REVIEW ARTICLE (META-ANALYSIS)

Evaluation of Cognitive Behavioral Interventions and Psychoeducation Implemented by Rehabilitation Specialists to Treat Fear-Avoidance Beliefs in Patients With Low Back Pain: A Systematic Review

Shelby Baez, MSAT, ATC,[a] Matthew C. Hoch, PhD, ATC,[b] Johanna M. Hoch, PhD, ATC[b]

From the [a]Rehabilitation Sciences Program and [b]Division of Athletic Training, University of Kentucky, Lexington, KY.

Abstract

Objectives: To systematically locate, critically appraise, and synthesize the available evidence regarding the effectiveness of cognitive behavioral therapies (CBTs) and psychoeducation that can be implemented by rehabilitation specialists to treat fear-avoidance beliefs in patients with acute, subacute, and chronic low back pain (LBP).

Data Sources: Electronic databases (CINAHL, PubMed, Psychology and Behavior Sciences Collection, SPORTDiscus, PsycINFO) were searched from inception to September 2017.

Study Selection: Assessment of methodological quality was completed using the Physiotherapy Evidence Database (PEDro) scale. The Strength of Recommendation Taxonomy was used to evaluate the quality of evidence.

Data Extraction: Study sample, subject demographics, CBT and/or psychoeducation intervention details, data collection time points, outcome assessments, statistical analysis, results, and conclusions were extracted from each study. In addition, effect sizes were calculated.

Data Synthesis: Five high-quality studies (PEDro ≥6) were included. All included studies evaluated fear-avoidance beliefs. CBTs and psychoeducation strategies designed to target patient-specific fears demonstrated clinically meaningful results, while psychoeducation methodologies were not as effective.

Conclusions: There is inconsistent, patient-oriented evidence (grade B) to support the use of CBTs and/or psychoeducation strategies by rehabilitation specialists to treat fear-avoidance beliefs. Patient-centered and personalized CBTs were most effective to treat these psychosocial factors in patients with LBP when compared with a control treatment.

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The fear-avoidance model provides a conceptual framework to illustrate how fear-avoidance beliefs can affect a patient's health-related quality of life and physical activity levels.[1,2] Specifically, this model suggests why patients who engage in avoidant behaviors after initial injury enter a cycle of pain, depression, and disability.[1,2] This phenomenon is commonly evaluated in patients with acute, subacute, or chronic low back pain (LBP), and recent literature[3-5] has established a relationship between fear-avoidance beliefs, kinesiophobia, and poor long-term outcomes in patients with LBP. For example, some patients with LBP have elevated pain-related fear, which may help explain why these patients report chronic disability and do not return to work or desired physical activity.[5] Specific treatments have been developed to help combat psychosocial factors such as fear-avoidance beliefs, kinesiophobia, or both.[6,7] Specifically for patients with acute, subacute, or chronic LBP, cognitive behavioral therapies (CBTs) and psychoeducation are often used as interventions to decrease fear-avoidance beliefs, kinesiophobia, or both.[6,7]

CBT emphasizes the interrelations between patient's thoughts, feelings, and behaviors.[8] Compared with other forms of psychotherapy, CBT is short-term, goal-oriented, and focuses on the modification of dysfunctional beliefs and behaviors to reduce distress and improve long-term function.[9] CBT techniques include cognitive restructuring,[8] patient education and effective communication,[10] and cognitive functional therapies, such as in vivo

exposure technique.[3] Some CBT treatments must be used by trained mental health professionals,[6,7] but other techniques such as graded exposure and psychoeducation can be provided by a rehabilitation specialist.[3,8] While it is very important to engage in interprofessional collaboration with mental health specialists, it is also important to evaluate treatments or interventions that can be implemented in the musculoskeletal rehabilitation setting to treat fear after injury. Previous systematic reviews[6,7] have examined the interventions and the efficacy of these interventions used to combat psychosocial risk factors in patients with LBP; however, to our knowledge, no systematic review has focused on interventions that can be implemented by a rehabilitation specialist during the patient's musculoskeletal rehabilitation. Therefore, the purpose of this systematic review is to systematically locate, critically appraise, and synthesize the available evidence regarding the effectiveness of CBTs and psychoeducation on fear-avoidance beliefs, kinesiophobia, or both, which were implemented by a rehabilitation specialist, in the treatment of patients with LBP compared with a control treatment. For the purpose of this review, rehabilitation specialists included athletic trainers, physical therapists, occupational therapists, and physiotherapists.

Methods

This systematic review was performed using the Preferred Reporting Items for Systematic Reviews and Meta-Analyses guidelines.

Search strategy

The electronic databases CINAHL, PubMed, Psychology and Behavior Sciences Collection, SPORTDiscus, and PsycINFO were systematically searched from their inception through September 1, 2017, by the primary investigator. A combination of keywords related to fear-avoidance beliefs, kinesiophobia, LBP, CBT, and psycho-education were searched in the databases (table 1). Boolean operators "OR" and "AND" were used to merge search terms. Additional articles were identified through a hand search of the reference lists of articles that were identified through database searches. Duplicates retrieved from different databases were removed.

Eligibility criteria

The primary author reviewed articles identified by the systematic search for inclusion in the review. Abstracts and titles were screened by 2 independent reviewers (S.B., J.M.H.) to determine whether the study met inclusion criteria for this review. Thus, each abstract was

List of abbreviations:

CBT	cognitive behavioral therapy
CFT	cognitive functional therapy
FABQ	Fear-Avoidance Beliefs Questionnaire
FABQ-PA	Fear-Avoidance Beliefs Questionnaire—Physical Activity Subscale
FABQ-W	Fear-Avoidance Beliefs Questionnaire—Work Subscale
HSCL	Hopkins Symptom Checklist
LBP	low back pain
ODI	Oswestry Disability Index
PEDro	Physiotherapy Evidence Database
PINRS	Pain Intensity Numerical Rating Scale

Table 1 Search strategy

Step	Search Terms	Boolean Operator	EBSCO Host
1	Low Back Pain Non Specific Low Back Pain Backache Lumbago Chronic Low Back Pain Low Back Dysfunction Back Pain Acute Low Back Pain Subacute Low Back Pain	OR	58, 715
2	Fear Avoidance Fear Avoidance Beliefs Fear of Movement Kinesiophobia Fear of Reinjury Biopsychosocial	OR	22, 853
3	Intervention Treatment Rehabilitation Rehab Therapy Cognitive Therapy Behavioral Therapy Cognitive Behavioral Therapy Psychoeducation	OR	9, 722, 072
4	1+2+3	AND	1, 608
5		Limited to ALL ADULT	438
6		Limited to English	428
Hand search			3
Total identified			431

read twice for inclusion. Once the independent reviewers determined the study would be included, the full text of the article was reviewed. Only the full text of the abstracts that met the inclusion criteria was reviewed. If disagreements occurred about study eligibility, a third reviewer (M.C.H.) who was blinded to the decisions of the independent reviewers made the final decision on whether the study would be included into the final review.

Inclusion criteria

Studies were included in the systematic review if they met the following criteria:

- Used a randomized controlled trial study design.
- Included cognitive functional therapy (CFT), CBT patient education/psychoeducation techniques, or fear-avoidance—based.

Table 2   Characteristics of included studies

| Author	Level of Evidence	PEDro Score	Type of LBP	Subject Characteristics	Intervention	Data Collection Time Points	No. of Control Patients	No. of Experimental Patients	Dependent Variables	Results
George et al,[13] 2003	1	7	Acute LBP	*Inclusion:* Between ages 18 and 55y, LBP within the last 8wk, English speaking/reading *Exclusion*: Nerve root compression, low back surgery within the last 6mo, tumor, fracture, osteoporosis, or pregnancy	*Intervention:* Patients were enrolled in a fear-avoidance—based physical therapy treatment that consisted of distribution of the *Back Book* to complete during HEP and graded exercise supervised by a physical therapist. Graded exercise consisted of a predetermined quota of intensity of exercise, duration of exercise, or repetition of exercise. *Control*: Patients were enrolled in appropriate treatment-based classification therapy and were provided *Handy Hints*, an educational pamphlet to read as part of their HEP.	Preassessment, 4-wk and 6-mo follow-up	32	34	ODI, pain intensity, FABQ	The intervention group had significantly lower FABQ scores at both follow-ups compared with the control group. There were no other significant differences between groups at any of the time points for the ODI or pain intensity outcome measures.
Sparkes et al,[14] 2012	1	9	Chronic LBP	*Inclusion:* Aged >18y, LBP with or without referred pain, and referral to the spine clinic by general practitioner *Exclusion:* Serious spinal disease, history of drug or alcohol abuse, psychiatric illness, or inability to read, write, or understand English	*Intervention:* Patients received the *Back Book* while waiting for their appointment with SPC. Patients completed the outcome questionnaires before reading the *Back Book*. Patients completed the postassessments at their first appointment with SPC. *Control:* No additional information was provided while waiting for appointment with SPC. Patients completed the preappointment questionnaires while waiting for an appointment with the SPC and the postappointment questionnaires.	Preappointment and postappointment	32	34	BBQ, FABQ, RMDQ, VAS	No statistical differences between groups for any of the outcome measures.
Rasmussen-Barr et al,[15] 2009	1	6	Chronic LBP	*Inclusion*: Ages 18—60y, working, back pain lasting >8wk, 1 pain-free period in the previous year *Exclusion:* First-time LBP, radiating pain, lumbar disk hernia or fracture, back surgery, diagnosed inflammatory joint disease, severe osteoarthritis, or malignant disease	*Intervention:* Patients met with a physical therapist and completed an exercise program that was based on pain level and observed movement control and quality (graded exercise). Patients were also given an HEP and were instructed to complete the HEP indefinitely to avoid recurrent back pain. Finally, patients were educated on the importance of activating stabilizing muscles for activities of daily living. *Control:* Patients were instructed to take a 30-min walk every day. They were given a general HEP but received no follow-up instructions. Patients documented their walks in a diary and returned it to their physical therapist. No formal physical therapy occurred.	Before physical therapy, after physical therapy, 6, 12, and 36mo	35	36	ODI, VAS, SF-36, SES, FABQ-PA	No significant differences between groups for fear-avoidance beliefs or pain. There were significant differences in ODI scores. Participants enrolled in the exercise group demonstrated significant decreases in perceived disability at postintervention, 6, and 12mo after baseline.

Table 2 (*continued*)

Author	Level of Evidence	PEDro Score	Type of LBP	Subject Characteristics	Intervention	Data Collection Time Points	No. of Control Patients	No. of Experimental Patients	Dependent Variables	Results
										Additionally, there was a significant difference in pain reduction from baseline between groups immediately postintervention. Lastly, there was a significant group difference at the follow-up time points in physical health. The exercise group had significantly better physical health immediately postintervention and at 6-, 12-, and 36-mo follow-ups. They also had improved self-efficacy at both the 12- and 36-mo follow-ups compared with the control group.
Rantonen et al,[16] 2014	1	6	Mild LBP	*Inclusion:* Aged <57y, reported LBP intensity between 10 and 34mm on VAS in the past week, and fulfilled 1 of the following criteria: LBP duration of ≥2wk in the past 12mo; LBP that radiates below the knee; recurrent LBP (≥2 episodes in past year), and self-reported work absence due to LBP in the past year. *Exclusion:* Retirement within the follow-up period, pregnancy, acute nerve root compression	*Intervention:* Patients were given the *Back Book* by an occupational health nurse who reviewed the book in detail and provided an additional PowerPoint presentation prepared by the primary author. *Control:* Patients only received the *Back Book* without any further information or advice.	Pre—*Back Book* distribution, 3, 6, 12, 24, 48mo post	92	89	RM-18, FABQ, VAS, HRQL	No statistical differences between groups for any outcome measure

(*continued on next page*)

Table 2 (*continued*)

Author	Level of Evidence	PEDro Score	Type of LBP	Subject Characteristics	Intervention	Data Collection Time Points	No. of Control Patients	No. of Experimental Patients	Dependent Variables	Results
				symptoms, malignant tumors, recent fracture, severe osteoporosis, or other disease.						
Vibe Fersum et al,[17] 2013	1	6	Chronic, nonspecific LBP	*Inclusion:* Localized back pain as a result of mechanical dysfunction *Exclusion:* Continuous sick leave for >4mo, specific LBP diagnosis, any lower limb surgery in the previous 3mo, surgery involving the lumbar spine, pregnancy, diagnosed with psychiatric disorder, widespread constant nonspecific pain disorder, pain without clear mechanical behavior, active rheumatologic disease, progressive neurologic disease, serious cardiac or internal medical condition, malignant diseases, acute traumas, infection or acute vascular catastrophes	*Intervention:* After examination by a physical therapist, the patients completed classification- based cognitive functional therapy, which had 4 main components: (1) an outline of the patient's pain in a diagram; (2) completed specific movement exercises to normalize maladaptive movement behaviors; (3) focused on a functional integration of activities avoided in activities of daily living; and (4) a physical activity program designed for the movement classification. Patients were seen 2—3 times per week for 30- to 45-min sessions for 12wk. *Control:* Treated with joint mobilization or manipulation techniques to the spine or pelvis. Patients were also given general exercise or motor control exercise. Patients were not assigned into a classification group.	3mo, 12mo	43	51	ODI, PINRS, HSCL-25, FABQ, Patient Satisfaction Questionnaire, Orebro Screening Questionnaire	Statistical and clinical significance between groups for all outcomes measures at 3 and 12mo.

Abbreviations: BBQ, Back Beliefs Questionnaire; FABQ-PA, Fear-Avoidance Beliefs Questionnaire—Physical Activity Subscale; HEP, home exercise plan; HRQL, Health-Related Quality of Life; HSCL-25, Hopkins Symptom Checklist; ODI, Oswestry Disability Index; PINRS, Pain Intensity Numerical Rating Scale; RM-18, Roland-Morris Disability Questionnaire—18 items; RMDQ, Roland-Morris Disability Questionnaire; SES, Self-Efficacy Scale; SF-36, Medical Outcomes Study 36-Item Short-Form Health Survey; SPC, Spinal Pain Clinic; VAS, visual analog scale.
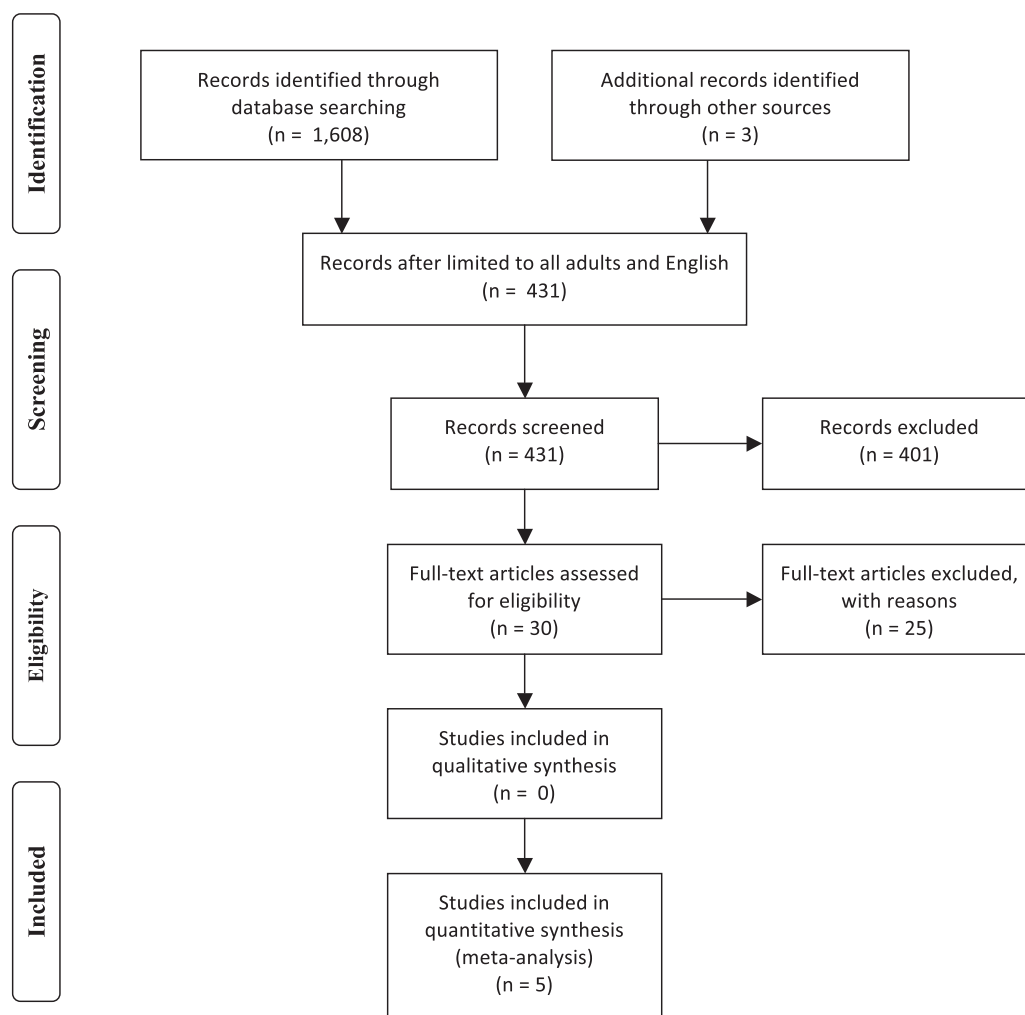
Fig 1 Flowchart of literature review. This figure was adapted from the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) statement created by Moher et al.[19]

rehabilitation. CBT was operationally defined as previously described by Beck.[9]

- Included adults (aged >18y) with acute, subacute, or chronic LBP.
- Evaluated an intervention that could be implemented by a rehabilitation specialist (physical therapists, athletic trainers, occupational therapists, physiotherapists).
- Included a patient-reported outcome measure as a measure of effectiveness specific to fear-avoidance beliefs (ie, Fear-Avoidance Beliefs Questionnaire [FABQ]) or kinesiophobia (ie, Tampa Scale of Kinesiophobia).

Exclusion criteria

Studies were excluded from the systematic review for the following reasons:

- Did not evaluate fear, fear-avoidance beliefs, or kinesiophobia in the participants.
- Included postsurgical patients (ie, lumbar fusions, disk surgery, etc) or specified pathologies (ie, disk degeneration).
- Included an intervention that could only be implemented by a mental health specialist.
- Were not published in English.

Quality assessment

The quality of each of the included studies was determined using the Physiotherapy Evidence Database (PEDro) scale. The PEDro scale was developed to identify randomized controlled trials that were internally valid and to determine whether randomized controlled trials provided sufficient statistical information to allow results to be interpretable.[11] Two investigators (S.B., J.M.H.) independently reviewed each study, completed the PEDro, and then came to a consensus on the quality of each study. In the event of disagreement, a third investigator (M.C.H.) who was blind to the previous assessment results made the final decision on final scoring of each study. Studies were considered high quality if a PEDro score was ≥6.[11]

Study characteristics

Characteristics associated with each study were extracted. All studies included interventions to treat fear-avoidance beliefs in patients with acute, subacute, or chronic LBP. The characteristics extracted for each study were as follows: subject demographics, information regarding the experimental and control intervention used, data collection time points, specific outcome

Table 3 Risk of bias of included studies

PEDro Item	Sparkes et al,[14] 2012	Rasmussen-Barr et al,[15] 2009	Rantonen et al,[16] 2014	Vibe Fersum et al,[17] 2013	George et al,[13] 2003
1. Eligibility criteria were specified.	Yes	Yes	Yes	Yes	Yes
2. Subjects were randomly allocated to groups (in a crossover study, subjects were randomly allocated an order in which treatments were received).	Yes	Yes	Yes	Yes	Yes
3. Allocation was concealed.	Yes	Yes	Yes	Yes	Yes
4. The groups were similar at baseline regarding the most important prognostic factors.	Yes	Yes	Yes	Yes	Yes
5. There was blinding of all subjects.	No	No	No	No	No
6. There was blinding of all therapists who administered the therapy.	Yes	No	No	No	No
7. There was blinding of all assessors who measured at least 1 key outcome.	Yes	No	No	Yes	No
8. Measures of at least 1 key outcome were obtained from >85% of the subjects initially allocated to groups.	Yes	No	No	No	Yes
9. All subjects for whom outcome measures were available received the treatment or control condition as allocated or, where this was not the case, data for at least 1 key outcome were analyzed by "intention to treat."	Yes	Yes	Yes	No	Yes
10. The results of between-group statistical comparisons are reported for at least 1 key outcome.	Yes	Yes	Yes	Yes	Yes
11. The study provides both point measures and measures of variability for at least 1 key outcome.	Yes	Yes	Yes	Yes	Yes
Total	9/10	6/10	6/10	6/10	7/10

measures for each study, and the results associated with each respective study.

Level of evidence and strength of recommendation

Quality assessment of the evidence for recommendations was evaluated using the Strength of Recommendation Taxonomy.[12] The Strength of Recommendation Taxonomy is a patient-centered method to grading evidence in the health care literature.[12] Individual study quality was assessed using the following Strength of Recommendation Taxonomy levels: level 1 evidence represents good-quality, patient-oriented evidence; level 2 evidence represents limited-quality, patient-oriented evidence; and level 3 represents other evidence. Strength of recommendation was also assessed using the Strength of Recommendation Taxonomy grades. A grade of A represents consistent, good-quality, patient- oriented evidence; a grade of B represents inconsistent or limited-quality, patient-oriented evidence; and a grade of C represents consensus, disease-oriented evidence.[12]

Table 4 Hedges' g effect sizes and 95% CIs for all time points for the included studies

Studies	Outcome Measures	Time Point	Experimental	Control	Effect Size (95% CI)
George et al,[13] 2003	FABQ-PA	4wk	10.7±5.4	14.9±6.5	−0.70 (−1.19, −0.20)
	FABQ-PA	6mo	10.1±5.9	13.5±7.0	−0.52 (−1.01, −0.03)
	FABQ-W	4wk	11.1±10.5	13.4±12.4	−0.20 (−0.68, 0.29)
	FABQ-W	6mo	9.7±10.2	12.3±12.3	−0.23 (−0.71, 0.26)
	ODI	4wk	17.7±19.5	21.5±18.3	−0.20 (−0.68, 0.20)
	ODI	6mo	11.9±10.0	15.5±17.9	−0.25 (−0.73, 0.24)
	Pain*	4wk	1.9±2.4	2.6±2.4	−0.29 (−0.77, 0.20)
	Pain*	6mo	1.7±2.2	1.5±2.0	0.09 (−0.39, 0.58)
Sparkes et al,[14] 2012	FABQ	Post	11.3±6.0	12.4±3.9	−0.21 (−0.73, 0.31)
	BBQ	Post	27.7±8.5	27.1±8.3	0.07 (−0.45, 0.31)
	RMDQ	Post	8.3±5.4	6.5±4.6	0.35 (−0.17, 0.88)
	VAS	Post	4.22±3.2	3.74±2.6	0.16 (−0.36, 0.68)
Rantonen et al,[16] 2014	FABQ	3mo	28±11	26±10	0.19 (−0.10, 0.48)
	FABQ	6mo	25±10	25±10	0.00 (−0.29, 0.29)
	FABQ	12mo	27±11	25±9	0.20 (−0.09, 0.49)
	FABQ	24mo	26±12	25±9	0.09 (−0.20, 0.39)
	RM-18	3mo	3±3	2±3	0.33 (0.04, 0.63)
	RM-18	6mo	2±3	2±3	0.00 (−0.29, 0.29)
	RM-18	12mo	2±3	2±3	0.00 (−0.29, 0.29)
	RM-18	24mo	2±4	2±3	0.00 (−0.29, 0.29)
	VAS	3mo	16±16	20±21	−0.21 (−0.51, 0.08)
	VAS	6mo	14±16	17±17	−0.18 (−0.48, 0.11)
	VAS	12mo	19±20	17±19	0.10 (−0.19, 0.40)
	VAS	24mo	20±23	18±20	0.09 (−0.20, 0.39)
	HRQL	3mo	0.92±0.07	0.93±0.06	−0.15 (−0.45, 0.14)
	HRQL	6mo	0.92±0.09	0.93±0.07	−0.12 (−0.42, 0.17)
	HRQL	12mo	0.92±0.09	0.93±0.06	0.00 (−0.29, 0.29)
	HRQL	24mo	0.91±0.10	0.92±0.07	−0.12 (−0.41, 0.18)
Vibe Fersum et al,[17] 2013	FABQ-PA	3mo	6.1±5.0	10.3±6.0	−0.76 (−1.18, −0.34)
	FABQ-PA	12mo	5.8±5.5	10.9±5.5	−0.92 (−1.35, −0.49)
	FABQ-W	3mo	8.3±8.4	17.4±10.8	−0.94 (−1.37, −0.52)
	FABQ-W	12mo	7.7±9.0	16.6±12.2	−0.21 (−0.73, 0.31)
	ODI	3mo	7.6±6.7	18.5±8.1	−1.48 (−1.94, −1.02)
	ODI	12mo	9.9 ±9.8	19.7±11.7	−0.91 (−1.22, −0.48)
	PINRS	3mo	1.7±1.7	3.8±1.9	−1.16 (−1.60, −0.72)
	PINRS	12mo	2.3±2.0	3.8±2.1	−0.73, (−1.15, −0.31)
	HSCL	3mo	1.20±0.27	1.43±0.37	−0.71, (−1.13, −0.30)
	HSCL	12mo	1.22±0.32	1.51±0.47	−0.73, (−1.13, −0.30)
	ROM	3mo	49.7±14.0	45.6±12.7	0.30 (−0.11, 0.71)

NOTE. Values are mean ± SD or as otherwise indicated.
Abbreviations: BBQ, Back Beliefs Questionnaire; CI, confidence interval; HRQL, Health-Related Quality of Life; HSCL, Hopkins Symptom Checklist; ODI, Oswestry Disability Index; PINRS, Pain Intensity Numerical Rating Scale; RM-18, Roland-Morris Disability Questionnaire—18 items; RMDQ, Roland-Morris Disability Questionnaire; ROM, total lumbar range of motion; VAS, visual analog scale.
* Pain = pain intensity.

Data extraction

Two reviewers (S.B., J.M.H.) extracted data during initial review of each study. The data extracted included the following: study sample, subject demographics, CBT and psychoeducation intervention details, data collection time points, outcome assessments, statistical analysis, results, and conclusions (table 2). Extracted data were reviewed a second time for accuracy once final inclusion of all studies was determined. In addition, the magnitude of the difference between the 2 groups at each of the time points was examined using Hedges' g effect sizes.[18] Effect sizes were interpreted as weak if ≤.39, moderate if between .40 and .69, and strong if ≥.70. Effect sizes were only calculated for studies reporting the appropriate measure of central tendency and variability.

Results

Literature search

The search and review process of articles is demonstrated in figure 1. After examining 30 articles, 5[13-17] met the inclusion criteria and were eligible for this systematic review. Of the 25 studies excluded, 20 of the studies were deemed ineligible because a rehabilitation specialist did not complete the intervention, and 1

study[20] was excluded because of a crossover, randomized controlled trial study design. Four other articles[21-24] were excluded because their intervention was not designed specifically to target fear avoidance or kinesiophobia in patients with LBP. Characteristics of the included studies are summarized in table 2.

Methodological quality

The results of the quality assessment for each study are located in table 3. The investigators (S.B., J.M.H.) initially agreed on 90.9% of the items on the PEDro. Disagreements were resolved between the 2 researchers for 4 of the 6 items, while a third reviewer (M.C.H.) was consulted to make a final decision on the remaining 2 items. The average total PEDro scores for the 5 included studies was 6.8, with a range of 6 to 9. All included studies scored ≥6 on the PEDro and were all classified as moderate to high quality.[11]

Study characteristics

The characteristics of the included studies are presented in table 2. All studies used interventions to treat fear avoidance in patients with acute, subacute, or chronic LBP that were implemented by a rehabilitation specialist. None of the included studies addressed kinesiophobia. Secondary outcomes extracted from these studies included disability,[13-17] pain intensity,[13-17] self-efficacy,[15] patient satisfaction,[17] and general health and well-being.[15-17]

Outcome measures

Patient-reported outcome measures that assessed fear-avoidance beliefs and kinesiophobia were the primary outcomes of interest for this systematic review. Patient-reported outcome measures are self-report surveys that query information about the patient's health status directly from the patient.[25] All studies that assessed fear-avoidance beliefs used the FABQ. The FABQ is a 16-item questionnaire that assesses fear-avoidance beliefs in patients with musculoskeletal conditions.[2] The FABQ consists of 2 subscales. The physical activity subscale (FABQ-PA) consists of 5 items and examines fear-avoidance beliefs associated with physical activity. The work subscale (FABQ-W) consists of 10 items and examines fear-avoidance beliefs associated with work. A 6-point Likert scale is used to score each question, and higher scores represent greater fear-avoidance beliefs. A score >15 on the FABQ-PA[5] and >34 on the FABQ-W[26] indicates high fear-avoidance beliefs. In patients with LBP, the FABQ demonstrates excellent reliability (intraclass correlation coefficients, .90 [FABQ-PA] and .96 [FABQ-W]).[2]

Interventions

Interventions included psychoeducation through usage of *The Back Book*,[13,14,16] graded exercise,[13,15] and CFT.[17] *The Back Book* is an educational booklet with a "stay-active approach" that was designed for patients with nonspecific LBP.[14] The book promotes self-care as it provides patients with information about the fear-avoidance model, appropriate strategies on how to cope with LBP, and encouragement to return to normal activities.[14] A graded exercise technique, included in a fear-avoidance–based treatment, consisted of predetermined intensity, duration, and repetition of specific exercises.[13,15] Finally, a classification-based CFT was used in 1 included study.[17] This treatment included outlining the patient's pain on a diagram and focused on integration of functional

activities that the patient avoided in daily life.[17] CFT is multifaceted and patient specific. This technique is also similar to cognitive-behavioral exposure treatments or activities pacing, or both.[17]

Statistical and clinical significance

Of the 5 included studies, 2 studies[13,17] demonstrated significant differences between the experimental and control groups. Means, SDs, and effect sizes for outcomes of interest in each study are shown in table 4. Of the 39 effect sizes that were calculated, 10[13,17] were interpreted as strong with 95% confidence intervals that did not encompass zero, while 1 effect size[13] was interpreted as moderate and 28[13,14,16,17] were interpreted as weak with 95% confidence intervals that crossed zero. Of the large effect sizes, 3 were observed in the FABQ-PA, 1 was observed in the FABQ-W, 2 were observed for the Oswestry Disability Index (ODI), 2 were observed for the Pain Intensity Numerical Rating Scale (PINRS), and 2 were observed for the Hopkins Symptom Checklist (HSCL). Large effect sizes were demonstrated at 4 weeks,[13] 3 months,[17] and 12 months[17] post-CBT intervention for FABQ-PA, ODI, PINRS, and HSCL, and were observed at 3 months[17] for the FABQ-W. The moderate effect size was observed in the FABQ-PA at 6 months post-CBT intervention.[13] Rasmussen-Barr et al[15] did not include appropriate data for effect size calculation.

Level of evidence

The results of this systematic review demonstrate there is grade B evidence to support the use of CBT or psychoeducation interventions, or both, implemented by rehabilitation specialists, to treat fear-avoidance beliefs in patients with LBP. This grade was given because of inconsistent level 1 patient-oriented evidence on the effectiveness of these interventions when compared with control treatments.

Discussion

Summary of results

The purpose of this systematic review was to evaluate the effectiveness of CBT and/or psychoeducation interventions implemented by rehabilitation specialists, compared with a control treatment, to treat fear-avoidance beliefs and/or kinesiophobia in patients with acute, subacute, or chronic LBP. Two[13,17] of 5 studies included in this systematic review demonstrated significant and clinically meaningful improvements in fear-avoidance beliefs for patients who underwent a CBT and/or psychoeducation intervention to treat psychosocial factors compared with a control condition. None of the included studies assessed kinesiophobia.

Effectiveness of psychoeducation and CBTs

George et al[13] examined the effectiveness of a fear-avoidance–based physical therapy treatment that included *The Back Book*, treatment-based classification therapy, and graded exercise technique compared with treatment-based classification therapy alone. Treatment-based classification therapy uses key findings on a physical examination to classify the patient with acute LBP into 1 of 4 separate treatment categories.[27] The standard-of-care treatment group received an educational pamphlet, which discussed spinal

anatomy and pathology, and a standardized exercise progression. The fear-avoidance—based treatment group received psychoeducation that encouraged the patients to assume a participatory role in their rehabilitation, and also educated the patients to view their back pain as a common condition instead of a debilitating disease.[13] Patients in the experimental group completed a graded exercise program and were provided positive reinforcement and a new exercise quota once an established exercise quota was reached. The graded exercise program used predefined guidelines to standardize the treatment for those enrolled within the fear-avoidance—based physical therapy treatment group. The fear-avoidance group had significantly lower FABQ-PA scores compared with the standard-of-care group (see table 4) at both 4 weeks and 6 months, which was further supported by moderate and large effect sizes. No significant differences were demonstrated for the FABQ-W at any period within this study.

Vibe Fersum et al[17] implemented classification-based CFT and compared these effects to traditional exercise and manual therapy. Classification-based CFT addresses cognitive, functional, and lifestyle factors that are individualized for each patient. For example, psychoeducation regarding the nature of the patient's pain and graded exposure exercise techniques specific to the patient's impairments could be implemented in classification-based CFT. The inclusion of therapy to address a lifestyle factor, such as sedentary behaviors, may also be included. The classification-based CFT in this study consisted of 4 main components: (1) outlining each patient's pain in a diagram with the physiotherapist; (2) incorporating specific movement exercises to normalize maladaptive movements; (3) integrating activities of daily living that were avoided by the patient; and (4) designing a physical activity program based on the classification system that was best suited for the patient.[17] The control group was treated with mobilization or manipulation, and was also provided exercises to be completed at home. The results demonstrated that classification-based CFT led to decreases in fear-avoidance beliefs as measured by the FABQ when compared with the traditional exercise and manual therapy group at 3 months and 12 months on the FABQ-PA, which was also supported by large effect sizes between groups at both time points. Furthermore, the experimental group demonstrated significantly improved FABQ-W scores at 3 months. This study provides further information regarding the efficacy of additional interventions besides psychoeducation strategies, specifically for patients with chronic LBP. When compared with the other studies in cohorts of patients with chronic LBP, significant and clinical differences only occurred in combination with further cognitive behavioral intervention techniques.

Vibe Fersum[17] also included the ODI, the PINRS, the HSCL (a screening tool to measure symptoms of anxiety and depression), total lumbar spine range of motion, a patient satisfaction questionnaire, and the Orebro Screening Questionnaire (a screening tool that predicts long-term disability and failure to return to work). Classification-based CFT led to statistical and clinical meaningful differences in decreasing pain and disability, and increasing range of motion and patient satisfaction.[17] Large effect sizes were observed for ODI, PINRS, and HSCL. George[13] also collected the ODI and PINRS to measure disability and pain, respectively. However, significant between-group differences were not observed.

Three included studies did not find significant results. Rasmussen-Barr[15] included similar methodologies as George[13]; however, George[13] included a stronger psychoeducation component (ie, *The Back Book*). The stronger psychoeducation component may have provided the active ingredient necessary to demonstrate significant and clinical differences between groups. Additionally, Rasmussen-Barr[15] included a chronic LBP population, while George[13] examined these methodologies in an acute LBP population. It is possible these methodologies are more effective for patients with acute LBP. Sparkes[14] and Rantonen[16] and colleagues also used a psychoeducation component but did not include further strategies, such as a graded exercise program. Thus, it appears psychoeducation strategies alone are not effective in decreasing fear-avoidance beliefs in patients with LBP.

Methodological considerations

All studies included in this review were considered moderate- to high-quality evidence, but methodological concerns did affect PEDro scores. All the studies lost 1 point on the quality assessment because of lack of participant blinding. In addition, only 1 study blinded the therapists, and only 2 studies blinded assessors of at least 1 outcome measure. While blinding of the patients and outcome assessors in future studies could be relatively easily addressed, blinding of the therapist implementing the treatment may not always be possible. Future studies should examine ways to blind patients and outcome assessors, provide further consideration on the description of how therapists are trained, and discuss whether blinding was possible.

Outcome measures

While not included in this systematic review because of methodological design, Vlaeyen et al[20] examined the effectiveness of a cognitive behavioral exposure treatment, in vivo exposure, compared with graded activity. Vlaeyen[20] included the Pain Catastrophizing Scale to assess pain catastrophizing in patients with LBP. The Pain Catastrophizing Scale is a valid and reliable 13-item questionnaire that is scored using a 5-point Likert scale, where higher scores indicate greater levels of catastrophizing.[28] In this study, patients who had the in vivo exposure treatment had decreased pain catastrophizing scores compared with those in the graded activity treatment. The fear-avoidance model illustrates how pain catastrophizing can lead to fear-avoidance beliefs, which in turn leads to chronic disability, depression, and disuse.[1] Other behavioral interventions that have been used to specifically target pain include relaxation training[29] and mindfulness.[30] Future research should consider using the Pain Catastrophizing Scale, which can provide another perspective into the patient's attitudes toward and beliefs about pain, which can be affected before the engagement in avoidant behaviors. Early recognition of pain catastrophizing behaviors and early intervention may prevent development of avoidant behaviors. Lastly, depression and anxiety may be important variables to consider that could affect fear-avoidance beliefs, kinesiophobia in patients with acute, subacute, or chronic LBP.

Practical implications

Patient-centered care has been demonstrated to improve treatment outcomes and should be further incorporated into the orthopedic rehabilitation setting.[31] One of the 2 studies[17] that demonstrated significant and clinically meaningful differences between groups incorporated CBT techniques that were personalized treatment plans to treat patient-specific fears. Emphasis on the patient's specific fears and treating those issues appears to have led to a

more successful long-term outcome. While *The Back Book* emphasizes patient education, this modality in isolate was not effective in decreasing fear in patients with LBP.[14,16] Thus, while patient education is necessary to provide patient-centered care, the reduction of fear-avoidance beliefs may not occur with patient education alone. The results of this review suggest that long-term changes in patient behavior and psychological well-being may need further intervention beyond patient education. The combination of a gradual completion of the fearful task through patient-specific classification-based CFTs and psychoeducation appear to be more effective at decreasing fear-avoidance beliefs.

This concept is further supported by George et al.,[13] who included *The Back Book* in combination with graded exercise treatments. While George et al.[13] did not find statistical or clinically meaningful differences for any other outcome measure besides fear-avoidance beliefs, interaction was discovered between individuals with elevated fear-avoidance beliefs and less disability in those assigned to the fear-avoidance treatment group. Those patients enrolled into a fear-avoidance–based treatment group who exhibited lower levels of fear-avoidance beliefs at baseline had increased disability at follow-up time points when compared with those receiving standard-of-care physical therapy. It appears the intervention may negatively affect their disability and pain. These results further emphasize the importance of patient-centered care, as it is important to design an appropriate treatment based on the information gleaned from the patient by the rehabilitation specialist.[13] Clinicians should use patient-reported outcome measures that assess these psychological factors to identify elevated levels of fear that warrant proper treatment. Furthermore, the utilization of cutoff scores on these patient-reported outcome measures may assist rehabilitation specialists with determining whether patients should be enrolled in fear-avoidance–based interventions.[13] However, clinicians should use caution when using cutoff scores in clinical practice. While cutoff scores can be used as a crude strategy for identifying patients who may benefit from fear-avoidance–based interventions, a patient-by-patient assessment of their psychological schema should be assessed, in combination with the usage of dimension-specific, patient-reported outcome measures, to foster personalized and patient-centered care for each individual patient.

Future research should further examine the effects of CBTs on different types of psychosocial factors such as self-efficacy. Rasmussen-Barr[15] included a measure of self-efficacy in their study. The patients enrolled in CBT demonstrated significant and clinically meaningful differences in self-efficacy when compared with patients who completed the daily walking and traditional home exercise treatment.[15] Self-efficacy may be a mediating factor between the development of pain-related fear and outcomes in chronic LBP.[32] Thus, future research should include a measure of self-efficacy in this population.

Study limitations

This review is not without limitations. First, the databases that were searched were considered to be best for the purposes of this review. There is always a possibility that relevant articles may have failed to be retrieved during the search process. Second, the authors defined rehabilitation specialist to include physical therapists, athletic trainers, occupational therapists, and physiotherapists. While these rehabilitation specialists traditionally treat patients with LBP, studies that included other health care providers who treat these patients could have been missed in this review. Third, the included

studies were not equivalent in the type of "dose" of cognitive behavioral intervention or psychoeducation provided, and the samples only represent patients with LBP in certain settings. These factors could affect the generalizability of these results. Fourth, there was a lack of information provided in the individual studies regarding the training of the rehabilitation specialists to implement the CBTs or psychoeducation intervention, or both. One study[17] provided this information and was 1 of the 2 studies to demonstrate statistical and clinical significance with their intervention. Thus, it is possible a lack of education and/or training on how to appropriately administer the interventions affected the results. Further information regarding the training of the rehabilitation specialist should be included in future studies. Lastly, because of the limited number of studies, there is limited strength associated with the conclusions and recommendations in this review.

None of the studies presented in this review used the FABQ to evaluate fear-avoidance beliefs and the Tampa Scale of Kinesiophobia toe valuate kinesiophobia, which are 2 different constructs of fear. Fear-avoidance beliefs, measured by the FABQ, are dysfunctional beliefs about pain or fear of pain.[1] Kinesiophobia, measured by the Tampa Scale of Kinesiophobia, is a debilitating or irrational fear of movement or vulnerability to reinjury.[33] Measuring both constructs of fear may be beneficial in future research and clinical practice. Additionally, to gain a better perspective of the patient's psychosocial well-being, other outcome measures such as the Pain Catastrophizing Scale and Self-Efficacy Scale could be used in combination with the FABQ or Tampa Scale of Kinesiophobia. Lastly, inclusion of an outcome measure such as the HSCL[34] to screen for anxiety and depression could be of benefit for clinicians and should also be considered.

Conclusions

There is inconsistent, patient-oriented evidence (grade B) that CBT and/or psychoeducation interventions implemented by a rehabilitation specialist to treat fear-avoidance beliefs and/or kinesiophobia in patients with LBP are effective. Patient-centered interventions, such as classification-based CFT with psychosocial patient education, demonstrated favorable outcomes, while patient education techniques alone were not sufficient to reduce these psychosocial factors in this population. However, continued research is needed to determine the most effective combination of treatments to treat fear-avoidance beliefs. Future research should further explore which components of CBTs are the most beneficial, determine best practices for training rehabilitation specialists in the delivery of CBTs, and should also examine how to match these interventions for individualized patient problems.

Keywords

Cognitive therapy; Low back pain; Psychology; Rehabilitation; Therapeutics

Corresponding author

Shelby Baez, MSAT, ATC, Rehabilitation Sciences Doctoral Student, Division of Athletic Training, University of Kentucky, 206A Wethington Bldg, Lexington, KY 40508. *E-mail address:* shelby.baez@uky.edu.

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