table 3. Between country comparison of knowledge expectations and received knowledge

	Total sample	Finland	Greece	Iceland	Spain	Sweden	p-value
Expected knowledge <sup>a</sup>	3.6	3.4	3.9	3.7	3.3	3.7	<0.001
Received knowledge <sup>b</sup>	2.9	2.9	2.8	2.9	3.3	2.8	<0.001
Level of empowering knowledge <sup>c</sup>	-0.7	-0.5	-1.1	-0.8	0	-0.9	<0.001

a. EK<sub>hp</sub>-scale ranges from 1(expected little information) – 4 (expected a lot of information)

b. RK<sub>hp</sub>-scale ranges from 1(received little information) – 4 (received a lot of information)

c. The level of empowering knowledge is constructed by calculating the difference between expected and received knowledge.

Table 4. The association between the level of empowering knowledge and the preoperative -, postoperative - and increase in HRQoL per country.

<i>Association between HRQoL and level of empowering knowledge.</i>		<b>Preoperative</b>	<b>Postoperative</b>	<b>Increase in</b>
		<b>HRQoL</b>	<b>HRQoL</b>	<b>HRQoL</b>
		<i>p</i> -value	<i>p</i> -value	<i>p</i> -value
<b>Total sample</b>	EQ-5D <sub>index</sub>	<b>&lt;0.001</b>	<b>&lt;0.001</b>	0.32
	EQ-5D <sub>VAS</sub>	<b>0.05</b>	<b>0.03</b>	0.72
<b>Finland</b>	EQ-5D <sub>index</sub>	<b>0.03</b>	<b>0.003</b>	0.15
	EQ-5D <sub>VAS</sub>	0.09	<b>0.007</b>	0.38
<b>Greece</b>	EQ-5D <sub>index</sub>	0.52	0.06	0.45
	EQ-5D <sub>VAS</sub>	0.54	<b>0.02</b>	<b>0.04</b>
<b>Iceland</b>	EQ-5D <sub>index</sub>	<b>0.002</b>	<b>&lt;0.001</b>	0.38
	EQ-5D <sub>VAS</sub>	<b>0.03</b>	<b>&lt;0.001</b>	0.76
<b>Spain</b>	EQ-5D <sub>index</sub>	0.42	0.84	0.46
	EQ-5D <sub>VAS</sub>	0.21	0.2	0.76
<b>Sweden</b>	EQ-5D <sub>index</sub>	0.06	<b>&lt;0.001</b>	0.14
	EQ-5D <sub>VAS</sub>	<b>0.02</b>	<b>&lt;0.001</b>	0.84