Research Square

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The value of health education including motivational psychology elements for patients with osteoarthritis of the hip and knee- a prospective randomized comparison of two strategies

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Research Article

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Abstract

Background: Patient education is key in the management of chronic musculoskeletal diseases like osteoarthritis (OA) of the hip and/or knee. Comparatively few studies provide information on the content of educational programs and their specific impact on patient-related parameters such as self-efficacy. The objective of this study was to evaluate the effect of two single-session educational trainings containing different motivational psychology elements.

Methods: Two different types of educational training conveying the same information were designed as a one-time intervention. Training A was designed according to the Health Action Process Approach (HAPA). Training B included motivational elements based on positive images. Patients with OA of the hip or knee were randomly assigned to participate in either Training A or Training B. The patients completed questionnaires at baseline, directly after the training and 16 weeks after the training. The main evaluated parameters were disease-specific knowledge, assessed by two different questionnaires, pain-related self-efficacy and OA symptoms (WOMAC score).

Results: Fifty-two patients participated. Of these, 27 were assigned to group A and 25 to group B. Disease-specific knowledge improved significantly in both groups immediately after the training and at 16 weeks follow-up. Self-efficacy was initially enhanced in both groups after the trainings but a significant improvement at 16 weeks follow-up was only found for group A. The increase in self-efficacy scores after 16 weeks was significantly higher in group A than in group B. There was a trend towards improved WOMAC scores after 16 weeks for group A but not for group B.

Conclusion: The results indicate that disease-specific knowledge of OA patients can be enhanced by one-time educational trainings including motivational psychology elements. A HAPA-based training could possibly also lead to lasting improvements regarding patients' self-efficacy and OA-related symptoms. Thus HAPA-based educational programs seem to be a promising, feasible tool to improve OA patients' self-care.

Trial registration:

The study was registered with the German Clinical Trials Register (DRKS00021827).

Background

Osteoarthritis (OA) is a highly prevalent and disabling disease [1, 2]. The impact for both the individual and the society is high and demographic change will lead to an increasing socioeconomic burden [3, 4]. There is a large consensus that patient education should be a high priority in OA management [5, 6]. The 2019 American College of Rheumatology/Arthritis Foundation Guideline for the Management of Osteoarthritis of the Hand, Hip and Knee strongly recommends self-efficacy and self-management

programs for OA patients [5]. Despite these recommendations, only comparatively few patients receive such educational programmes [7]. Furthermore, existing concepts of patient education in osteoarthritis often are not described precisely.

An important pillar in coping with chronic diseases is self-efficacy. First described by Bandura, self-efficacy is a person´s belief that he or she can perform a specific task in the future [8]. Bandura identified past performance, vicarious experience, verbal persuasion and emotional cues as the four sources of self-efficacy. In this framework, past performance in the sense of previously successfully completed tasks is considered as the most important influence. Vicarious experience refers to learning complex behaviour by imitating other persons and the observation that other people can do a task well. Verbal persuasion can be achieved through rhetorical techniques such as positive reinforcement. Furthermore, emotional cues can be used as an additional tool of increasing self-efficacy. Lippke et al. et al. demonstrated that self-efficacy has a moderating role in the implementation of the envisaged goals. Thus, only persons who had a sufficient degree of self-efficacy overcame the gap between the intention to change behaviour to the actual change of behaviour [9]. Pain specific self-efficacy is a person`s ability to successfully adopt to chronic pain situations [10]. Prior research revealed that a higher self-efficacy is associated with lower pain levels and a better physical performance and thus serves as a protective psychological factor in the sense of a higher resiliency in patients with early knee OA [11]. Lorig et al. showed that higher self-efficacy in arthritis patients is associated with lower levels of pain, functional impairments and psychological distress [12]. In several chronic conditions, the literature shows that educational interventions can improve self-efficacy [13–16].

In the conceptual phase of developing an app for OA patient self-care we performed a literature research regarding specific methods of patient education. As we found scarce data in this respect, we developed and evaluated two different teaching concepts for OA patients. We hypothesized that adding motivational psychological techniques to OA knowledge teaching sessions may enhance the effect of patient education, particularly regarding self-efficacy. Training A was based on the established educational concept “Health Action Process Approach” (HAPA) [17], while training B was self-designed. HAPA is a social-cognitive process model of health-related outcomes. Therefore, intervention techniques are used to promote motivational behavioural determinants including risk perception, expectations of action outcome, intention and action planning. In contrast, training B was developed with the aim of an emotion-based approach using images. These images should be linked by the participants with positive feelings and goals in relation to a possible improvement of their OA symptoms. Results from motivational psychology research suggest that images with motivational content can contribute to improved goal achievement [18, 19].

The hypothesis of the study was that a one-time patient education session with motivational psychology elements can improve disease-specific knowledge and self-efficacy.

Methods

The participants were recruited in the outpatient clinic of the Department of Orthopaedics and Trauma Surgery, Musculoskeletal University Center Munich (MUM), LMU Munich. Written informed consent was obtained from each participant. The study was approved by the local ethics committee and registered with the German Clinical Trials Register (DRKS00021827).

Inclusion criteria were a clinical diagnosis of osteoarthritis of the hip and/or knee joint confirmed by x-ray and age ≥ 18 years. Exclusion criteria were the inability to speak and understand the German language and severe acute medical conditions.

All participants received a random pseudonym prior to the data collection. Participants could choose the date of the training according to personal preference. After the appointments had been made, it was decided by lot which training was to take place at which date.

For baseline examination, an anamnesis and physical examination was performed. The Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC) [20, 21] was raised as well as the eight-item Patient Health Questionnaire scale (PHQ-8) for depressive symptoms [22, 23]. Before (T0) and after (T1) the training the participants filled out a questionnaire for pain-specific self-efficacy and two knowledge questionnaires for disease-specific knowledge. Patient knowledge was measured by the Patient Knowledge questionnaire- Osteoarthritis (PKQ-OA) [24], which we translated into German for this study using the Beaton method [25]. A translation was carried out in six steps. These steps were: translation, cross-translation, evaluation of semantic equivalence, elaboration of synthesis versions as well as pre-testing in the target population and finally the development of a final version [25]. As a second questionnaire to test disease-specific knowledge, we developed a 16-item multiple-choice questionnaire, the MF-KWA in German (Münchner Fragebogen für krankheitsspezifisches Wissen bei Arthrose, Munich Questionnaire for Disease-Specific Knowledge Osteoarthritis).

For the examination of pain self-efficacy, the German Adoption of the Pain Self-Efficacy Questionnaire PSEQ [10], called FESS (Fragebogen zur Erfassung der schmerzspezifischen Selbstwirksamkeit), was used [26].

After the intervention, the participants were asked to fill out the comprehensibility of health education programs questionnaire (COHEP) a 30 item to assess patient-perceived comprehensibility of health education programs. The questionnaire comprises four scales, the trainer scale (11 items), the transferability scale (9 items), the medical information scale (6 items) and the amount scale (4 items) [27].

16 weeks after the classroom session (T2), WOMAC, PHQ-8, PKQ-OA, MF-KWA and FESS were collected again.

In both trainings, the same disease-specific knowledge was imparted, only the motivational psychological coaching elements differed in the groups. The knowledge units consisted of anatomy, pathophysiology and therapeutic options. The participants could ask individual questions at any time. Group A received a

HAPA-based training. Participants were supported in developing risk awareness, reflecting on their previous experiences of physical activity with the corresponding barriers in its implementation and finally developing individual goals with concrete action plans.

For the development of training B, a group of physicians with neurological, orthopaedic and rehabilitative background as well as experienced psychologist, psychotherapists and physiotherapists, who all had prior teaching and patient education experience, was formed. These experts designed an image-based intervention. Twenty-five photos of animals and landscapes were compiled. Among the pictures were, for example, images of hiking trails, meadows, bridges, hills, and animals that were often in motion. Each participant was asked to choose a favourite picture and use it to formulate a positive feeling associated with better management of their OA. The favourite picture was given to the patients after the intervention as a coloured print, and the participants wrote the individual feeling associated with it by hand on pre-designed cards, similar to greeting cards with sayings.

Both training courses took place as group classroom sessions with a duration of about 120 minutes. The educational trainings for both groups were conducted by the same team consisting of a physician specialized in rehabilitation and a physiotherapist.

A sample size calculation was performed prior to the study. To achieve a power of 80%, a sample of at least 42 participants was needed to detect medium to large effects, 21 in each group.

Differences of each group between the T0, T1, and T2 were compared using the nonparametric Wilcoxon-signed-rank-test. The comparison between training group A and training group B was performed using Mann-Whitney-U tests.

For statistical calculations, the software package IBM SPSS Statistics 26.0 was used.

Results

52 patients participated, 27 in group A and 25 in group B. Baseline data are shown in Table 1.

Four patients in group A and six patients in group B were lost to the 16 weeks follow-up.

WOMAC scores at baseline and follow-up are shown in Table 2. For participants of group A, there was a statistical trend towards improvement regarding WOMAC (decreasing scores) between baseline and 16 weeks follow-up ($p = 0.051$). In group B WOMAC scores increased but no statistical trend or significance was found ($p = 0.316$). Comparing the two groups, the difference of WOMAC score changes trended towards significance ($p = 0.065$).

Pain-specific self-efficacy measured by FESS improved significantly immediately after training in both group A ($p < 0.0001$) and group B ($p = 0.002$). At 16 weeks follow-up, the FESS scores further increased in group A and were also significantly higher than the baseline values ($p = 0.002$). In group B, FESS scores at 16 weeks follow-up were not significantly different from the baseline values. Immediately after the

training, there was no significant difference in FESS score changes between the two groups. At 16 weeks follow-up, group A showed a significantly stronger improvement of self-efficacy than group B ($p = 0.011$). FESS scores are shown in Fig. 1.

Disease-specific knowledge measured both by PKQ-OA and MF-KWA improved significantly immediately after training and at 16 weeks follow-up both in group A and group B (p-values < 0.002). Comparing the two groups, there were no significant differences in PKQ-OA and MF-KWA score changes ($p > 0.446$). MF-KWA and PKQ-OA scores are illustrated in Figs. 2 and 3, respectively.

The comprehensibility of the training sessions was graded equally high in both groups using the COHEP score (see Table 3).

Table 1
Baseline characteristics

	Total sample (n = 52)	**Group A- HAPA intervention (n = 27)**	**Group B- Picture intervention (n = 25)**
Age (years)	67.5 (45–88)	70 (53–88)	67 (45–83)
Median (Range)	66.8	68.3	65.2
Mean			
Gender			
Female	39	22	17
Male	13	5	8
Depression[a]			
No or mild Depression	44	23	21
Moderate Depression	6	4	2
Moderately severe or severe Depression	2	0	2
Qualification			
Unskilled	0	0	0
Vocational training	45	25	20
University graduate	7	2	5
a: PHQ-8			

Table 2
WOMAC Scores

	WOMAC-Total		WOMAC-Pain		WOMAC-Stiffness		WOMAC-Physical function	
	Baseline	16 Weeks	Baseline	16 Weeks	Baseline	16 Weeks	Baseline	16 Weeks
Group A	68.2	59.5	14.4	11.1	8.0	7.4	45.8	39.9
Group B	68.6	77.5	13.2	15.6	7.2	8.6	48.2	53.3
WOMAC: Western Ontario and McMaster Universities Osteoarthritis Index, group A-HAPA, group B-Image-intervention								

Table 3
Comprehensibility of health education programs

	Group A	Group B
Total score	**90.0**	**91.8**
Comprehension-fostering behaviour of program trainers	89.5	93.9
Transferability to everyday life	91.2	93.9
Comprehensibility of medical information	90.3	94.4
Amount of information	80.1	77.4
All scale values 0-100, 100 = maximum comprehensibility		

Discussion

The importance of patient education for the management of OA is acknowledged in various clinical guidelines [28–30]. Several large studies have shown positive effects on both self-efficacy and functional outcome for OA self-management programmes including a combination of instructed exercises and patient education. For example, over 44.000 patients who participated in the Swedish “Better Management of Patients with Osteoarthritis” programme were evaluated in a registry-based study and improvements regarding pain, quality of life and self-efficacy were found both at three- and twelve-months follow-up [31]. In a similar registry-based study, the Norwegian “Active with OsteoArthritis (AktivA)” model, which includes a three-hour educational session and 6–12 weeks of physiotherapy, was found to decrease pain and raise the quality of life of patients up to two years after the intervention [32]. However, there are relatively few studies that evaluate the specific effect of educational programmes or compare different educational methods. A French group designed an educational programme with three visits. The first visit focused on advice and educational key messages on OA, the second visit covered

joint protection and appropriate exercise regimes and during the third visit, strategies for losing weight and maintaining weight were addressed. The study reports higher physical activity and a greater decrease in weight for patients who participated in the standardized education programme compared to patients who received usual care [33]. Another study evaluated the effects of teaching videos which include dramatized episodes featuring osteoarthritis patients and a narrator providing information about OA in combination with an educational booklet. The authors report an increase in knowledge and improvements in behaviour to participate in their health care [34]. Hansson et al. analysed a programme with a focus on improving self-efficacy consisting of five three-hour sessions over a period of five weeks for patients with osteoarthritis of the knee, hip or hand. Compared to a control group, they found a positive influence of the programme on the quality of life but not on self-efficacy [35].

In our study a one-time educational training with two different complementary motivational psychology strategies for patients with OA were evaluated. Both trainings achieved a significant increase in disease specific knowledge after the training and at 16 weeks follow-up. Pain-specific self-efficacy improved significantly immediately after training in both groups. At 16 weeks follow-up, self-efficacy further increased in group A. In group B, on the other hand, the improvement in self-efficacy was not completely sustained at 16 weeks follow-up and was not significantly different from the baseline values. Moreover, there was a trend towards improvement of OA symptoms measured by the WOMAC score in group A.

The two trainings with a one-time intervention achieved positive effects with a comparatively low use of resources in terms of time expenditure, labour, required staff and additional costs. Hinman et al. pointed out a relevant discrepancy between guideline-based interventions such as weight loss and exercise for osteoarthritis and the implementation of such recommendations in practice [36]. Feasible, economical programs like our training could contribute to a wider use of patient education.

Our results indicate that the training that was conceptually structured according to the HAPA led to more sustainable effects regarding self-efficacy compared to the approach based on motivational pictures. This does not appear to be due to differences in comprehensibility, as both programs were evaluated equally well in this regard. Since HAPA was developed with the goal of bridging the gap between motivation and action, we hypothesize that participants in the corresponding training better implemented and integrated the educational content, such as the importance of exercise, into their daily lives following the intervention. This is consistent with a previous study evaluating a HAPA-based intervention for promoting exercise during pregnancy [37].

Self-efficacy with its various facets plays an important, complex role in the context of behaviour change and motivation. The positive influence of high or improved self-efficacy of OA patients has been demonstrated by several studies [38, 39]. Williams and Rhodes argue that self-efficacy surveys may capture a broader range of behavioural motives and that this needs to be considered as a possible confounder when interpreting results in the context of health behaviour research [40]. To what extent the addition of coaching elements to our interventions had a direct effect on pain-specific self-efficacy or if they influence self-efficacy via motivation remains unclear to a certain extent. Nevertheless, patient

empowerment is a key element for successful behaviour change, as the implementation of the announced goals must be carried out in the everyday life of the patients.

A limitation of the study is the relatively small sample size. Furthermore, the majority of participants were female, which limits the generalizability of the results. In addition, there were no participants without a professional or university degree, so that no statement can be made about the benefit of our educational programme for patients without such degrees. The patients were allowed to carry out their usual conservative treatment for OA such as physiotherapy, as usual during the follow-up period, so that an influence of other therapies cannot be excluded.

Conclusion

Two one-time time educational trainings including motivational psychology elements were shown to improve disease-specific knowledge in OA patients. Our results also indicate that a HAPA-based educational programme is beneficial regarding self-efficacy and possibly OA symptoms. Thus our findings support the use of motivational psychological strategies, particularly HAPA, for patient education. Furthermore, the study demonstrates that positive effects in patient education can be achieved with short, easy-to-implement programmes.

Our study contributes to the development of effective and feasible OA patient education, which is frequently called for but rarely precisely described and evaluated. We suggest that HAPA-based one-time trainings should start early in the patient journey and ideally be made available at diagnosis to support behaviour change through early information and enhanced self-efficacy and to prevent dysfunctional handling of the disease, such as fear of movement, in advance. We assume that an early use of our trainings with a manageable effort could have sustainable positive effects regarding therapy adherence and thus contribute to an improved care and patient empowerment.

In times of the pandemic, when classic group education on site is only possible to a limited extent, the development of digital offers, e.g. app- or video-based, is of particular interest in order to not neglect the needs of patients with chronic musculoskeletal disorders. Mhealth services could also allow patients to receive education programmes addressing physical and psychological aspects tailored to their individual condition. Another advantage of digital patient education could be the improved adaptability to different languages. We believe that the educational sessions described in our study could be well suited to be integrated in mhealth applications and should be considered and evaluated for their effectiveness in this new technical context.

Abbreviations

COHEP
Comprehensibility of health education programs
FESS

Fragebogen zur Erfassung der schmerzspezifischen Selbstwirksamkeit (Questionnaire for the Assessment of Pain-related Self-efficacy)
MF-KWA
Münchner Fragebogen für krankheitsspezifisches Wissen bei Arthrose (Munich Questionnaire for Disease-Specific Knowledge Osteoarthritis)
HAPA
Health Action Process Approach
OA
Osteoarthritis
PHQ-8
Eight-item Patient Health Questionnaire depression scale
PKQ-OA
Patient Knowledge Questionnaire – Osteoarthritis
PSEQ
Pain Self-Efficacy Questionnaire
WOMAC
Western Ontario and McMaster Universities Osteoarthritis Index

Declarations

Ethics approval and consent to participate

The study was approved by the ethics committee of the medical faculty of the Ludwig Maximilians University Munich (Nr. 19-387). Written informed consent was obtained from each participant.

Consent for publication

Not applicable.

Availability of data and materials

The datasets used and/or analysed during the current study are available from the corresponding author on reasonable request.

Competing interests

Stephan Huber is an employee of Kaia Health and receives salary and stock options.

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Authors' contributions

JTB, EK, MR, SK, BMH, SH and AL contributed substantially to the conception and design of the study and the acquisition, analysis and interpretation of the data. JTB, SH and AL drafted the manuscript. EK, MR, SK and BMH read and revised and the manuscript. All authors approved the submitted version.

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Not applicable.

References

1. Glyn-Jones S, Palmer AJ, Agricola R, Price AJ, Vincent TL, Weinans H, et al. Osteoarthritis. Lancet. 2015;386(9991):376–87.
2. Hunter DJ, Schofield D, Callander E. The individual and socioeconomic impact of osteoarthritis. Nat Rev Rheumatol. 2014;10(7):437–41.
3. Picavet HS, Hazes JM. Prevalence of self reported musculoskeletal diseases is high. Ann Rheum Dis. 2003;62(7):644–50.
4. Berger A, Bozic K, Stacey B, Edelsberg J, Sadosky A, Oster G. Patterns of pharmacotherapy and health care utilization and costs prior to total hip or total knee replacement in patients with osteoarthritis. Arthritis Rheum. 2011;63(8):2268–75.
5. Kolasinski SL, Neogi T, Hochberg MC, Oatis C, Guyatt G, Block J, et al. 2019 American College of Rheumatology/Arthritis Foundation Guideline for the Management of Osteoarthritis of the Hand, Hip, and Knee. Arthritis Care Res (Hoboken). 2020;72(2):149–62.
6. Conaghan PG, Dickson J, Grant RL, Guideline Development G. Care and management of osteoarthritis in adults: summary of NICE guidance. BMJ. 2008;336(7642):502–3.
7. Skou ST, Roos EM. Physical therapy for patients with knee and hip osteoarthritis: supervised, active treatment is current best practice. Clin Exp Rheumatol. 2019;37 Suppl 120(5):112–7.
8. Bandura A. Self-efficacy: toward a unifying theory of behavioral change. Psychol Rev. 1977;84(2):191–215.
9. Lippke S, Wiedemann AU, Ziegelmann JP, Reuter T, Schwarzer R. Self-efficacy moderates the mediation of intentions into behavior via plans. Am J Health Behav. 2009;33(5):521–9.
10. Nicholas MK. The pain self-efficacy questionnaire: Taking pain into account. Eur J Pain. 2007;11(2):153–63.
11. Schulz R, Heckhausen J. A life span model of successful aging. Am Psychol. 1996;51(7):702–14.
12. Lorig K, Chastain RL, Ung E, Shoor S, Holman HR. Development and evaluation of a scale to measure perceived self-efficacy in people with arthritis. Arthritis Rheum. 1989;32(1):37–44.
13. Kennedy A, Reeves D, Bower P, Lee V, Middleton E, Richardson G, et al. The effectiveness and cost effectiveness of a national lay-led self care support programme for patients with long-term conditions: a pragmatic randomised controlled trial. J Epidemiol Community Health. 2007;61(3):254–61.

14. Lorig KR, Ritter P, Stewart AL, Sobel DS, Brown BW, Jr., Bandura A, et al. Chronic disease self-management program: 2-year health status and health care utilization outcomes. Med Care. 2001;39(11):1217–23.
15. Tsay SL. Self-efficacy training for patients with end-stage renal disease. J Adv Nurs. 2003;43(4):370–5.
16. Abbasi A, Najafi Ghezeljeh T, Ashghali Farahani M, Naderi N. Effects of the self-management education program using the multi-method approach and multimedia on the quality of life of patients with chronic heart failure: A non-randomized controlled clinical trial. Contemp Nurse. 2018;54(4–5):409–20.
17. Schwarzer R. Self-efficacy in the adoption and maintenance of health behaviors: Theoretical approaches and a new model. (Ed.) RS, editor. Washington, DC: Hemisphere; 1992.
18. Loke YK, Hinz I, Wang X, Rowlands G, Scott D, Salter C. Impact of health literacy in patients with chronic musculoskeletal disease–systematic review. PLoS One. 2012;7(7):e40210.
19. Bipp TK, A; van Mierlo, H; Kunde, W. The Effect of Subconcious Performance Goals on Academic Performance. The Journal of Experimental Education. 2017(83:5):469–85.
20. Bellamy N, Buchanan WW, Goldsmith CH, Campbell J, Stitt LW. Validation study of WOMAC: a health status instrument for measuring clinically important patient relevant outcomes to antirheumatic drug therapy in patients with osteoarthritis of the hip or knee. J Rheumatol. 1988;15(12):1833–40.
21. Stucki G, Meier D, Stucki S, Michel BA, Tyndall AG, Dick W, et al. [Evaluation of a German version of WOMAC (Western Ontario and McMaster Universities) Arthrosis Index]. Z Rheumatol. 1996;55(1):40–9.
22. Kroenke K, Strine TW, Spitzer RL, Williams JB, Berry JT, Mokdad AH. The PHQ-8 as a measure of current depression in the general population. J Affect Disord. 2009;114(1–3):163–73.
23. Löwe B SR, Zipfel S Gesundheitsfragebogen für Patienten (PHQ-D). Komplettversion und Kurzform. Testmappe mit Manual, Fragebögen, Schablonen.. Karlsruhe: Pfizer; 2002.
24. Hill J, Bird H. Patient knowledge and misconceptions of osteoarthritis assessed by a validated self-completed knowledge questionnaire (PKQ-OA). Rheumatology (Oxford). 2007;46(5):796–800.
25. Beaton DE, Bombardier C, Guillemin F, Ferraz MB. Guidelines for the process of cross-cultural adaptation of self-report measures. Spine (Phila Pa 1976). 2000;25(24):3186–91.
26. Mangels M SS, Sohr G, Holme M, Rief R. Der Fragebogen zur Erfassung der schmerzspezifischen Selbstwirksamkeit (FESS) - Eine Adaptation des Pain Self-Efficacy Questionnaire für den deutschen Sprachraum Diagnostica 2009. p. pp. 84–93.
27. Farin E, Nagl M, Ullrich A. The comprehensibility of health education programs: questionnaire development and results in patients with chronic musculoskeletal diseases. Patient Educ Couns. 2013;90(2):239–46.
28. Bannuru RR, Osani MC, Vaysbrot EE, Arden NK, Bennell K, Bierma-Zeinstra SMA, et al. OARSI guidelines for the non-surgical management of knee, hip, and polyarticular osteoarthritis. Osteoarthritis Cartilage. 2019;27(11):1578–89.

29. Kolasinski SL, Neogi T, Hochberg MC, Oatis C, Guyatt G, Block J, et al. 2019 American College of Rheumatology/Arthritis Foundation Guideline for the Management of Osteoarthritis of the Hand, Hip, and Knee. Arthritis Rheumatol. 2020;72(2):220–33.
30. Lohmander LS, Roos EM. Clinical update: treating osteoarthritis. Lancet. 2007;370(9605):2082–4.
31. Jonsson T, Eek F, Dell'Isola A, Dahlberg LE, Ekvall Hansson E. The Better Management of Patients with Osteoarthritis Program: Outcomes after evidence-based education and exercise delivered nationwide in Sweden. PLoS One. 2019;14(9):e0222657.
32. Holm I, Pripp AH, Risberg MA. The Active with OsteoArthritis (AktivA) Physiotherapy Implementation Model: A Patient Education, Supervised Exercise and Self-Management Program for Patients with Mild to Moderate Osteoarthritis of the Knee or Hip Joint. A National Register Study with a Two-Year Follow-Up. J Clin Med. 2020;9(10).
33. Ravaud P, Flipo RM, Boutron I, Roy C, Mahmoudi A, Giraudeau B, et al. ARTIST (osteoarthritis intervention standardized) study of standardised consultation versus usual care for patients with osteoarthritis of the knee in primary care in France: pragmatic randomised controlled trial. BMJ. 2009;338:b421.
34. Lopez-Olivo MA, des Bordes JK, Lin H, Volk RJ, Rizvi T, Suarez-Almazor ME. A Randomized Controlled Trial Comparing Two Self-Administered Educational Strategies for Patients With Knee Osteoarthritis. ACR Open Rheumatol. 2021;3(3):185–95.
35. Hansson EE, Jonsson-Lundgren M, Ronnheden AM, Sorensson E, Bjarnung A, Dahlberg LE. Effect of an education programme for patients with osteoarthritis in primary care–a randomized controlled trial. BMC Musculoskelet Disord. 2010;11:244.
36. Hinman RS, Nicolson PJ, Dobson FL, Bennell KL. Use of nondrug, nonoperative interventions by community-dwelling people with hip and knee osteoarthritis. Arthritis Care Res (Hoboken). 2015;67(2):305–9.
37. Gaston A, Prapavessis H. Using a combined protection motivation theory and health action process approach intervention to promote exercise during pregnancy. J Behav Med. 2014;37(2):173–84.
38. Degerstedt A, Alinaghizadeh H, Thorstensson CA, Olsson CB. High self-efficacy - a predictor of reduced pain and higher levels of physical activity among patients with osteoarthritis: an observational study. BMC Musculoskelet Disord. 2020;21(1):380.
39. Skou ST, Simonsen ME, Odgaard A, Roos EM. Predictors of long-term effect from education and exercise in patients with knee and hip pain. Dan Med J. 2014;61(7):A4867.
40. Williams DM, Rhodes RE. The confounded self-efficacy construct: conceptual analysis and recommendations for future research. Health Psychol Rev. 2016;10(2):113–28.

Figures

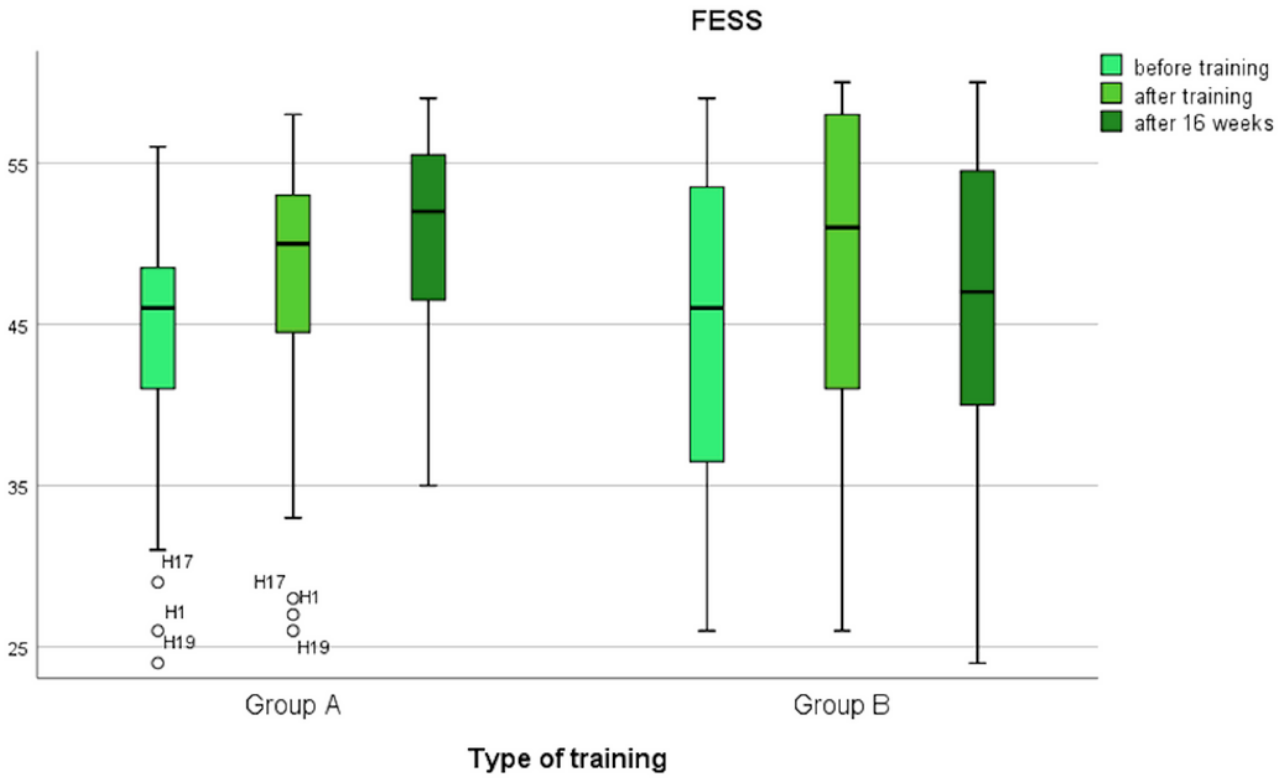

Figure 1

Pain self-efficacy

Scores of the pain self-efficacy questionnaire (german version, “FESS” = “Fragebogen zur Erfassung der schmerzspezifischen Selbstwirksamkeit”) in group A (training based on the Health Action Process Approach) and group B (image-based training).

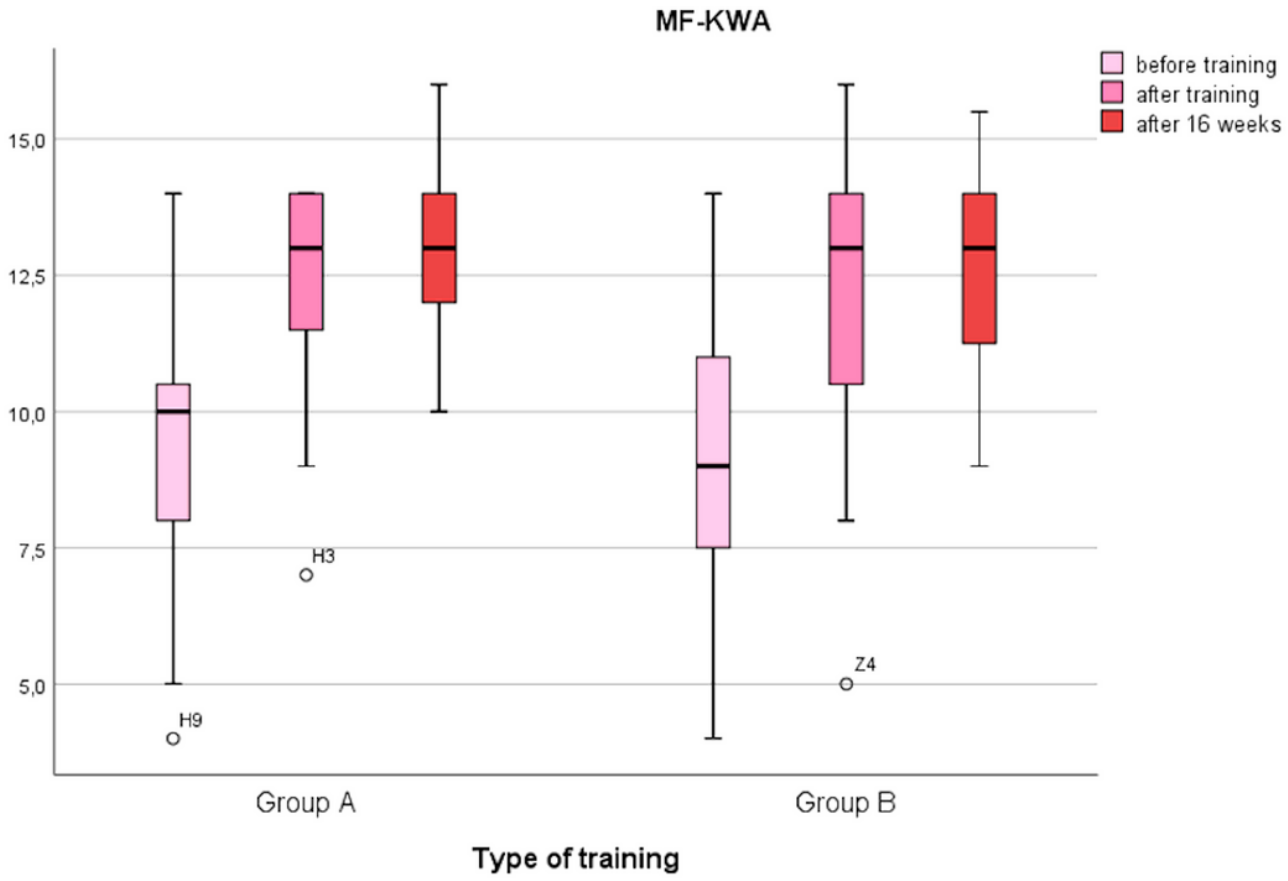

Figure 2

Disease-specific knowledge (MF-KWA)

Scores of the knowledge questionnaire “MF-KWA” (Münchner Fragebogen für krankheitsspezifisches Wissen bei Arthrose, Munich Questionnaire for Disease-Specific Knowledge Osteoarthritis) in group A (training based on the Health Action Process Approach) and group B (image-based training).

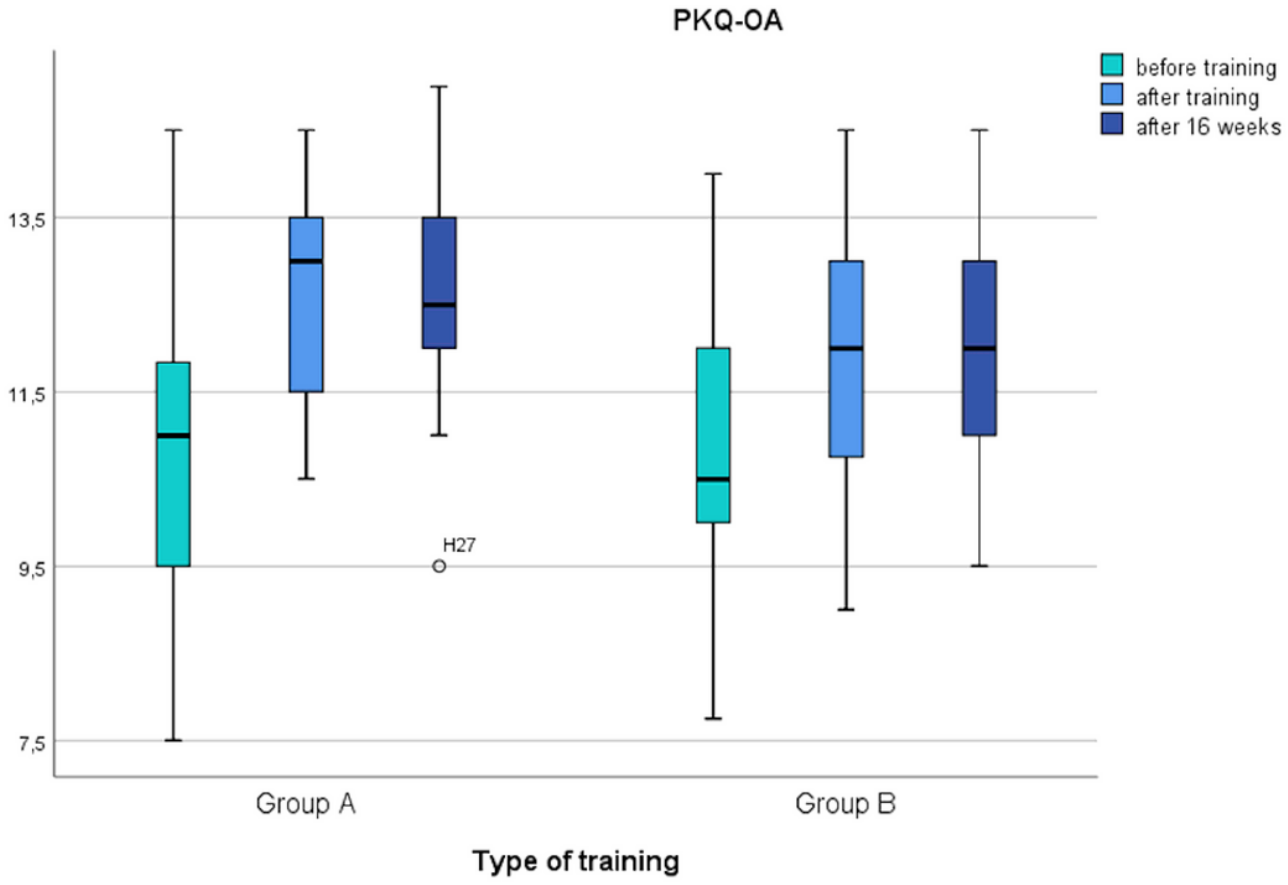

Figure 3

Disease-specific knowledge (PKQ-OA)

Scores of the knowledge questionnaire “PKQ-OA” (Patient Knowledge Questionnaire – Osteoarthritis) in group A (training based on the Health Action Process Approach) and group B (image-based training).