ACRM
AMERICAN CONGRESS OF REHABILITATION MEDICINE

Archives of Physical Medicine and Rehabilitation

journal homepage: www.archives-pmr.org

Archives of Physical Medicine and Rehabilitation 2023;000: 1–11

REVIEW ARTICLE (META-ANALYSIS)

Association Between Pain Coping and Symptoms of Anxiety and Depression, and Work Absenteeism in People With Upper Limb Musculoskeletal Disorders: A Systematic Review and Meta-analysis

Rodrigo Núñez-Cortés, MSc,[a,b,c] Ander Espin, MSc,[b,d,e] Sofía Pérez-Alenda, PhD,[a] Rubén López-Bueno, PhD,[b,f,g] Carlos Cruz-Montecinos, PhD,[a,c,h] Karina Glies Vincents-Seeberg, MSc,[b] Thomas A. Püschel, PhD,[i] Joaquín Calatayud, PhD,[b,g] Lars Louis Andersen, PhD[b]

From the [a]Department of Physiotherapy, Physiotherapy in Motion Multispeciality Research Group (PTinMOTION), University of Valencia, Valencia, Spain; [b]National Research Centre for the Working Environment, Copenhagen, Denmark; [c]Department of Physical Therapy, Faculty of Medicine, University of Chile, Santiago, Chile; [d]Ageing On Research Group, Department of Physiology, University of the Basque Country (UPV/EHU), Leioa, Spain; [e]Biocruces Bizkaia Health Research Institute, Barakaldo, Spain; [f]Department of Physical Medicine and Nursing, University of Zaragoza, Zaragoza, Spain; [g]Exercise Intervention for Health Research Group (EXINH-RG), Department of Physiotherapy, University of Valencia, Valencia, Spain; [h]Division of Research, Development and Innovation in Kinesiology, Kinesiology Unit, San José Hospital, Santiago, Chile; and [i]Ecology and Evolutionary Biology Division, School of Biological Sciences, University of Reading, Reading, United Kingdom.

Abstract

Objective: To determine the prospective association of pain coping strategies and symptoms of anxiety and depression with work absenteeism in people with upper limb musculoskeletal disorders.

Data Sources: A systematic search of PubMed, Web of Science, Embase, Cochrane Library, and Scopus databases was conducted from inception to September 23, 2022.

Study Selection: Prospective observational studies of adults with upper limb musculoskeletal disorders were included. Included studies had to provide data on the association of pain coping strategies (catastrophizing, kinesiophobia, self-efficacy or fear avoidance) or symptoms of anxiety and depression with work absenteeism.

Data Extraction: Study selection, data extraction, and assessment of methodological quality (Newcastle Ottawa Scale) were performed by 2 independent authors. Random-effects models were used for quantitative synthesis.

Data Synthesis: Eighteen studies (n=12,393 participants) were included. Most studies (77.8%) reported at least 1 significant association between 1 or more exposure factors (pain coping strategies or symptoms of anxiety and depression) and work absenteeism. Meta-analyses showed a statistically significant correlation between the exposure factors of catastrophizing (r=0.28, 95% confidence interval [CI]: 0.15 to 0.40; P<.0001) and symptoms of anxiety and depression (r=0.23, 95% CI: 0.10 to 0.34; P=.0003) with work absenteeism. The correlation between self-efficacy and work absenteeism was non-significant (r=0.24, 95% CI: -0.02 to 0.47; P=.0747).

Rodrigo Núñez-Cortés is supported by the National Research and Development Agency of Chile (ANID/2020-72210026). Rubén López-Bueno is supported by European Union—NextGeneration-EU. The other authors have nothing to disclose.

https://doi.org/10.1016/j.apmr.2023.07.003

Conclusions: Rehabilitation teams should consider assessing catastrophizing and symptoms of anxiety and depression to identify patients at risk for work absenteeism. Addressing these variables may also be considered in return-to-work programs for individuals with upper limb disorders.
Archives of Physical Medicine and Rehabilitation 2023;000:1−11

Upper limb musculoskeletal symptoms are common in the general population and account for a significant proportion of work-related problems, with a substantial effect on physical function and health care utilization.[1,2] The annual incidence of work-related upper limb musculoskeletal disorders ranges from 0.08% to 6.3%, and the prevalence from 0.14% to 14.9%.[3] Furthermore, a recent meta-analysis focusing on workers in secondary industries (ie, industries responsible for converting raw materials into consumer products) in Europe identified that the most frequent musculoskeletal symptoms in the upper limb are located in the shoulder and wrist region, with 12-month mean prevalence values of 50% and 42%, respectively.[1] Thus, this health condition places a great economic burden on the individual, the employer, and society because of work absenteeism and a loss of productivity.[4] Additionally, the economic burden of presenteeism (lost productivity due to illness and impaired performance at work) is considerably large among workers with musculoskeletal symptoms and is associated with a higher risk of subsequent absenteeism.[5-7]

Work absenteeism can be defined in terms of return to work (RTW) or in terms of duration of sick leave. RTW provides economic self-esteem, psychological well-being, and social connectedness.[8] However, as the duration of sick leave increases, the likelihood of RTW decreases and the risk of long-term disability increases.[9] Both absenteeism and presenteeism impose significant individual costs and burdens, particularly on vulnerable populations. For example, workers with low socio-economic status may be more likely to suffer health problems due to adverse physical and psychosocial working conditions.[10] Similarly, migrant workers are more likely to suffer occupational injuries than non-migrant workers.[11] On the other hand, previous studies have reported that young female workers may have higher levels of upper limb pain and musculoskeletal disorders than their male counterparts.[12] These differences may be due to biological differences (eg, lean muscle mass or endocrine function) or cultural gender stereotypes, where women tend to perform more repetitive and monotonous work than men, which may increase their risk of injury, particularly in the upper extremity.[13] Given that time off work can be as long as 304 days for people with musculoskeletal conditions in the upper limb,[14] early identification of factors that may affect timely RTW could be important in reducing costs and disability, particularly in populations at high risk for work-related disorders.

Personal and environmental factors modify the progress of work absenteeism in different health and injury conditions.[15] Factors associated with positive return-to-work outcomes include optimistic expectations of recovery and RTW and socio-economic status, while older age, female gender, greater pain or disability, and greater physical demands of work are associated with negative outcomes.[15] Recent research has highlighted the importance of studying pain coping strategies (catastrophic thinking, kinesiophobia, self-efficacy, fear avoidance) and mental health factors (symptoms of anxiety and depression) because of their strong association with postoperative pain, function, and response to treatment in patients with chronic pain.[16,17] Within this particular framework, the fear-avoidance model suggests that individuals who hold catastrophic beliefs about their pain are more likely to perceive certain situations as threatening, avoid certain activities and ultimately experience reduced engagement, disability, and depressive symptoms.[18] In this regard, several systematic reviews have shown that fear and catastrophizing play a crucial role as predictors of the development of chronic pain and its persistence over time.[19-22] However, scarce information exists about the association of these variables with work absenteeism in people with upper extremity disorders. Previous reviews in people with upper limb disorders has shown that high self-efficacy is positively associated with an early return to work (E-RTW),[23] while depression is associated with a lower likelihood of returning to work.[14] On the other hand, in patients with carpal tunnel syndrome, 2 previous systematic reviews identified catastrophizing and poorer mental health status as predictors of poorer employment outcome after surgery.[24,25] However, to our knowledge, no previous meta-analysis has examined the association between pain coping strategies and symptoms of anxiety and depression with absenteeism in people with upper limb disorders.

Increasing evidence supports that pain coping strategies and mental health factors (symptoms of anxiety and depression) are modifiable through targeted intervention strategies (eg, pain education, exercise, cognitive behavioral therapy, and mindfulness).[26-28] A better understanding of the association between these factors and absenteeism can help rehabilitation teams (psychologists, physiotherapists, occupational therapists, and physicians) to design strategies to improve patients' physical and mental health, optimize RTW and, indirectly, decrease economic costs. Therefore, this systematic review and meta-analysis aims to determine the association of selected pain coping strategies and symptoms of anxiety and depression with work absenteeism in people with upper limb musculoskeletal disorders.

List of abbreviations:

CI	**confidence interval**
CES-D	**Center for Epidemiologic Studies Depression Scale**
CSQ	**Coping Strategy Questionnaire**
FABQ	**Fear Avoidance Beliefs Questionnaire**
GSES	**General Self-Efficacy Scale**
E-RTW	**early return to work**
L-RTW	**late return to work**
PASS	**Pain Anxiety Symptom Scale**
PCCL	**Pain Coping and Cognition List**
PCS	**Pain Catastrophizing Scale**
PHQ-9	**Patient Health Questionnaire**
PSEQ	**Pain Self-Efficacy Questionnaire**
RTW	**Return to Work**
SF-36 MC	**36-item short form health survey (Mental component)**
TSK	**Tampa scale of kinesiophobia**
VRMCS	**Veterans RAND Mental Component Score**

Methods

Protocol and registration

This systematic review and meta-analysis was prospectively registered in PROSPERO (registration number CRD42022362385) and reported following the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA 2020) and the Meta-analysis of Observational Studies in Epidemiology checklist.[29,30]

Eligibility criteria

Inclusion criteria were based on the Population, Exposure, Comparison, Outcome and Study Design (PECOS) methodology. (1) Population: Adults >18 years with any type of musculoskeletal disorder of the upper limb (ie, shoulder, arm, elbow, hand), including gradual onset symptoms, acute injuries, or orthopedic surgeries; (2) Exposure: Studies investigating pain coping strategies (catastrophic thinking, kinesiophobia, fear-avoidance, or self-efficacy) or selected mental health factors (symptoms of anxiety or depression) using validated questionnaires (supplemental table S1; available online only at http://www.archives-pmr.org/); (3) Comparison: Both low levels of exposure and no exposure to risk factor; (4) Outcomes: Work absenteeism, evaluated in terms of time to RTW (eg, days, weeks, months, years), duration of sick leave (eg, days of work missed) or absenteeism during follow-up; (5) Study Design: Prospective observational studies. Original, peer-reviewed articles written in English or Spanish were included (Publication date: Published from inception to September 23, 2022). All editorials, letters, reviews and meta-analyses, retrospective, and cross-sectional studies were excluded.

Data sources and searches

A systematic search of PubMed (including the database "MEDLINE"), Web of Science Core Collection, Embase, Cochrane Library, and Scopus databases was performed from inception to September 23, 2022. Specific search strategies, using a combination of MeSH (Medical Subject Headings) and keyword terms, combined with Boolean operators, are shown in supplemental table S2 (available online only at http://www.archives-pmr.org/). The reference lists and bibliographies of the included studies were also screened.

Study selection

All records were analyzed in the free web version of Rayyan.[31,a] After eliminating duplicates, the titles and abstracts of all records were reviewed. Screening and selection were performed by 2 independent reviewers (R.NC. and A.E.) with a third author (J.C.) as referee in case of disagreement. Subsequently, the same authors (R.NC. and A.E.) independently reviewed the full-text articles for eligibility according to the predefined criteria. Any discrepancies were resolved by consensus in consultation with a third author (J.C.).

Data extraction

Two authors (R.NC. and A.E.) independently extracted data using a standardized extraction form. Corresponding authors were contacted by e-mail if essential data were missing or uncertainties existed. The following variables were collected for each study: author, year of publication, country, number of participants enrolled, sex (%), mean age, musculoskeletal condition, follow-up, exposure factor, outcome, number of participants analyzed, comparative measure between groups or measure of association (correlation coefficient, odds ratio or hazard ratio) and corresponding measure of dispersion (standard error, standard deviation, interquartile range) or precision (95% confidence interval [95% CI]).

Methodological quality assessment

The Newcastle Ottawa scale was used to assess the quality of the included studies.[32] Each study was independently assessed by 2 reviewers (R.NC., A.E.) using a three-domain scoring system: (1) Selection (4 points); (2) Comparability (2 points); and (3) Exposure/outcome (3 points). If there were discrepancies or disagreements between the reviewers' judgments, a third reviewer (J.C.) was consulted. The sum of points determined the methodological quality of each study, ranging from 0 (poorest quality) to 9 (best quality) points.

Quantitative synthesis

All analyses were performed in R v. 4.1.1.[b] For meta-analyses, to avoid performing a low-power analysis, pooling of data were considered if there were at least 3 or more studies measuring the same prognostic factor. In addition, studies that operationalized the exposure factor in a markedly different way from most other studies were excluded from the estimation. First, the original data (eg, odds ratios, correlations, regression coefficients) were converted to Pearson's *r* using standard formulas.[33] To maintain consistency, associations were calculated in the same direction. The data were then converted to Fisher's z using the *scalc()* function of the R package "metafor" v. 3.8-1.[34] In the next step, using the *rma()* function of the same package, we apply a random effects model to synthesize the quantitative results of the included studies for each of the correlational data on exposure factors (catastrophic thinking, kinesiophobia, fear-avoidance or self-efficacy, symptoms of anxiety or depression) and outcome (work absenteeism). This type of model was preferred because it takes into account the heterogeneity of the studies and does not assume that all studies are from a single common population that were tested under identical or fairly similar conditions.[35]

For the final interpretation, the result of each meta-analysis was again transformed into Pearson's *r* and the magnitude of the effect size *r* was interpreted as small (r=0.1 to 0.29), moderate (r=0.3 to 0.49) and large ($r \geq 0.5$).[36] Following the recommendations of the Cochrane Handbook,[37] statistical heterogeneity was classified as negligible (I^2=0%-40%), moderate (I^2=30%-60%), substantial (I^2=50%-90%) or considerable (I^2=75%-100%). Finally, forest plots were generated to visualize the effect size (and 95% CI) of each included study and the calculated summary effect size. In addition, a sensitivity analysis was performed by including in the meta-analyses only studies of high quality (ie, 7 or more points on the Newcastle Ottawa scale) when there were at least 3 studies that met this condition for the variable of interest.

Results

Study selection

A total of 827 potentially eligible studies were identified by searching databases and reference lists. After eliminating 328

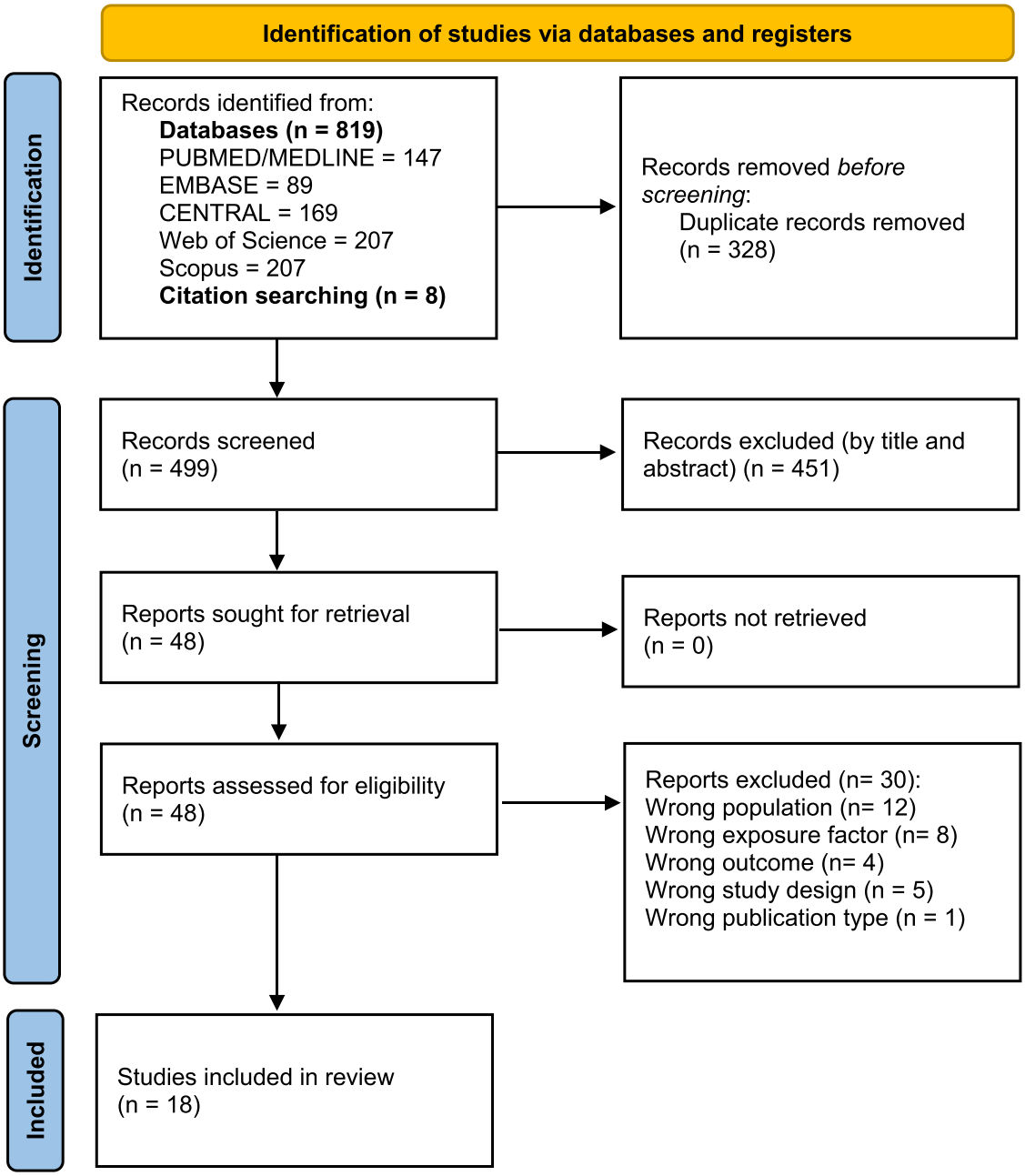

Fig 1 Study selection process. Abbreviation: CENTRAL, Cochrane Central Register of Controlled Trials.

duplicate records and 451 by screening publications by title and abstract, 48 studies were potentially eligible for inclusion and full-text articles were retrieved. Thirty reports were excluded based on eligibility criteria, that is, wrong population (n=12), wrong exposure factor (n=8), wrong outcome (n=4), wrong study design (n=5), wrong publication type (n= 1). Finally, 18 studies were included in this systematic review (fig 1).[38-55]

Characteristics of the studies

The characteristics of the included studies are detailed in table 1.[38-55] The studies were conducted in the United States of America (n=6), the Netherlands (n=4), Sweden (n=2), Australia (n=1), Germany (n=1), Israel (n=1), Taiwan (n=1), and in Multi-countries (n=1). The year of publication ranged from 1997[38] to 2020.[55] The sample size ranged from 40[47] to 8587[55] enrolled participants. Follow-up time ranged from 1 month[49] to 2 years.[43,51]

Participants

In total, 12,393 participants were included among the included studies, with a mean age ranging from 37.4±11.0 to 52.1± 8.8 years. Overall, the percentage of men participants ranged from 26% to 100% (median=51%) and women participants ranged from 0% to 74% (median=49%). Thirteen studies included participants with musculoskeletal conditions in the hand/wrist region.[38-40,42,43,45-50,53,55] Among them, 6 studies included patients with carpal tunnel syndrome.[38-40,42,46,50] 5 studies included patients with hand injuries,[43,45,47,48,53] 1 study included participants with distal radius fracture,[55] and 1 study included participants with

Table 1 Characteristics of the items included

Author	Country	N	Sex (M/F)	Age (y)	MSDs (Condition)	Follow-up	Prognostic Factor	Outcome
Katz 1997[38]	USA	135	M: 31%, F: 69%	NR	Carpal tunnel release	6 months	Mental health	Work absence at 6 months
Katz 1998[39]	USA	220*	M: 29%, F: 71%	43±11	Carpal tunnel syndrome	18 months	Mental health	Work absence at 18 months
Katz 2005[40]	USA	181	M: 42%, F: 58%	45.7±9.4	Carpal tunnel release	12 months	Mental health Self-efficacy	Work absence at 12 months
Kuijpers 2006[41]	The Netherlands	350	M: 55%, F: 45%	45±11	Shoulder pain	6 months	Catastrophizing Kinesiophobia Fear avoidance	Sick leave
Turner 2007[42]	USA	899	M: 38%, F: 62%	44.3±9.7	Carpal tunnel syndrome	1 year	Mental health Catastrophizing	Work disability (≥180)
Opsteegh 2009[43]	The Netherlands	91	M: 69%, F: 31%	43±11.5	Hand disorders/injuries	2 years	Self-efficacy	RTW (≤10 weeks)
Karels 2010[44]	The Netherlands	483	M: 33%, F: 67%	41.5±10.4	Upper limb complaints	3 months	Catastrophizing Kinesiophobia	Sickness absence
Chen 2012[45]	Taiwan	120	M: 77%, F: 23%	35.7 (17-57)	Hand injury	NR	Mental health	Time off work
Cowan 2012[46]	USA	66	M: 26%, F: 74%	49.7±11.3	Carpal tunnel release	2-4 months	Depressive symptoms Anxiety symptoms Catastrophizing	Time to RTW
Ramel 2013[47]	Sweden	40	M: 80%, F: 20%	40±14.0	Hand injury	12 months	Mental health	RTW at 12 months
Roesler 2013[48]	Australia	192	M: 85%, F: 15%	35.1 (18-63)	Hand injury	12 weeks	Self-efficacy	RTW within 12 weeks
Bot 2014[49]	USA	70	M: 64%, F: 36%	43±15	Fingertip injuries	1 month	Self-efficacy depressive symptoms	Days of work missed
Conzen 2016[50]	Germany	71	M: 37%, F: 63%	50.5 (40-60)	Carpal tunnel release	6 months	Depressive symptoms	Duration of sick leave
Feleus 2017[51]	The Netherlands	533	M: 47%, F: 53%	42 (18-64)	Upper limb complaints	2 years	Catastrophizing Kinesiophobia	Sick leave (>10 working days)
Gowd 2019[52]	USA	89	M: 71%, F: 29%	52.1±8.8	Rotator cuff repair	12 months	Depressive symptoms	Time of RTW
Marom 2019[53]	Israel	178	M: 100%, F: 0%	37.4±11.0	Hand injury	12 months	Self-efficacy	Time of RTW
Coggon 2020[54]	Multicounty	8587	M: 34%, F: 66%	38.5±9.8	Shoulder pain	14 months	Fear avoidance	Sickness absence
Egund 2020[55]	Sweden	88	M: 100%, F: 0%	45 (21-64)	Distal radius fracture	12 months	Mental health	Weeks of sick leave

NOTE. Data are presented as mean ± standard deviation or as median and range (min-max).
Abbreviations: F, female; M, male; MSDs, musculoskeletal disorders; RTW, return to work.
* For the narrative and quantitative synthesis, the non-operated cohort (n=64) was taken into account.

Table 2 Main results for the association between each of the prognostic factors and work absenteeism

Author	Prognostic Factor (n Analyzed)	Results	Significant Result of Univariate Analysis	Significant Result of Multivariate Analysis	Newcastle Ottawa Scale
Katz 1997[38]	SF-36 MC (n=135)	OR=1.4 [95% CI: 1.1, 1.7]	Yes	Yes	7/9
Katz 1998[39]	SF-36 MC (n=64)	OR=5.87 [95% CI 1.16, 29.83]*	Yes	-	7/9
Katz 2005[40]	SF-36 MC (n=143)	*P*=.38	No	No	8/9
	Self-efficacy† (n=120)	OR= 4.4 [95% CI: 1.4, 14.0]	Yes	Yes	
Kuijpers 2006[41]	PCCL‡ (n=350)	OR=1.6 [95% CI: 1.1, 2.2]	Yes	-	7/9
	TSK (n=350)	OR=1.7 [95% CI: 0.5, 5.3]	No	-	
	FABQ (n=350)	OR=1.1 [95% CI: 1.0, 1.1]	No	-	
Turner 2007[42]	SF-36 MC (n=899)	OR=4.34 [95% CI: 2.69, 6.99]	Yes	Yes	8/9
	PCS (n=899)	OR=4.40 [95% CI: 2.55, 7.59]	Yes	Yes	
Opsteegh 2009[43]	GSES (n=91)	E-RTW: 48.5 (IQR: 42.3-54.8) vs L-RTW: 48 (IQR 42-61)	No	No	6/9
Karels 2010[44]	CSQ§ (n=348)	OR=2.8 [95% CI: 1.8, 4.5]	Yes	-	7/9
	TSK‖ (n=348)	OR=2.1 [95% CI: 1.3.3.4]	Yes		
Chen 2012[45]	SF-36 MC (n=120)	β=0.168, *P*<.05	-	Yes	9/9
Cowan 2012[46]	CES-D (n=66)	*P*=.480	No	No	6/9
	PASS (n=66)	*P*=.005; R^2=0.03 (multivariate)	Yes	Yes	
	PCS (n=34)	*P*=.40; R^2=0.15 (multivariate)	Yes	Yes	
Ramel 2013[47]	SF-36 MC (n=40)	RTW: 54 (range 19.9-58.6) vs No-RTW: 50 (range 19.5-63.2)	No	-	6/9
Roesler 2013[48]	GSES (n=192)	E-RTW: 33.23±2.82 vs L-RTW: 33.24±3.84	No	-	8/9
Bot 2014[49]	PSEQ (n=56)	*r*=-0.52, *P*<.001	Yes	-	6/9
	PHQ-9 (n=56)	*r*=0.54, *P*<.001	Yes	Yes	
Conzen 2016[50]	WHO-5 (n=42)	HR=1.05 [95% CI: 0.85, 1.31]	No	-	6/9
Feleus 2017[51]	CSQ§ (n=533)	OR=2.87 [95% CI: 1.48, 5.58]	Yes	-	8/9
	TSK‖ (n=533)	OR=2.33 [95% CI: 1.22, 4.43]			
Gowd 2019[52]	VRMCS (n=89)	AUC=70.4%	Yes	-	6/9
Marom 2019[53]	Self-efficacy§ (n=178)	HR=1.42 [95% CI:1.26, 1.66]	Yes	Yes	8/9
Coggon 2020[54]	FAB (n=8386)	OR=1.6 [95% CI: 1.1, 2.4]	Yes	-	6/9
Egund 2020[55]	SF-36 (MC) (n=88)	*r*=0.03 [95% CI: -0.21, 0.27]	No	-	7/9

NOTE. For quantitative synthesis, the original data (eg, odds ratios, correlations, regression coefficients) were converted to Pearson's *r* using standard formulae (Borenstein M, Hedges LV, Higgins JPT, Rothstein HR. Introduction to meta-analysis. 2021). For the studies by Ramel 2013, Opsteegh 2009, Roesler 2013, the conversion was done from effect size (dCohen).

Abbreviations: AUC, area under the curve; CES-D, Center for Epidemiologic Studies Depression Scale; CSQ, Coping Strategy Questionnaire; FABQ, Fear Avoidance Beliefs Questionnaire; GSES, General Self-Efficacy Scale; HR, hazard ratio; IQR, interquartile range; L-RTW, late return to work; OR, odds ratio; PASS, Pain Anxiety Symptom Scale; PCCL, Pain Coping and Cognition List; PCS, Pain Catastrophizing Scale; PHQ-9; Patient Health Questionnaire; PSEQ, Pain Self-Efficacy Questionnaire; SF-36 MC, 36-item short form health survey (Mental component); TSK, Tampa scale of kinesiophobia; VRMCS, Veterans RAND Mental Component Score; WHO-5, WHO-Five well-being index.

* value estimated from the frequency distribution (score ≤75) presented for the non-operated cohort.

† Assess using a 4-point scale.

‡ subdomains catastrophizing, 1-6 points.

§ catastrophizing: subscale 0-60.

‖ short version without the 4 reversed items.

¶In the Maroom 2019 study, a 5-point likert scale was used to assess self-efficacy.

fingertip injuries.[49] On the other hand, 3 studies included participants with shoulder conditions,[41,52,54] and 2 studies included patients with complaints in different regions of the upper extremities.[44,51]

Methodological quality assessment

Overall, the quality of the included articles was good, with a median of 7 points (range: 6-9) on the Newcastle Ottawa scale (supplemental table S3; available online only at http://www.archives-pmr.org/). In terms of scope of selection, 16/18 (89%) of the studies had representative cohorts, in 18/18 (100%) the unexposed cohort was from the same community as the exposed cohort, in 18/18 (100%) exposure factors were assessed with valid evidence, and 15/18 studies (83%) explicitly stated that the outcome of interest (ie, absence from work) was not present at baseline. In terms of comparability, in 10/18 (56%) demographic factors were controlled for and in 17/18 (94%) other potential confounders were controlled for. In the exposure/outcome domain, only 3 studies (17%) assessed outcome by record linkage, and the rest did so by self-report. In 17/18 (94%), the duration of follow-up was adequate (ie, ≥3 months) and in 12/18 (67%) the number of losses to follow-up was less than 20%.

Pain coping strategies

The main results of the association between pain coping strategies and outcomes are presented in table 2. Eleven studies evaluated these factors.[40-44,46,48,49,51,53,54] Most studies (9/11;

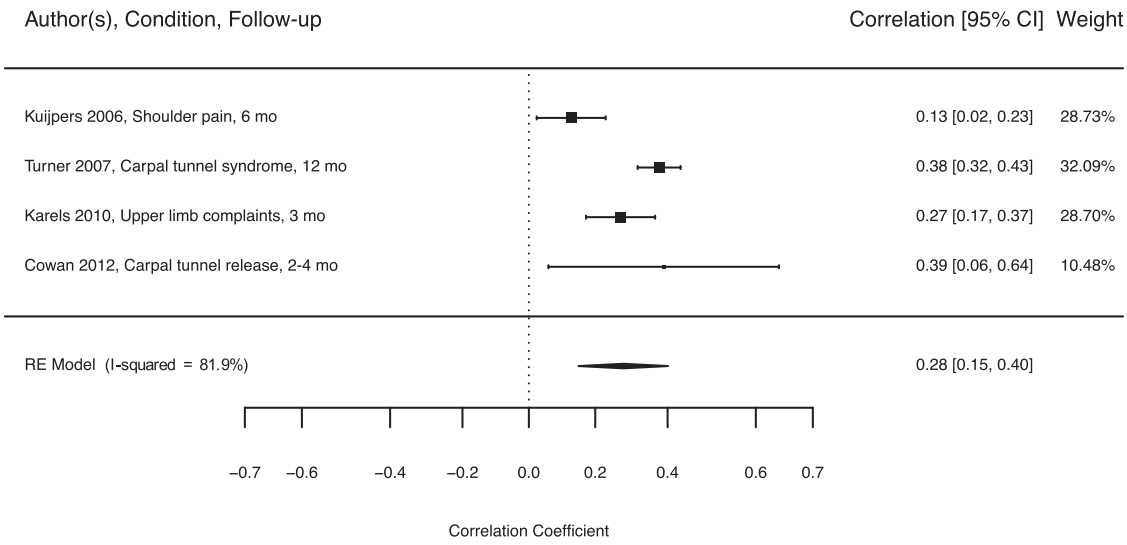

Fig 2 Forest plot of the association of work absenteeism with catastrophizing. Each study included in the meta-analysis corresponds to a point estimate bounded by a 95% CI. The polygon at the bottom of the plot corresponds to the summary effect, and its width represents its 95% CI. Studies with larger squares have contributed more to the summary effect size than other studies.

82%) reported a significant association between at least 1 of these factors and work absenteeism in univariate or multivariate analyses.

Catastrophizing

Five studies assessed catastrophizing. Two studies used the Pain Catastrophizing Scale,[42,46] 2 studies used the catastrophizing subscale of the Coping Strategies Questionnaire,[44,51] and 1 study used the catastrophizing subscale of the Pain Coping and Cognition List.[41] Four studies presented data on the estimates between catastrophizing and work absenteeism and were included in the meta-analysis (n=1631).[41,42,44,46] The overall result of the random-effects model was r=0.28 (95% CI, 0.15 to 0.40, P<.0001) (fig 2). Heterogeneity across studies was considerable (I^2=81.9%).

Self-efficacy

Five studies assessed self-efficacy. Two studies used the General Self-Efficacy Scale,[43,48] 1 study used the Pain Self-Efficacy Questionnaire,[49] and 2 studies used a Likert-type scale.[40,53] Four studies presented data on the estimates between self-efficacy and work absenteeism and were included in the meta-analysis (n=459). The overall result of the random-effects model was r=0.24 (95% CI, -0.02 to 0.47, P=.0747) (fig 3). Heterogeneity across studies was considerable (I^2=86.9%).

Kinesiophobia

Three studies assessed kinesiophobia using different versions of the Tampa Kinesiophobia Scale.[41,44,51] Two of the 3 studies showed a significant univariate analysis result for the association with work absenteeism.[44,51] Because Feleus et al[51] conducted a

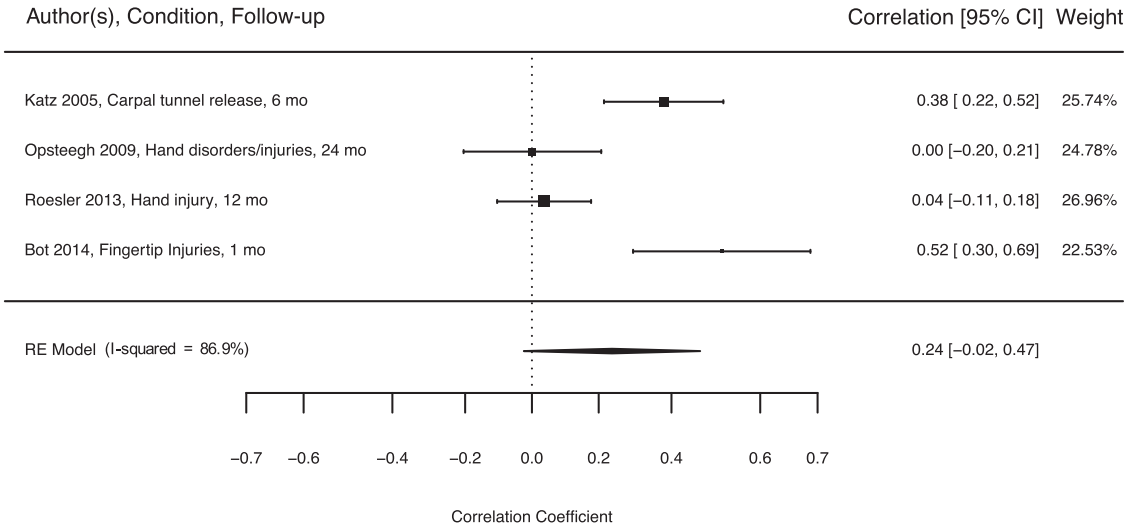

Fig 3 Forest plot of the association of work absenteeism with self-efficacy. Each study included in the meta-analysis corresponds to a point estimate bounded by a 95% CI. The polygon at the bottom of the plot corresponds to the summary effect, and its width represents its 95% CI. Studies with larger squares have contributed more to the summary effect size than other studies.

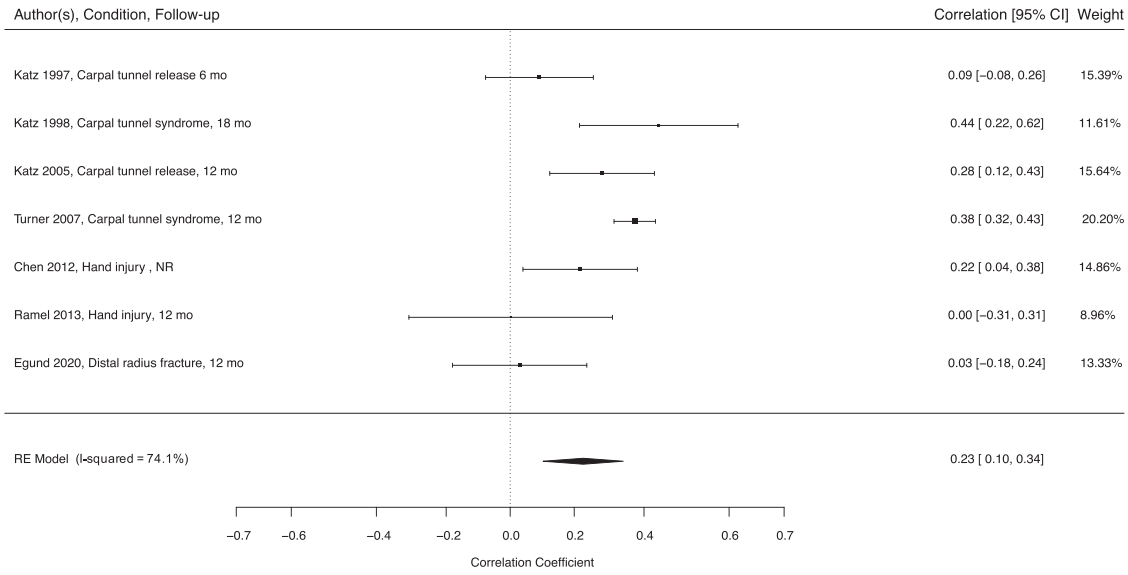

Fig 4 Forest plot of the association of work absenteeism with symptoms of depression and anxiety. Each study included in the meta-analysis corresponds to a point estimate bounded by a 95% CI. The polygon at the bottom of the plot corresponds to the summary effect, and its width represents its 95% CI. Studies with larger squares have contributed more to the summary effect size than other studies. NOTE. Katz 1997[38]: Recruited July 1992-October 1993 (surgical cohort, n=135); Katz 1998[39]: Recruited between July 1992 and October 1993 (non-surgical cohort, n=64); Katz 2005[40]: Recruited between April 1997 and October 1998.

secondary analysis of a cohort previously included in the Karels et al study,[44] there were insufficient studies on kinesiophobia to conduct a quantitative synthesis.

Fear avoidance

Finally, 2 studies presented data on estimates between fear avoidance (using the Fear Avoidance Beliefs Questionnaire).[41,54] One of the 2 studies showed a significant result in the univariate analysis for the association with work absenteeism.[54] There were insufficient studies of this exposure to perform a quantitative synthesis.

Symptoms of anxiety and depression

The main results of the association between mental health factors and outcomes are presented in table 2. Eleven studies evaluated the chosen mental health factors. Seven studies used the mental health component of the SF-36 questionnaire,[38-40,42,45,47,55] while 1 study used the Veterans RAND Mental Component Score.[52] On the other hand, 2 studies measured depressive symptoms using the Patient Health Questionnaire and the WHO-Five well-being index.[49,50] One study assessed both symptoms of anxiety and depression with the Center for Epidemiologic Studies Depression Scale and Pain Anxiety Symptom Scale, respectively.[46] Sixty-three percent of the studies (7/11) reported a significant association with work absenteeism in univariate or multivariate analysis. For the quantitative synthesis, only studies that assessed mental health using the same measurement instrument, that is, the mental health component of the SF-36 questionnaire, were pooled.[38-40,42,45,47,55] There were insufficient studies specifically assessing anxiety or depressive symptoms to pool these exposures separately. Seven studies presented data on the estimates between mental health and work absenteeism and were included in the meta-analysis (n=1748).[38-40,42,45,47,55] The overall result of the random-effects model was r=0.23 (95% CI, 0.10 to 0.34, P=.0003) (fig 4). Heterogeneity across studies was substantial (I^2=74.1%).

Sensitivity analysis

Sensitivity analyses including only high-quality studies in meta-analyses were possible for the variables of catastrophizing and symptoms of anxiety and depression. Both results showed consistency with the main results. For catastrophizing, the overall result of the random effects model was r=0.27 (95% CI, 0.12 to 0.40, P=.0005) (supplemental fig S1; available online only at http://www.archives-pmr.org/). For symptoms of anxiety and depression, the overall result of the random effects model was r=0.25 (95% CI, 0.12 to 0.37, P=.0001) (supplemental fig S2; available online only at http://www.archives-pmr.org/).

Discussion

This systematic review and meta-analysis of prospective studies provides updated evidence on the association of pain coping strategies and symptoms of anxiety and depression with work absenteeism in people with upper limb musculoskeletal disorders. Most studies (14/18; 77.8%) reported at least 1 significant association between pain coping strategies or symptoms of anxiety and depression and work absenteeism (table 2). The meta-analyses showed a small statistically significant correlation between catastrophizing and symptoms of anxiety and depression with work absenteeism. Therefore, our findings suggest that rehabilitation teams could consider catastrophizing and mental health factors (symptoms of anxiety and depression) when designing programs to facilitate E-RTW for people with upper limb disorders. However, these results should be interpreted with caution, as the small sample size, the small effect sizes and the considerable heterogeneity observed reduce the level of certainty of these results.

Our findings are consistent with previous systematic reviews without meta-analyses that provide low certainty evidence that pain coping and mental health factors are associated with E-RTW in people with upper extremity disorders.[14,24,25] However, our meta-analysis provides quantitative evidence of the effect size of these previously narratively described associations, that is, small statistically significant correlation. For example, Bousfield et al[14] recommended that clinicians assess patients' psychological status (eg, depression) to predict RTW in people with elbow, wrist, and hand disorders. However, a relevant psychosocial factor such as catastrophizing was not specifically included in the search strategy of their study. Therefore, the authors were unable to make recommendations for this variable. In our meta-analysis, we found a small but statistically significant association between catastrophizing and work absenteeism.

In contrast to our results, Black et al[23] in a review of the literature, found that higher levels of self-efficacy had a positive association with RTW in workers with psychological or upper-body musculoskeletal injuries but did not provide a quantitative synthesis. Among the studies included in our meta-analysis, Bot et al[49] reported a moderate correlation between days off work and self-efficacy as measured by the Pain Self-Efficacy Questionnaire. However, no association was observed in the 2 studies that used the General Self-Efficacy Scale.[43,48] In this sense, a specific assessment of self-efficacy as a coping strategy in relation to pain may be useful for future comparisons. It is also worth mentioning that, although not significant in the present meta-analysis, the size of the correlation coefficient for self-efficacy was quite similar to that of the other exposure factors (ie, pain coping strategy and anxiety and depressive symptoms).

With regard to symptoms of anxiety and depression, it is important to note that all studies included in the meta-analysis used the SF-36 Mental Health Component, which has been used to assess symptoms of anxiety and depression in various populations and health conditions.[56,57] A psychometric study based on data from 35,908 chronic pain patients found a high and significant correlation between the SF-36 mental health subscale and the Hospital Anxiety and Depression Scale (HAD).[58] Similarly, Pfoh et al found a strong correlation between SF-36 mental health scores and HAD symptoms of depression and anxiety (r=-0.72 to -0.79) in survivors of acute respiratory failure in a cross-sectional analysis of 1229 participants from the US, UK, and Australia.[59] In this context, our results provide a clear approximation of the relation between anxiety and depressive symptoms and work absence.

Other previous systematic reviews of patients with musculoskeletal symptoms in other regions of the body (eg, the spine) also support our findings. For example, Zieger et al found that symptoms of anxiety and depression had a significant effect on patients' RTW after disk surgery.[60] Wertli et al also found evidence that fear-avoidance beliefs are associated with poor outcomes in patients with low back pain, including RTW.[61] According to the fear-avoidance model, people with negative coping strategies related to pain (eg, catastrophizing) avoid certain experiences or activities that are perceived as threatening, developing disability, and mental health problems,[18] which may also affect participation in work.[62]

The pain coping strategies and mental health factors considered may be modifiable by various psychosocial treatment approaches, such as pain education, exercise, cognitive behavioral therapy, or mindfulness.[26-28] Therefore, early intervention strategies that reinforce positive beliefs, attitudes, and behaviors may be effective in modifying the pain experience and thus facilitating an E-RTW. For example, education and counseling on pain management and exercise can reduce the duration of work absenteeism in people with fear-avoidance beliefs and acute low back pain.[63] Similarly, multidisciplinary interventions based on participatory ergonomics and graded activities based on cognitive-behavioral principles can also optimize sustainable RTW in people with chronic musculoskeletal pain.[64] Thus, addressing pain coping strategies and mental health in future studies may be a critical intervention opportunity to improve health outcomes in people with upper limb musculoskeletal symptoms and prevent long-term work disability. In addition, for people with chronic pain to have a successful and satisfying RTW, it is important to focus on pain management, managing work relations, and making workplace accommodations.[65] These include using strategies such as slowing down, taking continuous breaks, working more slowly, and being aware of workloads, as well as changing working hours and schedules, and increasing employers' understanding and awareness of pain issues.[65]

Strengths and limitations

Among the strengths of this systematic review, we highlight the rigorous adherence to reporting guidelines and the exhaustive search of 5 databases and additional sources to identify relevant studies. Moreover, to our knowledge, our meta-analysis is the first to examine the correlation between pain coping strategies and mental health and work absenteeism in people with upper extremity disorders in prospective studies. In contrast, our review has several limitations that should be considered for a cautious interpretation of the results: (1) Most studies assessed absenteeism by self-report, and few used record linkage, which severely compromised the methodological quality of the outcome measures. To address this point, we conducted a sensitivity analysis that included only studies of high methodological quality in the meta-analyses, which showed that the direction and magnitude of the overall effect were consistent with the main results; (2) Gray literature (ie, studies not indexed in the databases reviewed) was not searched. Therefore, publication bias should not be ruled out; (3) The potential for significant clinical heterogeneity due to the type of musculoskeletal condition and duration of follow-up may result in some degree of measurement bias. Furthermore, the statistical heterogeneity of the meta-analyses ranged from substantial to considerable. For this reason, the results should be interpreted with caution; (4) The lack of available data for some exposure factors or the use of association measures that were not possible to convert to Pearson's r using standardized formulas (eg, hazard ratio) limited the possibility of performing a meta-analysis for other exposure factors (eg, kinesiophobia, fear avoidance, and anxiety symptoms or depressive symptoms separately). Consequently, there may be some degree of selection bias; (5) No specific tool was used to assess risk of bias. However, the Newcastle-Ottawa scale allows the quality of prospective studies to be assessed, which is an important component of a comprehensive meta-analysis. In addition, the guidelines for reporting Meta-analysis of Observational Studies in Epidemiology recommend assessment of study quality.[30] (6) Previous studies have used different definitions of pain coping strategies and mental health factors. This may influence the results and also label patients, which may not be conducive to the RTW process. Finally, it was not possible to analyze the correlations for men and women separately in order to identify sex or gender differences. Previous research has shown that women have lower pain tolerance and higher pain intensity than men when exposed to similar painful stimuli.[66,67] While there is

empirical evidence to support these differences from a biological perspective (eg, the role of genotype or gonadal hormones),[66,68,69] there has been little research into possible psychosocial influences. For example, other personal characteristics, such as emotional vulnerability, may explain gender differences in pain and catastrophizing.[70] Therefore, rehabilitation teams are encouraged to consider sex and gender variables when interpreting patients' pain reports and coping strategies.

Conclusions

To our knowledge, this is the first meta-analysis to examine the association between pain coping and symptoms of anxiety and depression, and work absenteeism in people with upper limb musculoskeletal disorders. Catastrophizing and symptoms of anxiety and depression showed a small but statistically significant correlation with work absenteeism. Therefore, rehabilitation teams should consider assessing these variables to identify patients at risk of work absenteeism. In addition, future research should determine the effect of interventions aimed at reducing catastrophizing and symptoms of anxiety and depression to facilitate E-RTW.

Suppliers

a. Rayyan; Qatar Foundation.
b. R; R Foundation.

Keywords

Pain; Psychosocial functioning; Rehabilitation; Return to work; Sick leave; Upper extremity

Corresponding author

Joaquín Calatayud, PhD, C/Gascó Oliag 5. PC, 46010, Valencia, Spain. *E-mail address:* joaquin.calatayud@uv.es.

References

1. Govaerts R, Tassignon B, Ghillebert J, et al. Prevalence and incidence of work-related musculoskeletal disorders in secondary industries of 21st century Europe: a systematic review and meta-analysis. BMC Musculoskelet Disord 2021;22:751.
2. Walker-Bone K, Palmer KT, Reading I, Coggon D, Cooper C. Prevalence and impact of musculoskeletal disorders of the upper limb in the general population. Arthritis Rheum 2004;51:642–51.
3. da Costa JT, Baptista JS, Vaz M. Incidence and prevalence of upper-limb work related musculoskeletal disorders: a systematic review. Work 2015;51:635–44.
4. Bevan S. Economic impact of musculoskeletal disorders (MSDs) on work in Europe. Best Pract Res Clin Rheumatol 2015;29:356–73.
5. Yoshimoto T, Oka H, Fujii T, Nagata T, Matsudaira K. The economic burden of lost productivity due to presenteeism caused by health conditions among workers in Japan. J Occup Environ Med 2020; 62:883–8.
6. Taloyan M, Aronsson G, Leineweber C, Magnusson Hanson L, Alexanderson K, Westerlund H. Sickness presenteeism predicts suboptimal self-rated health and sickness absence: a nationally representative study of the Swedish working population. PLoS One 2012;7:e44721.
7. Janssens H, Clays E, De Clercq B, De Bacquer D, Braeckman L. The relation between presenteeism and different types of future sickness absence. J Occup Health 2013;55:132–41.
8. Figueredo J-M, García-Ael C, Gragnano A, Topa G. Well-being at work after return to work (RTW): a systematic review. Int J Environ Res Public Health 2020: 17.
9. Laaksonen M, Gould R. Return to work after temporary disability pension in Finland. J Occup Rehabil 2015;25:471–80.
10. Niedhammer I, Chastang J-F, David S, Kelleher C. The contribution of occupational factors to social inequalities in health: findings from the national French SUMER survey. Soc Sci Med 2008;67:1870–81.
11. Pega F, Govindaraj S, Tran NT. Health service use and health outcomes among international migrant workers compared with non-migrant workers: a systematic review and meta-analysis. PLoS One 2021;16:e0252651.
12. Dabbagh A, MacDermid JC, Grewal R, Walton DM. The role of perceived job exertion and age as moderators of the relationship between gender and upper extremity musculoskeletal disability and pain in injured workers. J Occup Rehabil 2022;32:128–37.
13. Treaster DE, Burr D. Gender differences in prevalence of upper extremity musculoskeletal disorders. Ergonomics 2004;47:495–526.
14. Bousfield K, Cheon J-Y, Harley S, et al. What are the predictors of return to work for people with elbow, wrist, and hand conditions? A systematic review. J Occup Rehabil 2022;32:380–413.
15. Cancelliere C, Donovan J, Stochkendahl MJ, et al. Factors affecting return to work after injury or illness: best evidence synthesis of systematic reviews. Chiropr Man Therap 2016;24:32.
16. Tseli E, Boersma K, Stålnacke B-M, et al. Prognostic factors for physical functioning after multidisciplinary rehabilitation in patients with chronic musculoskeletal pain. Clin J Pain 2019;35:148–73.
17. Giusti EM, Lacerenza M, Manzoni GM, Castelnuovo G. Psychological and psychosocial predictors of chronic postsurgical pain: a systematic review and meta-analysis. Pain 2021;162:10–30.
18. Leeuw M, Goossens MEJB, Linton SJ, Crombez G, Boersma K, Vlaeyen JWS. The fear-avoidance model of musculoskeletal pain: current state of scientific evidence. J Behav Med 2007;30:77–94.
19. Wertli MM, Eugster R, Held U, Steurer J, Kofmehl R, Weiser S. Catastrophizing-a prognostic factor for outcome in patients with low back pain: a systematic review. Spine J 2014;14:2639–57.
20. Wertli MM, Rasmussen-Barr E, Weiser S, Bachmann LM, Brunner F. The role of fear avoidance beliefs as a prognostic factor for outcome in patients with nonspecific low back pain: a systematic review. Spine J 2014;14:816-36.e4.
21. Kroska EB. A meta-analysis of fear-avoidance and pain intensity: the paradox of chronic pain. Scand J Pain 2016;13:43–58.
22. Theunissen M, Peters ML, Bruce J, Gramke H-F, Marcus MA. Preoperative anxiety and catastrophizing: a systematic review and meta-analysis of the association with chronic postsurgical pain. Clin J Pain 2012;28:819–41.
23. Black O, Keegel T, Sim MR, Collie A, Smith P. The effect of self-efficacy on return-to-work outcomes for workers with psychological or upper-body musculoskeletal injuries: a review of the literature. J Occup Rehabil 2018;28:16–27.
24. Peters S, Johnston V, Hines S, Ross M, Coppieters M. Prognostic factors for return-to-work following surgery for carpal tunnel syndrome: a systematic review. JBI Database Syst Rev Implement Rep 2016;14:135–216.
25. Núñez-Cortés R, Cruz-Montecinos C, Torres-Castro R, Tapia C, Püschel TA, Pérez-Alenda S. Effects of cognitive and mental health factors on the outcomes following Carpal Tunnel Release: a systematic review and meta-analysis. Arch Phys Med Rehabil 2022; 103:1615–27.
26. Siddall B, Ram A, Jones MD, Booth J, Perriman D, Summers SJ. Short-term impact of combining pain neuroscience education with

exercise for chronic musculoskeletal pain: a systematic review and meta-analysis. Pain 2022;163:e20–30.
27. Serrat M, Sanabria-Mazo JP, Almirall M, et al. Effectiveness of a multicomponent treatment based on pain neuroscience education, therapeutic exercise, cognitive behavioral therapy, and mindfulness in patients with fibromyalgia (FIBROWALK Study): a randomized controlled trial. Phys Ther 2021;101:pzab200.
28. Martinez-Calderon J, Flores-Cortes M, Morales-Asencio JM, Fernandez-Sanchez M, Luque-Suarez A. Which interventions enhance pain self-efficacy in people with chronic musculoskeletal pain? A systematic review with meta-analysis of randomized controlled trials, including over 12 000 participants. J Orthop Sports Phys Ther 2020;50:418–30.
29. Page MJ, McKenzie JE, Bossuyt PM, et al. The PRISMA 2020 statement: an updated guideline for reporting systematic reviews. Rev Esp Cardiol 2021;74:790–9.
30. Stroup DF, Berlin JA, Morton SC, et al. Meta-analysis of observational studies in epidemiology: a proposal for reporting. Meta-analysis Of Observational Studies in Epidemiology (MOOSE) group. JAMA 2000;283:2008–12.
31. Ouzzani M, Hammady H, Fedorowicz Z, Elmagarmid A. Rayyan-a web and mobile app for systematic reviews. Syst Rev 2016;5:210.
32. Ottawa Hospital Research Institute. Available at: https://www.ohri.ca/programs/clinical_epidemiology/oxford.asp. Accessed November 22, 2022.
33. Borenstein M, Hedges LV, Higgins JPT, Rothstein HR. Introduction to meta-analysis. 2021. Available at: http://dx.doi.org/10.1002/9781119558378. Accessed November 22, 2022.
34. Viechtbauer W. Conducting meta-analyses in *R* with the **metafor** Package. J Statist Softw 2010: 36.
35. Borenstein M, Hedges LV, Higgins JPT, Rothstein HR. A basic introduction to fixed-effect and random-effects models for meta-analysis. Res Synth Methods 2010;1:97–111.
36. Cohen J. A power primer. Psychol Bull 1992;112:155–9.
37. Higgins JPT, Thomas J, Chandler J, et al. Cochrane Handbook for Systematic Reviews of Interventions. John Wiley & Sons; 2019.
38. Katz JN, Keller RB, Fossel AH, et al. Predictors of return to work following carpal tunnel release. Am J Ind Med 1997;31:85–91.
39. Katz JN, Lew RA, Bessette L, et al. Prevalence and predictors of long-term work disability due to carpal tunnel syndrome. Am J Ind Med 1998;33:543–50.
40. Katz JN, Amick 3rd BC, Keller R, et al. Determinants of work absence following surgery for carpal tunnel syndrome. Am J Ind Med 2005;47:120–30.
41. Kuijpers T, van der Windt DAWM, van der Heijden GJMG, Twisk JWR, Vergouwe Y, Bouter LM. A prediction rule for shoulder pain related sick leave: a prospective cohort study. BMC Musculoskelet Disord 2006;7:97.
42. Turner JA, Franklin G, Fulton-Kehoe D, et al. Early predictors of chronic work disability associated with carpal tunnel syndrome: a longitudinal workers' compensation cohort study. Am J Ind Med 2007;50:489–500.
43. Opsteegh L, Reinders-Messelink HA, Schollier D, et al. Determinants of return to work in patients with hand disorders and hand injuries. J Occup Rehabil 2009;19:245–55.
44. Karels CH, Bierma-Zeinstra SM, Verhagen AP, Koes BW, Burdorf A. Sickness absence in patients with arm, neck and shoulder complaints presenting in physical therapy practice: 6 months follow-up. Man Ther 2010;15:476–81.
45. Chen Y-H, Lin H-T, Lin Y-T, et al. Self-perceived health and return to work following work-related hand injury. Occup Med 2012;62:295–7.
46. Cowan J, Makanji H, Mudgal C, Jupiter J, Ring D. Determinants of return to work after carpal tunnel release. J Hand Surg Am 2012;37:18–27.
47. Ramel E, Rosberg H-E, Dahlin LB, Cederlund RI. Return to work after a serious hand injury. Work 2013;44:459–69.
48. Roesler ML, Glendon AI, O'Callaghan FV. Recovering from traumatic occupational hand injury following surgery: a biopsychosocial perspective. J Occup Rehabil 2013;23:536–46.
49. Bot AGJ, Bossen JKJ, Mudgal CS, Jupiter JB, Ring D. Determinants of disability after fingertip injuries. Psychosomatics 2014;55:372–80.
50. Conzen C, Conzen M, Rübsamen N, Mikolajczyk R. Predictors of the patient-centered outcomes of surgical carpal tunnel release – a prospective cohort study. BMC Musculoskelet Disord 2016;17.
51. Feleus A, Miedema HS, Bierma-Zeinstra SMA, Hoekstra T, Koes BW, Burdorf A. Sick leave in workers with arm, neck and/or shoulder complaints; defining occurrence and discriminative trajectories over a 2-year time period. Occup Environ Med 2017;74:114–22.
52. Gowd AK, Cvetanovich GL, Liu JN, et al. Preoperative mental health scores and achieving patient acceptable symptom state are predictive of return to work after arthroscopic rotator cuff repair. Orthop J Sports Med 2019;7:2325967119878415.
53. Marom BS, Ratzon NZ, Carel RS, Sharabi M. Return-to-work barriers among manual workers after hand injuries: 1-year follow-up cohort study. Arch Phys Med Rehabil 2019;100:422–32.
54. Coggon D, Ntani G, Walker-Bone K, et al. Associations of sickness absence for pain in the low back, neck and shoulders with wider propensity to pain. Occup Environ Med 2020;77:301–8.
55. Egund L, Önnby K, Mcguigan F, Åkesson K. Disability and pain are the best predictors of sick leave after a distal radius fracture in men. J Occup Rehabil 2020;30:656–64.
56. Matcham F, Norton S, Steer S, Hotopf M. Usefulness of the SF-36 Health Survey in screening for depressive and anxiety disorders in rheumatoid arthritis. BMC Musculoskelet Disord 2016;17:224.
57. Lo S, Shu J, Phillips M, Sun F, Berk JL, Sanchorawala V. Symptoms of depression and anxiety assessed by the SF-36 questionnaire in patients with AL amyloidosis. Blood 2015;126:3299.
58. LoMartire R, Äng BO, Gerdle B, Vixner L. Psychometric properties of Short Form-36 Health Survey, EuroQol 5-dimensions, and Hospital Anxiety and Depression Scale in patients with chronic pain. Pain 2020;161:83–95.
59. Pfoh ER, Chan KS, Dinglas VD, et al. The SF-36 offers a strong measure of mental health symptoms in survivors of acute respiratory failure. A Tri-National Analysis. Ann Am Thorac Soc 2016;13:1343–50.
60. Zieger M, Schwarz R, König H-H, Härter M, Riedel-Heller SG. Depression and anxiety in patients undergoing herniated disc surgery: relevant but underresearched - a systematic review. Cent Eur Neurosurg 2010;71:26–34.
61. Wertli MM, Rasmussen-Barr E, Held U, Weiser S, Bachmann LM, Brunner F. Fear-avoidance beliefs-a moderator of treatment efficacy in patients with low back pain: a systematic review. Spine J 2014;14:2658–78.
62. de Wit M, Wind H, Hulshof CTJ. Frings-Dresen MHW. Person-related factors associated with work participation in employees with health problems: a systematic review. Int Arch Occup Environ Health 2018;91:497–512.
63. Godges JJ, Anger MA, Zimmerman G, Delitto A. Effects of education on return-to-work status for people with fear-avoidance beliefs and acute low back pain. Phys Ther 2008;88:231–9.
64. Lambeek LC, van Mechelen W, Knol DL, Loisel P, Anema JR. Randomised controlled trial of integrated care to reduce disability from chronic low back pain in working and private life. BMJ 2010;340:c1035.
65. Grant M, O-Beirne-Elliman J, Froud R, Underwood M, Seers K. The work of return to work. Challenges of returning to work when you have chronic pain: a meta-ethnography. BMJ Open 2019;9:e025743.
66. Bartley EJ, Fillingim RB. Sex differences in pain: a brief review of clinical and experimental findings. Br J Anaesth 2013;111:52–8.
67. Riley JL, Robinson ME, Wise EA, Myers CD, Fillingim RB. Sex differences in the perception of noxious experimental stimuli: a meta-analysis. Pain 1998;74:181–7.
68. Fillingim RB, Kaplan L, Staud R, et al. The A118G single nucleotide polymorphism of the mu-opioid receptor gene (OPRM1) is associated with pressure pain sensitivity in humans. J Pain 2005;6:159–67.
69. Craft RM, Mogil JS, Aloisi AM. Sex differences in pain and analgesia: the role of gonadal hormones. Eur J Pain 2004;8:397–411.
70. Thorn BE, Clements KL, Charles Ward L, et al. Personality factors in the explanation of sex differences in pain catastrophizing and response to experimental pain. Clin J Pain 2004;20:275–82.