Systematic Review

The Prevalence of Perceived Injustice and Factors Associated With Perceived Injustice in People With Pain: A Systematic Review With Meta-analysis

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Background: Perceived injustice (PI) is a multidimensional appraisal cognition comprising the severity of loss consequent to injury, blame, a sense of unfairness, and/or irreparability of loss. PI gained increasing interest in pain research since it potentially contributes to the experience and burden of (chronic) pain.

Objectives: This systematic review aimed to determine the prevalence of PI and factors associated with PI in people with pain.

Study Design: Systematic review with meta-analysis.

Methods: Web of Science, PubMed, and Embase were screened for cross-sectional or cohort studies encompassing human patients who were diagnosed with a condition causing pain and reported prevalence rates for PI and/or associations between a factor and PI. Meta-analyses were carried out, and subgroup analyses were undertaken based on the methodological quality of the studies, the type of pain population, and whether the outcome measure was valid or not in case of heterogeneity ($P < 0.05$).

Results: Fifty-four studies were found eligible. The prevalence of PI ranged from 23% to 77% ($I^2 = 99\%$, $P < 0.001$). Association with PI, assessed using the Injustice Experienced Questionnaire, were found with pain catastrophizing (pooled Pearson's r [r_p] = 0.66 [0.64, 0.69], $P < 0.00001$), posttraumatic stress (r_p = 0.63 [0.59, 0.67], $P < 0.00001$), anger (r_p = 0.59 [0.49, 0.67], $P < 0.00001$), anxiety (r_p = 0.59 [0.52, 0.64], $P < 0.00001$), pain acceptance (r_p = -0.59 [-0.66, -0.49], $P < 0.00001$), depressive symptoms (r_p = 0.57 [0.52, 0.60], $P < 0.00001$), kinesiophobia (r_p = 0.57 [0.50, 0.64], $P < 0.00001$), academic functioning (r_p = -0.54 [-0.65, -0.41], $P < 0.00001$), disability (r_p = 0.53 [0.47, 0.59], $P < 0.00001$), emotional functioning (r_p = -0.52 [-0.64, -0.39], $P < 0.00001$), pain interference (r_p = 0.49 [0.35, 0.60], $P < 0.00001$), state anger (r_p = 0.48 [0.41, 0.54], $P < 0.00001$), mental functioning (r_p = -0.48 [-0.57, -0.38], $P < 0.00001$), symptoms of central sensitization (r_p = 0.47 [0.39, 0.55], $P < 0.00001$), social functioning (r_p = -0.47 [-0.60, -0.31], $P < 0.00001$), and physical functioning (r_p = -0.43 [-0.53, -0.33], $P < 0.00001$), pain perceptions (r_p = 0.40 [0.40, 0.64], $P < 0.00001$), trait anger (r_p = 0.40 [0.29, 0.49], $P < 0.00001$), pain intensity (r_p = 0.37 [0.33, 0.42], $P < 0.00001$), and anger inhibition (r_p = 0.35 [0.26, 0.43], $P < 0.00001$).

Limitations: Some articles had to be excluded due to the absence of a full-text version. The findings can largely be applied to developed and high-income countries, but further research is needed in developing countries. Also, no validated cutoff values were available for the National Institutes of Health to determine the methodological quality of the included studies. Lastly, high heterogeneity was observed in many of the performed analyses. However, this was addressed by performing subgroup analyses, which could decrease heterogeneity in some cases.

Conclusions: The prevalence of PI was ≥ 33% in 75% of the studies indicating that PI is

important to consider in people with pain. There is evidence for the association of PI with psychological, pain, and quality of life characteristics in people with pain. The associations of PI with personal, injury, and recovery characteristics were overall not significant or negligible.

Key words: Pain, perceived injustice, psychological, quality of life, prevalence, association, systematic review, meta-analysis

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Pain is one of the most frequent and debilitating symptoms (1), particularly seen in people with low back pain and headache disorders (2). In addition, pain is the second most frequent reason for primary health care consultations (3). This implies that pain contributes strongly to the global burden of disease (4).

Pain is a subjective experience, which is strongly influenced by psychological factors (5). Maladaptive cognitive-emotional factors (e.g., pain catastrophizing, hypervigilance, and somatization) are known to contribute to the malfunctioning of the endogenous analgesic system, and thus amplification of pain (6). Besides that, they also play an important role in the transition from acute to chronic pain in people with chronic non-cancer pain (7,8). Therefore, the impact of psychological processes on the experience of pain is of growing interest (5).

A relatively novel construct in pain research is the justice-related appraisals in the experience of pain (9). Injustice perceptions are likely to occur in situations involving "a felt discrepancy between what is perceived to be and what is perceived should be," leading to feelings of undeserved hardship or irreparable loss (7,8). Some of these losses can be temporary and others permanent (10,11). When someone has the feeling of undeserved loss or hardship, injustice can be perceived (12).

Perceived injustice (PI) predicts adverse pain-related outcomes even when controlling for other pain-related psychosocial constructs, such as pain catastrophizing, and fear of movement (9,13). In people with PI increased protective pain behavior is seen (14,15). Pain behavior, rather than pain intensity and depressive symptoms, mediates the association between PI and opioid prescriptions (16). Feelings of injustice predict tentative opioid use at one-year follow-up (17), increasing the risk of side effects associated with long-term opioid use (18).

Moreover, PI acts on the social consequences of pain (19). The constant search for the cause of the pain can lead to mental isolation and depression (7) or conflicts with family or friends (20). The vast majority of studies assessing PI investigated PI as a predictor of adverse physical and mental health outcomes associated with pain, such as long-term disability and poor rehabilitation outcomes (14), posttraumatic stress symptoms (21), pain severity, disability, and work absence at one-year follow-up (22). Given the expansion of the novel research area concerning PI as a possible predictor of adverse pain-related disability and mental outcomes, an overview of the prevalence of PI and factors associated to PI in populations with pain is warranted. Therefore, the aim of this systematic review and meta-analysis was (I) to examine the prevalence of PI in people with pain and (II) to explore all the factors associated with PI in people with pain.

Methods

Search Strategy

PubMed, Web of Science, and Embase were searched on April 30, 2021 and complemented by a backward and forward hand searches of included articles as well as additional reviews about PI. In case of unavailable studies, the corresponding authors were contacted. The applied search terms were defined by AR and ES based on possible search terms elaborated by synonyms, terms found in relevant abstracts, and terms found in search term lists of other systematic reviews. Since this is an explorative study defining all factors associated with PI, all types of measurements/scales could be included. We did not define any scales or instruments a priori. Truncation and wildcards were used when applicable. Also, the subject heading was used if all terms underneath seemed relevant to the search strategy. The key chain was tested before use. An overview of the applied search terms can be found in Table 1 and the full search strategy can be found in Appendix 1.

Study Selection

This systematic review with meta-analyses was reported in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses check-

list (23) and was registered a priori in the International Prospective Register of Systematic Reviews database on May 3, 2021 (No. CRD42021238317). After duplication removal, eligibility was assessed in a blinded manner by 2 researchers (AR and ES), using the Rayyan online tool (24). First, the title and abstract were examined. Second, full-text articles of the remaining studies were verified. In case of disagreements, a third independent researcher (ER) was consulted to resolve uncertainties. Studies were included if they met all of the following criteria: (I) Patients diagnosed with a disease that is causing pain; (II) Data available to determine the prevalence of PI or a factor, no matter which type of scale/measurement, associated with PI (in case of regression-based analyses, studies must have identified PI as the dependent variable and the factor as the independent variable); (III) Studies written in English, French, Dutch, or German; and (IV) Study design being cross-sectional or cohort. Protocols, systematic reviews, narrative reviews, pilot studies, and randomized controlled trials were excluded. No publication date restrictions were imposed.

Data Extraction

Data from all included studies were extracted blindly by AR and ES on first author, publication year, country, study design, sample size, mean age, type of population with pain, disease duration, PI outcome

Table 1. *Search terms*.

	P	E	O
	Patients with pain	**Associations and prevalence rates**	**Perceived injustice**
MeSH terms	Pain Causalgia Central Nervous System Sensitization Fibromyalgia Hyperalgesia Hyperesthesia Neuralgia Nociceptive Pain Paresthesia	Risk Probability Morbidity Basic reproduction number Epidemiology Causality Prognosis Epidemiologic Factor Survival analysis Odds ratio	Patient Harm
Free terms	Suffering Ache Type II Complex Regional Pain Syndrome CRPS Type II Sensitization Rheumatic Fibrositis Allodynia Oxyesthesia Neurodynia Nociceptive Formication	Incidence Prevalence Reproduction rate Reproduction ratio Determinant Frequency Occurrence Causation Cause Factor Etiology Cross-Product Ratio Relative Odd Prognose Epidemiologic Determinant Survival analyze Hazard ratio Characteristic Contributing Indicator Outcome Phenomenon Prediction Predictor Relative frequency Relative incidence Variable	Unfairness Irreparability Blame Inequality NOT Socioeconomic Perceived justice Perceived fairness Injustice

Abbreviations: E, exposure; MeSH, Medical Subheading; O, outcome; P, population; PI, perceived injustice; CRPS, complex regional pain syndrome.

measure, and their cutoff. The prevalence of PI and standard error were extracted for studies reporting prevalence rates. The pain outcome measure, predictor and their outcome measure, the measure of association, and significance were extracted for included studies reporting factors associated with PI. In case of missing data, the first author was contacted to complete the table of results. If none of the contacted authors answered, the data was left missing. There was no restriction on data extraction based on adverse or beneficial results.

Quality Assessment

The quality assessment was performed by 2 independent researchers (AR and ES) using the Quality Assessment Tool for Observational Cohort and Cross-Sectional Studies of the National Institute of Health (25). This tool focuses on the key concepts for evaluating the internal validity of a study. Each item was classified as "yes," "no," or "not applicable/not reported/cannot determine." Cohort studies were evaluated on 14 points and cross-sectional studies on 10 points (questions 6, 7, 12, and 13 are marked as not applicable), resulting in a different maximum score of 14 and 10 points (26). The quality categories proposed by Besora-Moreno et al (26) were applied, being, low (≤ 5 points), medium (6-9 points), and high quality (10-14 points) for cohort studies, and low (≤ 3 points), medium (4-7 points), and high quality (8-10 points) for cross-sectional studies. Uncertainties were again resolved by the third researcher (ER).

Data Synthesis and Analysis

For the prevalence rate, effect sizes were calculated manually for all studies reporting prevalence numbers to estimate the pooled prevalence rate of PI in people with pain. For the factors associated with PI in people with pain, all types of univariate association measures were tolerated for inclusion. Regression coefficients were omitted from the meta-analyses, due to the fact that the regression models from which they were retrieved included different covariates, making comparability across studies (even for standardized ones) problematic (27). All extracted data, both for univariate and multivariate associations, were summarized in a descriptive way in an evidence table divided into different clusters and further subdivided into all factors retrieved from the search (Table 2).

Accordingly, a meta-analysis was only conducted if at least 2 similar association measures were reported for the analyzed factor and if the same PI outcome measure was used. In the case of different outcomes for the measurement of a factor within one study, the most common or overarching type of measurement was chosen. In the case of Pearson's correlation coefficients, these were first transformed to Fisher's Z test to stabilize the variance of correlation coefficients. Afterwards, model results were recalculated into Pearson's correlation coefficients for ease of interpretation (28). The size of correlation was respectively negligible (± 0.00 to ± 0.30), low (± 0.30 to ± 0.50), moderate (± 0.50 to ± 0.70), high (± 0.70 to ± 0.90), and very high (± 0.90 to ± 1.00) (29).

Review Manager 5.4 from the Cochrane Collaboration (30) was used to perform the meta-analyses. Random effects were used for all analyses done. The method presented by Higgins et al (31) was used to assess the consistency across studies. Subgroup analyses defined prior to the analyses were performed based on the methodological quality of the studies (low, medium, or high quality), the type of pain population, and whether the outcome measure was valid or not (valid or invalid). To determine the significance of heterogeneity among studies, a chi-squared (χ^2) test was interpreted wherefore a P value of 0.05 was used as a cutoff (32).

Results

Study Selection

After removing duplicates, the systematic search resulted in 10,081 articles that were subsequently screened on title and abstract. Four authors were contacted (22,33-36) due to the unavailability of the study, of which 2 replied to the request (22,35,36). After initial screening, 153 articles were screened in full text. Two additional studies were identified by a forward and backward hand search. Ultimately, 54 studies (15,163 patients) were included: 3 for prevalence rates and 43 for factors associated with PI, and 8 for both the prevalence rates and the associated factors (Fig. 1).

Study Characteristics

The 54 included studies involved 44 cross-sectional (7,9,16,17,35-74) and 10 cohort studies (16,21,22,75-81). The included studies were all retrieved from high-income countries. Sample sizes ranged from 30 (35) to 4,516 (45) (Table 4). Three different PI outcomes were found across the studies: 50 used the Injustice Experienced Questionnaire (IEQ) (7,9,16,21,22,35-

Table 2. *Association measures of perceived injustice in pain populations.*

Study	Design	Sample size (n)	Mean age (y)	Type of population with pain	Pain outcome measure [min/max]: mean ± SD or median ± IQR	Disease duration: mean ± SD	PI outcome measure [min/max]: mean ± SD or median ± IQR	Cut-off PI outcome	Predictor outcome measure	Measure of association
PSYCHOLOGICAL CHARACTERISTICS AND COGNITIONS										
Depressive symptoms[MA]										
Agtarap 2016, United States (62)	CS	206	47.48	Traumatic injury	NRS [0/20]: NM	12 me	IEQ [0/48]: 16.74 ± 14.92	NM	PHQ-8	r = 0.681***[MA]
Boals 2020, United States (81)	C	176	44.47	Traumatic injury	NM	NM	IEQ [0/48]: - T1: 17.04 ± 12.93 - T2: 16.25 ± 14.10 - T3: 16.41 ± 15.63	NM	- T1-T1 PHQ-8 - T2-T1 PHQ-8 - T3-T1 PHQ-8 - T1-T2 PHQ-8 - T2-T2 PHQ-8 - T3-T2 PHQ-8 - T1-T3 PHQ-8 - T2-T3 PHQ-8 - T3-T3 PHQ-8	r = 0.61***[MA] r = 0.48*** r = 0.41*** r = 0.55*** r = 0.73***[MA] r = 0.72*** r = 0.62*** r = 0.69*** r = 0.80***[MA]
Monden 2019, United States (50)	CS	74	47.6	SCI	MPQ-SF-PPI [0/5]: NM	51.5 (27.0 – 94.0) de	IEQ [0/48]: NM	NM	PHQ-8	r = 0.45***[MA] SLOPE = 1.19***
Trost 2015, United States (54)	CS	155	47.5	Traumatic injury	NRS [0/10]: 4.01 ± 3.00	NM	IEQ [0/48]: 17.07 ± 14.55	NM	PHQ-8	r = 0.64**[MA]
Trost 2016 (b), United States (55)	CS	45	48.80	SCI	MPQ-SF-PPI [0/5]: 3.35 ± 2.5	82.49 ± 101.56 de	IEQ [0/48]: NM	NM	PHQ-8	r = 0.49***[MA] SLOPE = 1.19***
Trost 2017, United States (72)	CS	53	47.62	SCI	MPQ-PRI-PPI [0/5]: 1.49 ± 0.91	204.51 ± 410.67 de	IEQ [0/48]: 15.37 ± 12.35	NM	PHQ-8	r = 0.44***[MA]
Iverson 2018, Canada (44)	CS	102	41.2	mTBI	BPQ [0/15]: NM	12.1 ± 6.3 we	IEQ [0/48]: 20.79 ± 10.94	> 30 > 19	PHQ-9	IEQ total: r = 0.598***[MA] IEQ blame: r = 0.511*** IEQ severity: r = 0.605***
Scott 2013, Canada (83)	CS	183	49.67	Chronic MSK pain	PPI [0/10]: 5.82 ± 2.09	9.98 ± 8.20 yd	IEQ [0/48]: 28.91 ± 11.11	NM	PHQ-9	r = 0.56**[MA]
Scott 2016, Canada (52)	CS	66	40.03	Chronic MSK pain	MPQ-PRI [0/78]: 34.21 ± 14.16	11.55 ± 16.63 m	IEQ [0/48]: 31.71 ± 8.55	NM	PHQ-9	r = 0.44**[MA]
Scott 2019, United Kingdom (78)	C	303	45.22	Chronic pain	NRS [0/10]: 7.63 ± 1.60	13.37 ± 10.29 yd	IEQ [0/48]: 31.84 ± 9.96	> 19	PHQ-9	r = 0.45**[MA]

Table 2 (cont.). *Association measures of perceived injustice in pain populations.*

Study	Design	Sample size (n)	Mean age (y)	Type of population with pain	Pain outcome measure [min/max]: mean ± SD or median ± IQR	Disease duration: mean ± SD	PI outcome measure [min/max]: mean ± SD or median ± IQR	Cut-off PI outcome	Predictor outcome measure	Measure of association
Yakobov 2018 (a), Canada (76)	C	110	66.9	Knee OA scheduled for TKA	WOMAC [0/20]: - Pretreatment: 10.6 ± 3.3 - Posttreatment: 3.4 ± 3.4	NM	Changes in IEQ-chr [0/48]: - Pretreatment: 8.9 ± 8.4 - Posttreatment: 6.3 ± 8.4 IEQ-chr [0/48]: - Pretreatment: 8.9 ± 8.4 - Posttreatment: 6.3 ± 8.4	NM	PHQ-9	r = 0.24* β = 0.19* r = 0.52**[MA]
Trost 2019, United States (53)	CS	137	41.86	CLBP	MPQ-SF-PRI [0/45]: 21.58 ± 13.05	8.52 ± 7.58 yd	IEQ [0/48]: 24.81 ± 12.44	NM	PHQ-9	r = 0.64**[MA]
Ziadni 2020, Seattle (59)	CS	137	41.9	CLBP	MPQ-SF-PRI [0/45]: 21.96 ± 13.02	8.52 ± 7.58 yd	IEQ [0/48]: 25.09 ± 12.27	> 19	PHQ-9	r = 0.630*[MA]
Pâquet 2016, Canada (51)	CS	100	25.50	Women with PVD and their partners	MPQ [0/78]: 27.22 ± 11.29	51.50 ± 43.34 md	IEQ [0/48]: 21.86 ± 10.71	NM	BDI-II	r = 0.05**[MA]
Rahbari 2019, Iran (64)	CS	230	41.57	Chronic MSK pain	MPQ [0/78]: NM	43.4 ± 38.40 md	IEQ-P [0/48]: 20.15 ± 9.36	NM	BDI-II	r = 0.40**[MA]
Scott 2012, Canada (7)	CS	107	41	Chronic MSK pain	NRS [0/10]: - Women: 4.9 ± 1.9 - Men: 4.1 ± 2.2	8.3 y	IEQ [0/48]: - Women: 26.8 ± 11.6 - Men: 23.4 ± 11.2	NM	BDI-II	r = 0.42**[MA]
Sullivan 2008, Canada (22)	C	226	37.7	Chronic MSK pain	MPQ-PRI: - Work accident: 24.3 ± 15.6 - Motor accident: 26.6 ± 15.7	NM	IEQ [0/48]: - Work accident: 17.3 ± 12.2 - Motor accident: 25.1 ± 11.8	NM	BDI-II	r = 0.66**[MA]
Sullivan 2009, Canada (15)	C	112	35.8	Whiplash injury	MPQ-PRI: 21.4 ± 13.5	18.3 w	IEQ [0/48]: 22.3 ± 9.7	NM	BDI-II	r = 0.43**[MA]

Table 2 (cont.). *Association measures of perceived injustice in pain populations.*

Study	Design	Sample size (n)	Mean age (y)	Type of population with pain	Pain outcome measure [min/max]: mean ± SD or median ± IQR	Disease duration: mean ± SD	PI outcome measure [min/max]: mean ± SD or median ± IQR	Cut-off PI outcome	Predictor outcome measure	Measure of association
Yakobov 2016, Canada (56)	CS	71	35.8	Whiplash injury	NPRS [0/10]: - Pretreatment: 5.2 ± 1.8 - Posttreatment: 4.2 ± 1.8	18.6 ± 7.3 w	Changes in IEQ [0/48]: - Pre-treatment: 27.0 ± 6.6 - Post-treatment: 22.6 ± 9.7	≥ 18	BDI-II (changes)	r = 0.16^{MA}
Penn 2019, United States (70)	CS	60	47.6	Chronic pain among PLWH	Rate [0/5]: NM	NM	IEQ [0/48]: 25.7 ± 11.9	NM	CES-D	r = 0.572**^{MA}
Penn 2020, United States (77)	C	105	45.79	CLBP	SPPB-Pain [0/100]: 27.37 ± 27.41	NM	IEQ [0/48]: 17.95 ± 13.38	NM	CES-D	r = 0.505**^{MA}
Carriere 2017 (a), California (16)	CS	344	48	Chronic pain	NRS [0/10]: - No active opioid prescription: 4.44 ± 2.78 - Active opioid prescription: 5.68 ± 2.37	NM	IEQ [0/48]: - No active opioid prescription: 15.60 ± 11.40 - Active opioid prescription: 20.17 ± 10.51	NM	PROMIS depression	r = 0.656***^{MA}
Miller 2021, United States (35)	CS	30	11.3	Youth with SCD	PedsQL [0/100]: 68.43 ± 19.11	NM	IEQ [0/48]: 11.17 ± 12.42	NM	PROMIS depression	r = 0.60**^{MA}
Sturgeon 2017, United States (69)	CS	330	NM	Chronic pain	NRS [0/10]: 6.42 ± 1.53	15 ± 6.42 yd	IEQ [0/48]: 30.0 ± 10.3	NM	PROMIS depression	r = 0.608**^{MA}
Ysidron 2020, Greece (80)	C	343	NM	LBP	NRS [0/10]: 6.0 ± 1.8	NM	IEQ [0/48]: NM	NM	- PROMIS depression - PROMIS depression (after 3m)	r = 0.48***^{MA} r = 0.48***
Giummarra 2017 (a), Australia (40)	CS	354	42.97	Traumatic injury	BPI, pain severity [0/10]: NM	NM	IEQ [0/48]: - Compensable: 20.26 ± 14.20 - Non compensable: 11.79 ± 11.24	> 30	HADS depression	r = 0.65***^{MA}
Ioannou 2016, Australia (42)	CS	160	43.01	Traumatic injury	BPI, pain severity [0/10]: 2.94 ± 2.19	13.38 ± 1.67 mc	IEQ [0/48]: 20.52 ± 14.61	≥ 11	HADS depression	r = 0.71**^{MA}

Table 2 (cont.). *Association measures of perceived injustice in pain populations.*

Study	Design	Sample size (n)	Mean age (y)	Type of population with pain	Pain outcome measure [min/max]: mean ± SD or median ± IQR	Disease duration: mean ± SD	PI outcome measure [min/max]: mean ± SD or median ± IQR	Cut-off PI outcome	Predictor outcome measure	Measure of association
La Cour 2017, Denmark (66)	CS	358	45.5	Chronic benign pain or a "somatoform" diagnosis	SF-36 Bodily pain [0/100]: 31.8 ± 25.5	9.8 ± 8.6 y	IEQ [0/48]: 26.8 ± 11.0	> 30	HADS depression	r = 0.573**MA
Rodero 2012, Spain (9)	CS	250	52.4	FM	PVAS [0/100]: 52.5 ± 16.8	18.5 ± 11.3 y	IEQ [0/48]: 30.1 ± 12.2	> 30	HADS depression	r = 0.67***MA
Yamada 2019, Japan (67)	CS	130	33	Menstrual pain	NRS [0/10]: 5.7 ± 2.2	NM	IEQ-chr-J [0/48]: 14.2 ± 13.0	NM	HADS depression	r = 0.62***MA
Bults 2020, the Netherlands (74)	CS	53 (PR-UMCG) 228 (TC)	42.2	Chronic pain	NRS [0/10]: 7.0 ± 1.7	69.3 ± 81.5 md	IEQ [0/48]: 21.0 ± 11.5	≥ 30	SCL-90-D	PR-UMCG: r = 0.62***MA TC: r = 0.69***MA
Posttraumatic stress[MA]										
Agtarap 2016, United States (62)	CS	206	47.48	Traumatic injury	NRS [0/20]: NM	12 me	IEQ [0/48]: 16.74 ± 14.92	NM	PC-PTSD	r = 0.602***MA
Boals 2020, United States (81)	C	176	44.47	Traumatic injury	NM	NM	IEQ [0/48]: - T1: 17.04 ± 12.93 - T2: 16.25 ± 14.10 - T3: 16.41 ± 15.63	NM	- T1-T1 PC-PTSD - T2-T1 PC-PTSD - T3-T1 PC-PTSD - T1-T2 PC-PTSD - T2-T2 PC-PTSD - T3-T2 PC-PTSD - T1-T3 PC-PTSD - T2-T3 PC-PTSD - T3-T3 PC-PTSD	r = 0.47***MA r = 0.43*** r = 0.31** r = 0.46 r = 0.65***MA r = 0.54*** r = 0.43*** r = 0.57*** r = 0.67***MA
Trost 2015, United States (54)	CS	155	47.5	Traumatic injury	NRS [0/10]: 4.01 ± 3.00	NM	IEQ [0/48]: 17.07 ± 14.55	NM	PC-PTSD	r = 0.61**MA

Table 2 (cont.). *Association measures of perceived injustice in pain populations.*

Study	Design	Sample size (n)	Mean age (y)	Type of population with pain	Pain outcome measure [min/max]: mean ± SD or median ± IQR	Disease duration: mean ± SD	PI outcome measure [min/max]: mean ± SD or median ± IQR	Cut-off PI outcome	Predictor outcome measure	Measure of association
Trost 2016 (b), United States	CS	45	48.80	SCI	MPQ-SF-PPI [0/5]: 3.35 ± 2.5	82.49 ± 101.56 de	IEQ [0/48]: NM	NM	PC-PTSD	r = 0.58***MA β = 0.52
Trost 2017, United States (72)	CS	53	47.62	SCI	MPQ-PRI-PPI [0/5]: 1.49 ± 0.91	204.51 ± 410.67 de	IEQ [0/48]: 15.37 ± 12.35	NM	PC-PTSD	r = 0.6***MA
Bults 2020, the Netherlands (74)	CS	53 (PR-UMCG) 228 (TC)	42.2	Chronic pain	NRS [0/10]: 7.0 ± 1.7	69.3 ± 81.5 md	IEQ [0/48]: 21.0 ± 11.5	≥ 30	SCL-90-PTSD	PR-UMCG: r = 0.68***MA TC: r = 0.71***MA
Sullivan 2009, Canada (15)	C	112	35.8	Whiplash injury	MPQ-PRI: 21.4 ± 13.5	18.3 we	IEQ [0/48]: 22.3 ± 9.7	NM	IES-R	r = 0.60**MA
Yakobov 2018 (b), Canada (73)	CS	146	36.5	Whiplash injury	MPQ-PRI: 22.0 ± 12.5	9.0 wd	IEQ [0/48]: 22.8 ± 9.7	NM	IES-R	r = 0.61**MA
Giummarra 2017 (a), Australia (40)	CS	354	42.97	Traumatic injury	BPI, pain severity [0/10]: NM	NM	IEQ [0/48]: - Compensable: 20.26 ± 14.20 - Non compensable: 11.79 ± 11.24	> 30	PCL-C	r = 0.65***MA
Ioannou 2016, Australia (42)	CS	160	43.01	Traumatic injury	BPI, pain severity [0/10]: 2.94 ± 2.19	13.38 ± 1.67 mc	IEQ [0/48]: 20.52 ± 14.61	≥ 11	PCL-C	r = 0.71**MA
Trost 2015, United States (54)	CS	155	47.5	Traumatic injury	NRS [0/10]: 4.01 ± 3.00	NM	IEQ [0/48]: 17.07 ± 14.55	NM	PCL-C	r = 0.61**MA
Iverson 2018, Canada (44)	CS	102	41.2	mTBI	BPQ [0/15]: NM	12.1 ± 6.3 we	IEQ [0/48]: 20.79 ± 10.94	> 30 > 19	PCL-5	IEQ total: r = 0.689***MA IEQ blame: r = 0.632*** IEQ severity: r = 0.637***
Linnemørken 2020, Norway (46)	CS	692	47.5	Chronic pain	NRS [0/10]: 7.17 ± 1.71	7.55 ± 8.35 ye	IEQ [0/48]: 23.99 ± 11.18	≥ 33	PCL-5	OR: 1.09*** ORadja: 1.08***
Pain acceptance[MA]										
Bults 2020, the Netherlands (74)	CS	53 (PR-UMCG)	42.2	Chronic pain	NRS [0/10]: 7.0 ± 1.7	69.3 ± 81.5 md	IEQ [0/48]: 21.0 ± 11.5	≥ 30	AAQ-II	r = -0.81***MA

Table 2 (cont.). *Association measures of perceived injustice in pain populations.*

Study	Design	Sample size (n)	Mean age (y)	Type of population with pain	Pain outcome measure [min/max]: mean ± SD or median ± IQR	Disease duration: mean ± SD	PI outcome measure [min/max]: mean ± SD or median ± IQR	Cut-off PI outcome	Predictor outcome measure	Measure of association
Carriere 2018, United States (38)	CS	354	47.5	Chronic pain	NRS [0/10]: 4.72 ± 2.74	NM	IEQ [0/48]: 16.8 ± 11.41	NM	CPAQ-8	r = -0.595***MA
Martel 2017, Canada (49)	CS	475	51	Chronic pain	NRS [0/10]: 5.93 ± 1.51	NM	IEQ [0/48]: 29.1 ± 10.3	> 19	- CPAQ-8 total - CPAQ-8 subscale engagement - CPAQ-8 subscale willingness	r = -0.56**MA r = -0.42** r = -0.45**
Scott 2019, United Kingdom (78)	C	303	45.22	Chronic pain	NRS [0/10]: 7.63 ± 1.60	13.37 ± 10.29 yd	IEQ [0/48]: 31.84 ± 9.96	> 19	CPAQ-8	r = -0.36***MA
Rodero 2012, Spain (9)	CS	250	52.4	FM	PVAS [0/100]: 52.5 ± 16.8	18.5 ± 11.3 yd	IEQ [0/48]: 30.1 ± 12.2	> 30	CPAQ	r = -0.62***MA
Ysidron 2020, Greece (80)	C	343	NM	LBP	NRS [0/10]: 6.0 ± 1.8	NM	IEQ [0/48]: NM	NM	- CPAQ - CPAQ (after 1m)	r = -0.58***MA r = -0.59***
Pain-related injustice appraisals										
Boals 2020, United States (81)	C	176	44.47	Traumatic injury	NM	NM	IEQ [0/48]: T1: 17.04 ± 12.93 T2: 16.25 ± 14.10 T3: 16.41 ± 15.63	NM	- T1-T2 IEQ - T1-T3 IEQ - T2-T1 IEQ - T2-T3 IEQ - T3-T1 IEQ - T3-T2 IEQ	r = 0.59*** r = 0.59*** r = 0.59*** r = 0.85*** r = 0.64*** r = 0.86***
Daenen 2020, United Kingdom (61)	CS	146	15.03	Paediatric chronic pain	NRS [0/10]: 5.39 ± 2.39	NM	GJWB [5/34]: 20.92 ± 5.47 PJWB [0/41]: 25.49 ± 6.83	NM	IEQ	r = -0.13 r = -0.27**
Anxiety[MA]										
Bults 2020, the Netherlands (74)	CS	53 (PR-UMCG) 228 (TC)	42.2	Chronic pain	NRS [0/10]: 7.0 ± 1.7	69.3 ± 81.5 m	IEQ [0/48]: 21.0 ± 11.5	≥ 30	SCL-90-A	PR-UMCG: r = 0.66***MA TC: r = 0.65***MA

Table 2 (cont.). *Association measures of perceived injustice in pain populations.*

Study	Design	Sample size (n)	Mean age (y)	Type of population with pain	Pain outcome measure [min/max]: mean ± SD or median ± IQR	Disease duration: mean ± SD	PI outcome measure [min/max]: mean ± SD or median ± IQR	Cut-off PI outcome	Predictor outcome measure	Measure of association
Giummarra 2017 (a), Australia (40)	CS	354	42.97	Traumatic injury	BPI, pain severity [0/10]: NM	NM	IEQ [0/48]: - Compensable: 20.26 ± 14.20 - Non compensable: 11.79 ± 11.24	> 30	HADS anxiety	r = 0.58***MA
Ioannou 2016, Australia (42)	CS	160	43.01	Traumatic injury	BPI, pain severity [0/10]: 2.94 ± 2.19	13.38 ± 1.67 mc	IEQ [0/48]: 20.52 ± 14.61	≥ 11	HADS anxiety	r = 0.67**MA
La Cour 2017, Denmark (66)	CS	358	45.5	Chronic benign pain or a "somatoform" diagnosis	SF-36 Bodily pain [0/100]: 31.8 ± 25.5	Disease duration: 9.8 ± 8.6 y	IEQ [0/48]: 26.8 ± 11.0	> 30	HADS anxiety	r = 0.533**MA
Rodero 2012, Spain (9)	CS	250	52.4	FM	PVAS [0/100]: 52.5 ± 16.8	18.5 ± 11.3 y	IEQ [0/48]: 30.1 ± 12.2	> 30	HADS anxiety	r = 0.56***MA
Yamada 2019, Japan (67)	CS	130	33	Menstrual pain	NRS [0/10]: 5.7 ± 2.2	NM	IEQ-chr-J [0/48]: 14.2 ± 13.0	NM	HADS anxiety	r = 0.65***MA
Miller 2021, United States (35)	CS	30	11.3	Youth with SCD	PedsQL [0/100]: 68.43 ± 19.11	NM	IEQ [0/48]: 11.17 ± 12.42	NM	PROMIS anxiety	r = 0.072**MA
Kinesiophobia[MA]										
Agtarap 2016, United States (62)	CS	206	47.48	Traumatic injury	NRS [0/20]: NM	12 me	IEQ [0/48]: 16.74 ± 14.92	NM	TSK	r = 0.704***MA
Ioannou 2017, Australia (43)	CS	433	44.8	Traumatic injury	BPI, pain severity [0/10]: 2.60 ± 2.05	13.5 ± 1.6 mc	IEQ [0/48]: 16.26 ± 13.79	≥ 20	TSK	r = 0.55*MA βunadj = 0.91* β = 0.48*
Rahbari 2019, Iran (64)	CS	230	41.57	Chronic MSK pain	MPQ [0/78]: NM	43.4 ± 38.40 md	IEQ-P [0/48]: 20.15 ± 9.36	NM	TSK	r = 0.48**MA
Sullivan 2008, Canada (22)	CS	226	37.7	Chronic MSK pain	MPQ-PRI: - Work accident: 24.3 ± 15.6 - Motor accident: 26.6 ± 15.7	NM	IEQ [0/48]: - Work accident: 17.3 ± 12.2 - Motor accident: 25.1 ± 11.8	NM	TSK	r = 0.58**MA

Table 2 (cont.). *Association measures of perceived injustice in pain populations.*

Study	Design	Sample size (n)	Mean age (y)	Type of population with pain	Pain outcome measure [min/max]: mean ± SD or median ± IQR	Disease duration: mean ± SD	PI outcome measure [min/max]: mean ± SD or median ± IQR	Cut-off PI outcome	Predictor outcome measure	Measure of association
Sullivan 2009, Canada (15)	C	112	35.8	Whiplash injury	MPQ-PRI: 21.4 ± 13.5	18.3 we	IEQ [0/48]: 22.3 ± 9.7	NM	TSK	r = 0.62**[MA]
Yakobov 2014, Canada (75)	C	116	67.0	Knee OA scheduled for TKA	WOPAIN [0/100]: - Presurgery: 53.0 ± 17.7 - Postsurgery: 17.0 ± 17.2	7.6 ye	IEQ-chr [0/48]: 9.0 ± 8.7	NM	TSK-13	r = 0.48***[MA]
State anger[MA]										
Monden 2019, United States (50)	CS	74	47.6	SCI	MPQ-SF-PPI [0/5]: NM	51.5 (27.0 – 94.0) de	IEQ [0/48]: NM	NM	STAXI-II subscale state	Bivariate GLM: r = 0.49***[MA] SLOPE = 1.09*** Multivariate GLM: SLOPE = 0.51*
Scott 2016, Canada (52)	CS	66	40.03	Chronic MSK pain	MPQ-PRI [0/78]: 34.21 ± 14.16	11.55 ± 16.63 me	IEQ [0/48]: 31.71 ± 8.55	NM	STAXI-II subscale state	r = 0.36**[MA]
Trost 2016 (b), United States (55)	CS	45	48.80	SCI	MPQ-SF-PPI [0/5]: 3.35 ± 2.5	82.49 ± 101.56 de	IEQ [0/48]: NM	NM	STAXI-II subscale state	r = 0.60***[MA] β = -0.02
Trost 2019, United States (53)	CS	137	41.86	CLBP	MPQ-SF-PRI [0/45]: 21.58 ± 13.05	8.52 ± 7.58 y	IEQ [0/48]: 24.81 ± 12.44	NM	STAXI-II subscale state	r = 0.50**[MA]
Trost 2017, United States (72)	CS	53	47.62	SCI	MPQ-PRI-PPI [0/5]: 1.49 ± 0.91	204.51 ± 410.67 de	IEQ [0/48]: 15.37 ± 12.35	NM	STAXI-II subscale state	r = 0.58***[MA]
Scott 2013, Canada (83)	CS	183	49.67	Chronic MSK pain	NRS [0/10]: 5.82 ± 2.09	9.98 ± 8.20 y	IEQ [0/48]: 28.91 ± 11.11	NM	STAEI subscale state	r = 0.42**[MA]
Trait anger[MA]										
Monden 2019, United States (50)	CS	74	47.6	SCI	MPQ-SF-PPI [0/5]: NM	51.5 (27.0 – 94.0) de	IEQ [0/48]: NM	NM	STAXI-II subscale trait	Bivariate GLM: r = 0.49***[MA] SLOPE = 1.66***
Scott 2016, Canada (52)	CS	66	40.03	Chronic MSK pain	MPQ-PRI [0/78]: 34.21 ± 14.16	11.55 ± 16.63 me	IEQ [0/48]: 31.71 ± 8.55	NM	STAXI-II subscale trait	r = 0.34**[MA]
Trost 2016 (b), United States (55)	CS	45	48.80	SCI	MPQ-SF-PPI [0/5]: 3.35 ± 2.5	82.49 ± 101.56 de	IEQ [0/48]: NM	NM	STAXI-II subscale trait	r = 0.55***[MA]
Trost 2017, United States (72)	CS	53	47.62	SCI	MPQ-PRI-PPI [0/5]: 1.49 ± 0.91	204.51 ± 410.67 de	IEQ [0/48]: 15.37 ± 12.35	NM	STAXI-II subscale trait	r = 0.55***[MA]
Trost 2019, United States (53)	CS	137	41.86	CLBP	MPQ-SF-PRI [0/45]: 21.58 ± 13.05	8.52 ± 7.58 y	IEQ [0/48]: 24.81 ± 12.44	NM	STAXI-II subscale trait	r = 0.33**[MA]
Scott 2013, Canada (83)	CS	183	49.67	Chronic MSK pain	NRS [0/10]: 5.82 ± 2.09	9.98 ± 8.20 y	IEQ [0/48]: 28.91 ± 11.11	NM	STAEI subscale trait	r = 0.27**[MA]

Table 2 (cont.). *Association measures of perceived injustice in pain populations.*

Study	Design	Sample size (n)	Mean age (y)	Type of population with pain	Pain outcome measure [min/max]: mean ± SD or median ± IQR	Disease duration: mean ± SD	PI outcome measure [min/max]: mean ± SD or median ± IQR	Cut-off PI outcome	Predictor outcome measure	Measure of association
Anger expression[MA]										
Scott 2016, Canada (52)	CS	66	40.03	Chronic MSK pain	MPQ-PRI [0/78]: 34.21 ± 14.16	11.55 ± 16.63 me	IEQ [0/48]: 31.71 ± 8.55	NM	STAXI-II subscale expression	r = 0.34**[MA]
Trost 2019, United States (53)	CS	137	41.86	CLBP	MPQ-SF-PRI [0/45]: 21.58 ± 13.05	8.52 ± 7.58 y	IEQ [0/48]: 24.81 ± 12.44	NM	STAXI-II subscale expression	r = 0.26**[MA]
Trost 2017, United States (72)	CS	53	47.62	SCI	MPQ-PRI-PPI [0/5]: 1.49 ± 0.91	204.51 ± 410.67 de	IEQ [0/48]: 15.37 ± 12.35	NM	STAXI-II subscale expression	r = 0.42**[MA]
Scott 2013, Canada (83)	CS	183	49.67	Chronic MSK pain	NRS [0/10]: 5.82 ± 2.09	9.98 ± 8.20 y	IEQ [0/48]: 28.91 ± 11.11	NM	STAEI subscale expression	r = 0.10**[MA]
Anger inhibition[MA]										
Scott 2016, Canada (52)	CS	66	40.03	Chronic MSK pain	MPQ-PRI [0/78]: 34.21 ± 14.16	11.55 ± 16.63 me	IEQ [0/48]: 31.71 ± 8.55	NM	STAXI-II subscale inhibition	r = 0.40**[MA]
Trost 2019, United States (53)	CS	137	41.86	CLBP	MPQ-SF-PRI [0/45]: 21.58 ± 13.05	8.52 ± 7.58 y	IEQ [0/48]: 24.81 ± 12.44	NM	STAXI-II subscale inhibition	r = 0.33**[MA]
Trost 2017, United States (72)	CS	53	47.62	SCI	MPQ-PRI-PPI [0/5]: 1.49 ± 0.91	204.51 ± 410.67 de	IEQ [0/48]: 15.37 ± 12.35	NM	STAXI-II subscale inhibition	r = 0.42**[MA]
Scott 2013, Canada (83)	CS	183	49.67	Chronic MSK pain	NRS [0/10]: 5.82 ± 2.09	9.98 ± 8.20 y	IEQ [0/48]: 28.91 ± 11.11	NM	STAEI subscale inhibition	r = 0.33**[MA]
Anger[MA]										
Bults 2020, the Netherlands (74)	CS	53 (PR-UMCG)	42.2	Chronic pain	NRS [0/10]: 7.0 ± 1.7	69.3 ± 81.5m	IEQ [0/48]: 21.0 ± 11.5	≥ 30	NRS anger	r = 0.74***[MA]
Carriere 2018, United States (38)	CS	354	47.5	Chronic pain	NRS [0/10]: 4.72 ± 2.74	NM	IEQ [0/48]: 16.8 ± 11.41	NM	PROMIS anger	r = 0.550***[MA]
Sturgeon 2016, Canada (68)	CS	302	47.6	Chronic pain	NRS [0/10]: 5.66 ± 2.25	8.67 ± 10.13 y	IEQ [0/48]: 17.92 ± 11.40	NM	PROMIS anger	r = 0.543**[MA]
Psychological distress										
Martel 2017, Canada (49)	CS	475	51	Chronic pain	NRS [0/10]: 5.93 ± 1.51	NM	IEQ [0/48]: 29.1 ± 10.3	> 19	HADS physical distress	r = 0.63**

Table 2 (cont.). *Association measures of perceived injustice in pain populations.*

Study	Design	Sample size (n)	Mean age (y)	Type of population with pain	Pain outcome measure [min/max]: mean ± SD or median ± IQR	Disease duration: mean ± SD	PI outcome measure [min/max]: mean ± SD or median ± IQR	Cut-off PI outcome	Predictor outcome measure	Measure of association
McParland 2010, United Kingdom (47)	CS	95	66.23	Arthritis and FM	7-item Chronic Pain Grade [0/100]: 69.06 ± 20.35	16.21 ± 14.66 yd	PJWB: 25.72 ± 6.06	NM	GHQ-28	r = -0.45***
McParland 2010, United Kingdom (47)	CS	95	66.23	Arthritis and FM	7-item Chronic Pain Grade [0/100]: 69.06 ± 20.35	16.21 ± 14.66 yd	GJWB: 22.78 ± 6.17	NM	GHQ-28	r = -0.12
General Just-world beliefs (GJWB)										
Daenen 2020, United Kingdom (61)	CS	146	15.03	Paediatric chronic pain	NRS [0/10]: 5.39 ± 2.39	NM	IEQ [0/48]: 18.98 ± 12.54 PJWB [0/41]: 25.49 ± 6.83	NM	GJWB	r = -0.13 r = 0.59**
McParland 2010, United Kingdom (47)	CS	95	66.23	Arthritis and FM	7-item Chronic Pain Grade [0/100]: 69.06 ± 20.35	16.21 ± 14.66 yd	PJWB: 25.72 ± 6.06	NM	GJWB	r = 0.43***
Personal Just-world beliefs (PJWB)										
Daenen 2020, United Kingdom (61)	CS	146	15.03	Paediatric chronic pain	NRS [0/10]: 5.39 ± 2.39	NM	IEQ [0/48]: 18.98 ± 12.54 GJWB [5/34]: 20.92 ± 5.47	NM	PJWB	r = -0.27** r = 0.59**
Life satisfaction										
Sturgeon 2017, United States (69)	CS	330	NM	Chronic pain	NRS [0/10]: 6.42 ± 1.53	15 ± 6.42 yd	IEQ [0/48]: 30.0 ± 10.3	NM	SWLS	r = -0.557**
Discrimination										
Ziadni 2020, Seattle (59)	CS	137	41.9	CLBP	MPQ-SF-PRI [0/45]: 21.96 ± 13.02	8.52 ± 7.58 yd	IEQ [0/48]: 25.09 ± 12.27	> 19	PEDQ	r = 0.345*
Negative experiences										
Alizadeh-Fard 2020, Iran (37)	CS	142	42.18	Breast cancer	PCS: 3.82 ± 0.46	10.03 ± 0.08 me	IEQ [0/48]: 25.72 ± 10.7	NM	ZTIP past negative	r = 0.43***
Positive experiences										
Alizadeh-Fard 2020, Iran (37)	CS	142	42.18	Breast cancer	PCS: 3.82 ± 0.46	10.03 ± 0.08 me	IEQ [0/48]: 25.72 ± 10.7	NM	ZTIP past positive	r = -0.11
Social isolation										
Sturgeon 2016, Canada (68)	CS	302	47.6	Chronic pain	NRS [0/10]: 5.66 ± 2.25	8.67 ± 10.13 yd	IEQ [0/48]: 17.92 ± 11.40	NM	PROMIS social isolation	r = 0.540**

Table 2 (cont.). *Association measures of perceived injustice in pain populations.*

Study	Design	Sample size (n)	Mean age (y)	Type of population with pain	Pain outcome measure [min/max]: mean ± SD or median ± IQR	Disease duration: mean ± SD	PI outcome measure [min/max]: mean ± SD or median ± IQR	Cut-off PI outcome	Predictor outcome measure	Measure of association
Stress										
Miller 2018, United States (71)	CS	253	14.1	Paediatric chronic pain	NRS [0/10]: 4.46 ± 2.82	NM	IEQ-C [0/48]: 18.94 ± 11.98	NM	NRS stress	r = 0.39**
Stigma										
Scott 2019, United Kingdom (78)	C	303	45.22	Chronic pain	NRS [0/10]: 7.63 ± 1.60	13.37 ± 10.29 yd	IEQ [0/48]: 31.84 ± 9.96	> 19	SSCI-8	r = 0.52***
PAIN CHARACTERISTICS										
Pain intensity[MA]										
Agtarap 2016, United States (62)	CS	206	47.48	Traumatic injury	NRS [0/20]: NM	12 me	IEQ [0/48]: 16.74 ± 14.92	NM	NRS pain intensity	r = 0.624***[MA]
Bults 2020, the Netherlands (74)	CS	53 (PR-UMCG) 228 (TC)	42.2	Chronic pain	NRS [0/10]: 7.0 ± 1.7	69.3 ± 81.5 m	IEQ [0/48]: 21.0 ± 11.5	≥ 30	NRS pain intensity	PR-UMCG: r = 0.35*[MA] TC: r = 0.36***[MA]
Carriere 2017 (a), California (16)	CS	344	48	Chronic pain	NRS [0/10]: - No active opioid prescription: 4.44 ± 2.78 - Active opioid prescription: 5.68 ± 2.37	NM	IEQ [0/48]: - No active opioid prescription: 15.60 ± 11.40 - Active opioid prescription: 20.17 ± 10.51	NM	NRS pain intensity	r = 0.333***[MA]
Carriere 2018, United States (38)	CS	354	47.5	Chronic pain	NRS [0/10]: 4.72 ± 2.74	NM	IEQ [0/48]: 16.8 ± 11.41	NM	NRS pain intensity	r = 0.326***[MA]
Daenen 2020, United Kingdom (61)	CS	146	15.03	Paediatric chronic pain	NRS [0/10]: 5.39 ± 2.39	NM	IEQ [0/48]: 18.98 ± 12.54 GJWB [5/34]: 20.92 ± 5.47 PJWB [0/41]: 25.49 ± 6.83	NM	NRS pain intensity	r = 0.41**[MA] r = -0.06[MA] r = -0.16[MA]
Martel 2017, Canada (49)	CS	475	51	Chronic pain	NRS [0/10]: 5.93 ± 1.51	NM	IEQ [0/48]: 29.1 ± 10.3	> 19	NRS pain intensity	r = 0.29**[MA]
Miller 2018, United States (71)	CS	253	14.1	Paediatric chronic pain	NRS [0/10]: 4.46 ± 2.82	NM	IEQ-C [0/48]: 18.94 ± 11.98	NM	NRS pain intensity	r = 0.32**[MA]

Table 2 (cont.). *Association measures of perceived injustice in pain populations.*

Study	Design	Sample size (n)	Mean age (y)	Type of population with pain	Pain outcome measure [min/max]: mean ± SD or median ± IQR	Disease duration: mean ± SD	PI outcome measure [min/max]: mean ± SD or median ± IQR	Cut-off PI outcome	Predictor outcome measure	Measure of association
Scott 2012, Canada (7)	CS	107	41	Chronic MSK pain	NRS [0/10]: - Women: 4.9 ± 1.9 - Men: 4.1 ± 2.2	8.3 y	IEQ [0/48]: - Women: 26.8 ± 11.6 - Men: 23.4 ± 11.2	NM	NRS pain intensity	r = 0.15[MA]
Scott 2013, Canada (83)	CS	183	49.67	Chronic MSK pain	NRS [0/10]: 5.82 ± 2.09	9.98 ± 8.20 y	IEQ [0/48]: 28.91 ± 11.11	NM	NRS pain intensity	r = 0.26**[MA]
Scott 2019, United Kingdom (78)	C	303	45.22	Chronic pain	NRS [0/10]: 7.63 ± 1.60	13.37 ± 10.29 y	IEQ [0/48]: 31.84 ± 9.96	> 19	NRS pain intensity	r = 0.20**[MA]
Sturgeon 2016, Canada (68)	CS	302	47.6	Chronic pain	NRS [0/10]: 5.66 ± 2.25	8.67 ± 10.13 y	IEQ [0/48]: 17.92 ± 11.40	NM	NRS pain intensity	r = 0.347**[MA]
Sturgeon 2017, United States (69)	CS	330	NM	Chronic pain	NRS [0/10]: 6.42 ± 1.53	15 ± 6.42 y	IEQ [0/48]: 30.0 ± 10.3	NM	NRS pain intensity	r = 0.293**[MA]
Trost 2015, United States (54)	CS	155	47.5	Traumatic injury	NRS [0/10]: 4.01 ± 3.00	NM	IEQ [0/48]: 17.07 ± 14.55	NM	NRS pain intensity	r = 0.63**[MA]
Trost 2016 (a), United Kingdom (79)	C	53	39.13	CLBP	NRS [0/10]: 2.39 ± 2.30	9.18 ± 6.9 y	IEQ [0/48]: 21.91 ± 13.08	NM	NRS pain intensity	r = 0.41**[MA]
Yamada 2019, Japan (67)	CS	130	33	Menstrual pain	NRS [0/10]: 5.7 ± 2.2	NM	IEQ-chr-J [0/48]: 14.2 ± 13.0	NM	NRS pain intensity	r = 0.27**[MA]
Ysidron 2020, Greece (80)	C	343	NM	LBP	NRS [0/10]: 6.0 ± 1.8	NM	IEQ [0/48]: NM	NM	NRS pain intensity NRS pain intensity (after 3m)	r = 0.35***[MA] r = 0.45***
Margiotta 2017, Ireland (48)	CS	80	49	Chronic pain	NRPS [0/10]: median 6 ± IQR 2	24 ± 51 m	IEQ [0/48]: median 22.5 ± IQR 16.75	≥ 30	NPRS pain intensity	IEQ total: r = 0.25*[MA] IEQ blame: r = 0.11 IEQ severity: r = 0.31**
Miller 2016, United States (36)	CS	139	15	Children & adolescents with chronic pain	NPRS [0/10]: 4.51 ± 2.81	NM	IEQ [0/48]: 19.11 ± 12.29	NM	NPRS	r = 0.31**[MA]

Table 2 (cont.). *Association measures of perceived injustice in pain populations.*

Study	Design	Sample size (n)	Mean age (y)	Type of population with pain	Pain outcome measure [min/max]: mean ± SD or median ± IQR	Disease duration: mean ± SD	PI outcome measure [min/max]: mean ± SD or median ± IQR	Cut-off PI outcome	Predictor outcome measure	Measure of association
Sullivan 2009, Canada (15)	C	112	35.8	Whiplash injury	MPQ-PRI: 21.4 ± 13.5	18.3 we	IEQ [0/48]: 22.3 ± 9.7	NM	NPRS MPQ-PRI	r = 0.12^{MA} r = 0.19*
Yakobov 2016, Canada (56)	CS	71	35.8	Whiplash injury	NPRS [0/10]: - Pretreatment: 5.2 ± 1.8 - Posttreatment: 4.2 ± 1.8	18.6 ± 7.3 we	Changes in IEQ [0/48]: - Pre-treatment: 27.0 ± 6.6 - Post-treatment: 22.6 ± 9.7 Changes in IEQ [0/48]: - Pre-treatment: 27.0 ± 6.6 - Post-treatment: 22.6 ± 9.7	≥ 18	NPRS changes NPRS	r = 0.37**^{MA} β = 0.16
Rahbari 2019, Iran (64)	CS	230	41.57	Chronic MSK pain	MPQ [0/78]: NM	43.4 ± 38.40 m	IEQ-P [0/48]: 20.15 ± 9.36	NM	MPQ	r = 0.44**^{MA}
Yakobov 2018 (b), Canada (73)	CS	146	36.5	Whiplash injury	MPQ-PRI: 22.0 ± 12.5	9.0 w	IEQ [0/48]: 22.8 ± 9.7	NM	MPQ	r = 0.16*
Pâquet 2016, Canada (51)	CS	100	25.50	Women with PVD and their partners	MPQ [0/78]: 27.22 ± 11.29	51.50 ± 43.34 md	IEQ [0/48]: 21.86 ± 10.71	NM	MPQ-PRI	r = 0.30*^{MA}
Scott 2016, Canada (52)	CS	66	40.03	Chronic MSK pain	MPQ-PRI [0/78]: 34.21 ± 14.16	11.55 ± 16.63 me	IEQ [0/48]: 31.71 ± 8.55	NM	MPQ-PRI	r = 0.20^{MA}
Sullivan 2008, Canada (22)	C	226	37.7	Chronic MSK pain	MPQ-PRI: - Work accident: 24.3 ± 15.6 - Motor accident: 26.6 ± 15.7	NM	IEQ [0/48]: - Work accident: 17.3 ± 12.2 - Motor accident: 25.1 ± 11.8	NM	MPQ-PRI	r = 0.54**^{MA}
Trost 2019, United States (53)	CS	137	41.86	CLBP	MPQ-SF-PRI [0/45]: 21.58 ± 13.05	8.52 ± 7.58 y	IEQ [0/48]: 24.81 ± 12.44	NM	MPQ-SF-PRI	r = 0.52**^{MA}
Ziadni 2020, Seattle (59)	CS		137		41.9		CLBP		MPQ-SF-PRI [0/45]: 21.96 ± 13.02	

Table 2 (cont.). *Association measures of perceived injustice in pain populations.*

Study	Design	Sample size (n)	Mean age (y)	Type of population with pain	Pain outcome measure [min/max]: mean ± SD or median ± IQR	Disease duration: mean ± SD	PI outcome measure [min/max]: mean ± SD or median ± IQR	Cut-off PI outcome	Predictor outcome measure	Measure of association
Trost 2017, United States (72)	CS		53		47.62		SCI		MPQ-PRI-PPI [0/5]: 1.49 ± 0.91	
Monden 2019, United States (50)	CS		74		47.6		SCI		MPQ-SF-PPI: NM	
Ioannou 2016, Australia (42)	CS		160		43.01		Traumatic injury		BPI, pain severity [0/10]: 2.94 ± 2.19	
Ioannou 2017, Australia (43)	CS		433		44.8		Traumatic injury		BPI, pain severity [0/10]: 2.60 ± 2.05	
McParland 2010, United Kingdom (47)	CS		95		66.23		Arthritis and FM		7-item Chronic Pain Grade [0/100]: 69.06 ± 20.35	
Van Leeuwen 2016, United States (57)	CS		124		54		Orthopaedic trauma patients		PROMIS-Pain Intensity [3/15]: 49 ± 8.4	
Yakobov 2018 (a), Canada (76)	C		110		66.9		Knee OA scheduled for TKA		WOMAC [0/20]: - Pretreatment: 10.6 ± 3.3 - Posttreatment: 3.4 ± 3.4	
Yakobov 2014, Canada (75)	C		116		67.0		Knee OA scheduled for TKA		WOPAIN [0/100]: - Presurgery: 53.0 ± 17.7 - Postsurgery: 17.0 ± 17.2	
Penn 2020, United States (77)	C		105		45.79		CLBP		SPPB-Pain [0/100]: 27.37 ± 27.41	
Leysen 2021, Belgium (60)	CS		110		59.6		BCS		VAS [0/100]: 24.3 ± 27.0	
Rodero 2012, Spain (9)	CS		250		52.4		FM		PVAS [0/100]: 52.5 ± 16.8	
Miller 2021, United States (35)	CS		30		11.3		Youth with SCD		PedsQL [0/100]: 68.43 ± 19.11	
Penn 2019, United States (70)	CS		60		47.6		Chronic pain among PLWH		Rate [0/5]: NM	
Iverson 2018, Canada (44)	CS		102		41.2		mTBI		BPQ [0/15]: NM	
Pain catastrophizing[MA]										
Agtarap 2016, United States (62)	CS		206		47.48		Traumatic injury		NRS [0/20]: NM	

Table 2 (cont.). *Association measures of perceived injustice in pain populations.*

Study	Design	Sample size (n)	Mean age (y)	Type of population with pain	Pain outcome measure [min/max]: mean ± SD or median ± IQR	Disease duration: mean ± SD	PI outcome measure [min/max]: mean ± SD or median ± IQR	Cut-off PI outcome	Predictor outcome measure	Measure of association
Alizadeh-Fard 2020, Iran (37)	CS		142		42.18		Breast cancer		PCS: 3.82 ± 0.46	
Bults 2020, the Netherlands (74)	CS		53 (PR-UMCG) 228 (TC)		42.2		Chronic pain		NRS [0/10]: 7.0 ± 1.7	
Ioannou 2016, Australia (42)	CS		160		43.01		Traumatic injury		BPI [0/10]: 2.94 ± 2.19	
Ioannou 2017, Australia (43)	CS		433		44.8		Traumatic injury		BPI, pain severity [0/10]: 2.60 ± 2.05	
Leysen 2021, Belgium (60)	CS		110		59.6		BCS		VAS [0/100]: 24.3 ± 27.0	
Margiotta 2017, Ireland (48)	CS		80		49		Chronic pain		NRPS [0/10]: median 6 ± IQR 2	
Rahbari 2019, Iran (64)	CS		230		41.57		Chronic MSK pain		MPQ [0/78]: NM	
Rodero 2012, Spain (9)	CS		250		52.4		FM		PVAS [0/100]: 52.5 ± 16.8	
Scott 2012, Canada (7)	CS		107		41		Chronic MSK pain		NRS [0/10]: - Women: 4.9 ± 1.9 - Men: 4.1 ± 2.2	
Sturgeon 2017, United States (69)	CS		330		NM		Chronic pain		NRS [0/10]: 6.42 ± 1.53	
Sullivan 2008, Canada (22)	C		226		37.7		Chronic MSK pain		MPQ-PRI: - Work accident: 24.3 ± 15.6 - Motor accident: 26.6 ± 15.7	
Sullivan 2009, Canada (15)	C		112		35.8		Whiplash injury		MPQ-PRI: 21.4 ± 13.5	
Trost 2019, United States (53)	CS		137		41.86		CLBP		MPQ-SF-PRI [0/45]: 21.58 ± 13.05	
Yakobov 2014, Canada (75)	C		116		67.0		Knee OA scheduled for TKA		WOPAIN [0/100]: - Presurgery: 53.0 ± 17.7 - Postsurgery: 17.0 ± 17.2	
Yamada 2019 Japan (67)	CS		130		33		Menstrual pain		NRS [0/10]: 5.7 ± 2.2	

Table 2 (cont.). *Association measures of perceived injustice in pain populations.*

Study	Design	Sample size (n)	Mean age (y)	Type of population with pain	Pain outcome measure [min/max]: mean ± SD or median ± IQR	Disease duration: mean ± SD	PI outcome measure [min/max]: mean ± SD or median ± IQR	Cut-off PI outcome	Predictor outcome measure	Measure of association
Ziadni 2020, Seattle (59)	CS		137		41.9		CLBP		MPQ-SF-PRI [0/45]: 21.96 ± 13.02	
Daenen 2020, United Kingdom (61)	CS		146		15.03		Paediatric chronic pain		NRS [0/10]: 5.39 ± 2.39	
Miller 2016, United States (36)	CS		139		15		Children & adolescents with chronic pain		NPRS [0/10]: 4.51 ± 2.81	
Miller 2021, United States (35)	CS		30		11.3		Youth with SCD		PedsQL [0/100]: 68.43 ± 19.11	
Pain duration[MA]										
Bults 2020, the Netherlands (74)	CS		53 (PR-UMCG) 228 (TC)		42.2		Chronic pain		NRS [0/10]: 7.0 ± 1.7	
La Cour 2017, Denmark (66)	CS		358		45.5		Chronic benign pain or a "somatoform" diagnosis		SF-36 Bodily pain [0/100]: 31.8 ± 25.5	
Margiotta 2017, Ireland (48)	CS		80		49		Chronic pain		NRPS [0/10]: median 6 ± IQR 2	
McParland 2010, United Kingdom (47)	CS		95		66.23		Arthritis and FM		7-item Chronic Pain Grade [0/100]: 69.06 ± 20.35	
Monden 2019, United States (50)	CS		74		47.6		SCI		MPQ-SF-PPI: NM	
Rodero 2012, Spain (9)	CS		250		52.4		FM		PVAS [0/100]: 52.5 ± 16.8	
Scott 2012, Canada (7)	CS		107		41		Chronic MSK pain		NRS [0/10]: - Women: 4.9 ± 1.9 - Men: 4.1 ± 2.2	
Sullivan 2009, Canada (15)	C		112		35.8		Whiplash injury		MPQ-PRI: 21.4 ± 13.5	
Trost 2016 (a), United Kingdom (79)	C		53		39.13		CLBP		NRS [0/10]: 2.39 ± 2.30	
Trost 2016 (b), United States (55)	CS		45		48.80		SCI		MPQ-SF-PPI [0/5]: 3.35 ± 2.5	

Table 2 (cont.). *Association measures of perceived injustice in pain populations.*

Study	Design	Sample size (n)	Mean age (y)	Type of population with pain	Pain outcome measure [min/max]: mean ± SD or median ± IQR	Disease duration: mean ± SD	PI outcome measure [min/max]: mean ± SD or median ± IQR	Cut-off PI outcome	Predictor outcome measure	Measure of association
Trost 2017, United States (72)	CS		53		47.62		SCI		MPQ-PRI-PPI [0/5]: 1.49 ± 0.91	
Trost 2019, United States (53)	CS		137		41.86		CLBP		MPQ-SF-PRI [0/45]: 21.58 ± 13.05	
Yakobov 2014, Canada (75)	C		116		67.0		Knee OA scheduled for TKA		WOPAIN [0/100]: - Presurgery: 53.0 ± 17.7 - Postsurgery: 17.0 ± 17.2	
Pain interference[MA]										
Ioannou 2016, Australia (42)	CS		160		43.01		Traumatic injury		BPI, pain severity [0/10]: 2.94 ± 2.19	
Ioannou 2017, Australia (43)	CS		433		44.8		Traumatic injury		BPI, pain severity [0/10]: 2.60 ± 2.05	
Scott 2019, United Kingdom (78)	C		303		45.22		Chronic pain		NRS [0/10]: 7.63 ± 1.60	
Yamada 2019, Japan (67)	CS		130		33		Menstrual pain		NRS [0/10]: 5.7 ± 2.2	
Sturgeon 2016, Canada (68)	CS		302		47.6		Chronic pain		NRS [0/10]: 5.66 ± 2.25	
Sturgeon 2017, United States (69)	CS		330		NM		Chronic pain		NRS [0/10]: 6.42 ± 1.53	
La Cour 2017, Denmark (66)	CS		358		45.5		Chronic benign pain or a "somatoform" diagnosis		SF-36 Bodily pain [0/100]: 31.8 ± 25.5	
Penn 2019, United States (70)	CS		60		47.6		Chronic pain among PLWH		Rate [0/5]: NM	
Pain perceptions[MA]										
Bults 2020, the Netherlands (74)	CS		228 (TC)		42.2		Chronic pain		NRS [0/10]: 7.0 ± 1.7	
Iverson 2018, Canada (44)	CS		102		41.2		mTBI		BPQ [0/15]: NM	
Penn 2020, United States (77)	C		105		45.79		CLBP		SPPB-Pain [0/100]: 27.37 ± 27.41	

Table 2 (cont.). *Association measures of perceived injustice in pain populations.*

Study	Design	Sample size (n)	Mean age (y)	Type of population with pain	Pain outcome measure [min/max]: mean ± SD or median ± IQR	Disease duration: mean ± SD	PI outcome measure [min/max]: mean ± SD or median ± IQR	Cut-off PI outcome	Predictor outcome measure	Measure of association
Symptoms of central sensitization[MA]										
Bults 2020, the Netherlands (74)	CS		228 (TC)		42.2		Chronic pain		NRS [0/10]: 7.0 ± 1.7	
Leysen 2021, Belgium (60)	CS		110		59.6		BCS		VAS [0/100]: 24.3 ± 27.0	
Number of pain sites[MA]										
Bults 2020, the Netherlands (74)	CS		228 (TC)		42.2		Chronic pain		NRS [0/10]: 7.0 ± 1.7	
Sullivan 2009, Canada (15)	C		112		35.8		Whiplash injury		MPQ-PRI: 21.4 ± 13.5	
Pain self-efficacy										
Ioannou 2017, Australia (43)	CS		433		44.8		Traumatic injury		BPI, pain severity [0/10]: 2.60 ± 2.05	
Neuropathic pain										
Leysen 2021, Belgium (60)	CS		110		59.6		BCS		VAS [0/100]: 24.3 ± 27.0	
Pain as main outcome										
La Cour 2017, Denmark (66)	CS		358		45.5		Chronic benign pain or a "somatoform" diagnosis		SF-36 Bodily pain [0/100]: 31.8 ± 25.5	
Pain behaviour										
Carriere 2017 (a), California (16)	CS		344		48		Chronic pain		NRS [0/10]: - No active opioid prescription: 4.44 ± 2.78 - Active opioid prescription: 5.68 ± 2.37	
QUALITY OF LIFE CHARACTERISTICS										
Disability[MA]										
Ioannou 2016, Australia (42)	CS		160		43.01		Traumatic injury		BPI [0/10]: 2.94 ± 2.19	
Ioannou 2017, Australia (43)	CS		433		44.8		Traumatic injury		BPI, pain severity [0/10]: 2.60 ± 2.05	

Table 2 (cont.). *Association measures of perceived injustice in pain populations.*

Study	Design	Sample size (n)	Mean age (y)	Type of population with pain	Pain outcome measure [min/max]: mean ± SD or median ± IQR	Disease duration: mean ± SD	PI outcome measure [min/max]: mean ± SD or median ± IQR	Cut-off PI outcome	Predictor outcome measure	Measure of association
Trost 2019, United States (53)	CS		137		41.86		CLBP		MPQ-SF-PRI [0/45]: 21.58 ± 13.05	
Ziadni 2020, Seattle (59)	CS		137		41.9		CLBP		MPQ-SF-PRI [0/45]: 21.96 ± 13.02	
Sullivan 2009, Canada (15)	C		112		35.8		Whiplash injury		MPQ-PRI: 21.4 ± 13.5	
Yakobov 2016, Canada (56)	CS		71		35.8		Whiplash injury		NPRS [0/10]: - Pretreatment: 5.2 ± 1.8 - Posttreatment: 4.2 ± 1.8	
Yakobov 2018 (b), Canada (73)	CS		146		36.5		Whiplash injury		MPQ-PRI: 22.0 ± 12.5	
Bults 2020, the Netherlands (74)	CS		53 (PR-UMCG) 228 (TC)		42.2		Chronic pain		NRS [0/10]: 7.0 ± 1.7	
Monden 2019, United States (50)	CS		74		47.6		SCI		MPQ-SF-PPI: NM	
Rahbari 2019, Iran (64)	CS		230		41.57		Chronic MSK pain		MPQ [0/78]: NM	
Scott 2013, Canada (83)	CS		183		49.67		Chronic MSK pain		NRS [0/10]: 5.82 ± 2.09	
Scott 2016, Canada (52)	CS		66		40.03		Chronic MSK pain		MPQ-PRI [0/78]: 34.21 ± 14.16	
Sullivan 2008, Canada (22)	C		226		37.7		Chronic MSK pain		MPQ-PRI: - Work accident: 24.3 ± 15.6 - Motor accident: 26.6 ± 15.7	
Trost 2016 (b), United States (55)	CS		45		48.80		SCI		MPQ-SF-PPI [0/5]: 3.35 ± 2.5	
Trost 2019, United States (53)	CS		137		41.86		CLBP		MPQ-SF-PRI [0/45]: 21.58 ± 13.05	
Daenen 2020, United Kingdom (61)	CS		146		15.03		Paediatric chronic pain		NRS [0/10]: 5.39 ± 2.39	
Miller 2016, United States (36)	CS		139		15		Children & adolescents with chronic pain		NPRS [0/10]: 4.51 ± 2.81	
Miller 2018, United States (71)	CS		253		14.1		Paediatric chronic pain		NRS [0/10]: 4.46 ± 2.82	

Table 2 (cont.). *Association measures of perceived injustice in pain populations.*

Study	Design	Sample size (n)	Mean age (y)	Type of population with pain	Pain outcome measure [min/max]: mean ± SD or median ± IQR	Disease duration: mean ± SD	PI outcome measure [min/max]: mean ± SD or median ± IQR	Cut-off PI outcome	Predictor outcome measure	Measure of association
Miller 2021, United States (35)	CS		30		11.3		Youth with SCD		PedsQL [0/100]: 68.43 ± 19.11	
Yakobov 2018 (a), Canada (76)	C		110		66.9		Knee OA scheduled for TKA		WOMAC [0/20]: - Pretreatment: 10.6 ± 3.3 - Posttreatment: 3.4 ± 3.4	
McParland 2010, United Kingdom (47)	CS		95		66.23		Arthritis and FM		7-item Chronic Pain Grade [0/100]: 69.06 ± 20.35	
Martel 2017, Canada (49)	CS		475		51		Chronic pain		NRS [0/10]: 5.93 ± 1.51	
Trost 2016 (a), United Kingdom (79)	C		53		39.13		CLBP		NRS [0/10]: 2.39 ± 2.30	
Physical functioning[MA]										
Agtarap 2016, United States (62)	CS		206		47.48		Traumatic injury		NRS [0/20]: NM	
Carriere 2018, United States (38)	CS		354		47.5		Chronic pain		NRS [0/10]: 4.72 ± 2.74	
Van Leeuwen 2016, United States (57)	CS		124		54		Orthopaedic trauma patients		PROMIS-Pain Intensity [3/15]: 49 ± 8.4	
Ysidron 2020, Greece (80)	C		343		NM		LBP		NRS [0/10]: 6.0 ± 1.8	
Daenen 2020, United Kingdom (61)	CS		146		15.03		Paediatric chronic pain		NRS [0/10]: 5.39 ± 2.39	
Ioannou 2017, Australia (43)	CS		433		44.8		Traumatic injury		BPI, pain severity [0/10]: 2.60 ± 2.05	
La Cour 2017, Denmark (66)	CS		358		45.5		Chronic benign pain or a "somatoform" diagnosis		SF-36 Bodily pain [0/100]: 31.8 ± 25.5	
Penn 2020, United States (77)	C		105		45.79		CLBP		SPPB-Pain [0/100]: 27.37 ± 27.41	
Trost 2015, United States (54)	CS		155		47.5		Traumatic injury		NRS [0/10]: 4.01 ± 3.00	

Table 2 (cont.). *Association measures of perceived injustice in pain populations.*

Study	Design	Sample size (n)	Mean age (y)	Type of population with pain	Pain outcome measure [min/max]: mean ± SD or median ± IQR	Disease duration: mean ± SD	PI outcome measure [min/max]: mean ± SD or median ± IQR	Cut-off PI outcome	Predictor outcome measure	Measure of association
Yakobov 2014, Canada (75)	C		116		67.0		Knee OA scheduled for TKA		WOPAIN [0/100]: - Presurgery: 53.0 ± 17.7 - Postsurgery: 17.0 ± 17.2	
Other types of Quality of Life (QoL)										
Ferrari 2015, Canada (39)	CS		46		62.7		Hip OA		HOOS, subscale Pain [0/100]: 62.3 ± 9.4	
La Cour 2017, Denmark (66)	CS		358		45.5		Chronic benign pain or a "somatoform" diagnosis		SF-36 Bodily pain [0/100]: 31.8 ± 25.5	
Leysen 2021, Belgium (60)	CS		110		59.6		BCS		VAS [0/100]: 24.3 ± 27.0	
Rodero 2012, Spain (9)	CS		250		52.4		FM		PVAS [0/100]: 52.5 ± 16.8	
Social functioning[MA]										
Daenen 2020, United Kingdom (61)	CS		146		15.03		Paediatric chronic pain		NRS [0/10]: 5.39 ± 2.39	
Miller 2016, United States (36)	CS		139		15		Children & adolescents with chronic pain		NPRS [0/10]: 4.51 ± 2.81	
La Cour 2017, Denmark (66)	CS		358		45.5		Chronic benign pain or a "somatoform" diagnosis		SF-36 Bodily pain [0/100]: 31.8 ± 25.5	
Miller 2021, United States (35)	CS		30		11.3		Youth with SCD		PedsQL [0/100]: 68.43 ± 19.11	
Emotional functioning[MA]										
Daenen 2020, United Kingdom (61)	CS		146		15.03		Paediatric chronic pain		NRS [0/10]: 5.39 ± 2.39	
Miller 2016, United States (36)	CS		139		15		Children & adolescents with chronic pain		NPRS [0/10]: 4.51 ± 2.81	
La Cour 2017, Denmark (66)	CS		358		45.5		Chronic benign pain or a "somatoform" diagnosis		SF-36 Bodily pain [0/100]: 31.8 ± 25.5	
Mental functioning[MA]										
Agtarap 2016, United States (62)	CS		206		47.48		Traumatic injury		NRS [0/20]: NM	
Ioannou 2017, Australia (43)	CS		433		44.8		Traumatic injury		BPI, pain severity [0/10]: 2.60 ± 2.05	

Table 2 (cont.). *Association measures of perceived injustice in pain populations.*

Study	Design	Sample size (n)	Mean age (y)	Type of population with pain	Pain outcome measure [min/max]: mean ± SD or median ± IQR	Disease duration: mean ± SD	PI outcome measure [min/max]: mean ± SD or median ± IQR	Cut-off PI outcome	Predictor outcome measure	Measure of association
La Cour 2017, Denmark (66)	CS		358		45.5		Chronic benign pain or a "somatoform" diagnosis		SF-36 Bodily pain [0/100]: 31.8 ± 25.5	
Trost 2015, United States (54)	CS		155		47.5		Traumatic injury		NRS [0/10]: 4.01 ± 3.00	
Academic functioning[MA]										
Daenen 2020, United Kingdom (61)	CS		146		15.03		Paediatric chronic pain		NRS [0/10]: 5.39 ± 2.39	
Miller 2016, United States (36)	CS		139		15		Children & adolescents with chronic pain		NPRS [0/10]: 4.51 ± 2.81	
Functional impairment in terms of work and social adjustment										
Scott 2019, United Kingdom (78)	C		303		45.22		Chronic pain		NRS [0/10]: 7.63 ± 1.60	
PERSONAL CHARACTERISTICS										
Age[MA]										
Agtarap 2016, United States (62)	CS		206		47.48		Traumatic injury		NRS [0/20]: NM	
Daenen 2020, United Kingdom (61)	CS		146		15.03		Paediatric chronic pain		NRS [0/10]: 5.39 ± 2.39	
Iverson 2018, Canada (44)	CS		102		41.2		mTBI		BPQ [0/15]: NM	
La Cour 2017, Denmark (66)	CS		358		45.5		Chronic benign pain or a "somatoform" diagnosis		SF-36 Bodily pain [0/100]: 31.8 ± 25.5	
McParland 2010, United Kingdom (47)	CS		95		66.23		Arthritis and FM		7-item Chronic Pain Grade [0/100]: 69.06 ± 20.35	
Monden 2019, United States (50)	CS		74		47.6		SCI		MPQ-SF-PPI [0/5]: NM	
Penn 2019, United States (70)	CS		60		47.6		Chronic pain among PLWH		Rate [0/5]: NM	
Penn 2020, United States (77)	C		105		45.79		CLBP		SPPB-Pain [0/100]: 27.37 ± 27.41	

Table 2 (cont.). *Association measures of perceived injustice in pain populations.*

Study	Design	Sample size (n)	Mean age (y)	Type of population with pain	Pain outcome measure [min/max]: mean ± SD or median ± IQR	Disease duration: mean ± SD	PI outcome measure [min/max]: mean ± SD or median ± IQR	Cut-off PI outcome	Predictor outcome measure	Measure of association
Rodero 2012, Spain (9)	CS		250		52.4		FM		PVAS [0/100]: 52.5 ± 16.8	
Scott 2012, Canada (7)	CS		107		41		Chronic MSK pain		NRS [0/10]: - Women: 4.9 ± 1.9 - Men: 4.1 ± 2.2	
Scott 2016, Canada (52)	CS		66		40.03		Chronic MSK pain		MPQ-PRI [0/78]: 34.21 ± 14.16	
Trost 2015, United States (54)	CS		155		47.5		Traumatic injury		NRS [0/10]: 4.01 ± 3.00	
Trost 2016 (a), United Kingdom (79)	C		53		39.13		CLBP		NRS [0/10]: 2.39 ± 2.30	
Trost 2017, United States (72)	CS		53		47.62		SCI		MPQ-PRI-PPI [0/5]: 1.49 ± 0.91	
Trost 2019, United States (53)	CS		137		41.86		CLBP		MPQ-SF-PRI [0/45]: 21.58 ± 13.05	
Yakobov 2016, Canada (56)	CS		71		35.8		Whiplash injury		NPRS [0/10]: - Pretreatment: 5.2 ± 1.8 - Posttreatment: 4.2 ± 1.8	
Yakobov 2018 (a), Canada (76)	C		110		66.9		Knee OA scheduled for TKA		WOMAC [0/20]: - Pretreatment: 10.6 ± 3.3 - Posttreatment: 3.4 ± 3.4	
Responsibility and forgiveness										
Trost 2016 (b), United States (55)	CS		45		48.80		SCI		MPQ-SF-PPI [0/5]: 3.35 ± 2.5	
Educational level[MA]										
Ioannou 2017, Australia (43)	CS		433		44.8		Traumatic injury		BPI, pain severity [0/10]: 2.60 ± 2.05	
La Cour 2017, Denmark (66)	CS		358		45.5		Chronic benign pain or a "somatoform" diagnosis		SF-36 Bodily pain [0/100]: 31.8 ± 25.5	
Rodero 2012, Spain (9)	CS		250		52.4		FM		PVAS [0/100]: 52.5 ± 16.8	
Trost 2017, United States (72)	CS		53		47.62		SCI		MPQ-PRI-PPI [0/5]: 1.49 ± 0.91	

Table 2 (cont.). *Association measures of perceived injustice in pain populations.*

Study	Design	Sample size (n)	Mean age (y)	Type of population with pain	Pain outcome measure [min/max]: mean ± SD or median ± IQR	Disease duration: mean ± SD	PI outcome measure [min/max]: mean ± SD or median ± IQR	Cut-off PI outcome	Predictor outcome measure	Measure of association
Gender[MA]										
Ioannou 2017, Australia (43)	CS		433		44.8		Traumatic injury		BPI, pain severity [0/10]: 2.60 ± 2.05	
La Cour 2017, Denmark (66)	CS		358		45.5		Chronic benign pain or a "somatoform" diagnosis		SF-36 Bodily pain [0/100]: 31.8 ± 25.5	
Rodero 2012, Spain (9)	CS		250		52.4		FM		PVAS [0/100]: 52.5 ± 16.8	
Yakobov 2016, Canada (56)	CS		71		35.8		Whiplash injury		NPRS [0/10]: - Pretreatment: 5.2 ± 1.8 - Posttreatment: 4.2 ± 1.8	
Yakobov 2018 (a), Canada (76)	C		110		66.9		Knee OA scheduled for TKA		WOMAC [0/20]: - Pretreatment: 10.6 ± 3.3 - Posttreatment: 3.4 ± 3.4	
Income[MA]										
Penn 2020, United States (77)	C		105		45.79		CLBP		SPPB-Pain [0/100]: 27.37 ± 27.41	
Trost 2017, United States (72)	CS		53		47.62		SCI		MPQ-PRI-PPI [0/5]: 1.49 ± 0.91	
Trost 2019, United States (53)	CS		137		41.86		CLBP		MPQ-SF-PRI [0/45]: 21.58 ± 13.05	
Body Mass Index (BMI)[MA]										
Trost 2019, United States (53)	CS		137		41.86		CLBP		MPQ-SF-PRI [0/45]: 21.58 ± 13.05	
Yakobov 2018 (a), Canada (76)	C		110		66.9		Knee OA scheduled for TKA		WOMAC [0/20]: - Pretreatment: 10.6 ± 3.3 - Posttreatment: 3.4 ± 3.4	
Resilience[MA]										
Agtarap 2016, United States (62)	CS		206		47.48		Traumatic injury		NRS [0/20]: NM	
Iverson 2018, Canada (44)	CS		102		41.2		mTBI		BPQ [0/15]: NM	
Marital status										
La Cour 2017, Denmark (66)	CS		358		45.5		Chronic benign pain or a "somatoform" diagnosis		SF-36 Bodily pain [0/100]: 31.8 ± 25.5	

Table 2 (cont.). *Association measures of perceived injustice in pain populations.*

Study	Design	Sample size (n)	Mean age (y)	Type of population with pain	Pain outcome measure [min/max]: mean ± SD or median ± IQR	Disease duration: mean ± SD	PI outcome measure [min/max]: mean ± SD or median ± IQR	Cut-off PI outcome	Predictor outcome measure	Measure of association
Rodero 2012, Spain (9)	CS		250		52.4		FM		PVAS [0/100]: 52.5 ± 16.8	
Religiosity										
McParland 2010, United Kingdom (47)	CS		95		66.23		Arthritis and FM		7-item Chronic Pain Grade [0/100]: 9.06 ± 20.35	
Sexual										
Pâquet 2016, Canada (51)	CS		100		25.50		Women with PVD and their partners		MPQ [0/78]: 27.22 ± 11.29	
Comorbidities										
Giummarra 2017 (b), Australia (41)	CS		433		44.8		Traumatic injury		BPI, pain severity [0/10]: - Compensable: 2.94 ± 2.19 - Not compensable: 2.30 ± 1.94 BPI, pain interference [0/10]: - Compensable: 3.39 ± 2.78 - Not compensable: 2.16 ± 2.28	
Ioannou 2017, Australia (43)	CS		433		44.8		Traumatic injury		BPI, pain severity [0/10]: 2.60 ± 2.05	
Immune status										
Penn 2019, United States (70)	CS		60		47.6		Chronic pain among PLWH		Rate [0/5]: NM	
Satisfaction with social roles and activities										
Sturgeon 2016, Canada (68)	CS		302		47.6		Chronic pain		NRS [0/10]: 5.66 ± 2.25	
Well-being										
La Cour 2017, Denmark (66)	CS		358		45.5		Chronic benign pain or a "somatoform" diagnosis		SF-36 Bodily pain [0/100]: 31.8 ± 25.5	
INJURY CHARACTERISTICS										
Cervical range of motion (cROM)[MA]										
Sullivan 2009, Canada (15)	C		112		35.8		Whiplash injury		MPQ-PRI: 21.4 ± 13.5	
Yakobov 2018 (b), Canada (73)	CS		146		36.5		Whiplash injury		MPQ-PRI: 22.0 ± 12.5	

Table 2 (cont.). *Association measures of perceived injustice in pain populations.*

Study	Design	Sample size (n)	Mean age (y)	Type of population with pain	Pain outcome measure [min/max]: mean ± SD or median ± IQR	Disease duration: mean ± SD	PI outcome measure [min/max]: mean ± SD or median ± IQR	Cut-off PI outcome	Predictor outcome measure	Measure of association
Ferrari 2015, Canada (39)	CS		46		62.7		Hip OA		HOOS, subscale Pain [0/100]: 62.3 ± 9.4	
Injury severity[MA]										
Boals 2020, United States (81)	C		176		44.47		Traumatic injury		NM	
Ioannou 2016, Australia (42)	CS		160		43.01		Traumatic injury		BPI [0/10]: 2.94 ± 2.19	
Ioannou 2017, Australia (43)	CS		433		44.8		Traumatic injury		BPI, pain severity [0/10]: 2.60 ± 2.05	
Giummarra 2017 (b), Australia (41)	CS		433		44.8		Traumatic injury		BPI, pain severity [0/10]: - Compensable: 2.94 ± 2.19 - Not compensable: 2.30 ± 1.94 BPI, pain interference [0/10]: - Compensable: 3.39 ± 2.78 - Not compensable: 2.16 ± 2.28	
Age at injury										
Ioannou 2017, Australia (43)	CS		433		44.8		Traumatic injury		BPI, pain severity [0/10]: 2.60 ± 2.05	
Place of injury										
Giummarra 2017 (b), Australia (41)	CS		433		44.8		Traumatic injury		BPI, pain severity [0/10]: - Compensable: 2.94 ± 2.19 - Not compensable: 2.30 ± 1.94 BPI, pain interference [0/10]: - Compensable: 3.39 ± 2.78 - Not compensable: 2.16 ± 2.28	
Trauma type										
Boals 2020, United States (81)	C		176		44.47		Traumatic injury		NM	
Crash related characteristics										
Sullivan 2009, Canada (15)	C		112		35.8		Whiplash injury		MPQ-PRI: 21.4 ± 13.5	
Post-concussion symptoms										
Iverson 2018, Canada (44)	CS		102		41.2		mTBI		BPQ [0/15]: NM	

Table 2 (cont.). *Association measures of perceived injustice in pain populations.*

Study	Design	Sample size (n)	Mean age (y)	Type of population with pain	Pain outcome measure [min/max]: mean ± SD or median ± IQR	Disease duration: mean ± SD	PI outcome measure [min/max]: mean ± SD or median ± IQR	Cut-off PI outcome	Predictor outcome measure	Measure of association
Osteoarthritis scores										
Ferrari 2015, Canada (39)	CS		46		62.7		Hip OA		HOOS, subscale Pain [0/100]: 62.3 ± 9.4	
RECOVERY CHARACTERISTICS										
Length of hospital stay[MA]										
Giummarra 2017 (b), Australia (41)	CS		433		44.8		Traumatic injury		BPI, pain severity [0/10]: - Compensable: 2.94 ± 2.19 - Not compensable: 2.30 ± 1.94 BPI, pain interference [0/10]: - Compensable: 3.39 ± 2.78 - Not compensable: 2.16 ± 2.28	
Monden 2019, United States (50)	CS		74		47.6		SCI		MPQ-SF-PPI [0/5]: NM	
Trost 2015, United States (54)	CS		155		47.5		Traumatic injury		NRS [0/10]: 4.01 ± 3.00	
Ioannou 2017, Australia (43)	CS		433		44.8		Traumatic injury		BPI, pain severity [0/10]: 2.60 ± 2.05	
Trost 2017, United States (72)	CS		53		47.62		SCI		MPQ-PRI-PPI [0/5]: 1.49 ± 0.91	
Number of treatment visits										
Hayashi 2020, Japan (58)	CS		85		46		WAD		NRS [0/10]: NM	
Type of discharge										
Giummarra 2017 (b), Australia (41)	CS		433		44.8		Traumatic injury		BPI, pain severity [0/10]: - Compensable: 2.94 ± 2.19 - Not compensable: 2.30 ± 1.94 BPI, pain interference [0/10]: - Compensable: 3.39 ± 2.78 - Not compensable: 2.16 ± 2.28	
Duration of opioid use										
La Cour 2017, Denmark (66)	CS		358		45.5		Chronic benign pain or a "somatoform" diagnosis		SF-36 Bodily pain [0/100]: 31.8 ± 25.5	
Weeks in treatment										
Scott 2016, Canada (52)	CS		66		40.03		Chronic MSK pain		MPQ-PRI [0/78]: 34.21 ± 14.16	

Table 2 (cont.). *Association measures of perceived injustice in pain populations.*

Study	Design	Sample size (n)	Mean age (y)	Type of population with pain	Pain outcome measure [min/max]: mean ± SD or median ± IQR	Disease duration: mean ± SD	PI outcome measure [min/max]: mean ± SD or median ± IQR	Cut-off PI outcome	Predictor outcome measure	Measure of association
Duration of time in the rehabilitation programme										
Scott 2016, Canada (52)	CS		66		40.03		Chronic MSK pain		MPQ-PRI [0/78]: 34.21 ± 14.16	
ENVIRONMENTAL CHARACTERISTICS										
Personal factors of the partner										
Miller 2018, United States (71)	CS		253		14.1		Paediatric chronic pain		NRS [0/10]: 4.46 ± 2.82	
Miller 2018, United States (71)	CS		253		14.1		Paediatric chronic pain		NRS [0/10]: 4.46 ± 2.82	
Pâquet 2016, Canada (51)	CS		100		25.50		Women with PVD and their partners		MPQ [0/78]: 27.22 ± 11.29	
Pâquet 2016, Canada (51)	CS		100		25.50		Women with PVD and their partners		MPQ [0/78]: 27.22 ± 11.29	
Pâquet 2016, Canada (51)	CS		100		25.50		Women with PVD and their partners		MPQ [0/78]: 27.22 ± 11.29	
Pâquet 2016, Canada (51)	CS		100		25.50		Women with PVD and their partners		MPQ [0/78]: 27.22 ± 11.29	
Court proceedings										
Ioannou 2016, Australia (42)	CS		160		43.01		Traumatic injury		BPI, pain severity [0/10]: 2.94 ± 2.19	
Ioannou 2017, Australia (43)	CS		433		44.8		Traumatic injury		BPI, pain severity [0/10]: 2.60 ± 2.05	
Trost 2016 (b), United States (55)	CS		45		48.80		SCI		MPQ-SF-PPI [0/5]: 3.35 ± 2.5	
Social support										
Iverson 2018, Canada (44)	CS		102		41.2		mTBI		BPQ [0/15]: NM	
Penn 2019, United States (70)	CS		60		47.6		Chronic pain among PLWH		Rate [0/5]: NM	
Injury compensation claim										

Table 2 (cont.). *Association measures of perceived injustice in pain populations.*

Study	Design	Sample size (n)	Mean age (y)	Type of population with pain	Pain outcome measure [min/max]: mean ± SD or median ± IQR	Disease duration: mean ± SD	PI outcome measure [min/max]: mean ± SD or median ± IQR	Cut-off PI outcome	Predictor outcome measure	Measure of association
Giummarra 2017 (b), Australia (41)	CS		433		44.8		Traumatic injury		BPI, pain severity [0/10]: - Compensable: 2.94 ± 2.19 - Not compensable: 2.30 ± 1.94 BPI, pain interference [0/10]: - Compensable: 3.39 ± 2.78 - Not compensable: 2.16 ± 2.28	
Ioannou 2017, Australia (43)	CS		433		44.8		Traumatic injury		BPI, pain severity [0/10]: 2.60 ± 2.05	
Hayashi 2020, Japan (58)	CS		85		46		WAD		NRS [0/10]: NM	
Fault attribution										
Giummarra 2017 (b), Australia (41)	CS		433		44.8		Traumatic injury		BPI, pain severity [0/10]: - Compensable: 2.94 ± 2.19 - Not compensable: 2.30 ± 1.94 BPI, pain interference [0/10]: - Compensable: 3.39 ± 2.78 - Not compensable: 2.16 ± 2.28	
Ioannou 2017, Australia (43)	CS		433		44.8		Traumatic injury		BPI, pain severity [0/10]: 2.60 ± 2.05	
WORK RELATED FACTORS										
Work status										
Giummarra 2017 (b), Australia (41)	CS		433		44.8		Traumatic injury		BPI, pain severity [0/10]: - Compensable: 2.94 ± 2.19 - Not compensable: 2.30 ± 1.94 BPI, pain interference [0/10]: - Compensable: 3.39 ± 2.78 - Not compensable: 2.16 ± 2.28	
Ioannou 2017, Australia (43)	CS		433		44.8		Traumatic injury		BPI, pain severity [0/10]: 2.60 ± 2.05	
La Cour 2017, Denmark (66)	CS		358		45.5		Chronic benign pain or a "somatoform" diagnosis		SF-36 Bodily pain [0/100]: 31.8 ± 25.5	
Working alliance										
Scott 2016, Canada (52)	CS		66		40.03		Chronic MSK pain		MPQ-PRI [0/78]: 34.21 ± 14.16	

Table 2 (cont.). *Association measures of perceived injustice in pain populations.*

Study	Design	Sample size (n)	Mean age (y)	Type of population with pain	Pain outcome measure [min/max]: mean ± SD or median ± IQR	Disease duration: mean ± SD	PI outcome measure [min/max]: mean ± SD or median ± IQR	Cut-off PI outcome	Predictor outcome measure	Measure of association
Length of work disability										
Carriere 2017 (b), Montreal (106)	C		152		36.4		Whiplash injury		MPQ-PRI [0/78]: 15.29 ± 12.12	
Return to work expectancies										
Carriere 2017 (b), Montreal (106)	C		152		36.4		Whiplash injury		MPQ-PRI [0/78]: 15.29 ± 12.12	

Significance level was shown with an asterisk: *$P < 0.05$; **$P < 0.01$; ***$P < 0.001$

Abbreviations: a: Adjusted for age, marital status and work or life situation; b: Adjusted for age, sex, pain intensity and injury severity; c: Time since injury to follow-up; d: Pain duration ; e: Time since injury ; MA: meta-analysis performed/included in meta-analysis

AAQ-II, Acceptance and Action Questionnaire-II; AIS, Abbreviated Injury Severity; BC-PSI, British Columbia Post-concussion Symptom Inventory; BCS, Breast Cancer Survivors; BDI-II, Beck Depression Inventory II; BMI, Body Mass Index; BPI, Brief Pain Inventory; BPI-SF, Brief Pain Inventory-Short Form; BPQ, Brief Pain Questionnaire; C, Cohort study; CD-RISC, Connor-Davidson Resilience Scale; CD-RISC-2, Connor-Davidson Resilience Scale-2; CES-D, Center for Epidemiologic Studies – Depression scale; CLBP, Chronic Low Back Pain; CPAQ-8, 8-item version of the Chronic Pain Acceptance Questionnaire; CS, Cross-sectional study; CSI, Central Sensitization Inventory; d, days; DN-4, The 10-item Douleur Neuropathique Questionnaire; DRI, Disability Rating Index; EORTC QLQ-C30, European Organisation for Research and Treatment of Cancer Core Quality of Life Questionnaire; FDI, Functional Disability Index; FIQ, Fibromyalgia Impact Questionnaire; FM, Fibromyalgia; FSDS, Female Sexual Distress Scale; FU, Follow-Up; GHQ-28, The 28-item General Health Questionnaire; GJWB, General Belief in a Just World Scale; GLM, general linear models; GMSEX, Global Measure of Sexual Satisfaction Scale; HADS, Hospital Anxiety and Depression Scale; HFS, 18-item Heartland Forgiveness Scale; HRQoL, Health Related Quality of Life; IEQ, Injustice Experiences Questionnaire; IEQ-C, Injustice Experiences Questionnaire Child; IEQ-chr, Injustice Experiences Questionnaire adapted for use in patients with chronic conditions; IEQ-chr-J, Japanese version of Injustice Experience Questionnaire-chronic; IEQ-P, Injustice Experience Questionnaire, Persian version; IEQ-PC, Injustice Experiences Questionnaire-Parent about Child; IES-R, Impact of Events Scale – Revised; IPQ-B, The Brief Illness Perception Questionnaire; IPQ-R, Illness Perception Questionnaire-Revised; ISCP, Internalized Stigma of Chronic Pain scale; m, month(s); LBP, Low Back Pain; MPQ, McGill-Melzack Pain Questionnaire; MPQ-PRI, Pain Rating Index of the McGill Pain Questionnaire; MPQ-SF-PPI, Present index of the McGill Pain Questionnaire – Short Form; MPQ-SF-PRI, Pain Rating Index of the McGill Pain Questionnaire – Short Form; MSK, Musculoskeletal; MSPSS, Multidimensional Scale of Perceived Social Support; mTBI, mild Traumatic Brain Injury; n, number; NDI, Neck Disability Index; NM, Not mentioned; NPRS, Numeric Pain Rating Scale; NRS, Numeric Rating Scale; NS, not significant; OA, osteoarthritis; PCA, Principal Component Analysis; PC-PTSD, Primary Care PTSD Screen; PCS, Pain Catastrophizing Scale; PCS-C, Pain Catastrophizing Scale for Children; PCL-C, PTSD Checklist – general civilian Version; PCL-5, PTSS Checklist for DSM-5; PDI, Pain Disability Index; PEDQ-CV, Brief Perceived Ethnic Discrimination Questionnaire; PedsQL, Pediatric Quality of Life Inventory; PedsQL-C, Pediatric Quality of Life-Child; PHQ-8, The eight-item Patient Health Questionnaire depression scale; PHQ-9, Patient Health Questionnaire-9; PI, Perceived injustice; PJWB, Personal Belief in a Just World Scale; PLWH, Persons Living with HIV; PROMIS, Patient-Reported Outcomes Measurement Information System; PR-UMCG, Rehabilitation Department University Medical Center Groningen; PSEQ, The Pain Self Efficacy Questionnaire; PTSD, Post-traumatic Stress Disorder; PTSS, Posttraumatic Stress Symptoms; PVAS, Pain Visual Analog Scale; PVD, Provoked Vestibulodynia; QoL, Quality of Life; RMDQ, Roland and Morris Disability Questionnaire; ROM, Range of Motion; SCD, Sickle Cell Disease; SCI, Spinal Cord Injury; SCL-90, Symptom Checklist-90; SF-12, Short Form Health Survey; SF-36, The Short Form Health Survey-36; SPPB, Short Physical Performance Battery – Pain; SSCI-8, Stigma Scale for Chronic Illnesses-Eight Item version; SSQ, Study Specific Questionnaire; SSQS, Social Support Questionnaire Short Form-Satisfaction Scale; STAXI, State-Trait Anger Expression Inventory; STAXI-II, State-Trait Anger Expression Inventory – II; STAEI-II, The State-Trait Anger Expression Inventory-II; TAC, Transport Accident Commission; TC, Transcare Pain Rehabilitation Center; TKA, Total Knee Arthroplasty; TSK, Tampa Scale for Kinesiophobia; TSK-13, Tampa Scale for Kinesiophobia-13; SWLS, The 5-item Satisfaction with Life Questionnaire; VAS, Visual Analog Scale; VR-12, Veterans RAND 12-Item Health Survey; VR-PCS, Veterans RAND 12-Item Survey Physical Composite Score; VR-MCS, Veterans RAND 12-Item Survey Mental Composite Score; WAD, Whiplash-associated disorders; WOMAC, Western Ontario and McMaster University Osteoarthritis Index; WOPAIN, Western Ontario and McMaster Universities Arthritis Index – Pain score; WPI, Widespread Pain Index; WSAS, Work and Social Adjustment Scale; y, years; ZTIP, Zimbardo Time Perspective Inventory

38,40-44,46,48-60,62-83), one used both the Personal Belief in a Just World Scale (PJWB) and the General Belief in a Just World Scale (GJWB) (47) and one used the IEQ as well as the PJWB and GJWB (61) (Tables 2 and 3). Additional data to complete the results table were requested for 17 articles (7,36-39,45,47,49,50,52-55,57,75,77,84). However, none of the contacted authors were able to provide us with the requested additional data.

Study Quality Assessment

The quality of the included studies was medium for the cross-sectional studies as well as for the cohort studies. Quality scores ranged from 5 to 9 with a mean of 7.75 ± 0.99 out of 10 for cross-sectional studies, while quality scores ranged from 8 to 10 with a mean of 9.10 ± 0.88 out of 14 for cohort studies (Table 1). The main weaknesses of the included studies were the lack of reporting the participation rate of eligible persons and repeated exposure assessment.

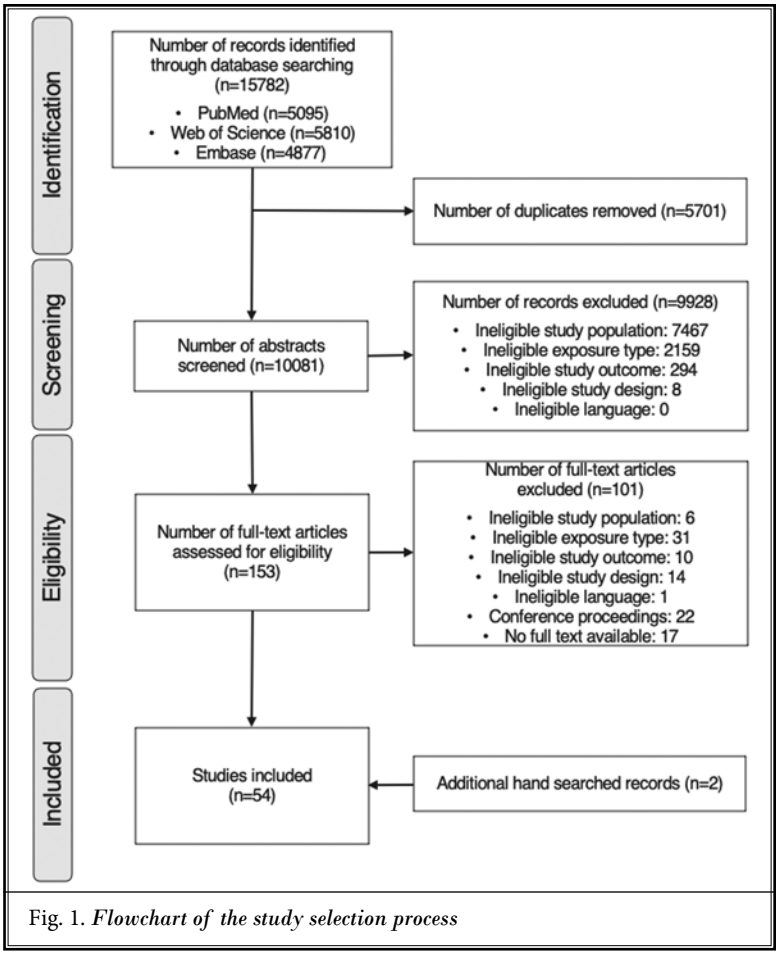

Fig. 1. *Flowchart of the study selection process*

Study Findings

Prevalence of PI

Eleven studies discussed the prevalence of PI (9,40,41,43-45,48,58,63,65,74) ranging from 23% (95% confidence interval [CI] = [0.18, 0.27]) (40) to 77% (95% CI = [0.76, 0.78]) (45) with a pooled estimate of 39% (95% CI = [0.23, 0.55], I^2 = 99%, $P < 0.001$) (Supplementary Fig. 1). No improvement in heterogeneity could be obtained by performing a subgroup analysis based on methodological quality (Supplementary Fig. 2). All studies used the IEQ to measure levels of PI; however, different cutoff values for PI were used across those studies. The sensitivity analyses were done with the cutoff values of > 19, > 30, and ≥ 30 since there were more than 2 studies available using those cutoffs. All prevalence rates were significant ($P < 0.001$), and homogeneity could only be retrieved in the analysis with a cutoff of ≥ 30 (I^2 = 2%, P = 0.36) (Supplementary Fig. 3). Looking at the different subgroups of the chronic pain sample investigated by Margiotta et al (48), a lower prevalence (25%) of unfairness is found in the group of retired people and a higher prevalence (50%) of unfairness for those on home duties compared to the prevalence of the overall chronic pain sample (33%). Also, the cause of pain seems to play a role, given that a trauma (53%) or road traffic accident (41%) resulted in higher PI prevalence rates as compared to the general prevalence rate (33%).

Factors Associated With PI

A total of 51 articles reported factors associated with PI in people with pain. Meta-analyses were performed for the factors described in more than one article and were subdivided into environmental, functioning, injury, pain, personal, psychological, and recovery characteristics. Findings of all conducted meta-analyses can be found in Table 5, but only low to highly associated factors with PI are further described in detail. Results of the negligible associations can be found in Supplementary Figs. 4-28. Further details on factors associated with PI that could not be pooled due to insufficient data are reported in Table 2.

Table 3. *Prevalence numbers of PI in pain populations.*

Study	Design	Sample size (n)	Mean age (y)	Type of population with pain	Disease duration: mean ± SD or median ± IQR	PI outcome measure [min/max]: mean ± SD or median ± IQR	Cut-off PI outcome	Prevalence PI (% (n))	Standard error (SE)
Bhalang 2020, Switzerland (63)	CS	799	NM	Chronic orofacial pain	NM	IEQ [0/48]: 14.1 ± 11.3	≥ 18	35.8% (n = 108)	0.017
Bults 2020, the Netherlands (74)	CS	53 (PR-UMCG) 228 (TC)	42.2	Chronic pain	69.3 ± 81.5 ma	IEQ [0/48]: 21.0 ± 11.5	≥ 30	24.5% (n = 13) 24.6% (n = 56)	0.059 0.029
Giummarra 2017 (a), Australia (40)	CS	354	42.97	Traumatic injury	NM	IEQ [0/48]: - Compensable: 20.26 ± 14.20 - Non compensable: 11.79 ± 11.24	> 30	22.7% (n = 66)	0.022
Giummarra 2017 (b), Australia (41)	CS	433	44.8	Traumatic injury	13.50 ± 1.60 mb	IEQ [0/48]: - Compensable: 20.52 ± 14.61 - Not compensable: 13.73 ± 12.40	> 20	36.9% (n = 159)	0.023
Hayashi 2020, Japan (58)	CS	85	46	WAD	NM	IEQ [0/48]: 17 ± 15	> 22	45.9% (n = 39)	0,054
Ioannou 2017, Australia (43)	CS	433	44.8	Traumatic injury	13.5 ± 1.6 mb	IEQ [0/48]: 16.26 ± 13.79	≥ 20	36.7% (n = 159)	0.023
Iverson 2018, Canada (44)	CS	102	41.2	mTBI	12.1 ± 6.3 wb	IEQ [0/48]: 20.79 ± 10.94	> 30 > 19	23.5% (n = 23) 53.9% (n = 55)	0.042 0.049
Laroche 2019, France (45)	CS	4,516	48.1	FM	NM	IEQ [0/48]: NM	NM	77% (n = 3,467)	0.006

Psychological Characteristics and Cognitions

Depressive Symptoms

For the association between depressive symptoms and PI, 30 studies (n = 5,214) reported a correlation coefficient (7, 9, 16,21,22,35,40,42,44,50-55, 59, 62, 64, 66, 67, 69, 70, 72, 74, 76-78, 80, 81, 83). A significant moderate positive correlation was found (pooled Pearson's r [r_p] 0.57, 95% CI = [0.52, 0.60], $P < 0.00001$) (Supplementary Fig. 29). Heterogeneity was high ($I^2 = 77\%$, $P < 0.00001$), which could not be reduced by performing a subgroup analysis based on methodological quality (Supplementary Fig. 30). Executing a subgroup analysis based on the outcome measures was not possible as all studies used a valid instrument.

Posttraumatic Stress

Posttraumatic stress was approached in 11 studies (n = 1,790) (21,40,42,44,54,55,62,72-74,81). After pooling, a significant high positive correlation was found (r_p 0.63, 95% CI = [0.59, 0.67], $P < 0.00001$), with low heterogeneity ($I^2 = 44\%$, $P = 0.05$) (Supplementary Fig. 31).

Pain Acceptance

Six studies reported data about pain acceptance (n = 1,371) (9,38,49,74,78,80), for which a significant moderate negative correlation was found (r_p -0.59, 95% CI = [-0.66, -0.49], $P < 0.00001$) (Supplementary Fig. 32). Due to high heterogeneity ($I^2 = 86\%$, $P < 0.00001$), subgroup analyses were performed, in which heterogeneity dropped to zero in the high methodological quality subgroup ($I^2 = 0\%$, $P = 0.45$) (Supplementary Fig. 33). No subgroup analysis on outcome measure was performed as all instruments were valid.

Anxiety

Nine studies explored the as-

Table 3 (cont.). *Prevalence numbers of PI in pain populations.*

Study	Design	Sample size (n)	Mean age (y)	Type of population with pain	Disease duration: mean ± SD or median ± IQR	PI outcome measure [min/max]: mean ± SD or median ± IQR	Cut-off PI outcome	Prevalence PI (% (n))	Standard error (SE)
Margiotta 2017, Ireland (48)	CS	80	49	Chronic pain	median 24 ± IQR 51 ma	IEQ [0/48]: median 22.5 ± IQR 16.75	≥ 30	33% (n = 26)	0.053
				employment status:					
		- 44		- employed				29.54% (n = 13)	0.069
		- 12		- retired				25% (n = 3)	0.125
		- 8		- home duties				50% (n = 4)	0.177
		- 8		- unemployed				37.5% (n = 3)	0.171
		- 8		marital status:					
		- 51		- married				33.33% (n = 17)	0.066
		- 14		- single				28.57% (n = 4)	0.121
		- 12		- divorced/widowed				33.33% (n = 4)	0.136
		- 3		- missing				33.33% (n = 1)	0.272
				pain category					
		- 33		- back pain				30.30% (n = 10)	0.080
		- 12		- neuropathy				25% (n = 3)	0.125
		- 10		- neck pain				30% (n = 3)	0.145
		- 9		- back and neck pain				55.55% (n = 5)	0.165
		- 7		- back and Ieg pain				14.28% (n = 1)	0.132
		- 7		- joint pain				42.85% (n = 3)	0.187
		- 2		- unknown/missing cause of pain				50% (n = 1)	0.353
		- 25		- degenerative changes				28% (n = 7)	0.090
		- 9		- dysfunctions				22.22% (n = 2)	0.139
		- 7		- missing/unknown				28.57% (n = 2)	0.171
		- 15		- trauma				53% (n = 8)	0.129
		- 17		- RTA				41% (n = 7)	0.119
Rodero 2012, Spain (9)	CS	250	52.4	FM	18.5 ± 11.3 ya	IEQ [0/48]: 30.1 ± 12.2	> 30	47.2% (n = 118)	0.032
Steiger 2019, Germany (65)	CS	134	46.3	Pain with mixed causes: no apparent cause, disease, physical strain, medical treatment, surgery, accident, physical stress	NM	IEQ [0/48]: 16.76 ± 11.05	> 19	35.1% (n = 47)	0.041

Abbreviations: a: Pain duration; b: Time since injury

CS = Cross-sectional Study, FM = Fibromyalgia, IEQ = Injustice Experience Questionnaire, IQR = Interquartile Range, m = month(s), mTBI = mild Traumatic Brain Injury, n = number, NM = Not Mentioned, PI = Perceived Injustice, PR-UMCG = Rehabilitation Department University Medical Center Groningen, RTA = Road Traffic Accident, SD = Standard Deviation, SE = Standard Error, TC = Transcare Pain Rehabilitation Center, w = week(s), WAD = Whiplash-Associated Disorders, y = years.

Table 4. *Quality assessment by the quality assessment tool for observational cohort and cross-sectional studies.*

	Design	1. Research question	2. Study population	3. Participation rate	4. Population selection	5. Sample size justification	6. Exposure assessment	7. Timeframe	8. Different levels of exposure	9. Exposure measures	10. Repeated exposure assessment	11. Outcome measures	12. Blinding of outcome assessors	13. Follow-up rate	14. Statistical analyses	mean = 8.00 ± 1.10 median = 8 Total YES	Quality
Agtarap 2016 (62)	CS	Y	Y	Y	Y	Y	NA	NA	Y	Y	N	Y	NA	N	Y	9	High
Alizadeh-Fard 2020 (37)	CS	Y	Y	Y	Y	Y	NA	NA	N	Y	N	Y	NA	NA	Y	8	High
Bhalang 2020 (63)	CS	Y	Y	NR	Y	NR	NA	NA	Y	Y	N	Y	NA	NA	Y	7	Medium
Boals 2020 (81)	C	Y	Y	NR	Y	Y	Y	Y	Y	Y	N	Y	NR	NR	Y	10	High
Bults 2020 (74)	CS	Y	y	NR	N	N	NA	NA	Y	Y	N	Y	NA	NA	Y	6	Medium
Carriere 2017 (a) (16)	CS	Y	Y	NR	Y	Y	NA	NA	Y	Y	N	Y	NA	NA	Y	8	High
Carriere 2017 (b) (106)	C	Y	Y	Y	Y	Y	Y	NM	N	Y	N	Y	NR	N	Y	9	Medium
Carriere 2018 (38)	CS	Y	Y	NR	Y	N	NA	NA	Y	Y	N	Y	NA	NA	Y	7	Medium
Daenen 2020 (61)	CS	Y	Y	Y	Y	Y	NA	NA	Y	Y	N	Y	NA	NA	Y	9	High
Ferrari 2015 (39)	CS	Y	Y	Y	Y	Y	NA	NA	Y	Y	N	Y	NA	NA	Y	9	High
Giummarra 2017 (a) (40)	CS	Y	Y	Y	Y	Y	NA	NA	Y	Y	N	Y	NA	NA	Y	9	High
Giummarra 2017 (b) (41)	CS	Y	Y	Y	Y	Y	NA	NA	N	Y	N	Y	NA	NA	Y	8	High
Hayashi 2020 (58)	CS	Y	Y	Y	Y	Y	NA	NA	Y	Y	N	Y	NA	NA	Y	9	High
Ioannou 2016 (42)	CS	Y	Y	NR	Y	Y	NA	NA	Y	Y	N	Y	NA	NA	Y	8	High
Ioannou 2017 (43)	CS	Y	Y	N	NR	Y	NA	NA	Y	Y	N	Y	NA	NA	Y	7	Medium
Iverson 2018 (44)	CS	Y	Y	N	Y	Y	NA	NA	Y	Y	N	Y	NA	NA	Y	8	High
La Cour 2017 (66)	CS	Y	Y	NR	Y	Y	NA	NA	N	Y	N	Y	NA	NA	Y	7	Medium
Laroche 2019 (45)	CS	Y	N	NR	CD	NR	NA	NA	Y	Y	N	Y	NA	NA	Y	5	Medium
Leysen 2021 (60)	CS	Y	Y	NR	Y	Y	NA	NA	Y	Y	N	Y	NA	NA	Y	8	High
Linnemørken 2020 (46)	CS	Y	Y	Y	Y	NR	NA	NA	Y	Y	N	Y	NA	NA	Y	8	High
Margiotta 2017 (48)	CS	Y	Y	Y	Y	Y	NA	NA	Y	Y	N	Y	NA	NA	Y	9	High
Martel 2017 (49)	CS	Y	Y	Y	Y	CD	NA	NA	Y	Y	N	Y	NA	NA	Y	8	High
McParland 2010 (47)	CS	Y	Y	Y	Y	Y	NA	NA	N	Y	N	Y	NA	NA	N	7	Medium
Miller 2016 (36)	CS	Y	Y	NR	Y	Y	NA	NA	Y	Y	N	Y	NA	NA	Y	8	High
Miller 2018 (71)	CS	Y	Y	Y	Y	N	NA	NA	Y	Y	N	Y	NA	N	Y	8	High
Miller 2021 (35)	CS	Y	Y	NR	Y	Y	NA	NA	Y	Y	N	Y	NA	NA	Y	8	High
Monden 2019 (50)	CS	Y	Y	NR	Y	Y	NA	NA	Y	Y	N	Y	NA	NA	Y	8	High
Påquet 2016 (51)	CS	Y	Y	N	Y	NR	NA	NA	Y	Y	N	Y	NA	NA	Y	7	Medium
Penn 2019 (70)	CS	Y	Y	Y	Y	N	NA	NA	Y	Y	N	Y	NA	NA	Y	8	High
Penn 2020 (77)	C	Y	Y	NR	Y	CD	Y	NR	Y	Y	N	Y	NR	CD	Y	8	Medium
Rahbari 2019 (64)	CS	Y	Y	NR	Y	Y	NA	NA	Y	Y	N	Y	NA	NA	Y	8	High
Rodero 2012 (9)	CS	Y	Y	Y	Y	Y	NA	NA	Y	Y	N	Y	NA	NA	Y	9	High
Scott 2012 (7)	CS	Y	N	NR	N	Y	NA	NA	Y	Y	N	Y	NA	NA	Y	6	Medium
Scott 2013 (83)	CS	Y	Y	NR	Y	NR	NA	NA	Y	Y	N	Y	NA	NA	Y	7	Medium

Table 4 (cont). *Quality assessment by the quality assessment tool for observational cohort and cross-sectional studies.*

	Design	1. Research question	2. Study population	3. Participation rate	4. Population selection	5. Sample size justification	6. Exposure assessment	7. Timeframe	8. Different levels of exposure	9. Exposure measures	10. Repeated exposure assessment	11. Outcome measures	12. Blinding of outcome assessors	13. Follow-up rate	14. Statistical analyses	mean = 8.00 ± 1.10 median = 8 Total YES	Quality
Scott 2016 (52)	CS	Y	Y	NR	Y	N	NA	NA	Y	Y	N	Y	NA	NA	Y	7	Medium
Scott 2019 (78)	C	Y	Y	Y	Y	CD	Y	NR	Y	Y	NR	Y	NR	NR	Y	9	Medium
Steiger 2019 (65)	CS	Y	Y	Y	Y	Y	NA	NA	Y	Y	N	Y	NA	NA	Y	9	High
Sturgeon 2016 (68)	CS	Y	Y	NR	Y	Y	NA	NA	Y	Y	N	Y	NA	NA	Y	8	High
Sturgeon 2017 (69)	CS	Y	Y	Y	Y	Y	NA	NA	Y	Y	N	Y	NA	NA	Y	9	High
Sullivan 2008 (22)	C	Y	Y	NR	Y	NR	Y	Y	Y	Y	Y	Y	NR	NM	Y	10	High
Sullivan 2009 (15)	C	Y	N	NR	Y	Y	Y	NR	N	Y	Y	Y	NR	NM	Y	8	Medium
Trost 2015 (54)	CS	Y	Y	NR	Y	Y	NA	NA	Y	Y	N	Y	NA	NA	Y	8	High
Trost 2016 (a) (79)	C	Y	Y	Y	Y	NR	Y	NR	Y	Y	N	Y	NR	NR	Y	9	Medium
Trost 2016 (b) (55)	CS	Y	N	NR	Y	Y	NA	NA	Y	Y	N	Y	NA	NA	Y	7	Medium
Trost 2017 (72)	CS	Y	Y	N	Y	Y	NA	NA	Y	Y	N	Y	NA	NA	Y	8	High
Trost 2019 (53)	CS	Y	N	NR	Y	NR	NA	NA	Y	Y	N	Y	NA	NA	Y	6	Medium
Van Leeuwen 2016 (57)	CS	Y	Y	Y	Y	Y	NA	NA	Y	Y	N	N	NA	NA	Y	8	High
Yakobov 2014 (75)	C	Y	N	NR	Y	Y	Y	NR	N	Y	Y	Y	NR	NR	Y	8	Medium
Yakobov 2016 (56)	CS	Y	N	NR	Y	Y	NA	NA	Y	Y	N	Y	NA	NA	Y	7	Medium
Yakobov 2018 (a) (76)	C	Y	N	NR	Y	Y	Y	Y	N	Y	Y	Y	NR	Y	Y	10	High
Yakobov 2018 (b) (73)	C	Y	Y	NR	Y	Y	NA	NA	Y	Y	N	Y	NA	NA	Y	8	High
Yamada 2019 (67)	CS	Y	Y	Y	Y	Y	NA	NA	Y	Y	N	Y	NA	NA	Y	9	High
Ysidron 2020 (80)	C	Y	Y	N	Y	Y	Y	Y	N	Y	Y	Y	NR	N	Y	10	High
Ziadni 2020 (59)	CS	Y	Y	NR	Y	Y	NA	NA	NR	Y	N	Y	NA	NA	N	6	Medium
Total YES		53	45	21	50	38	10	4	44	54	5	53	0	1	52		

Abbreviations: C = cohort, CS = cross-sectional, CD = cannot determine, N = no, NA = not applicable, NR = not reported, Y = yes

sociation between PI and anxiety (n = 1,563) (9,35,40,42,66,67,74,84,85). A significant moderate positive correlation coefficient was observed in the meta-analysis (r_p 0.59, 95% CI = [0.52, 0.64], $P < 0.00001$), with high heterogeneity ($I^2 = 66\%$, $P = 0.005$) (Supplementary Fig. 34). After executing a subgroup analysis based on methodological quality, heterogeneity remained high (Supplementary Fig. 35). Subgroup analysis based on outcome measure could not be performed as all instruments used were valid.

Kinesiophobia

The association between PI and kinesiophobia was investigated in 6 studies (n = 1,323) (21,22,43,62,64,75). After pooling the data, a significant moderate positive correlation was found between kinesiophobia and PI (r_p 0.57, 95% CI = [0.50, 0.64], $P < 0.00001$), with high heterogeneity ($I^2 = 70\%$, $P = 0.005$) (Supplementary Fig. 36). Subgroup analysis based on methodological quality showed zero heterogeneity in the medium methodological quality subgroup ($I^2 = 0\%$, $P = 0.46$); however, in the high methodological quality group, heterogeneity remained high (Supplementary Fig. 37). All studies used a valid measurement tool, wherefor no subgroup analysis based on outcome measure was performed.

State Anger

Six studies examined state anger (n = 558) (50,52,53,55,72,83). Combining these articles led to a significant low positive correlation between state anger and PI (r_p 0.48, 95% CI = [0.41, 0.54], $P < 0.00001$) (Supplementary Fig. 38). No heterogeneity was observed ($I^2 = 0\%$, $P = 0.47$).

Trait Anger

Trait anger was addressed by 6 studies (n = 558) (50,52,53,55,72,83). A significant low positive pooled correlation between PI and trait anger was observed (r_p 0.40, 95% CI = [0.29, 0.49], $P < 0.00001$) (Supplementary Fig. 39). Heterogeneity was not significant ($I^2 = 44\%$, $P = 0.11$).

Anger Inhibition

Combining 4 studies (n = 439) (52,53,72,83), a significant low positive correlation was found between anger inhibition and PI (r_p 0.35, 95% CI = [0.26,0.43], $P < 0.00001$) (Supplementary Fig. 40). No heterogeneity was observed ($I^2 = 0\%$, $P = 0.87$).

Anger

Three studies (n = 709) (38,68,74) investigated the association between anger and PI. The meta-analysis showed a significant moderate positive correlation (r_p 0.59, 95% CI = [0.49, 0.67], $P < 0.00001$) (Supplementary Fig. 41). Sensitivity analyses were performed as heterogeneity was high ($I^2 = 62\%$, $P = 0.07$). Heterogeneity decreased down to zero ($I^2 = 0\%$, $P = 0.90$) when excluding the invalid outcome measure and resulted in a significant moderate positive correlation (r_p 0.54, 95% CI = [0.49, 0.60], $P < 0.00001$) (Supplementary Fig. 42).

Pain Characteristics

Pain Intensity

Data from 39 studies (n = 6,646) (7,9,16,21,22,35,36,38,42-44,48-54,57,59-62,64,68-80,83,86) were combined to investigate the correlation between pain intensity and PI measured with the IEQ. This resulted in a significant low positive correlation (r_p 0.37, 95% CI = [0.33, 0.42], $P < 0.00001$) (Supplementary Fig. 43). Subgroup analyses based on methodological quality and outcome measures were performed as heterogeneity was high ($I^2 = 81\%$, $P < 0.00001$). None of the subgroup analyses explained the high heterogeneity (Supplementary Figs. 44-45).

Pain Catastrophizing

Data of 16 studies investigating the association between pain catastrophizing and PI were pooled (n = 3,502) (7,9,21,22,37,42,43,48,53,59,60,62,64,67,69,75) . A significant moderate positive correlation was found between pain catastrophizing and PI (r_p 0.66, 95% CI = [0.64, 0.69], $P < 0.00001$) (Supplementary Fig. 46). A subgroup analysis based on methodological quality was performed as heterogeneity was significant ($I^2 = 48\%$, $P = 0.009$). Heterogeneity decreased in the medium methodological quality subgroup ($I^2 = 44\%$, $P = 0.07$) (Supplementary Fig. 47). No further subgroups could be formed since all instruments used in the studies were valid.

Pain Interference

Eight studies reported correlations between pain interference and PI (n = 2,067) (42, 43,66-70,78). A significant low positive correlation was found (r_p 0.49, 95% CI = [0.35, 0.60], $P < 0.00001$) (Supplementary Fig. 48). Heterogeneity was high ($I^2 = 92\%$, $P < 0.00001$), and remained high in the subgroup analysis based on methodological quality (Supplementary Fig. 49). No subgroup analysis was performed on outcome measure as all outcomes were valid.

Pain Perceptions

Pain perceptions were studied in 3 studies (n = 435) (44,74,77). A significant low positive correlation was found (r_p 0.52, 95% CI = [0.40, 0.64], $P < 0.00001$) (Supplementary Fig. 50). No significant heterogeneity was observed ($I^2 = 65\%$, $P = 0.06$).

Symptoms of Central Sensitization

A significant low positive correlation was found between central sensitization pain and PI (r_p 0.47, 95% CI = [0.39, 0.55], $P < 0.00001$) based on results out of 2 studies (n = 338) (60,74) (Supplementary Fig. 51). No heterogeneity was observed ($I^2 = 0\%$, $P = 0.66$).

Quality of Life (QoL) Characteristics

Disability

For the association between PI measured with the IEQ and disability, 20 studies in total were pooled (n = 3,383) (21,22,35,36,42,43,49,50,52,53,55,59,61,64,71 ,73,74,76,79,83). A significant moderate positive correlation was found ($r_p = 0.53$, 95% CI = [0.47, 0.59], $P < 0.00001$) (Supplementary Fig. 52). The overall heterogeneity was significant ($I^2 = 80\%$, $P < 0.00001$), but

Table 5. *Summary of the meta-analyses*.

Factor		Number of studies (total sample size)	Pooled estimate	Description association outcome
PSYCHOLOGICAL CHARACTERISTICS AND COGNITIONS				
Depressive symptoms		30 (n = 5,214)	r_p 0.57 (95% CI = [0.52, 0.60]), $P < 0.00001$, $I^2 = 77$, $P < 0.00001$	Significant moderate positive correlation
Posttraumatic stress		11 (n = 1,790)	r_p 0.63 (95% CI = [0.59, 0.67]), $P < 0.00001$, $I^2 = 44$, $P = 0.05$	Significant moderate positive correlation
Pain acceptance		6 (n = 1,371)	r_p -0.59 (95% CI = [-0.66, -0.49]), $P < 0.00001$, $I^2 = 86$, $P < 0.00001$	Significant moderate negative correlation
Anxiety		7 (n = 1,563)	r_p 0.59 (95% CI = [0.52, 0.64]), $P < 0.00001$, $I^2 = 66$, $P = 0.005$	Significant moderate positive correlation
Kinesiophobia		6 (n = 1,323)	r_p 0.57 (95% CI = [0.50, 0.64]), $P < 0.00001$, $I^2 = 70$, $P = 0.005$	Significant moderate positive correlation
State anger		6 (n = 558)	r_p 0.48 (95% CI = [0.41, 0.54]), $P < 0.00001$, $I^2 = 0$, $P = 0.47$	Significant low positive correlation
Trait anger		6 (n = 558)	r_p 0.40 (95% CI = [0.29, 0.49]), $P < 0.00001$, $I^2 = 44$, $P = 0.11$	Significant low positive correlation
Anger expression		4 (n = 439)	r_p 0.25 (95% CI = [0.11, 0.39]), $P < 0.00001$, $I^2 = 54$, $P = 0.09$	Significant negligible positive correlation
Anger inhibition		4 (n = 439)	r_p 0.35 (95% CI = [0.26, 0.43]), $P < 0.00001$, $I^2 = 0$, $P = 0.87$	Significant low positive correlation
Anger		3 (n = 709)	r_p 0.59 (95% CI = [0.49, 0.67]), $P < 0.00001$, $I^2 = 62$, $P = 0.97$	Significant moderate positive correlation
PAIN CHARACTERISTICS				
Pain intensity	PJWB	2 (n = 241)	r_p -0.22 (95% CI = [0.34, 0.08]), $P = 0.001$, $I^2 = 6$, $P = 0.30$	Significant negligible negative correlation
	GJWB	2 (n = 241)	r_p -0.04 (95% CI = [-0.17, 0.09]), $P = 0.54$, $I^2 = 0$, $P = 0.71$	NS correlation
	IEQ	39 (n = 6,646)	r_p 0.37 (95% CI = [0.33, 0.42]), $P < 0.00001$, $I^2 = 81$, $P < 0.00001$	Significant low positive correlation
Pain catastrophizing		16 (n = 3,502)	r_p 0.66 (95% CI = [0.64, 0.69]), $P < 0.00001$, $I^2 = 44$, $P = 0.07$	Significant moderate positive correlation
Pain duration		11 (n = 1,518)	r_p 0.10 (95% CI = [0.03, 0.17]), $P = 0.003$, $I^2 = 36$, $P = 0.10$	Significant negligible positive correlation
Pain interference		8 (n = 2,067)	r_p 0.49 (95% CI = [0.35, 0.60]), $P < 0.00001$, $I^2 = 92$, $P < 0.00001$	Significant low positive correlation
Pain perceptions		3 (n = 435)	r_p 0.40 (95% CI = [0.40, 0.64]), $P < 0.00001$, $I^2 = 65$, $P = 0.06$	Significant low positive correlation
Symptoms of central sensitization		2 (n = 338)	r_p 0.47 (95% CI = [0.39, 0.55]), $P < 0.00001$, $I^2 = 0$, $P = 0.66$	Significant low positive correlation
Number of pain sites		2 (n = 340)	r_p 0.17 (95% CI = [0.04, 0.29]), $P = 0.008$, $I^2 = 24$, $P = 0.25$	Significant negligible positive correlation
QUALITY OF LIFE CHARACTERISTICS				
Disability	PJWB	2 (n = 241)	r_p -0.21 (95% CI = [-0.43, 0.04]), $P = 0.06$, $I^2 = 72$, $P = 0.06$	NS correlation
	GJWB	2 (n = 241)	r_p -0.09 (95% CI = [-0.22, 0.04]), $P = 0.16$, $I^2 = 0$, $P = 0.54$	NS correlation
	IEQ	20 (n = 3,383)	r_p 0.53 (95% CI = [0.47, 0.59]), $P < 0.00001$, $I^2 = 80$, $P < 0.00001$	Significant moderate positive correlation
Physical functioning		10 (n= 2,340)	r_p -0.43 (95% CI = [-0.53, -0.33]), $P < 0.00001$, $I^2 = 89$, $P < 0.00001$	Significant low negative correlation

Table 5 (cont). *Summary of the meta-analyses.*

Factor		Number of studies (total sample size)	Pooled estimate	Description association outcome
Social functioning		4 (n = 673)	r_p -0.47 (95% CI = [-0.60, -0.31]), $P < 0.00001$, $I^2 = 78$, $P = 0.003$	Significant low negative correlation
Emotional functioning		3 (n = 643)	r_p -0.52 (95% CI = [-0.64, -0.39]), $P < 0.00001$, $I^2 = 77$, $P = 0.01$	Significant moderate negative correlation
Mental functioning		4 (n = 1,152)	r_p -0.48 (95% CI = [-0.57, -0.38]), $P < 0.00001$, $I^2 = 75$, $P = 0.007$	Significant low negative correlation
Academic functioning		2 (n = 285)	r_p -0.54 (95% CI = [-0.65, -0.41]), $P < 0.00001$, $I^2 = 50$, $P = 0.16$	Significant moderate negative correlation
PERSONAL CHARACTERISTICS				
Age	PJWB	2 (n = 241)	r_p 0.12 (95% CI = [-0.38, 0.57]), $P = 0.65$, $I^2 = 94$, $P < 0.00001$	NS correlation
	GJWB	2 (n = 241)	r_p 0.07 (95% CI = [-0.32, 0.44]), $P = 0.74$, $I^2 = 89$, $P = 0.002$	NS correlation
	IEQ	16 (n = 1,982)	r_p 0.00 (95% CI = [-0.09, 0.08]), $P = 0.65$, $I^2 = 69$, $P < 0.0001$	NS correlation
Educational level		3 (n = 661)	r_p 0.07 (95% CI = [-0.18, 0.31]), $P = 0.60$, $I^2 = 87$, $P = 0.0004$	NS correlation
Gender		3 (n = 718)	r_p 0.02 (95% CI = [-0.05, 0.09]), $P = 0.61$, $I^2 = 0$, $P = 0.48$	NS correlation
Income		3 (n = 295)	r_p -0.31 (95% CI = [-0.47, -0.12]), $P = 0.07$, $I^2 = 63$, $P = 0.002$	NS correlation
BMI		2 (n = 247)	r_p 0.12 (95% CI = [-0.14, 0.37]), $P = 0.38$, $I^2 = 76$, $P = 0.04$	NS correlation
Resilience		2 (n = 308)	r_p -0.26 (95% CI = [-0.55, 0.11]), $P = 0.16$, $I^2 = 89$, $P = 0.002$	NS correlation
INJURY CHARACTERISTICS				
Cervical range of motion	Flexion	2 (n = 258)	r_p -0.12 (95% CI = [-0.24, 0.00]), $P = 0.06$, $I^2 = 0$, $P = 1.00$	NS correlation
	Extension	2 (n = 258)	r_p -0.22 (95% CI = [-0.33, -0.10]), $P = 0.0005$, $I^2 = 0$, $P = 0.62$	Significant negligible negative correlation
	Right rotation	2 (n = 258)	r_p -0.25 (95% CI = [-0.35, -0.13]), $P < 0.0001$, $I^2 = 0$, $P = 0.94$	Significant negligible negative correlation
	Left rotation	2 (n = 258)	r_p -0.24 (95% CI = [-0.35, -0.11]), $P = 0.0002$, $I^2 = 0$, $P = 056$	Significant negligible negative correlation
	Right lateral flexion	2 (n = 258)	r_p -0.01 (95% CI = [-0.22, 0.20]), $P = 0.92$, $I^2 = 63$, $P = 0.10$	NS correlation
	Left lateral flexion	2 (n = 258)	r_p -0.08 (95% CI = [-0.20, -0.04]), $P = 0.20$, $I^2 = 0$, $P = 0.58$	NS correlation
Injury severity		2 (n = 336)	r_p 0.07 (95% CI = [-0.03, 0.18]), $P = 0.18$, $I^2 = 0$, $P = 0.79$	NS correlation
RECOVERY CHARACTERISTICS				
Length of hospital stay		3 (n = 282)	r_p 0.13 (95% CI = [0.01, 0.25]), $P = 0.03$, $I^2 = 0$, $P = 0.39$	Significant negligible positive correlation

Abbreviations: BMI = Body Mass Index, CI = Confidence Interval, GJWB = Global Just World Beliefs, I = heterogeneity, IEQ = Injustice Experienced Questionnaire, n = number, NS = nonsignificant, P = significance value, PJWB = Personal Just World Beliefs, rp = Pearson's correlation coefficient.

could not be reduced by any of the subgroup analyses (Supplementary Figs. 53-54).

Physical Functioning

The association between physical functioning and

PI was explored in 10 studies (n = 2,340) (38,43,54,57,61,62,66,75,77,80). The pooled estimate showed a significant low negative pooled correlation (r_p -0.43, 95% CI = [-0.53, -0.33], $P < 0.00001$) (Supplementary Fig. 55). Due to high heterogeneity ($I^2 = 89\%$, $P < 0.00001$), subgroup analyses were performed. A subgroup analysis based on methodological quality did not explain the high heterogeneity (Supplementary Fig. 56). No subgroup analysis based on outcome measures was executed as all studies used a valid instrument. When excluding the pediatric pain population from the study of Daenen et al (61), heterogeneity remained high as well (Supplementary Fig. 57).

Social Functioning

A total of 4 studies (n = 673) (35,36,61,66) examined the correlation between social functioning and PI. A significant low negative correlation (r_p -0.47, 95% CI = [-0.60, -0.31], $P < 0.00001$) with a high heterogeneity ($I^2 = 78\%$, $P = 0.003$) was observed (Supplementary Fig. 58). Due to the limited number of studies, no subgroups of more than one study could be formed for a subgroup analysis. When excluding the study by la Cour et al (66), which was the only study with a medium methodological quality (vs high quality studies) and the only one considering an adult population, comparable results were found, nor did the heterogeneity drop ($I^2 = 80\%$, $P = 0.007$) (Supplementary Fig. 59).

Emotional Functioning

Three studies (n = 643) (35,61,66) investigated the association between emotional functioning and PI. By pooling these data, a significant moderate negative correlation was found (r_p -0.52, 95% CI = [-0.64, -0.39], $P < 0.00001$) (Supplementary Fig. 60). Significant heterogeneity ($I^2 = 77\%$, $P = 0.01$) was observed. Therefore, the study by la Cour et al (66) was excluded from the meta-analysis as this study included adults compared to the 2 other studies, which considered a pediatric population. This resulted in decreased heterogeneity ($I^2 = 47\%$, $P = 0.17$), but the correlation remained nonsignificant (Supplementary Fig. 61).

Mental Functioning

A meta-analysis for the factor of mental functioning was performed based on 4 studies (n = 1,152) (42,54,62,66). This meta-analysis showed a significant low negative correlation (r_p -0.48, 95% CI = [-0.57, -0.38], $P < 0.00001$) with significant heterogeneity ($I^2 = 75\%$, $P = 0.007$) (Supplementary Fig. 62). Heterogeneity remained high in the subgroup analysis based on methodological quality (Supplementary Fig. 63). Because only valid outcome measures were used, no subgroup analysis was performed based on the outcome measures.

Academic Functioning

The association between PI and academic functioning (e.g., school attendance, academic achievement, and social relationships) was retrieved in 2 studies (n = 285) (36,61). The meta-analysis resulted in a significant moderate negative correlation (r_p -0.54, 95% CI = [-0.65, -0.41], $P < 0.00001$) (Supplementary Fig. 64). Significant heterogeneity was found ($I^2 = 50\%$, $P = 0.16$), but no further subgroup analyses could be done due to insufficient studies.

Discussion

Summary of the Results

This systematic review and meta-analysis aimed to examine the prevalence of PI in people with pain and to enlist factors associated with PI in people with pain. Due to high heterogeneity across studies ($I^2 = 99\%$), it was not possible to define a weighted mean prevalence rate of PI in people with pain. The prevalence numbers ranged from 23% [0.18-0.27] (traumatic injury) to 77% [0.76-0.78] (fibromyalgia).

Based on correlational analyses of all factors found in the literature with PI, which in all cases was measured with the IEQ, a significant association was moderate positive with pain catastrophizing posttraumatic stress, anger, anxiety, depressive symptoms, kinesiophobia, and disability, and moderate negative with pain acceptance, academic functioning, and emotional functioning. A significant low association was found positive with pain interference, state anger, symptoms of central sensitization, pain perceptions, trait anger, pain intensity, anger inhibition, and negative with mental functioning, social functioning, and physical functioning. These results underline the importance of PI in people with pain.

Discussion of the Prevalence

Subgroup analyses were not able to explain the high heterogeneity, wherefor it can be assumed that most of the variability across studies is attributable to heterogeneity rather than chance (31). Unfortunately, it was not possible to conduct the subgroup analyses based on type of population because not all articles clearly defined their population in the same way (e.g.,

acute/chronic). However, subgrouping, based on acute or chronic pain complaints, could be worthful knowing that cognitions, such as beliefs of injustice, play an important part in the chronicity of pain (87). Overall, in 75% of the studies a prevalence of ≥ 33 is seen. The use of different cutoff scores to define clinically relevant levels of PI across studies can possibly result in discrepancies between studies in the classification of people as having clinically relevant levels of PI. Studies applying a higher cutoff score will have classified people as not having a clinically relevant level of PI; whereas, based on a lower cutoff score applied in a different study, those people would have been classified as having PI. After subgroup analysis, based on the cutoff, only one homogeneous (I^2 = 2%, P = 0.36) and significant (P < 0.001) pooled prevalence rate of 0.26 [0.22-0.31] was found for the cutoff of ≥ 30 on the IEQ. This cutoff value has been validated by Sullivan (88) in chronic pain samples. Future research should define proper population-specific cutoff values to define the correct prevalence of PI across populations with pain. Interestingly, it was also seen that the subgroup of retired people in the chronic pain sample demonstrated a lower prevalence rate of PI (48). This may be due to a lower valuation of the importance of their loss due to the painful condition as they did not lose their job and/or income (88). Also, a trauma or road traffic accident as the cause of pain resulted in higher PI prevalence, which is possibly caused by perceived self-victimization aspects which reflect the severity and irreparability of injury-related loss, blame, and unfairness (14).

Discussion of the Significant Associations

Pain catastrophizing was found as the most strongly associated factor with PI (r_p 0.66 [0.64, 0.69]). Both PI and pain catastrophizing affect cognitive pain experience (59) and represent a maladaptive pattern of cognitive appraisal (89). Therefore, it may be assumed that pain catastrophizing overlaps with the severity/irreparability part of PI assessed by the IEQ. However, the underlying concept of pain catastrophizing is not expressed in the "blame/unfairness" dimension of the IEQ (90). This illustrates that PI and pain catastrophizing are partially different constructs, which can be confirmed with the moderate pooled correlation (r_p 0.66 [0.64, 0.69]) found in this review.

Higher levels of depression and anxiety were found in people with pain experiencing PI (rp,depression 0.57 [0.52, 0.60]; rp,anxiety 0.59 [0.52, 0.64]). PI and depression may align with each other through injustice-relevant constructs, such as victimization and unfairness, which play a central role in depressive experiences (91). Moreover, PI augments the relationship between pain severity and depressive symptoms (7). Another mental health outcome that seems importantly associated with PI is posttraumatic stress. Pain complaints are often caused by traumatic experiences, which are often associated with posttraumatic stress disorder (81). Also, anger can arise when a discrepancy between the expected and the actual outcomes is present (89). This corresponds with PI since both are experienced when somehow feel wronged (92). Moreover, state anger and anger inhibition mediate the relationship between PI and pain intensity (83).

Those negative emotions associated with PI and PI itself may possibly contribute to the maintenance or worsening of complaints. Our findings are in accordance with current conceptualizations of injustice assessments, which propose a central role for symptom severity and disability as determinants of perceptions of injustice in people with persistent pain (76). First, higher levels of pain are seen in people with higher levels of PI. Maladaptive illness/pain perceptions, including PI, contribute to the presence of symptoms of central sensitization (93). This could explain why PI is seen with more symptoms of central sensitization (rp 0.47 [0.39, 0.55]), and thus a greater chronicity of pain. Secondly, disability occurs when a person's ability to perform activities considered normal is impaired as a result of loss (94). Feelings of injustice could possibly arise due to the perception of undeserved loss (95). However, loss and disability do not necessarily have the same meaning, as disabilities in daily life have the potential to be improved in some way, despite the loss (96). This can be extended to the positive correlation found between pain interference, "the degree to which pain limits or interferes with individuals' physical, mental and social activities" (97), and PI as well. Since the number of pain sites predicts disability (98), it is self-evident that the number of pain sites is also associated with PI. Disability features include impaired physical, emotional, social, mental, and academic functioning as well (36,61,66). These factors were found negatively associated with PI in this review.

The relationship between PI and emotional functioning is significantly mediated by pain acceptance (49). It has been suggested by Rodero et al (9) that PI and pain acceptance are opposite constructs since "something unjust is usually unacceptable," and "an event perceived as just may be more easily accepted."

Although, through the negative relationship (r_p -0.59 [-0.66, -0.49]) between PI and pain acceptance found in this review is likely to be much more complex, this seems to be an acceptable simplification.

Overall, PI is associated with negative emotions (i.e., stress, anger, anxiety), which are known to be continuous stressors for people. The biology behind PI could be explained by the essential role of the amygdala in negative emotions, pain memories, and anger (99). The amygdala is seen as the motor for chronic pain and central sensitization (100).

Strengths and Limitations

This is the first systematic review aiming at estimating the prevalence of PI and exploring factors associated with PI in people with pain. For this, qualitative meta-analyses were conducted including only medium-to-high qualitative studies (101), leading to an increase in sample size, and thus power to examine the effects of interest. Three databases were used, from which a high number of studies, considering a broad array of populations with pain emerged. Risk for selection bias was decreased by blinding the screening procedures for both title and abstract, full textual screening, and data extraction.

Despite these methodological strengths, a few limitations should be acknowledged. First, some articles had to be excluded due to the absence of the full text. Second, the findings can largely be applied to developed and high-income countries, as most included studies originated from North America and Europe, but further research is needed in developing countries. Third, because no validated cutoff values were available for the National Institutes of Health to determine the methodological quality of the included studies, quality categories were based on the values arbitrarily chosen by Besora-Moreno et al (26). Lastly, high heterogeneity was observed in many of the performed analyses, even though random effects were used during meta-analyses. Heterogeneity is due to variability in the data: clinically, methodologically, or statistically. Therefore, subgroup analyses were planned and performed when possible. This could decrease heterogeneity in some cases, but not for all. The clinical, methodological, or statistical impact is thus not always important for the overall effect found. However, more research is needed to be able to do more subgroup analyses and to become less heterogeneous results. Although, this also shows the innovative aspect of PI research and the results of this paper open new possible pathways to tackle PI in further research.

Implications for Clinical Practice

The presence of PI in people experiencing pain and a wide variety of factors associated with PI calls for further research. PI is a "perceived" feeling with thoughts and emotions of injustice, which could be maladaptive for the rehabilitation of people with pain (14). Up to now, we do not know the causal associations between PI and other factors. Therefore, it should be examined whether PI in people having pain worsens over time or not. If causal associations are found in future research, PI should be an area of focus to improve the efficacy of interventions in populations with pain (8,14). Since psychological characteristics have the highest correlations with PI, it could be assumed that our current environment is an important factor in the development of PI. First of all, mental disorders (e.g., anxiety, depression, and posttraumatic stress) are seen in 1 out of 8 people worldwide (102). Several studies (103,104) have also highlighted that the COVID-19 pandemic is associated with high levels of psychological distress. The number of people living with anxiety and depressive disorders increased during the COVID-19 pandemic to an estimation of 1 out of 3 people worldwide (105). Knowing this, more attention should be given to psychological well-being in clinical practice.

In clinical practice, these perceptions of injustice can be screened with the IEQ (88). With this, the type of injustice can be defined as well as the level of injustice, which makes PI measurable (88). Further anamnestic questioning is needed to define what the exact perception is. Furthermore, it would be interesting to identify people at risk of developing PI, so that clinicians can immediately initiate targeted therapy options, and thus prevent the potential negative consequences of the development of PI. Treatment strategies for PI do not exist up to now. Literature suggests the use of cognitive-behavioral interventions, pain acceptance (14), and educational interventions comprised of elements of reassurance and encouragement toward activity re-engagement (106). Up to now, a practical guide allowing clinicians to address PI in cancer survivors is already available (107), but requires experimental testing.

Conclusions

Prevalence numbers for PI in populations with pain ranged from 23% to 77%. Nevertheless, a pooled estimate could not be provided due to high heterogeneity even after performing subgroup analyses. Nonetheless, studies show that PI is significantly associated with psychological, pain, and QoL characteristics. Asso-

ciations with recovery characteristics were negligible. No significant associations were found with personal characteristics (i.e., age, gender, and body mass index). To draw strong conclusions on causal interactions between PI and related factors in people with pain, further research is warranted.

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Appendix 1. *Full search strategy used for PubMed, Web of Science, and Embase.*

PubMed

Population:

("pain"[MeSH Terms] OR "causalgia"[MeSH Terms] OR "central nervous system sensitization"[MeSH Terms] OR "fibromyalgia"[MeSH Terms] OR "hyperalgesia"[MeSH Terms] OR "hyperesthesia"[MeSH Terms] OR "neuralgia"[MeSH Terms] OR "nociceptive pain"[MeSH Terms] OR "paresthesia"[MeSH Terms] OR ("pain"[MeSH Terms] OR "pain"[All Fields]) OR ("stress, psychological"[MeSH Terms] OR ("stress"[All Fields] AND "psychological"[All Fields]) OR "psychological stress"[All Fields] OR "suffer"[All Fields] OR "suffered"[All Fields] OR "suffering"[All Fields] OR "sufferings"[All Fields] OR "suffers"[All Fields] OR "suffereing"[All Fields] OR "sufferer"[All Fields] OR "sufferer s"[All Fields] OR "sufferers"[All Fields] OR "sufferred"[All Fields]) OR ("pain"[MeSH Terms] OR "pain"[All Fields] OR "ache"[All Fields]) OR ("causalgia"[MeSH Terms] OR "causalgia"[All Fields]) OR ("causalgia"[MeSH Terms] OR "causalgia"[All Fields] OR ("type"[All Fields] AND "ii"[All Fields] AND "complex"[All Fields] AND "regional"[All Fields] AND "pain"[All Fields] AND "syndrome"[All Fields]) OR "type ii complex regional pain syndrome"[All Fields]) OR ("causalgia"[MeSH Terms] OR "causalgia"[All Fields] OR ("crps"[All Fields] AND "type"[All Fields] AND "ii"[All Fields]) OR "crps type ii"[All Fields]) OR ("central nervous system sensitization"[MeSH Terms] OR ("central"[All Fields] AND "nervous"[All Fields] AND "system"[All Fields] AND "sensitization"[All Fields]) OR "central nervous system sensitization"[All Fields]) OR ("sensitisation"[All Fields] OR "sensitisations"[All Fields] OR "sensitise"[All Fields] OR "sensitised"[All Fields] OR "sensitiser"[All Fields] OR "sensitisers"[All Fields] OR "sensitises"[All Fields] OR "sensitising"[All Fields] OR "sensitization"[All Fields] OR "sensitizations"[All Fields] OR "sensitize"[All Fields] OR "sensitized"[All Fields] OR "sensitizer"[All Fields] OR "sensitizers"[All Fields] OR "sensitizes"[All Fields] OR "sensitizing"[All Fields]) OR ("fibromyalgia"[MeSH Terms] OR "fibromyalgia"[All Fields] OR "fibromyalgias"[All Fields]) OR ("rheumatic diseases"[MeSH Terms] OR ("rheumatic"[All Fields] AND "diseases"[All Fields]) OR "rheumatic diseases"[All Fields] OR "rheumatics"[All Fields] OR "rheumatism"[All Fields] OR "rheumatic"[All Fields] OR "rheumatisms"[All Fields]) OR ("fibromyalgia"[MeSH Terms] OR "fibromyalgia"[All Fields] OR "fibrositis"[All Fields]) OR ("hyperalgesia"[MeSH Terms] OR "hyperalgesia"[All Fields] OR "hyperalgesias"[All Fields]) OR ("allodynias"[All Fields] OR "hyperalgesia"[MeSH Terms] OR "hyperalgesia"[All Fields] OR "allodynia"[All Fields]) OR ("hyperaesthesia"[All Fields] OR "hyperesthesia"[MeSH Terms] OR "hyperesthesia"[All Fields] OR "hyperesthesias"[All Fields]) OR ("hyperesthesia"[MeSH Terms] OR "hyperesthesia"[All Fields]) OR ("neuralgia"[MeSH Terms] OR "neuralgia"[All Fields] OR "neuralgias"[All Fields]) OR ("neuralgia"[MeSH Terms] OR "neuralgia"[All Fields] OR "neurodynia"[All Fields]) OR ("nociception"[MeSH Terms] OR "nociception"[All Fields] OR "nociceptions"[All Fields] OR "nociceptive"[All Fields] OR "nociceptively"[All Fields]) OR ("paraesthesia"[All Fields] OR "paresthesia"[MeSH Terms] OR "paresthesia"[All Fields] OR "paraesthesiae"[All Fields] OR "paraesthesias"[All Fields] OR "paresthesias"[All Fields] OR "paresthesiae"[All Fields]) OR ("paresthesia"[MeSH Terms] OR "paresthesia"[All Fields] OR "formication"[All Fields]))

Exposure:

("probability"[MeSH Terms] OR "morbidity"[MeSH Terms] OR "epidemiology"[MeSH Terms] OR "prognosis"[MeSH Terms] OR "epidemiologic factors"[MeSH Terms] OR "survival analysis"[MeSH Terms] OR ("risk"[MeSH Terms] OR "risk"[All Fields]) OR ("probability"[MeSH Terms] OR "probability"[All Fields] OR "probabilities"[All Fields]) OR ("epidemiology"[MeSH Subheading] OR "epidemiology"[All Fields] OR "morbidity"[All Fields] OR "morbidity"[MeSH Terms] OR "morbid"[All Fields] OR "morbidities"[All Fields] OR "morbids"[All Fields]) OR ("epidemiology"[MeSH Subheading] OR "epidemiology"[All Fields] OR "incidence"[All Fields] OR "incidence"[MeSH Terms] OR "incidences"[All Fields] OR "incident"[All Fields] OR "incidents"[All Fields]) OR ("epidemiology"[MeSH Subheading] OR "epidemiology"[All

Appendix 1 (cont). *Full search strategy used for PubMed, Web of Science, and Embase.*

Fields] OR "prevalence"[All Fields] OR "prevalence"[MeSH Terms] OR "prevalance"[All Fields] OR "prevalences"[All Fields] OR "prevalence s"[All Fields] OR "prevalent"[All Fields] OR "prevalently"[All Fields] OR "prevalents"[All Fields]) OR ("basic reproduction number"[MeSH Terms] OR ("basic"[All Fields] AND "reproduction"[All Fields] AND "number"[All Fields]) OR "basic reproduction number"[All Fields]) OR (("reproduction"[MeSH Terms] OR "reproduction"[All Fields] OR "reproductions"[All Fields] OR "reproductive"[All Fields] OR "reproductively"[All Fields] OR "reproductives"[All Fields] OR "reproductivity"[All Fields]) AND ("j rehabil assist technol eng"[Journal] OR "rate"[All Fields])) OR (("reproduction"[MeSH Terms] OR "reproduction"[All Fields] OR "reproductions"[All Fields] OR "reproductive"[All Fields] OR "reproductively"[All Fields] OR "reproductives"[All Fields] OR "reproductivity"[All Fields]) AND ("ratio"[All Fields] OR "ratio s"[All Fields] OR "ratioes"[All Fields] OR "ratios"[All Fields])) OR ("epidemiologies"[All Fields] OR "epidemiology"[MeSH Subheading] OR "epidemiology"[All Fields] OR "epidemiology"[MeSH Terms] OR "epidemiology s"[All Fields]) OR ("analysis"[MeSH Subheading] OR "analysis"[All Fields] OR "determination"[All Fields] OR "determinant"[All Fields] OR "determinants"[All Fields] OR "determinate"[All Fields] OR "determinated"[All Fields] OR "determinates"[All Fields] OR "determinating"[All Fields] OR "determinations"[All Fields] OR "determine"[All Fields] OR "determined"[All Fields] OR "determines"[All Fields] OR "determining"[All Fields]) OR ("epidemiology"[MeSH Subheading] OR "epidemiology"[All Fields] OR "frequency"[All Fields] OR "epidemiology"[MeSH Terms] OR "frequence"[All Fields] OR "frequences"[All Fields] OR "frequencies"[All Fields]) OR ("epidemiology"[MeSH Subheading] OR "epidemiology"[All Fields] OR "occurrence"[All Fields] OR "epidemiology"[MeSH Terms] OR "occurrences"[All Fields]) OR ("causal"[All Fields] OR "causality"[MeSH Terms] OR "causality"[All Fields] OR "causalities"[All Fields] OR "causally"[All Fields] OR "etiology"[MeSH Subheading] OR "etiology"[All Fields]) OR ("causality"[MeSH Terms] OR "causality"[All Fields] OR "causation"[All Fields] OR "causations"[All Fields]) OR ("causative"[All Fields] OR "causatively"[All Fields] OR "causatives"[All Fields] OR "cause"[All Fields] OR "caused"[All Fields] OR "causing"[All Fields] OR "etiology"[MeSH Subheading] OR "etiology"[All Fields] OR "causes"[All Fields] OR "causality"[MeSH Terms] OR "causality"[All Fields]) OR ("factor"[All Fields] OR "factor s"[All Fields] OR "factors"[All Fields]) OR ("aetiologie"[All Fields] OR "aetiologies"[All Fields] OR "aetiology"[All Fields] OR "etiologies"[All Fields] OR "etiology"[MeSH Subheading] OR "etiology"[All Fields] OR "causality"[MeSH Terms] OR "causality"[All Fields]) OR ("odds ratio"[MeSH Terms] OR ("odds"[All Fields] AND "ratio"[All Fields]) OR "odds ratio"[All Fields]) OR ("odds ratio"[MeSH Terms] OR ("odds"[All Fields] AND "ratio"[All Fields]) OR "odds ratio"[All Fields] OR ("cross"[All Fields] AND "product"[All Fields] AND "ratio"[All Fields]) OR "cross product ratio"[All Fields]) OR (("family"[MeSH Terms] OR "family"[All Fields] OR "relative"[All Fields] OR "relatives"[All Fields] OR "relative s"[All Fields] OR "relatively"[All Fields]) AND "Odd"[All Fields]) OR (("hazard"[All Fields] OR "hazard s"[All Fields] OR "hazardous"[All Fields] OR "hazardously"[All Fields] OR "hazardousness"[All Fields] OR "hazards"[All Fields]) AND ("ratio"[All Fields] OR "ratio s"[All Fields] OR "ratioes"[All Fields] OR "ratios"[All Fields])) OR ("prognose"[All Fields] OR "prognosing"[All Fields]) OR ("epidemiologic factors"[MeSH Terms] OR ("epidemiologic"[All Fields] AND "factors"[All Fields]) OR "epidemiologic factors"[All Fields] OR ("epidemiologic"[All Fields] AND "factor"[All Fields]) OR "epidemiologic factor"[All Fields]) OR ("epidemiologic factors"[MeSH Terms] OR ("epidemiologic"[All Fields] AND "factors"[All Fields]) OR "epidemiologic factors"[All Fields] OR ("epidemiologic"[All Fields] AND "determinant"[All Fields]) OR "epidemiologic determinant"[All Fields]) OR (("mortality"[MeSH Subheading] OR "mortality"[All Fields] OR "survival"[All Fields] OR "survival"[MeSH Terms] OR "survivability"[All Fields] OR "survivable"[All Fields] OR "survivals"[All Fields] OR "survive"[All Fields] OR "survived"[All Fields] OR "survives"[All Fields]

Appendix 1 (cont). *Full search strategy used for PubMed, Web of Science, and Embase.*

OR "surviving"[All Fields]) AND ("analyse"[All Fields] OR "analysed"[All Fields] OR "analyses"[All Fields] OR "analysing"[All Fields] OR "analyze"[All Fields])) OR ("characteristic"[All Fields] OR "characteristics"[All Fields]) OR ("contribute"[All Fields] OR "contributed"[All Fields] OR "contributes"[All Fields] OR "contributing"[All Fields] OR "contribution"[All Fields] OR "contributions"[All Fields]) OR ("indicate"[All Fields] OR "indicated"[All Fields] OR "indicates"[All Fields] OR "indicating"[All Fields] OR "indicative"[All Fields] OR "indicatives"[All Fields] OR "indicators and reagents"[Pharmacological Action] OR "indicators and reagents"[MeSH Terms] OR ("indicators"[All Fields] AND "reagents"[All Fields]) OR "indicators and reagents"[All Fields] OR "indicator"[All Fields] OR "indicators"[All Fields] OR "indice"[All Fields] OR "indices"[All Fields]) OR ("outcome"[All Fields] OR "outcomes"[All Fields]) OR ("phenomenon"[All Fields] OR "phenomenon s"[All Fields] OR "phenomenons"[All Fields]) OR ("predict"[All Fields] OR "predictabilities"[All Fields] OR "predictability"[All Fields] OR "predictable"[All Fields] OR "predictably"[All Fields] OR "predicted"[All Fields] OR "predicting"[All Fields] OR "prediction"[All Fields] OR "predictions"[All Fields] OR "predictive"[All Fields] OR "predictively"[All Fields] OR "predictiveness"[All Fields] OR "predictives"[All Fields] OR "predictivities"[All Fields] OR "predictivity"[All Fields] OR "predicts"[All Fields]) OR ("predictor"[All Fields] OR "predictors"[All Fields]) OR (("family"[MeSH Terms] OR "family"[All Fields] OR "relative"[All Fields] OR "relatives"[All Fields] OR "relative s"[All Fields] OR "relatively"[All Fields]) AND ("epidemiology"[MeSH Subheading] OR "epidemiology"[All Fields] OR "frequency"[All Fields] OR "epidemiology"[MeSH Terms] OR "frequence"[All Fields] OR "frequences"[All Fields] OR "frequencies"[All Fields])) OR (("family"[MeSH Terms] OR "family"[All Fields] OR "relative"[All Fields] OR "relatives"[All Fields] OR "relative s"[All Fields] OR "relatively"[All Fields]) AND ("epidemiology"[MeSH Subheading] OR "epidemiology"[All Fields] OR "incidence"[All Fields] OR "incidence"[MeSH Terms] OR "incidences"[All Fields] OR "incident"[All Fields] OR "incidents"[All Fields])) OR ("variabilities"[All Fields] OR "variability"[All Fields] OR "variable"[All Fields] OR "variable s"[All Fields] OR "variables"[All Fields] OR "variably"[All Fields]))

Outcome:

("patient harm"[MeSH Terms] OR ("unfair"[All Fields] OR "unfairness"[All Fields]) OR "Irreparability"[All Fields] OR ("blame"[All Fields] OR "blamed"[All Fields] OR "blameful"[All Fields] OR "blames"[All Fields] OR "blaming"[All Fields]) OR ("patient harm"[MeSH Terms] OR ("patient"[All Fields] AND "harm"[All Fields]) OR "patient harm"[All Fields]) OR (("inequities"[All Fields] OR "inequity"[All Fields] OR "socioeconomic factors"[MeSH Terms] OR ("socioeconomic"[All Fields] AND "factors"[All Fields]) OR "socioeconomic factors"[All Fields] OR "inequalities"[All Fields] OR "inequality"[All Fields]) NOT ("socioeconomic factors"[MeSH Terms] OR ("socioeconomic"[All Fields] AND "factors"[All Fields]) OR "socioeconomic factors"[All Fields] OR "socioeconomics"[All Fields] OR "socioeconomic"[All Fields] OR "socioeconomical"[All Fields] OR "socioeconomically"[All Fields])) OR (("perceivable"[All Fields] OR "perceive"[All Fields] OR "perceiver"[All Fields] OR "perceiver s"[All Fields] OR "perceivers"[All Fields] OR "perceives"[All Fields] OR "perception"[MeSH Terms] OR "perception"[All Fields] OR "perceived"[All Fields] OR "perceiving"[All Fields]) AND ("justice s"[All Fields] OR "social justice"[MeSH Terms] OR ("social"[All Fields] AND "justice"[All Fields]) OR "social justice"[All Fields] OR "justice"[All Fields] OR "justices"[All Fields])) OR (("perceivable"[All Fields] OR "perceive"[All Fields] OR "perceiver"[All Fields] OR "perceiver s"[All Fields] OR "perceivers"[All Fields] OR "perceives"[All Fields] OR "perception"[MeSH Terms] OR "perception"[All Fields] OR "perceived"[All Fields] OR "perceiving"[All Fields]) AND "fairness"[All Fields]) OR ("injustice"[All Fields] OR "injustices"[All Fields]))

Web of Science

Population:

TS = ("pain" OR "causalgia" OR "central nervous system

Appendix 1 (cont). *Full search strategy used for PubMed, Web of Science, and Embase*

sensitization" OR "fibromyalgia" OR "hyperalgesia" OR "hyperesthesia" OR "neuralgia" OR "nociceptive pain" OR "paresthesia" OR ("pain" OR "pain") OR ("stress, psychological" OR ("stress" AND "psychological") OR "psychological stress" OR "suffer" OR "suffered" OR "suffering" OR "sufferings" OR "suffers" OR "suffereing" OR "sufferer" OR "sufferer s" OR "sufferers" OR "sufferred") OR ("pain" OR "pain" OR "ache") OR ("causalgia" OR "causalgia") OR ("causalgia" OR "causalgia" OR ("type" AND "ii" AND "complex" AND "regional" AND "pain" AND "syndrome") OR "type ii complex regional pain syndrome") OR ("causalgia" OR "causalgia" OR ("crps" AND "type" AND "ii") OR "crps type ii") OR ("central nervous system sensitization" OR ("central" AND "nervous" AND "system" AND "sensitization") OR "central nervous system sensitization") OR ("sensitisation"[All Fields] OR "sensitisations" OR "sensitise" OR "sensitised" OR "sensitiser" OR "sensitisers" OR "sensitises" OR "sensitising" OR "sensitization" OR "sensitizations" OR "sensitize" OR "sensitized" OR "sensitizer" OR "sensitizers" OR "sensitizes" OR "sensitizing") OR ("fibromyalgia" OR "fibromyalgia" OR "fibromyalgias") OR ("rheumatic diseases" OR ("rheumatic" AND "diseases") OR "rheumatic diseases" OR "rheumatics" OR "rheumatism" OR "rheumatic" OR "rheumatisms") OR ("fibromyalgia" OR "fibromyalgia" OR "fibrositis") OR ("hyperalgesia" OR "hyperalgesia" OR "hyperalgesias") OR ("allodynias" OR "hyperalgesia" OR "hyperalgesia" OR "allodynia") OR ("hyperaesthesia" Fields] OR "hyperesthesia" OR "hyperesthesia" OR "hyperesthesias") OR ("hyperesthesia" OR "hyperesthesia") OR ("neuralgia" OR "neuralgia" OR "neuralgias") OR ("neuralgia" OR "neuralgia" OR "neurodynia") OR ("nociception" OR "nociception" OR "nociceptions" OR "nociceptive" OR "nociceptively") OR ("paraesthesia" OR "paresthesia" OR "paresthesia" OR "paraesthesiae" OR "paraesthesias" OR "paresthesias" OR "paresthesiae") OR ("paresthesia" OR "paresthesia" OR "formication"))

Exposure:

TS = ("probability" OR "morbidity" OR "epidemiology" OR "prognosis" OR "epidemiologic factors" OR "survival analysis" OR ("risk" OR "risk") OR ("probability" OR "probability" OR "probabilities") OR ("epidemiology" OR "epidemiology" OR "morbidity" OR "morbidity" OR "morbid" OR "morbidities" OR "morbids") OR ("epidemiology" OR "epidemiology" OR "incidence" OR "incidence" OR "incidences" OR "incident" OR "incidents") OR ("epidemiology" OR "epidemiology" OR "prevalence" OR "prevalence" OR "prevalance" OR "prevalences" OR "prevalence s" OR "prevalent" OR "prevalently" OR "prevalents") OR ("basic reproduction number" OR ("basic" AND "reproduction" AND "number") OR "basic reproduction number") OR (("reproduction" OR "reproduction" OR "reproductions" OR "reproductive" OR "reproductively" OR "reproductives" OR "reproductivity") AND ("j rehabil assist technol eng" OR "rate")) OR (("reproduction" OR "reproduction" OR "reproductions" OR "reproductive" OR "reproductively" OR "reproductives" OR "reproductivity") AND ("ratio" OR "ratio s" OR "ratioes" OR "ratios")) OR ("epidemiologies" OR "epidemiology" OR "epidemiology" OR "epidemiology" OR "epidemiology s") OR ("analysis" OR "analysis" OR "determination" OR "determinant" OR "determinants" OR "determinate" OR "determinated" OR "determinates" OR "determinating" OR "determinations" OR "determine" OR "determined" OR "determines" OR "determining") OR ("epidemiology" OR "epidemiology" OR "frequency" OR "epidemiology" OR "frequence" OR "frequences" OR "frequencies") OR ("epidemiology" OR "epidemiology" OR "occurrence" OR "epidemiology" OR "occurrences") OR ("causal" OR "causality" OR "causality" OR "causalities" OR "causally" OR "etiology" OR "etiology") OR ("causality" OR "causality" OR "causation" OR "causations") OR ("causative" OR "causatively" OR "causatives" OR "cause" OR "caused" OR "causing" OR "etiology" OR "etiology" OR "causes" OR "causality" OR "causality") OR ("factor" OR "factor s" OR "factors") OR ("aetiologie" OR "aetiologies" OR "aetiology" OR "etiologies" OR "etiology" OR "etiology" OR "causality" OR "causality") OR ("odds ratio" OR ("odds" AND "ratio") OR "odds ratio") OR ("odds ratio" OR ("odds" AND "ratio") OR "odds ratio" OR ("cross" AND "product" AND "ratio") OR "cross product ratio") OR (("family" OR "family" OR "relative" OR "relatives" OR "relative s" OR "relatively") AND "Odd") OR (("hazard" OR "hazard s" OR "hazardous" OR "hazardously" OR "hazardousness" OR "hazards") AND ("ratio" OR "ratio s" OR "ratioes" OR "ratios")) OR ("prognose" OR "prognosing") OR ("epidemiologic factors" OR

Appendix 1 (cont). *Full search strategy used for PubMed, Web of Science, and Embase.*

("epidemiologic" AND "factors") OR "epidemiologic factors" OR ("epidemiologic" AND "factor") OR "epidemiologic factor") OR ("epidemiologic factors" OR ("epidemiologic" AND "factors") OR "epidemiologic factors" OR ("epidemiologic" AND "determinant") OR "epidemiologic determinant") OR (("mortality" OR "mortality" OR "survival" OR "survival" OR "survivability" OR "survivable" OR "survivals" OR "survive" OR "survived" OR "survives" OR "surviving") AND ("analyse" OR "analysed" OR "analyses" OR "analysing" OR "analyze")) OR ("characteristic" OR "characteristics") OR ("contribute" OR "contributed" OR "contributes" OR "contributing" OR "contribution" OR "contributions") OR ("indicate" OR "indicated" OR "indicates" OR "indicating" OR "indicative" OR "indicatives" OR "indicators and reagents" OR "indicators and reagents" OR ("indicators" AND "reagents") OR "indicators and reagents" OR "indicator" OR "indicators" OR "indice" OR "indices") OR ("outcome" OR "outcomes") OR ("phenomenon" OR "phenomenon s" OR "phenomenons") OR ("predict" OR "predictabilities" OR "predictability" OR "predictable" OR "predictably" OR "predicted" OR "predicting" OR "prediction" OR "predictions" OR "predictive" OR "predictively" OR "predictiveness" OR "predictives" OR "predictivities" OR "predictivity" OR "predicts") OR ("predictor" OR "predictors") OR (("family" OR "family" OR "relative" OR "relatives" OR "relative s" OR "relatively") AND ("epidemiology" OR "epidemiology" OR "frequency" OR "epidemiology" OR "frequence" OR "frequences" OR "frequencies")) OR (("family" OR "family" OR "relative" OR "relatives" OR "relative s" OR "relatively") AND ("epidemiology" OR "epidemiology" OR "incidence" OR "incidence" OR "incidences" OR "incident" OR "incidents")) OR ("variabilities" OR "variability" OR "variable" OR "variable s" OR "variables" OR "variably"))

Outcome:

TS = ("patient harm" OR ("unfair" OR "unfairness") OR "Irreparability" OR ("blame" OR "blamed" OR "blameful" OR "blames" OR "blaming") OR ("patient harm" OR ("patient" AND "harm") OR "patient harm") OR (("inequities" OR "inequity" OR "socioeconomic factors" OR ("socioeconomic" AND "factors") OR "socioeconomic factors" OR "inequalities" OR "inequality") NOT ("socioeconomic factors" OR ("socioeconomic" AND "factors") OR "socioeconomic factors" OR "socioeconomics" OR "socioeconomic" OR "socioeconomical" OR "socioeconomically")) OR (("perceivable" OR "perceive" OR "perceiver" OR "perceiver s" OR "perceivers" OR "perceives" OR "perception" OR "perception" OR "perceived" OR "perceiving") AND ("justice s" OR "social justice" OR ("social" AND "justice") OR "social justice" OR "justice" OR "justices")) OR (("perceivable" OR "perceive" OR "perceiver" OR "perceiver s" OR "perceivers" OR "perceives" OR "perception" OR "perception" OR "perceived" OR "perceiving") AND "fairness") OR ("injustice" OR "injustices"))

Embase

Population:

("pain" OR "causalgia" OR "central nervous system sensitization" OR "fibromyalgia" OR "hyperalgesia" OR "hyperesthesia" OR "neuralgia" OR "nociceptive pain" OR "paresthesia" OR ("pain" OR "pain") OR ("stress, psychological" OR ("stress" AND "psychological") OR "psychological stress" OR "suffer" OR "suffered" OR "suffering" OR "sufferings" OR "suffers" OR "suffereing" OR "sufferer" OR "sufferer s" OR "sufferers" OR "sufferred") OR ("pain" OR "pain" OR "ache") OR ("causalgia" OR "causalgia") OR ("causalgia" OR "causalgia" OR ("type" AND "ii" AND "complex" AND "regional" AND "pain" AND "syndrome") OR "type ii complex regional pain syndrome") OR ("causalgia" OR "causalgia" OR ("crps" AND "type" AND "ii") OR "crps type ii") OR ("central nervous system sensitization" OR ("central" AND "nervous" AND "system" AND "sensitization") OR "central nervous system sensitization") OR ("sensitisation"[All Fields] OR "sensitisations" OR "sensitise" OR "sensitised" OR "sensitiser" OR "sensitisers" OR "sensitises" OR "sensitising" OR "sensitization" OR "sensitizations" OR "sensitize" OR "sensitized" OR "sensitizer" OR "sensitizers" OR "sensitizes" OR "sensitizing") OR ("fibromyalgia" OR "fibromyalgia" OR "fibromyalgias") OR ("rheumatic diseases" OR ("rheumatic" AND "diseases") OR "rheumatic diseases" OR "rheumatics" OR "rheumatism" OR "rheumatic" OR "rheumatisms") OR ("fibromyalgia" OR "fibromyalgia" OR "fibrositis") OR ("hyperalgesia" OR "hyperalgesia" OR "hyperalgesias") OR ("allodynias" OR "hyperalgesia" OR "hyperalgesia" OR "allodynia") OR ("hyperaesthesia" Fields] OR "hyperesthesia"

Appendix 1 (cont). *Full search strategy used for PubMed, Web of Science, and Embase*

OR "hyperesthesia" OR "hyperesthesias") OR ("hyperesthesia" OR "hyperesthesia") OR ("neuralgia" OR "neuralgia" OR "neuralgias") OR ("neuralgia" OR "neuralgia" OR "neurodynia") OR ("nociception" OR "nociception" OR "nociceptions" OR "nociceptive" OR "nociceptively") OR ("paraesthesia" OR "paresthesia" OR "paresthesia" OR "paraesthesiae" OR "paraesthesias" OR "paresthesias" OR "paresthesiae") OR ("paresthesia" OR "paresthesia" OR "formication"))

Exposure:

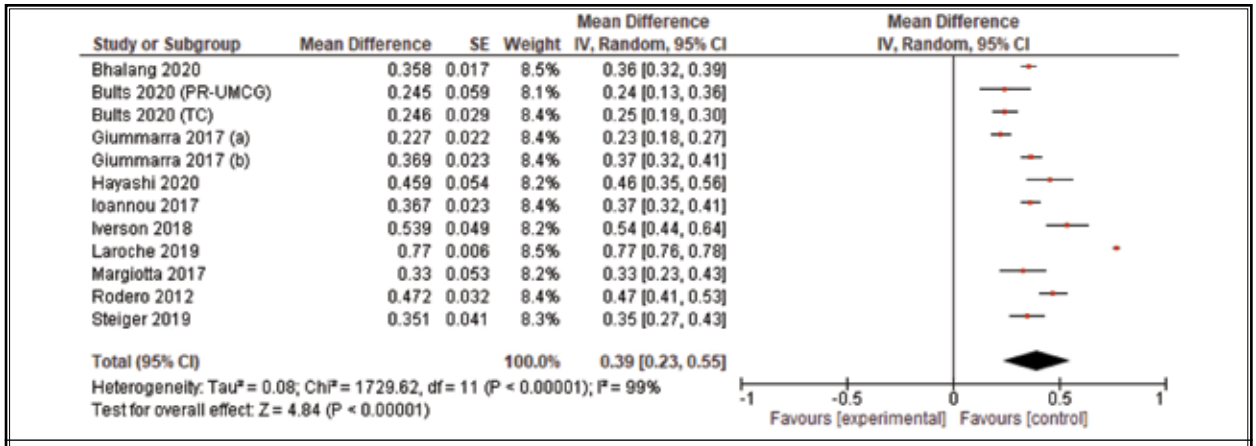
("probability" OR "morbidity" OR "epidemiology" OR "prognosis" OR "epidemiologic factors" OR "survival analysis" OR ("risk" OR "risk") OR ("probability" OR "probability" OR "probabilities") OR ("epidemiology" OR "epidemiology" OR "morbidity" OR "morbidity" OR "morbid" OR "morbidities" OR "morbids") OR ("epidemiology" OR "epidemiology" OR "incidence" OR "incidence" OR "incidences" OR "incident" OR "incidents") OR ("epidemiology" OR "epidemiology" OR "prevalence" OR "prevalence" OR "prevalance" OR "prevalences" OR "prevalence s" OR "prevalent" OR "prevalently" OR "prevalents") OR ("basic reproduction number" OR ("basic" AND "reproduction" AND "number") OR "basic reproduction number") OR (("reproduction" OR "reproduction" OR "reproductions" OR "reproductive" OR "reproductively" OR "reproductives" OR "reproductivity") AND ("j rehabil assist technol eng" OR "rate")) OR (("reproduction" OR "reproduction" OR "reproductions" OR "reproductive" OR "reproductively" OR "reproductives" OR "reproductivity") AND ("ratio" OR "ratio s" OR "ratioes" OR "ratios")) OR ("epidemiologies" OR "epidemiology" OR "epidemiology" OR "epidemiology" OR "epidemiology s") OR ("analysis" OR "analysis" OR "determination" OR "determinant" OR "determinants" OR "determinate" OR "determinated" OR "determinates" OR "determinating" OR "determinations" OR "determine" OR "determined" OR "determines" OR "determining") OR ("epidemiology" OR "epidemiology" OR "frequency" OR "epidemiology" OR "frequence" OR "frequences" OR "frequencies") OR ("epidemiology" OR "epidemiology" OR "occurrence" OR "epidemiology" OR "occurrences") OR ("causal" OR "causality" OR "causality" OR "causalities" OR "causally" OR "etiology" OR "etiology") OR ("causality" OR "causality" OR "causation" OR "causations") OR ("causative" OR "causatively" OR "causatives" OR "cause" OR "caused" OR "causing" OR "etiology" OR "etiology" OR "causes" OR "causality" OR "causality") OR ("factor" OR "factor s" OR "factors") OR ("aetiologie" OR "aetiologies" OR "aetiology" OR "etiologies" OR "etiology" OR "etiology" OR "causality" OR "causality") OR ("odds ratio" OR ("odds" AND "ratio") OR "odds ratio") OR ("odds ratio" OR ("odds" AND "ratio") OR "odds ratio" OR ("cross" AND "product" AND "ratio") OR "cross product ratio") OR (("family" OR "family" OR "relative" OR "relatives" OR "relative s" OR "relatively") AND "Odd") OR (("hazard" OR "hazard s" OR "hazardous" OR "hazardously" OR "hazardousness" OR "hazards") AND ("ratio" OR "ratio s" OR "ratioes" OR "ratios")) OR ("prognose" OR "prognosing") OR ("epidemiologic factors" OR ("epidemiologic" AND "factors") OR "epidemiologic factors" OR ("epidemiologic" AND "factor") OR "epidemiologic factor") OR ("epidemiologic factors" OR ("epidemiologic" AND "factors") OR "epidemiologic factors" OR ("epidemiologic" AND "determinant") OR "epidemiologic determinant") OR (("mortality" OR "mortality" OR "survival" OR "survival" OR "survivability" OR "survivable" OR "survivals" OR "survive" OR "survived" OR "survives" OR "surviving") AND ("analyse" OR "analysed" OR "analyses" OR "analysing" OR "analyze")) OR ("characteristic" OR "characteristics") OR ("contribute" OR "contributed" OR "contributes" OR "contributing" OR "contribution" OR "contributions") OR ("indicate" OR "indicated" OR "indicates" OR "indicating" OR "indicative" OR "indicatives" OR "indicators and reagents" OR "indicators and reagents" OR ("indicators" AND "reagents") OR "indicators and reagents" OR "indicator" OR "indicators" OR "indice" OR "indices") OR ("outcome" OR "outcomes") OR ("phenomenon" OR "phenomenon s" OR "phenomenons") OR ("predict" OR "predictabilities" OR "predictability" OR "predictable" OR "predictably" OR "predicted" OR "predicting" OR "prediction" OR "predictions" OR "predictive" OR "predictively" OR "predictiveness" OR "predictives" OR "predictivities" OR "predictivity" OR "predicts") OR ("predictor" OR "predictors") OR (("family" OR "family" OR "relative" OR "relatives" OR "relative s" OR "relatively") AND ("epidemiology" OR "epidemiology" OR "frequency" OR "epidemiology"

Appendix 1 (cont). *Full search strategy used for PubMed, Web of Science, and Embase.*

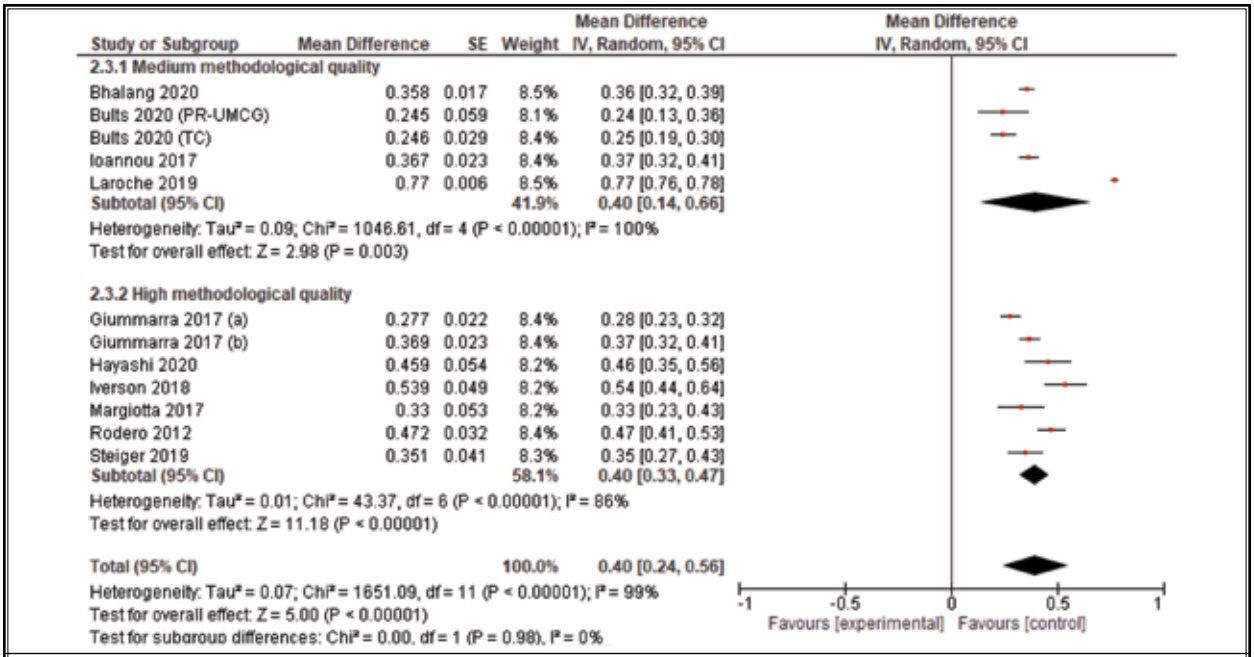
OR "frequence" OR "frequences" OR "frequencies")) OR (("family" OR "family" OR "relative" OR "relatives" OR "relative s" OR "relatively") AND ("epidemiology" OR "epidemiology" OR "incidence" OR "incidence" OR "incidences" OR "incident" OR "incidents")) OR ("variabilities" OR "variability" OR "variable" OR "variable s" OR "variables" OR "variably"))

Outcome:

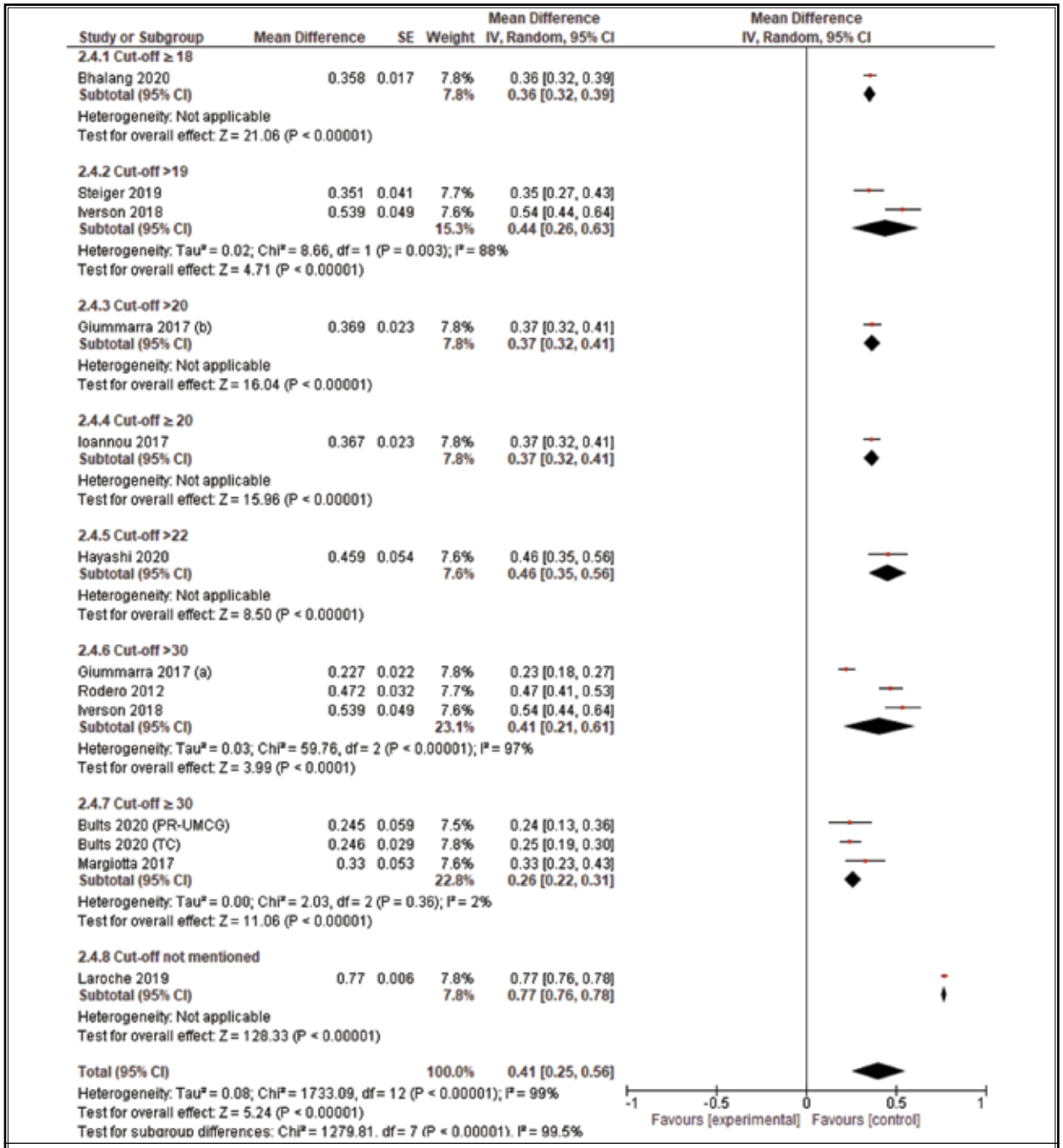
("patient harm" OR ("unfair" OR "unfairness") OR "Irreparability" OR ("blame" OR "blamed" OR "blameful" OR "blames" OR "blaming") OR ("patient harm" OR ("patient" AND "harm") OR "patient harm") OR (("inequities" OR "inequity" OR "socioeconomic factors" OR ("socioeconomic" AND "factors") OR "socioeconomic factors" OR "inequalities" OR "inequality") NOT ("socioeconomic factors" OR ("socioeconomic" AND "factors") OR "socioeconomic factors" OR "socioeconomics" OR "socioeconomic" OR "socioeconomical" OR "socioeconomically")) OR (("perceivable" OR "perceive" OR "perceiver" OR "perceiver s" OR "perceivers" OR "perceives" OR "perception" OR "perception" OR "perceived" OR "perceiving") AND ("justice s" OR "social justice" OR ("social" AND "justice") OR "social justice" OR "justice" OR "justices")) OR (("perceivable" OR "perceive" OR "perceiver" OR "perceiver s" OR "perceivers" OR "perceives" OR "perception" OR "perception" OR "perceived" OR "perceiving") AND "fairness") OR ("injustice" OR "injustices"))



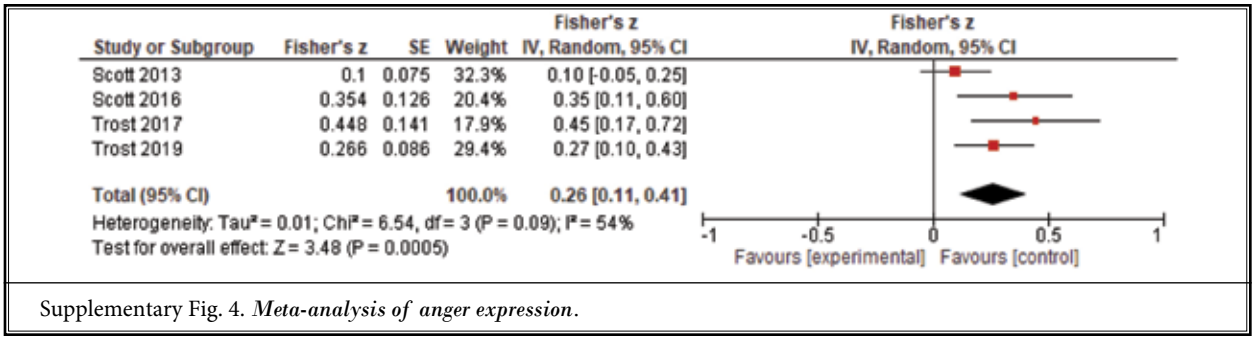
Supplementary Fig. 1. *Prevalence of PI in populations with pain.*



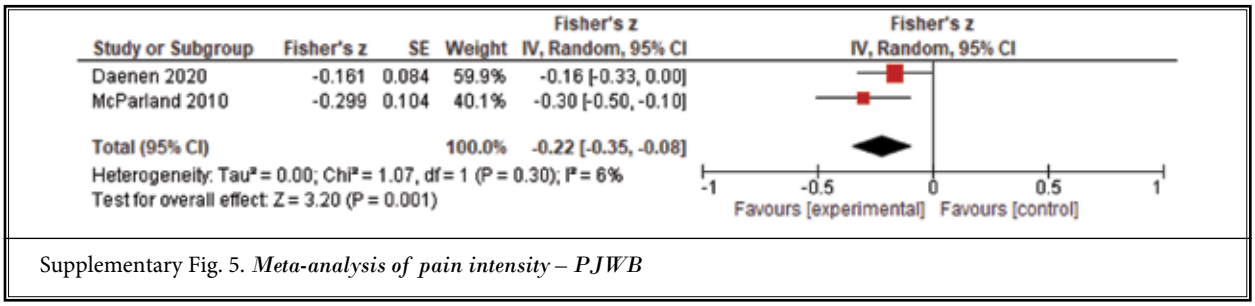
Supplementary Fig. 2. *Prevalence of PI in populations with pain (subgroup analysis: methodological quality).*



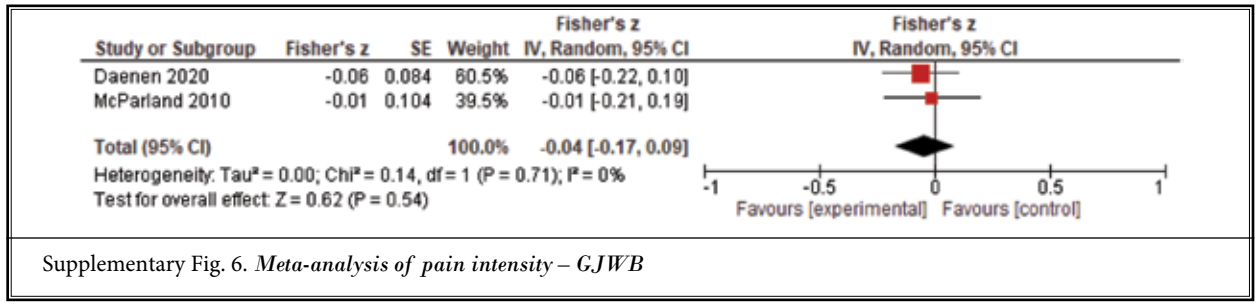
Supplementary Fig. 3. *Prevalence of PI in populations with pain (sensitivity analysis: cut-off used).*



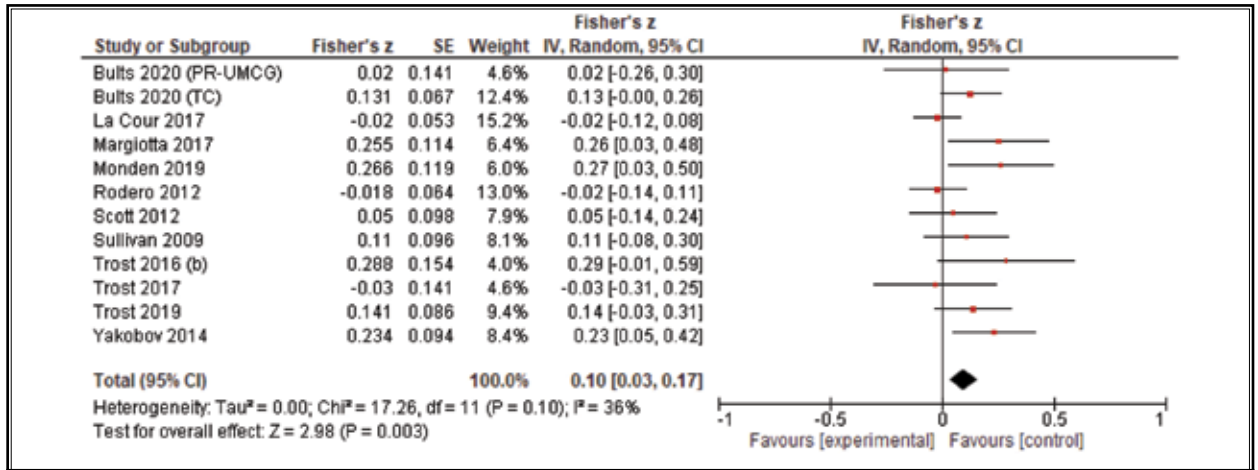
Supplementary Fig. 4. *Meta-analysis of anger expression*.



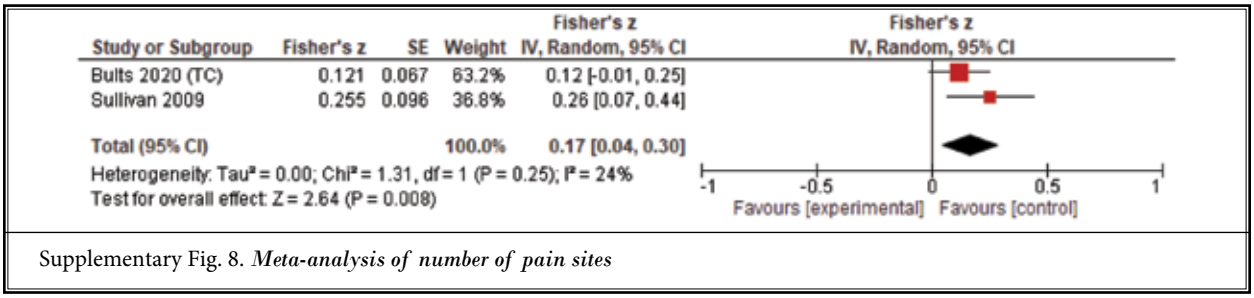
Supplementary Fig. 5. *Meta-analysis of pain intensity – PJWB*



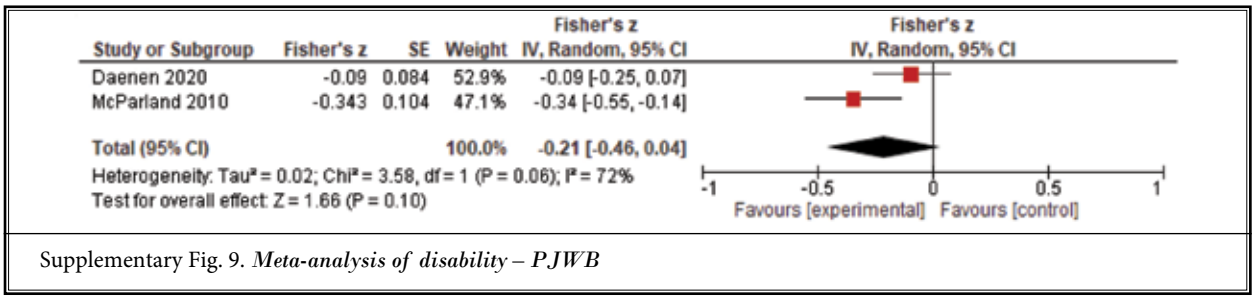
Supplementary Fig. 6. *Meta-analysis of pain intensity – GJWB*



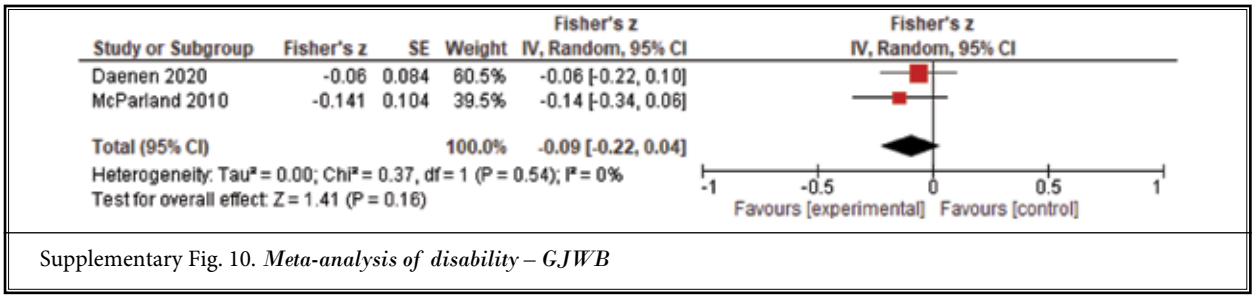
Supplementary Fig. 7. *Meta-analysis of pain duration*



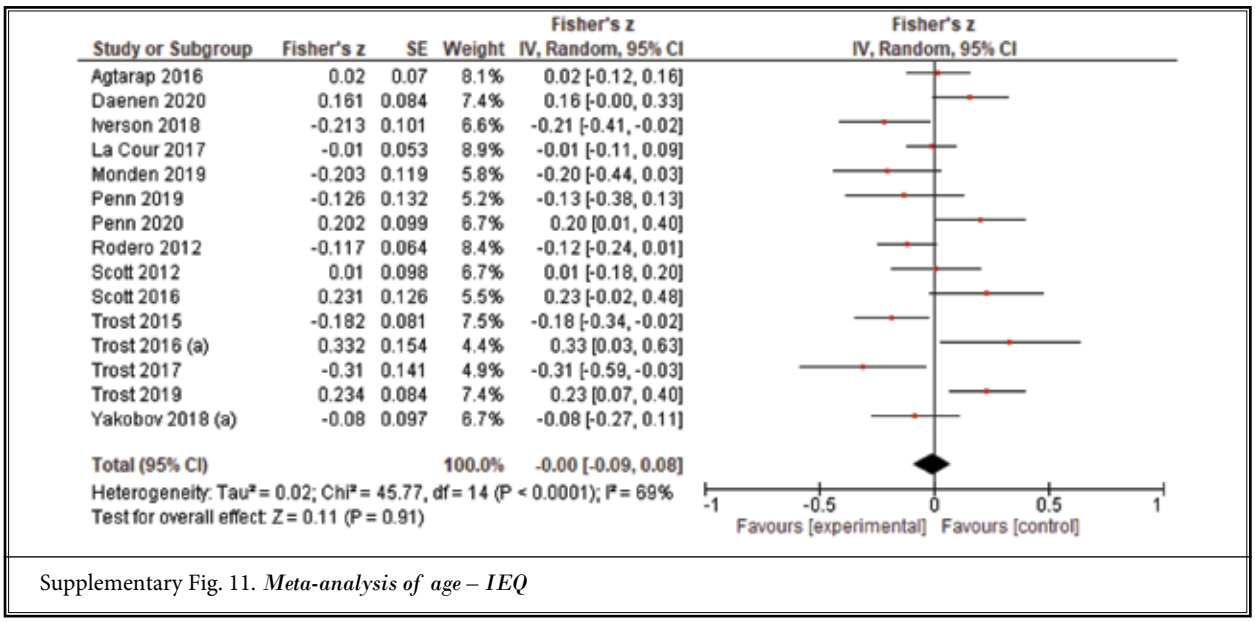
Supplementary Fig. 8. *Meta-analysis of number of pain sites*



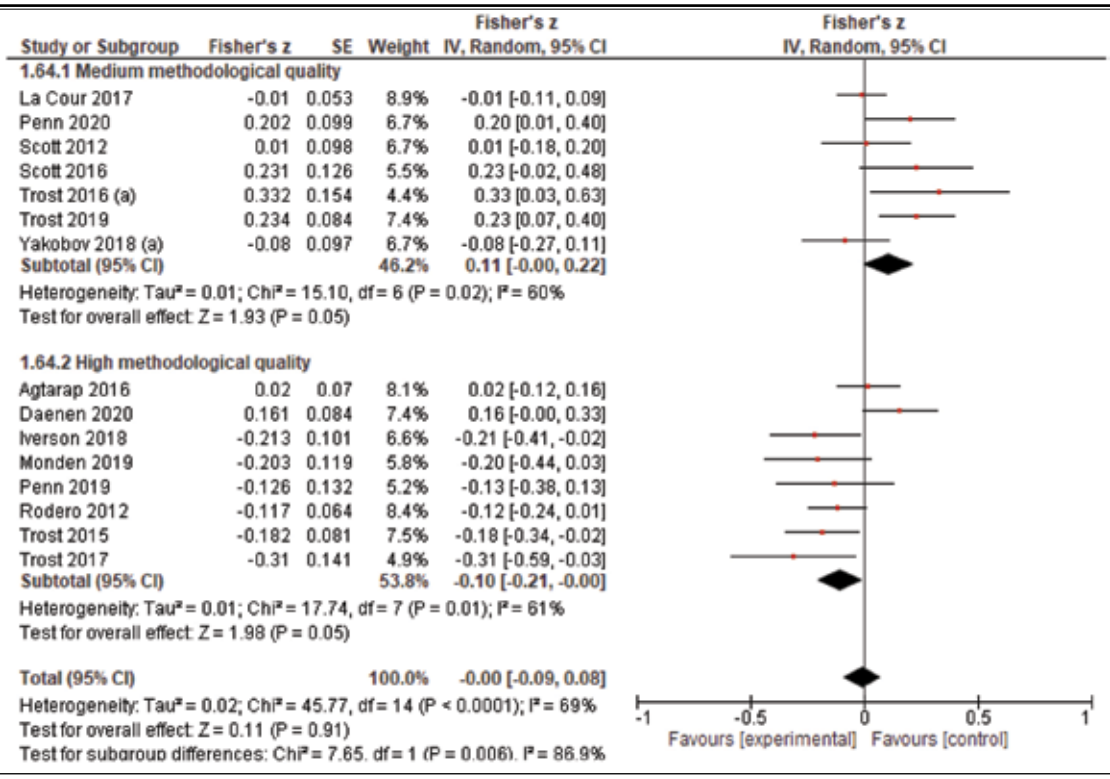
Supplementary Fig. 9. *Meta-analysis of disability – PJWB*



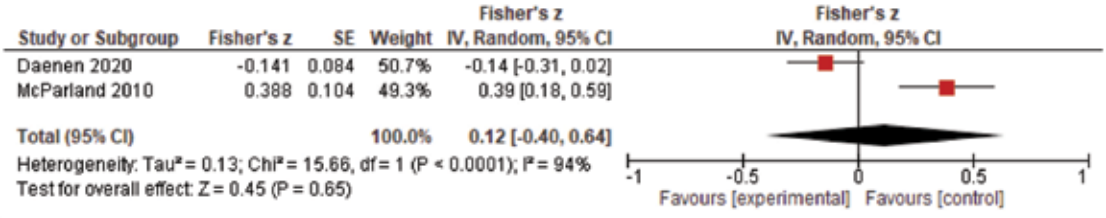
Supplementary Fig. 10. *Meta-analysis of disability – GJWB*



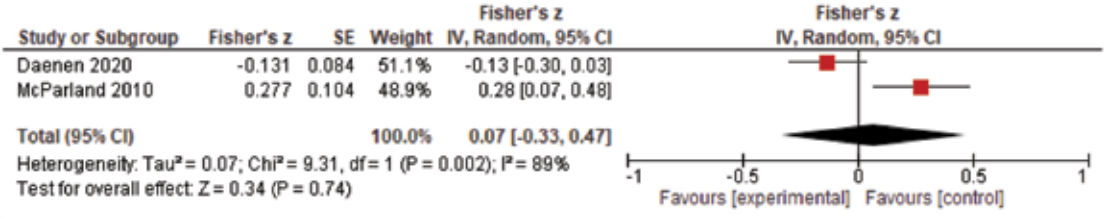
Supplementary Fig. 11. *Meta-analysis of age – IEQ*



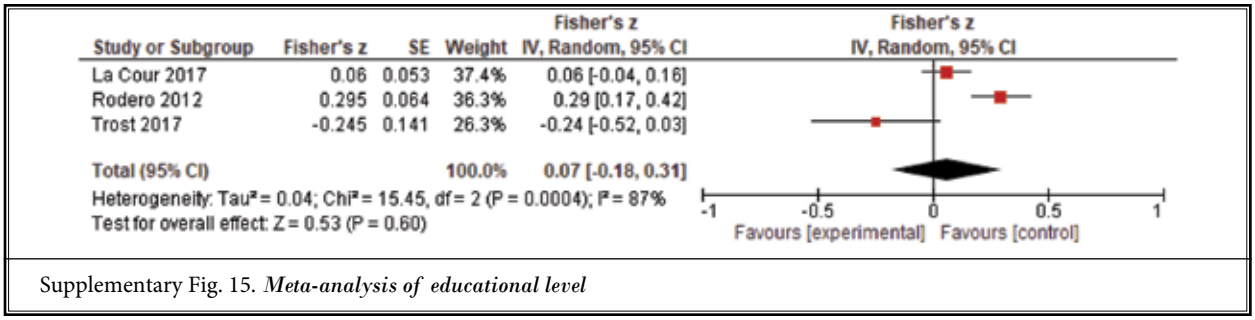
Supplementary Fig. 12. *Meta-analysis of age (subgroup analysis: methodological quality)*



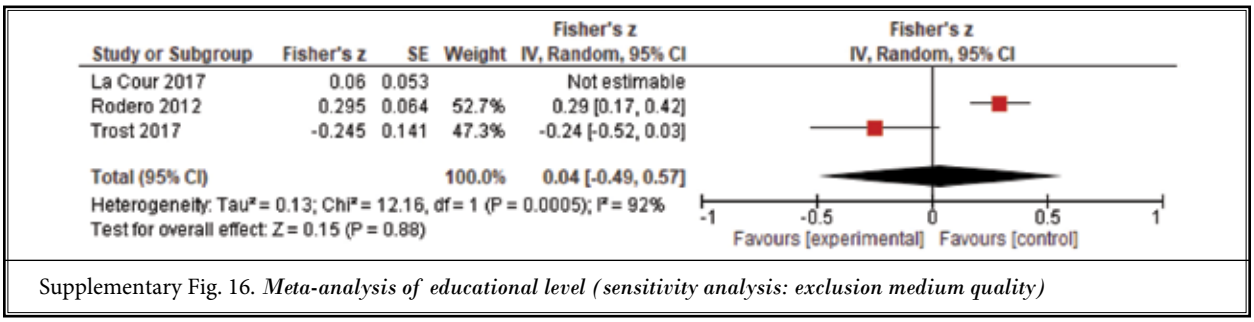
Supplementary Fig. 13. *Meta-analysis of age – PJWB*



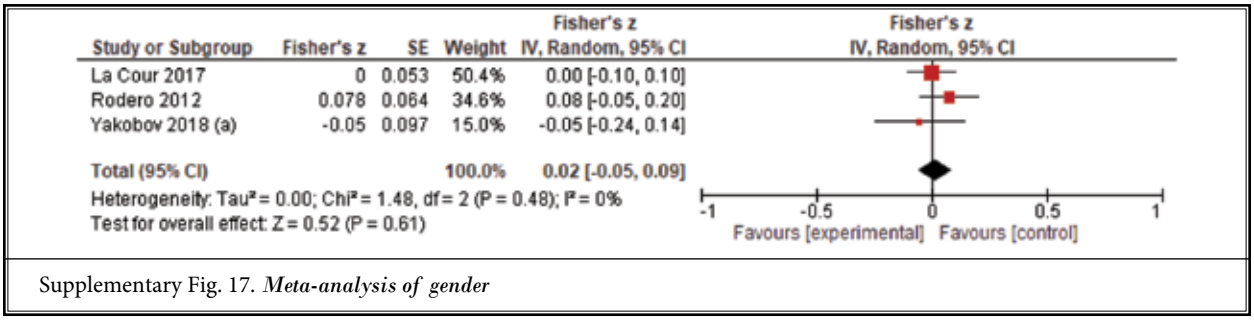
Supplementary Fig. 14. *Meta-analysis of age – GJWB*



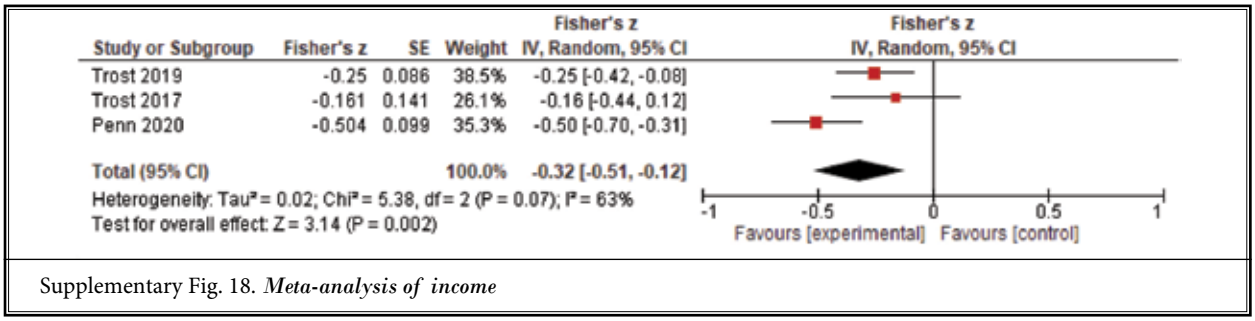
Supplementary Fig. 15. *Meta-analysis of educational level*



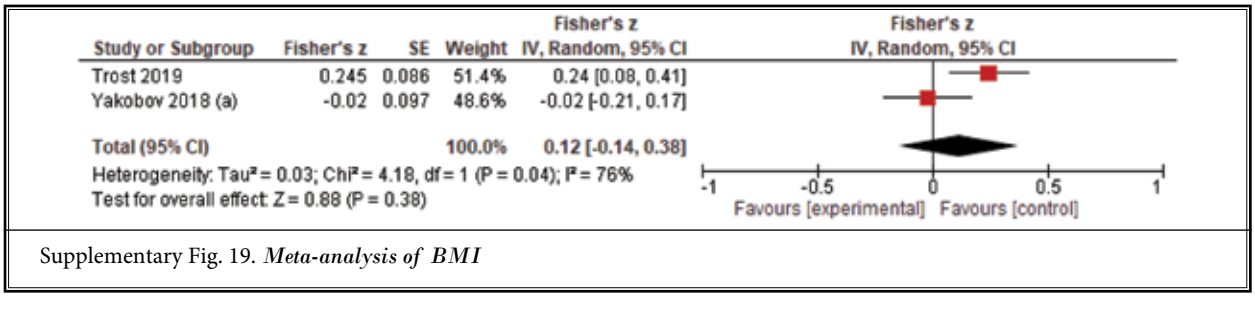
Supplementary Fig. 16. *Meta-analysis of educational level (sensitivity analysis: exclusion medium quality)*



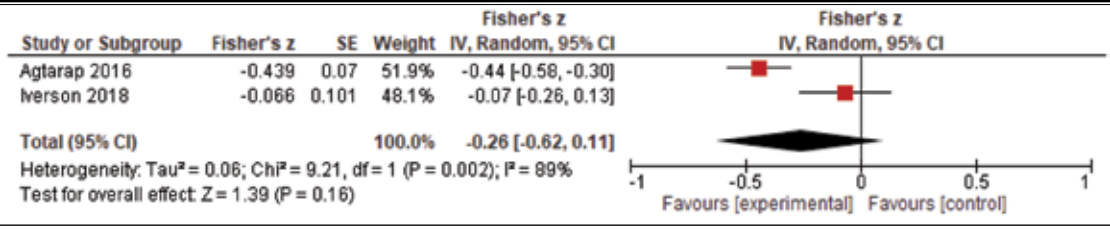
Supplementary Fig. 17. *Meta-analysis of gender*



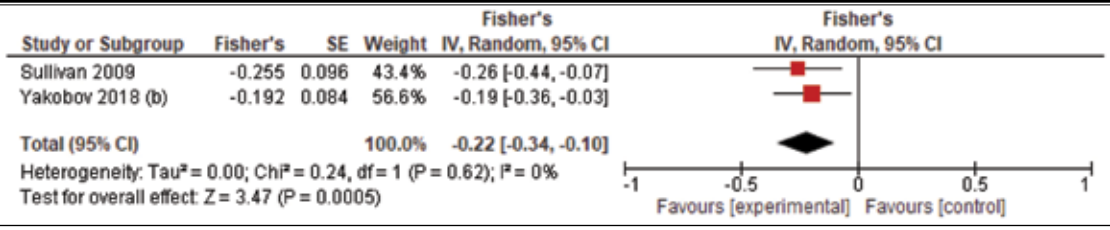
Supplementary Fig. 18. *Meta-analysis of income*



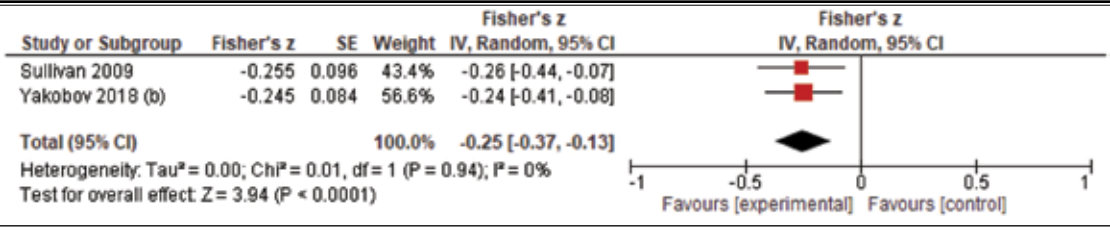
Supplementary Fig. 19. *Meta-analysis of BMI*



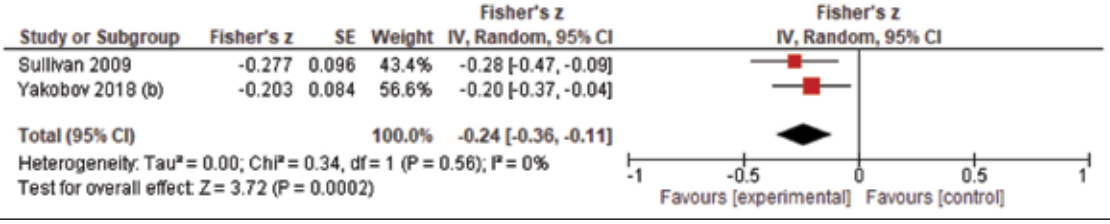
Supplementary Fig. 20. *Meta-analysis of resilience*



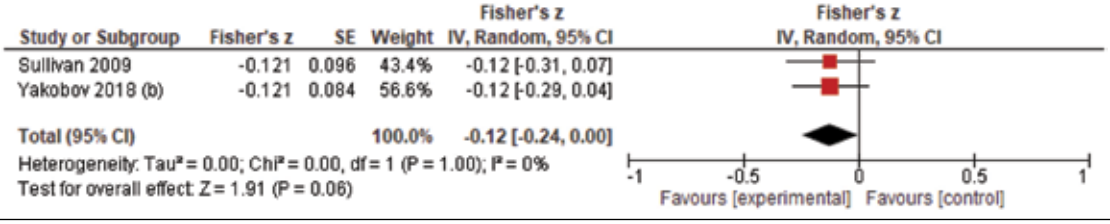
Supplementary Fig. 21. *Meta-analysis of cervical extension*



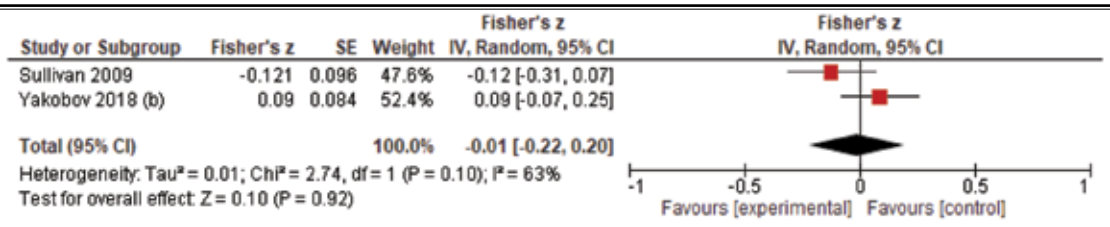
Supplementary Fig. 22. *Meta-analysis of cervical right rotation*



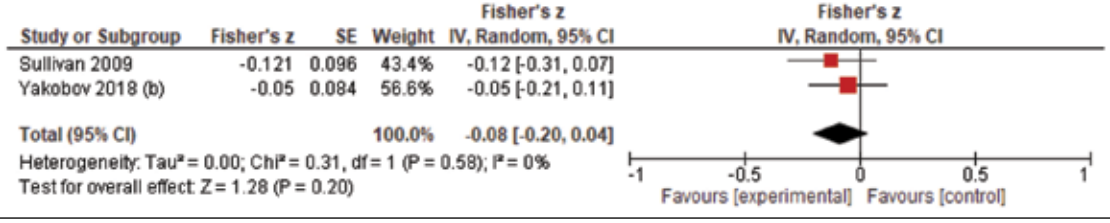
Supplementary Fig. 23. *Meta-analysis of cervical left rotation*



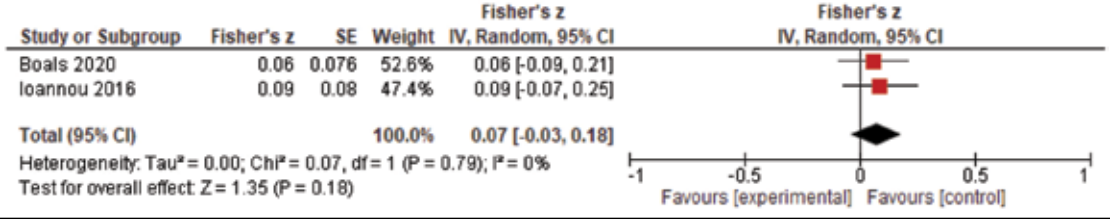
Supplementary Fig. 24. *Meta-analysis of cervical flexion*



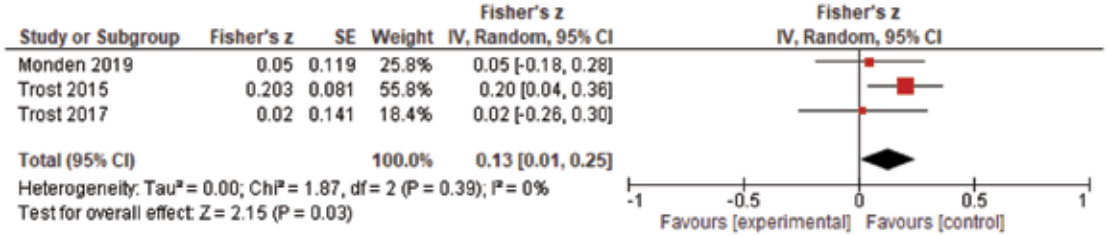
Supplementary Fig. 25. *Meta-analysis of cervical right lateral flexion*



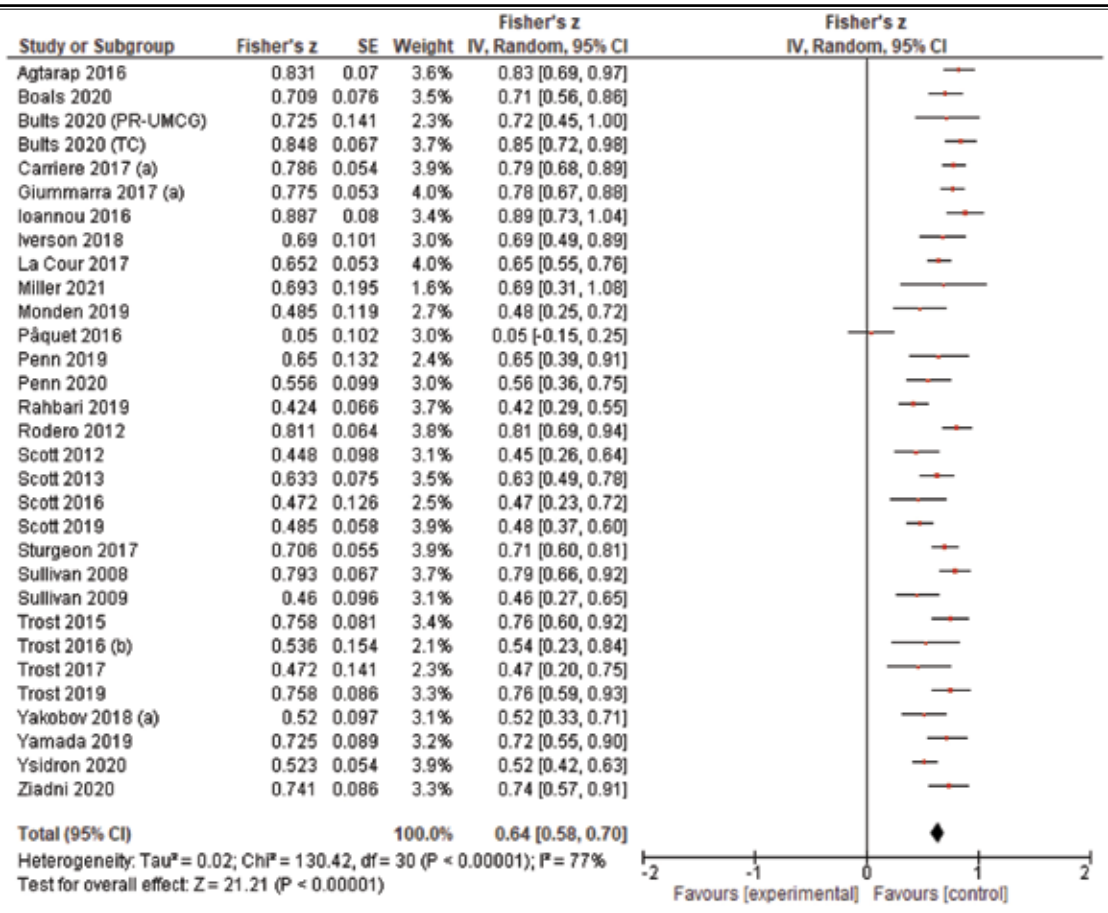
Supplementary Fig. 26. *Meta-analysis of cervical left lateral flexion*



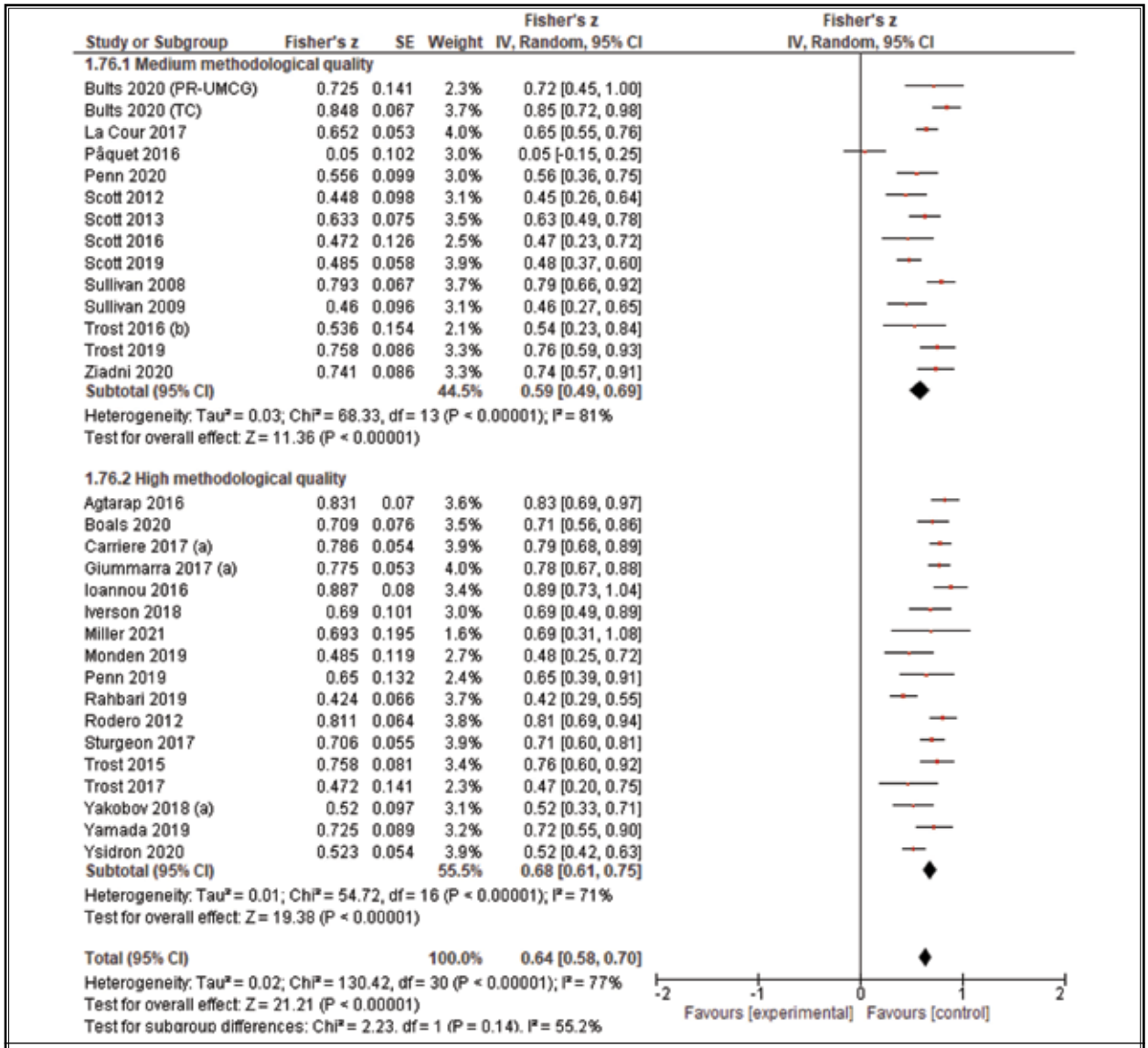
Supplementary Fig. 27. *Meta-analysis of injury severity*



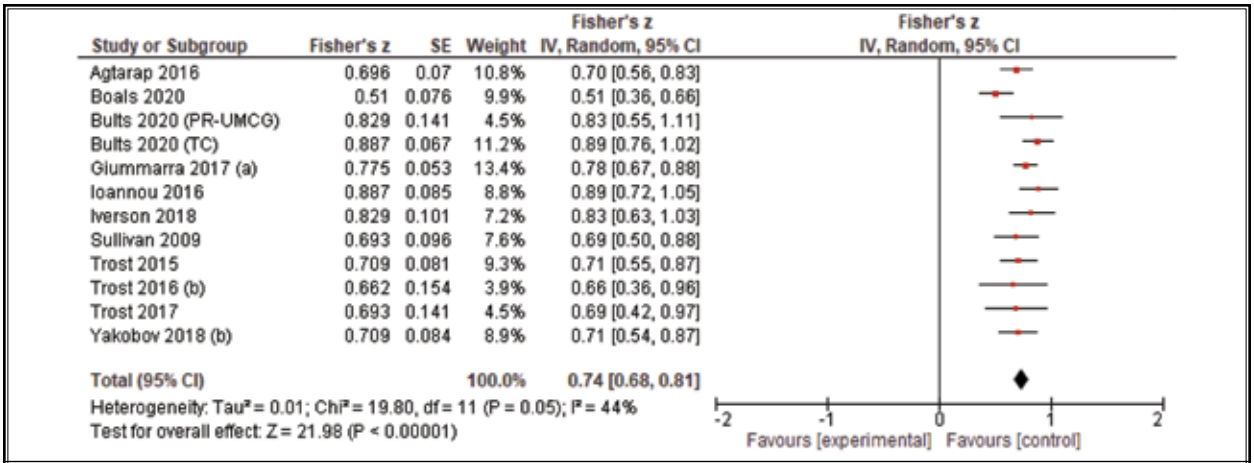
Supplementary Fig. 28. *Meta-analysis of length of hospital stay*



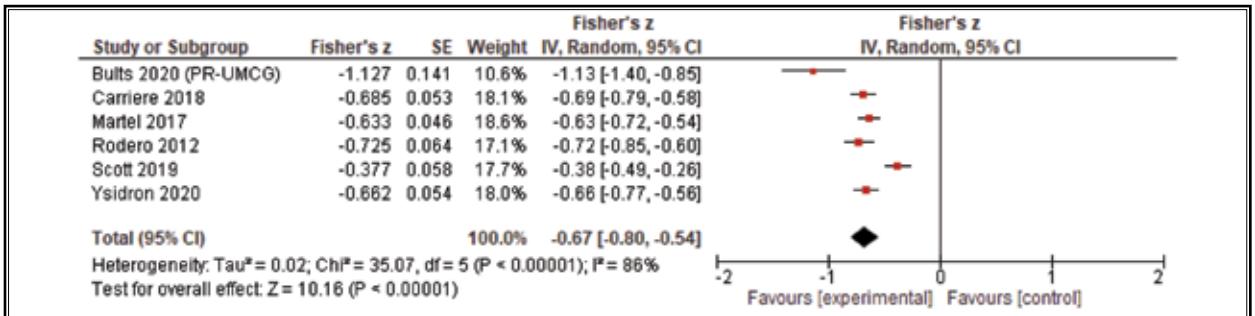
Supplementary Fig. 29. *Meta-analysis of depressive symptoms*



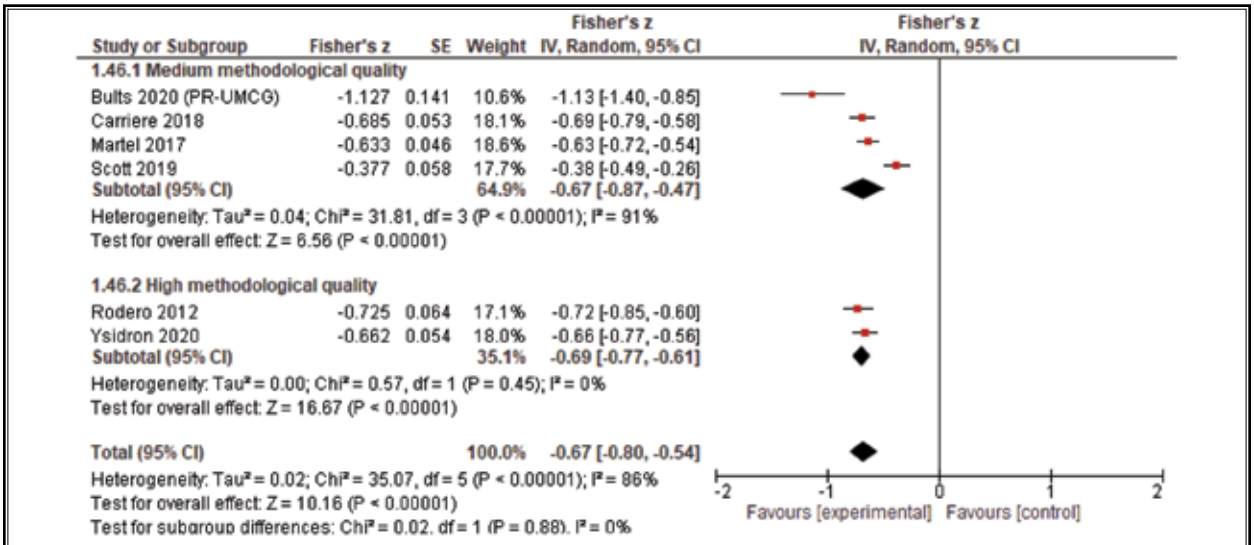
Supplementary Fig. 30. *Meta-analysis of depressive symptoms (subgroup analysis: methodological quality)*



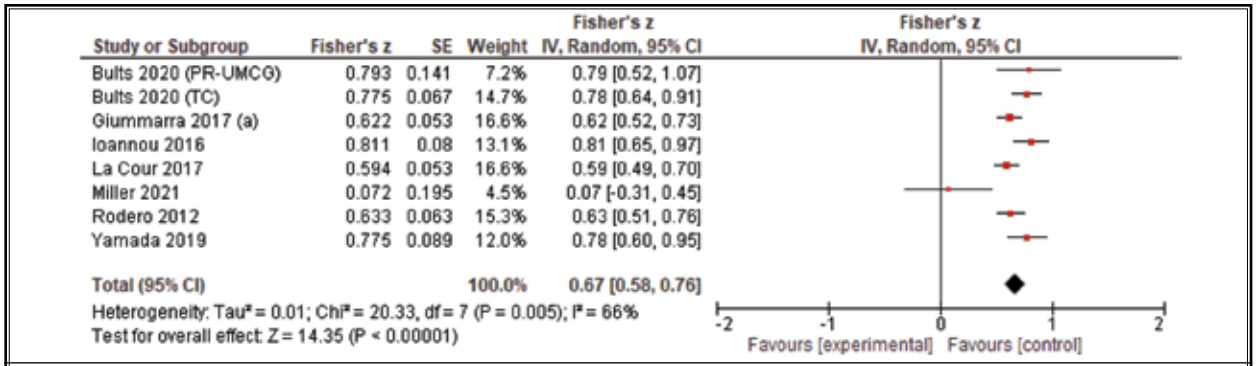
Supplementary Fig. 31. *Meta-analysis of posttraumatic stress*



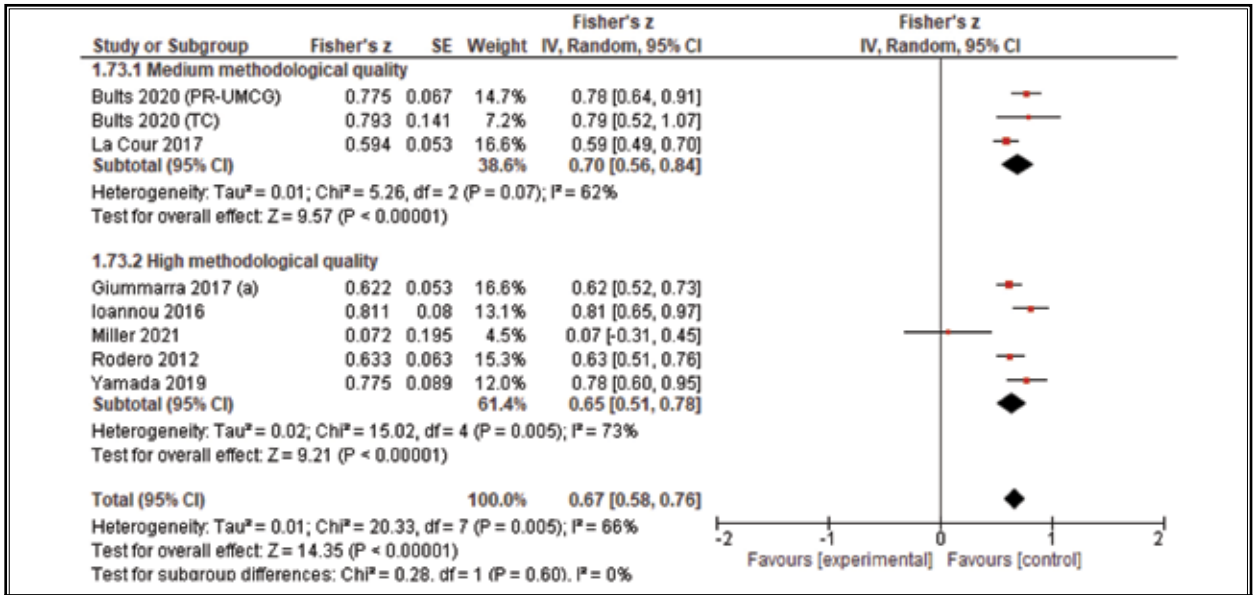
Supplementary Fig. 32. *Meta-analysis of pain acceptance*



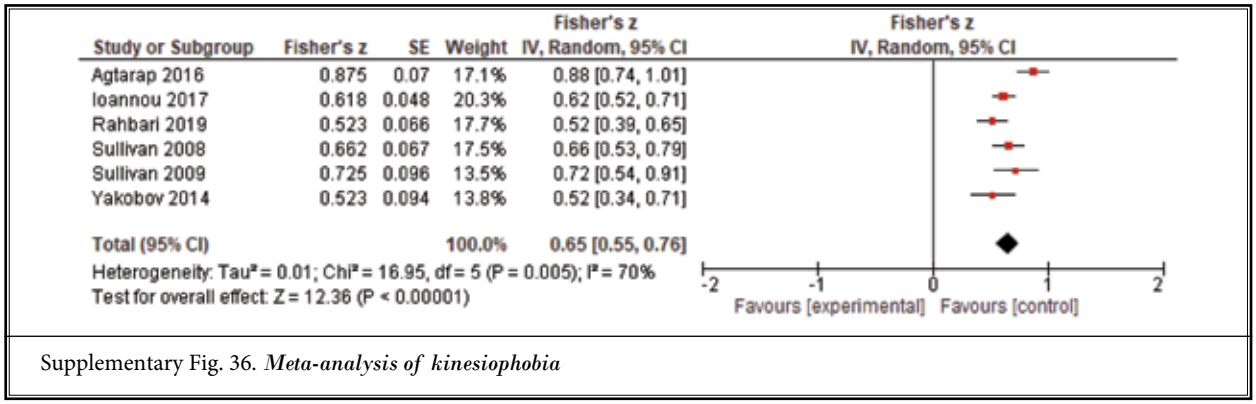
Supplementary Fig. 33. *Meta-analysis of pain acceptance (subgroup analysis: methodological quality)*



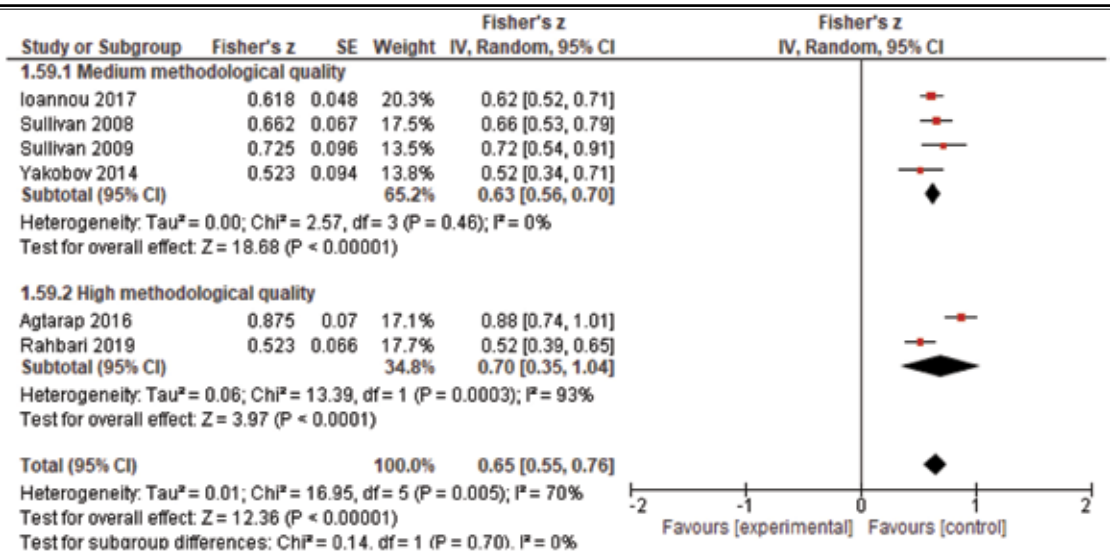
Supplementary Fig. 34. *Meta-analysis of anxiety*



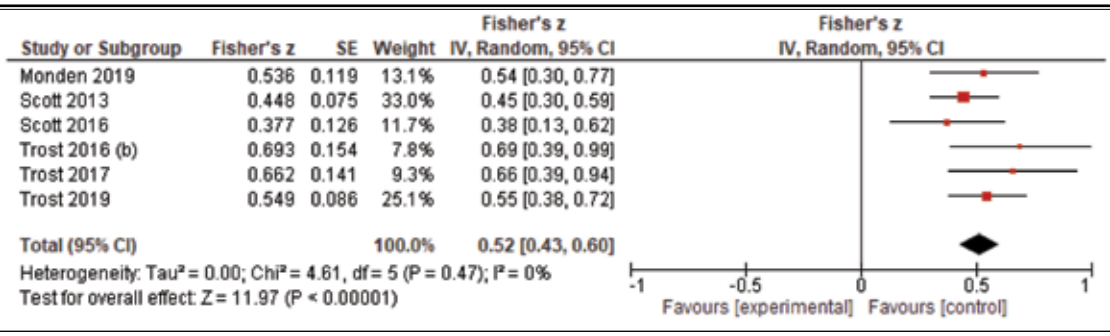
Supplementary Fig. 35. *Meta-analysis of anxiety (subgroup analysis: methodological quality)*



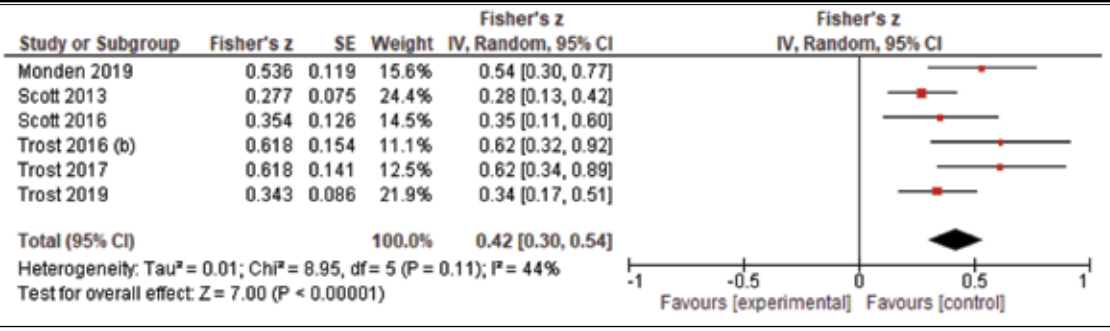
Supplementary Fig. 36. *Meta-analysis of kinesiophobia*



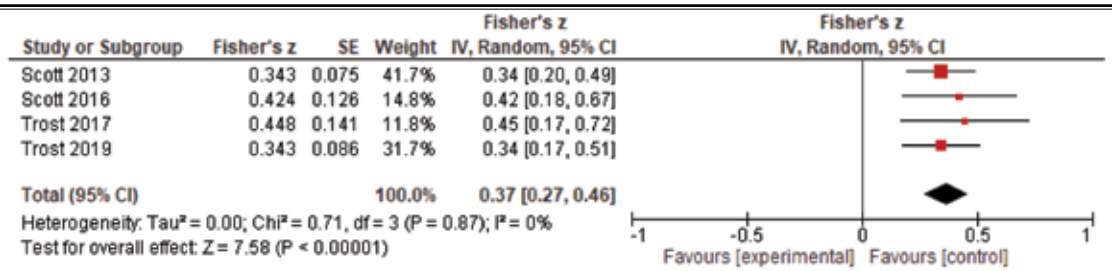
Supplementary Fig. 37. *Meta-analysis of kinesiophobia (subgroup analysis: methodological quality)*



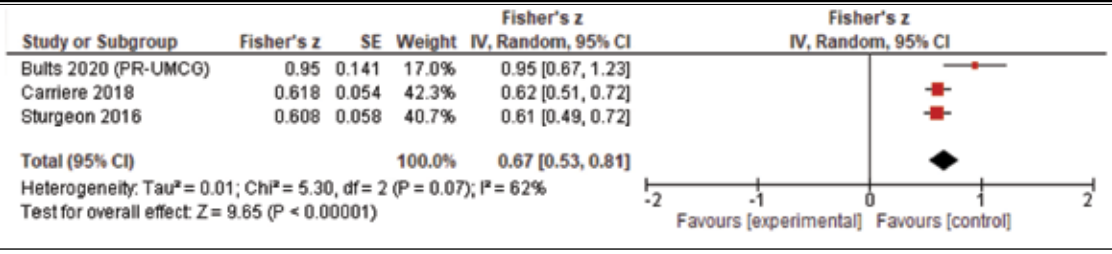
Supplementary Fig. 38. *Meta-analysis of state anger*



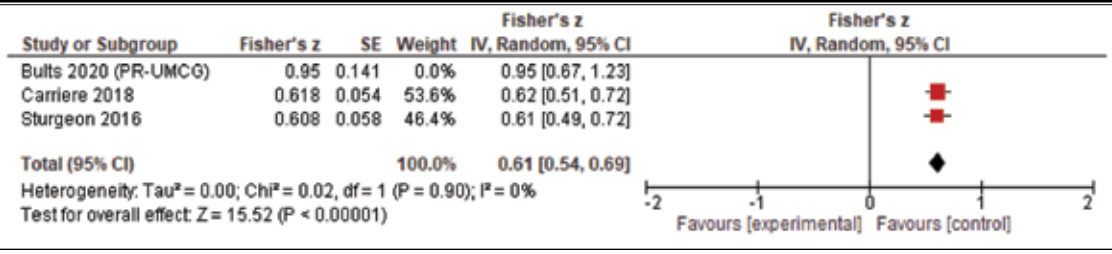
Supplementary Fig. 39. *Meta-analysis of trait anger*



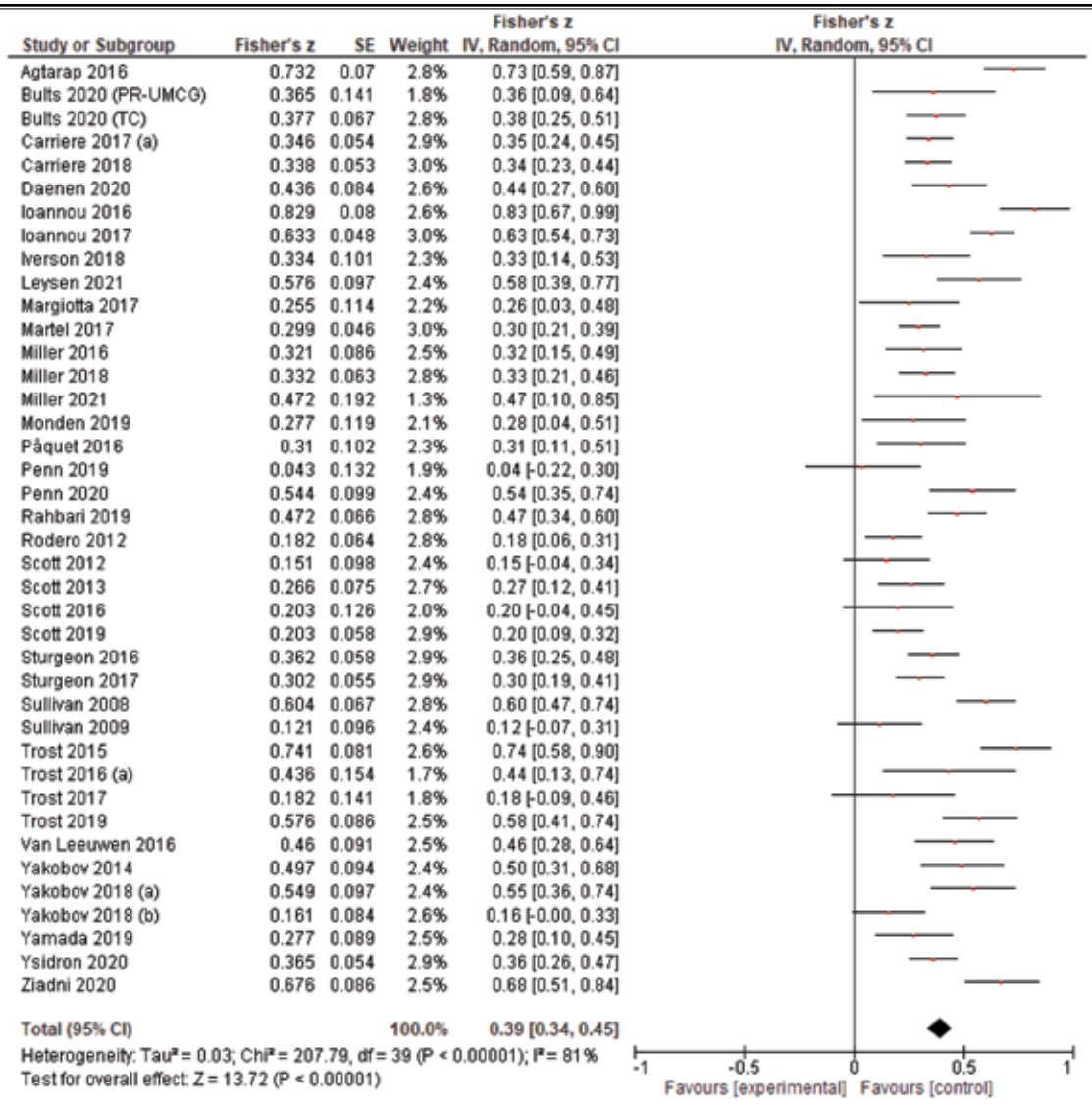
Supplementary Fig. 40. *Meta-analysis of anger inhibition*



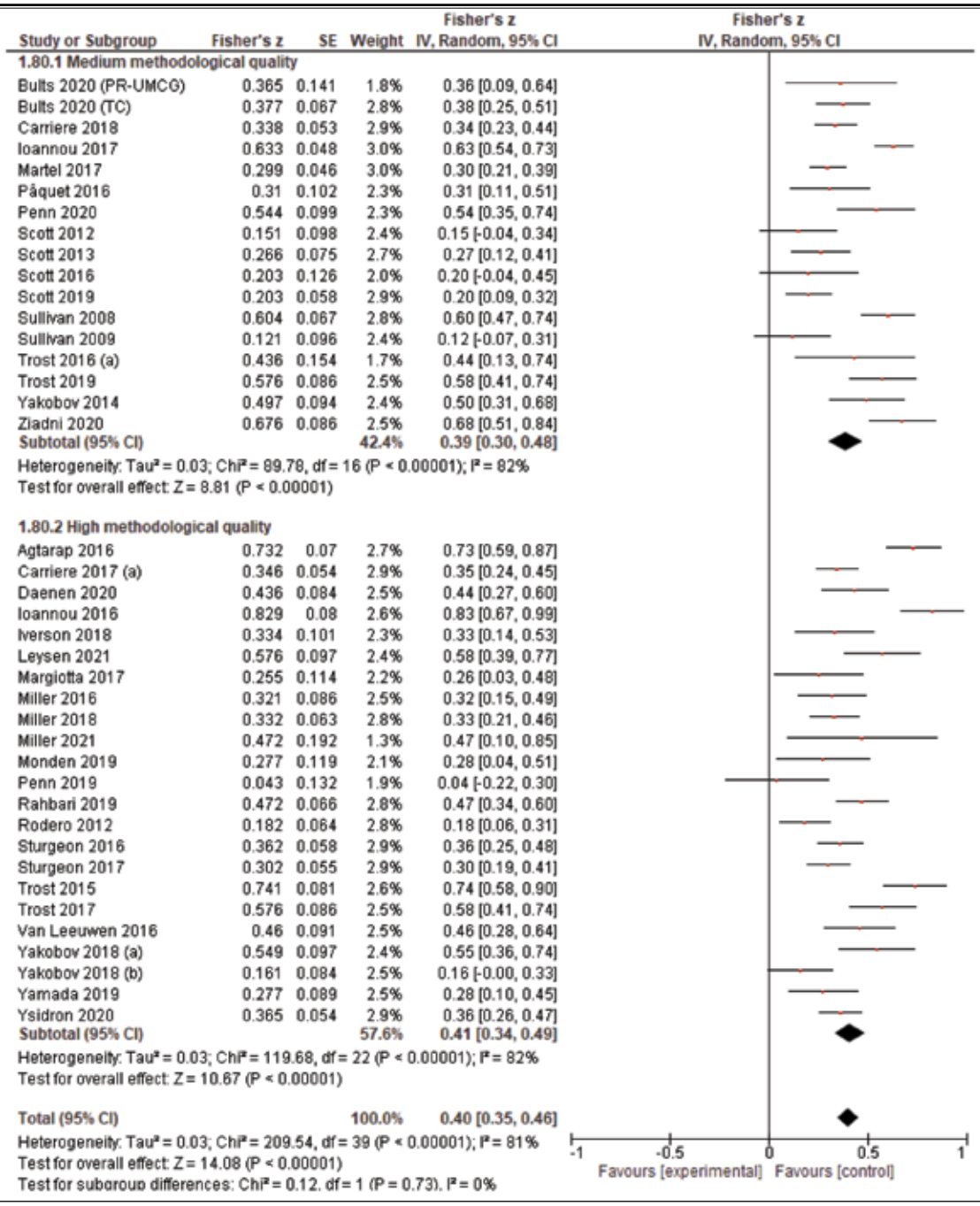
Supplementary Fig. 41. *Meta-analysis of anger*



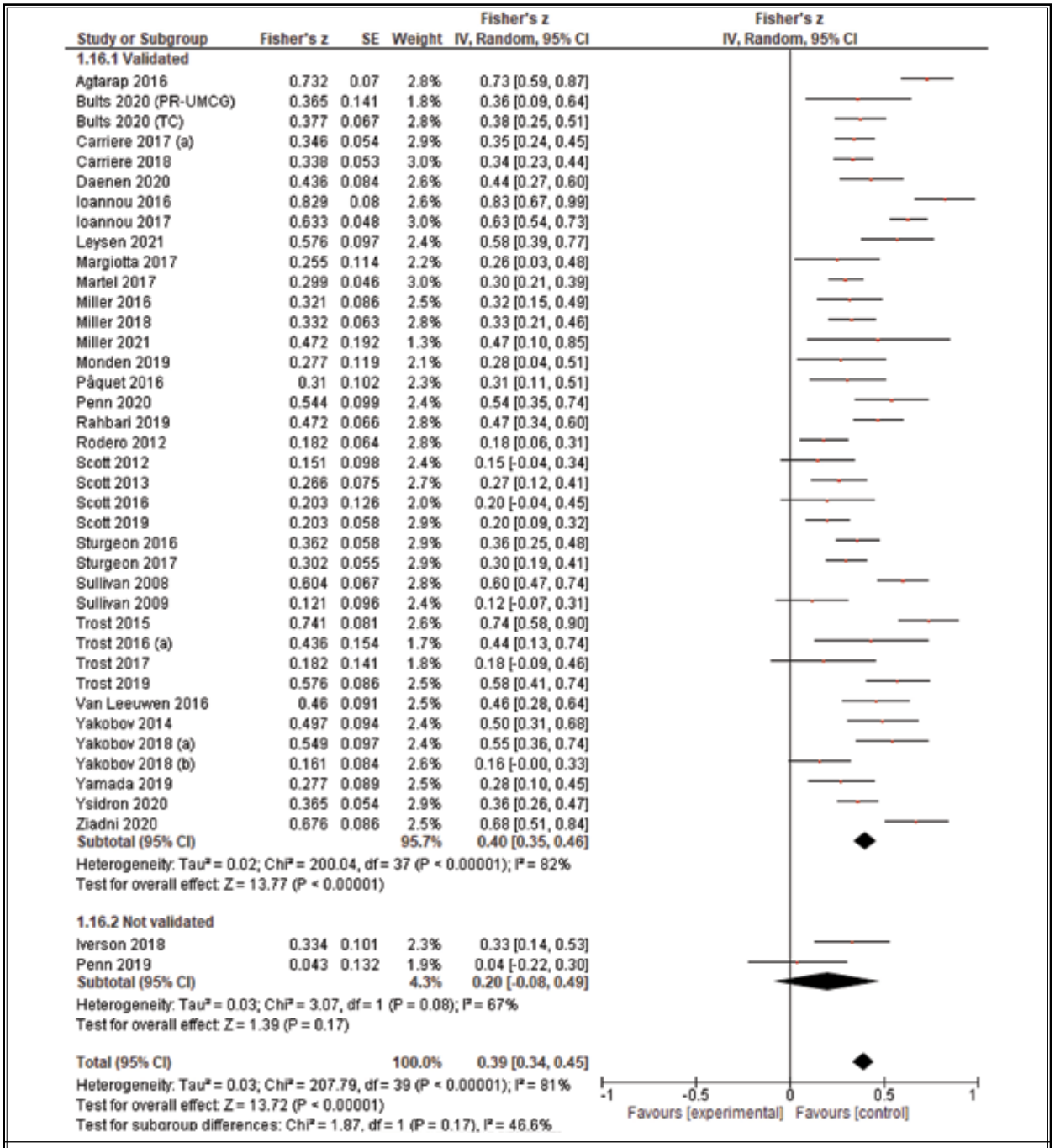
Supplementary Fig. 42. *Meta-analysis of anger (sensitivity analysis: exclusion of invalid outcome measure)*



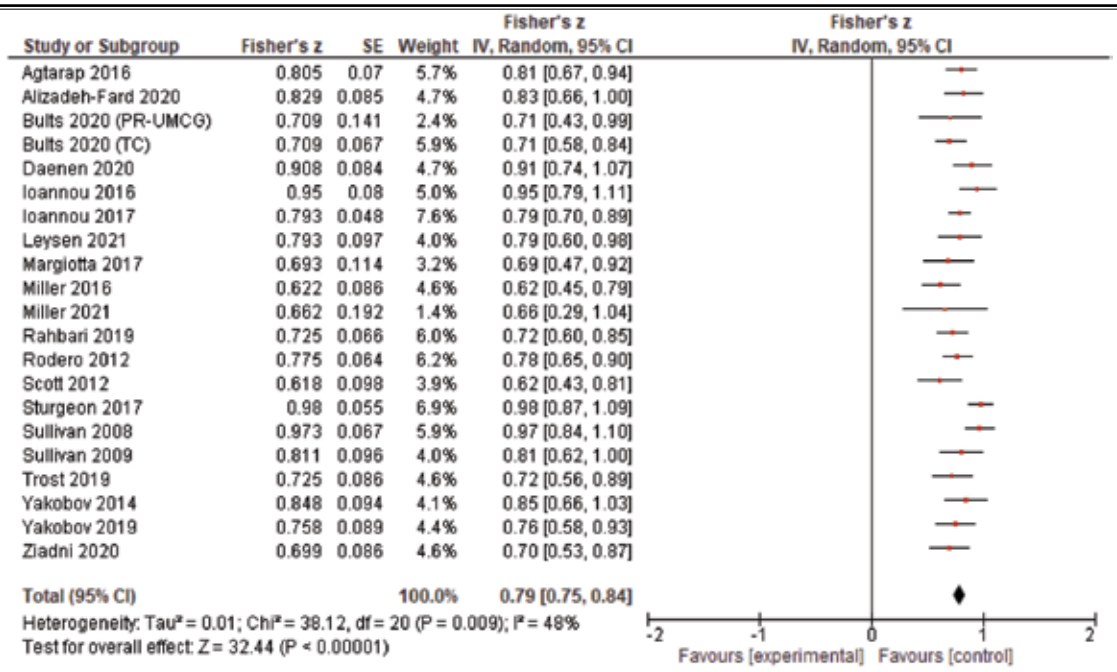
Supplementary Fig. 43. *Meta-analysis of pain intensity – IEQ*



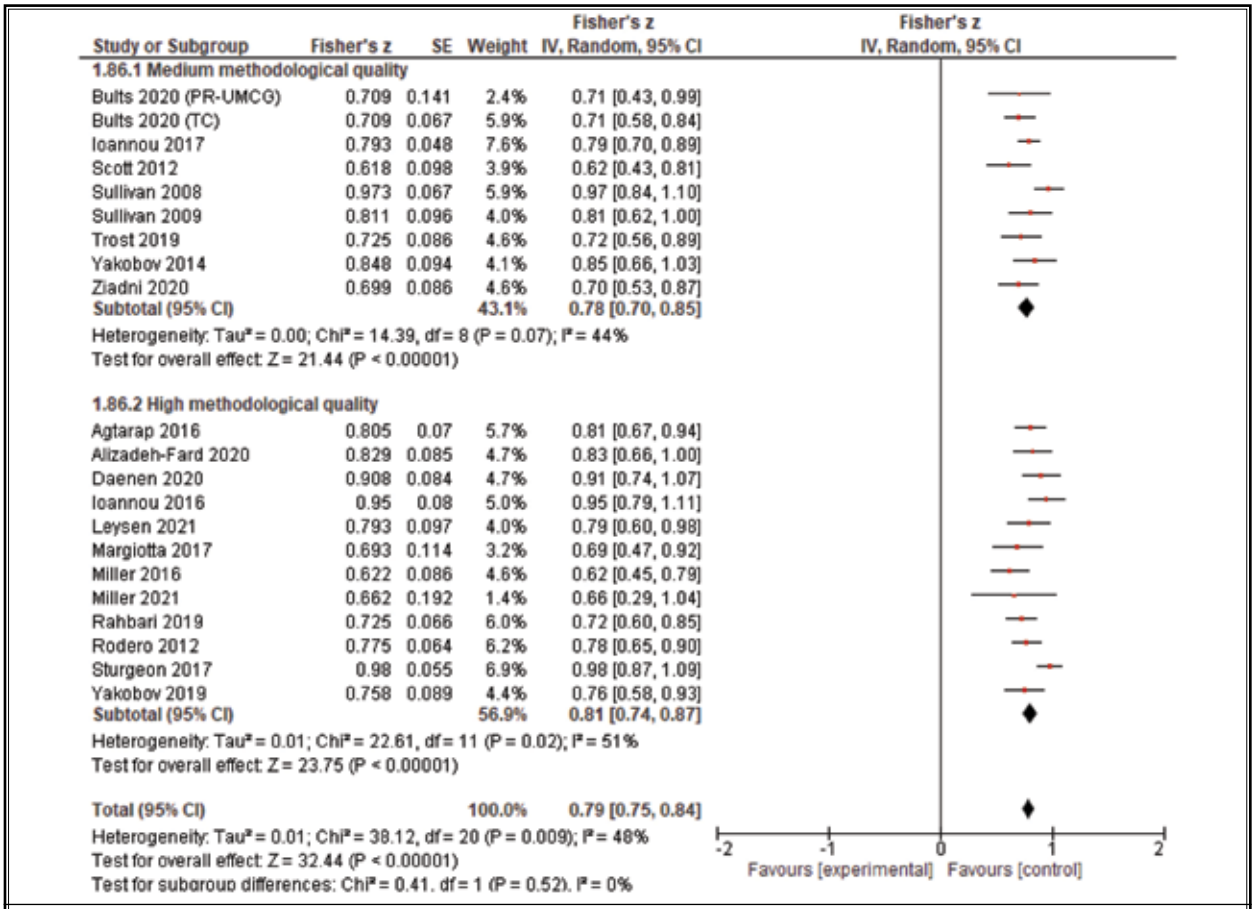
Supplementary Fig. 44. *Meta-analysis of pain intensity – IEQ (subgroup analysis: methodological quality)*



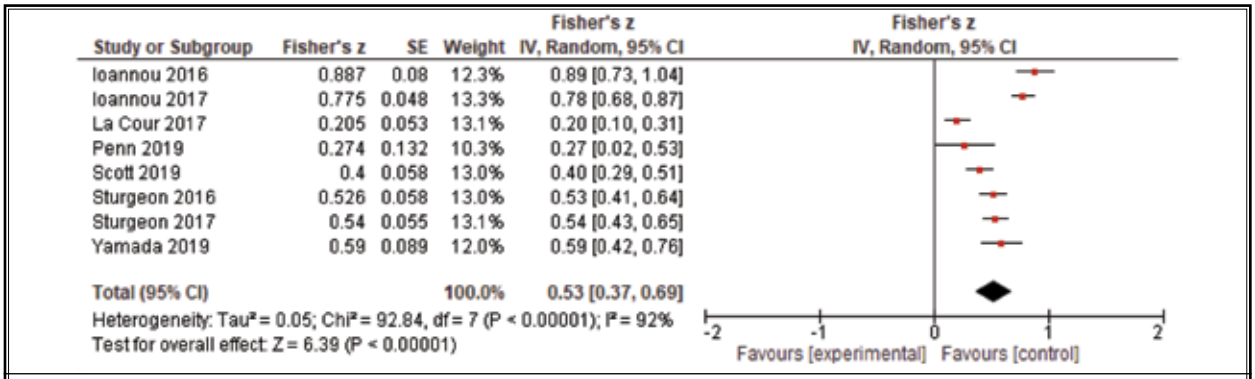
Supplementary Fig. 45. *Meta-analysis of pain intensity – IEQ (subgroup analysis: outcome measures)*



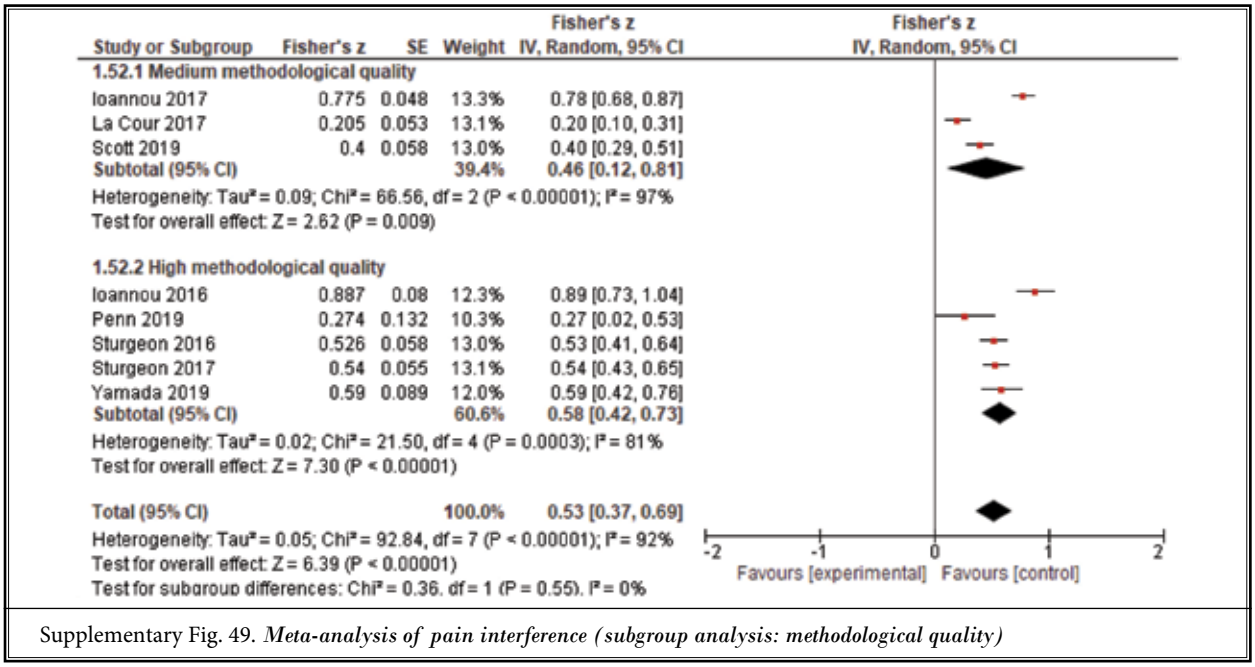
Supplementary Fig. 46. *Meta-analysis of pain catastrophizing*



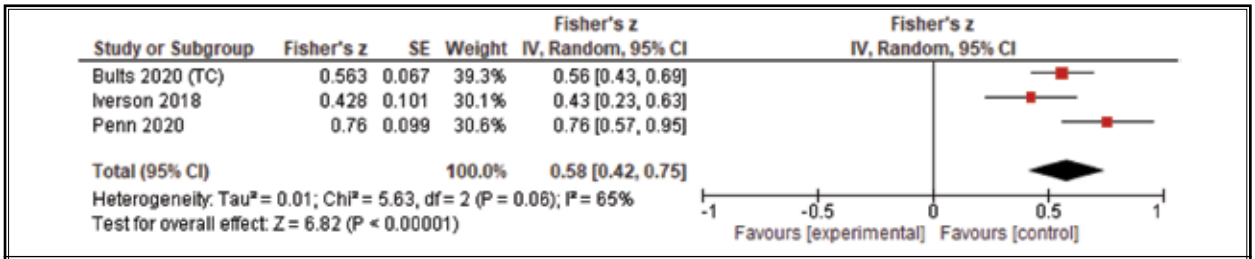
Supplementary Fig. 47. *Meta-analysis of pain catastrophizing (subgroup analysis: methodological quality)*



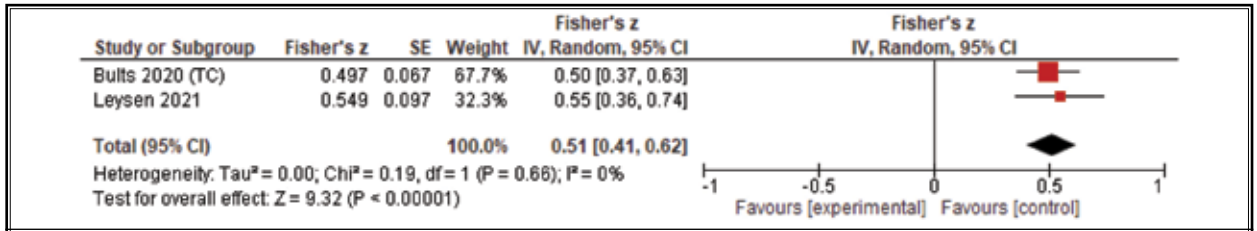
Supplementary Fig. 48. *Meta-analysis of pain interference*



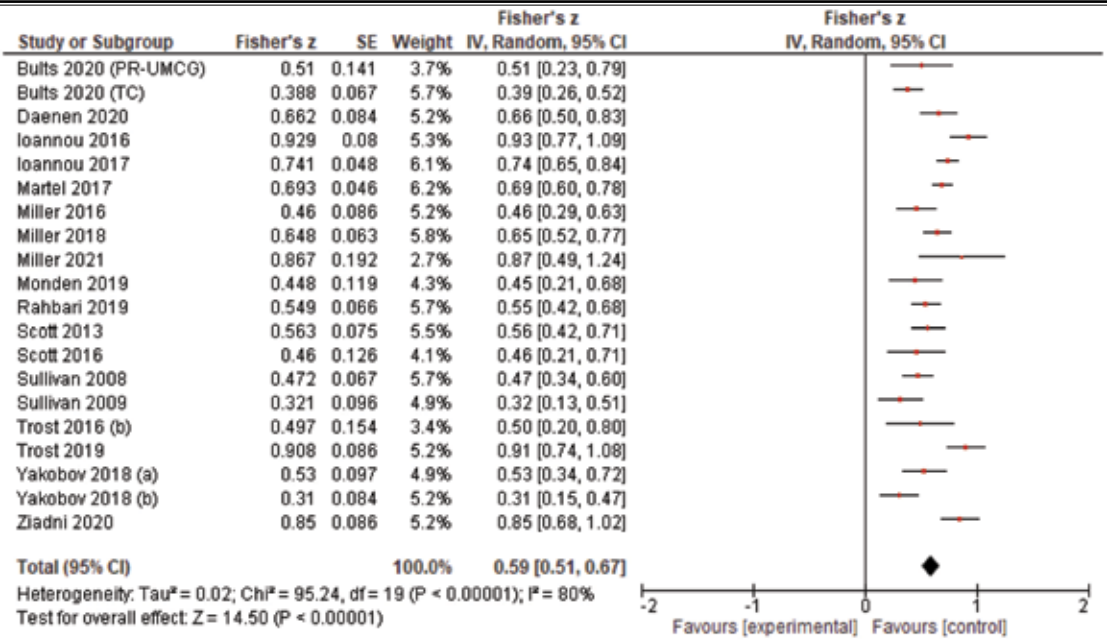
Supplementary Fig. 49. *Meta-analysis of pain interference (subgroup analysis: methodological quality)*



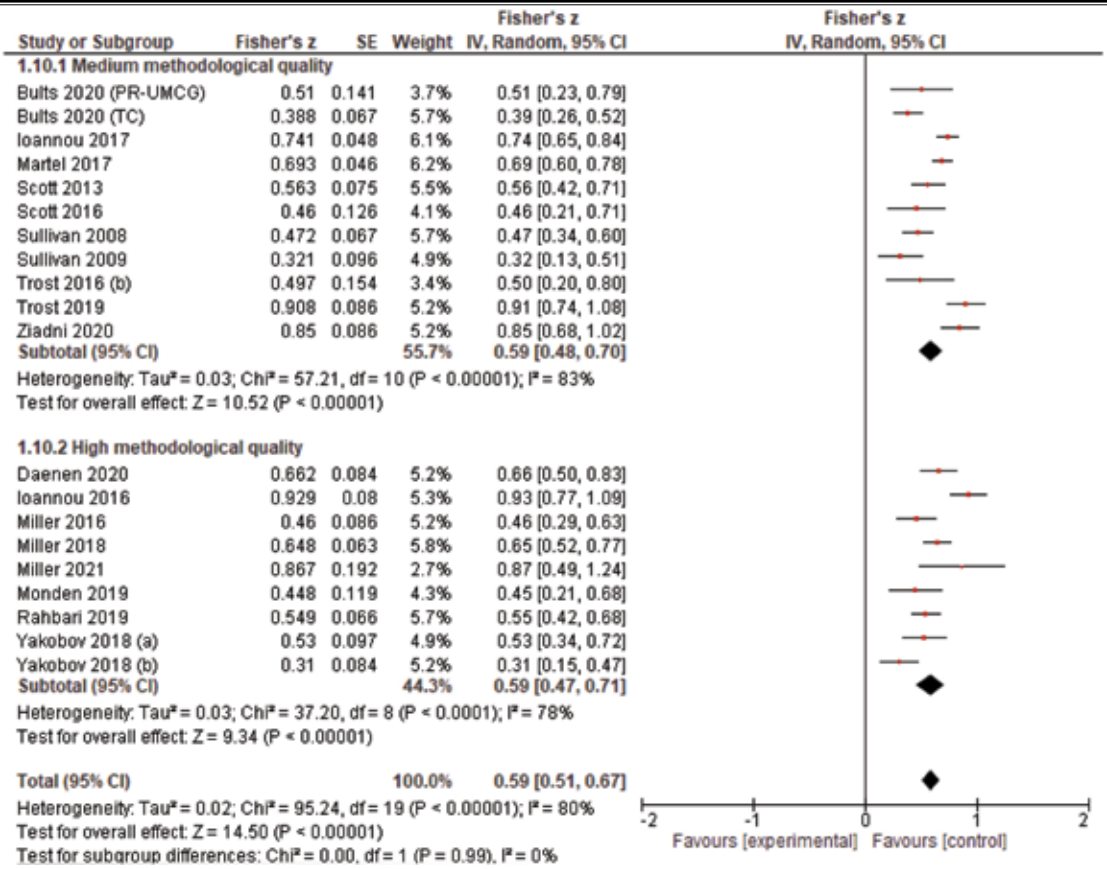
Supplementary Fig. 50. *Meta-analysis of pain perceptions*



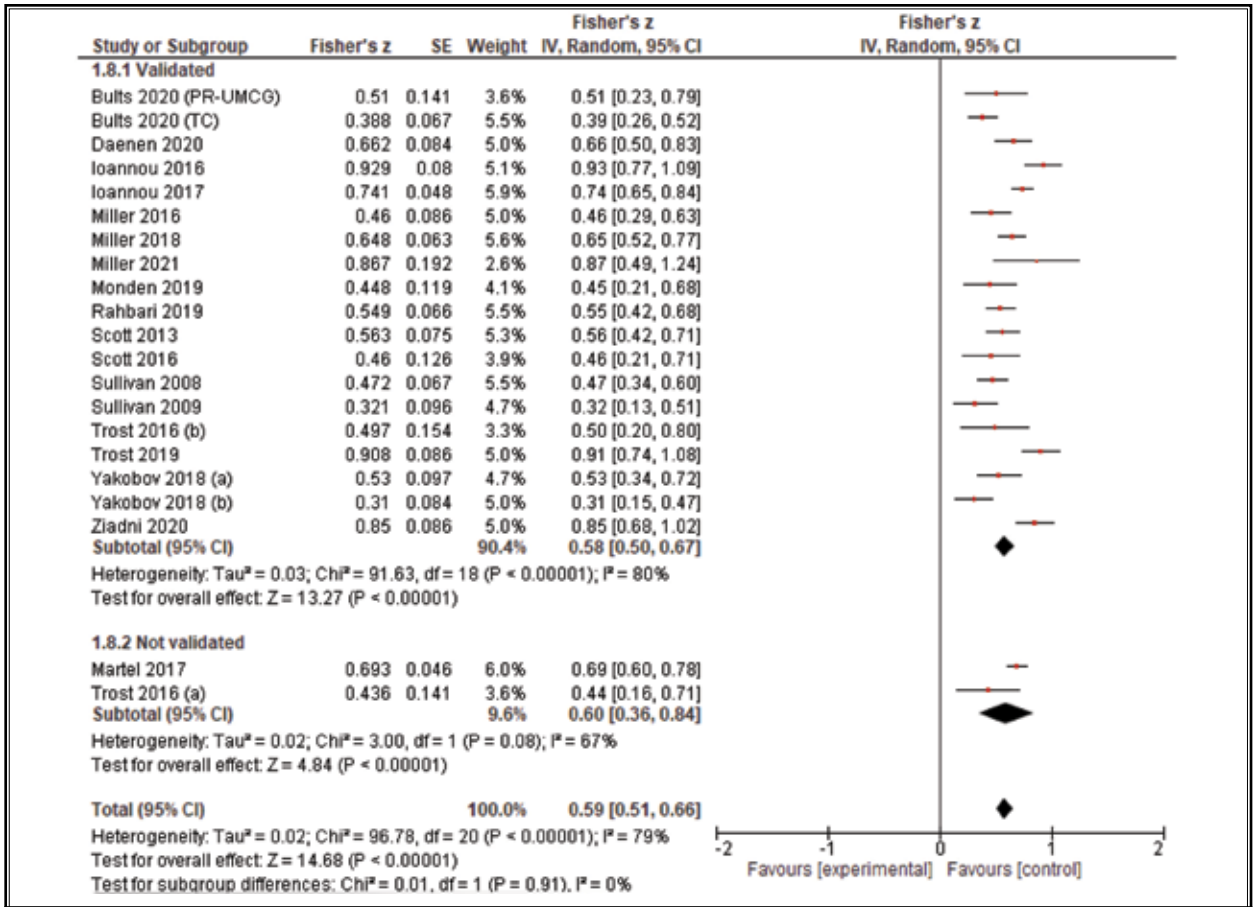
Supplementary Fig. 51. *Meta-analysis of symptoms of central sensitization*



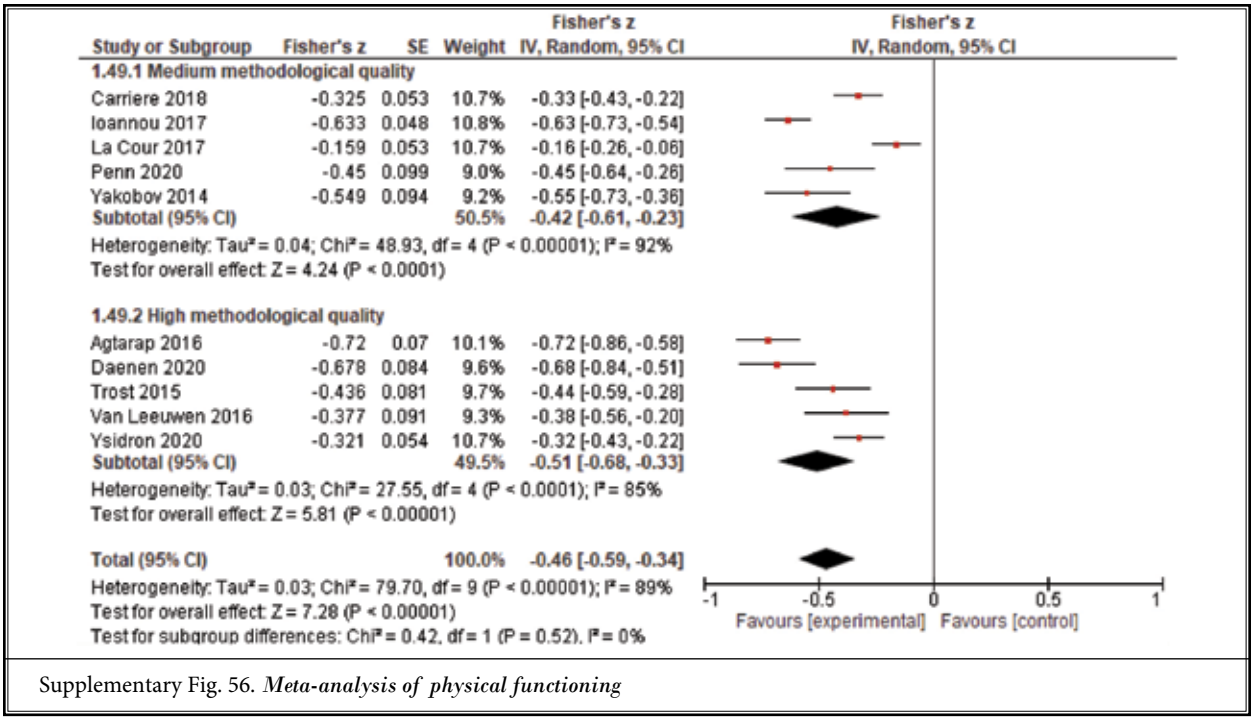
Supplementary Fig. 52. *Meta-analysis of disability – IEQ*



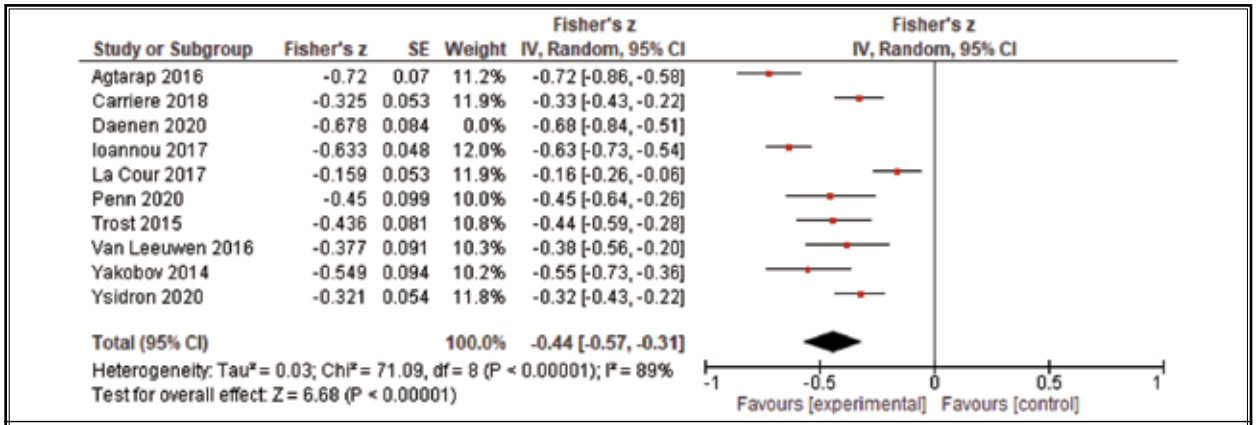
Supplementary Fig. 53. *Meta-analysis of disability – IEQ (subgroup analysis: methodological quality)*



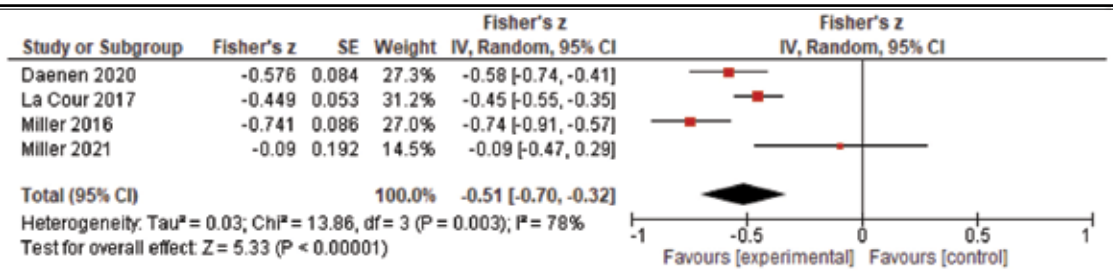
Supplementary Fig. 54. *Meta-analysis of disability – IEQ (subgroup analysis: outcome measures)*



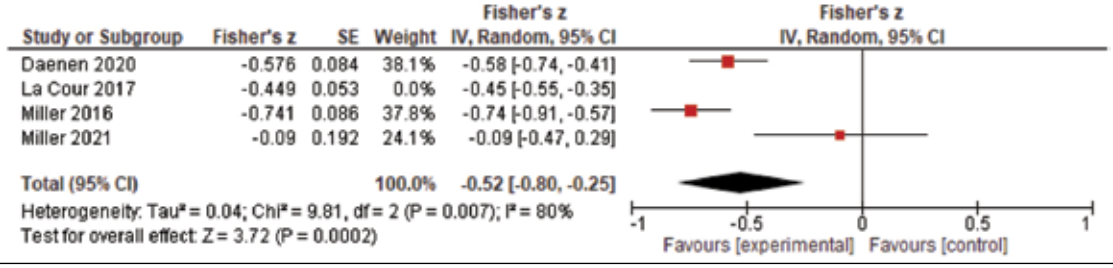
Supplementary Fig. 56. *Meta-analysis of physical functioning*



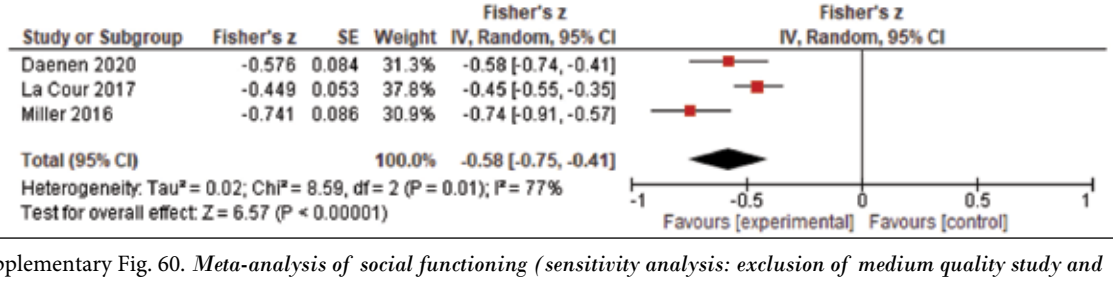
Supplementary Fig. 57. *Meta-analysis of physical functioning (subgroup analysis: methodological quality)*



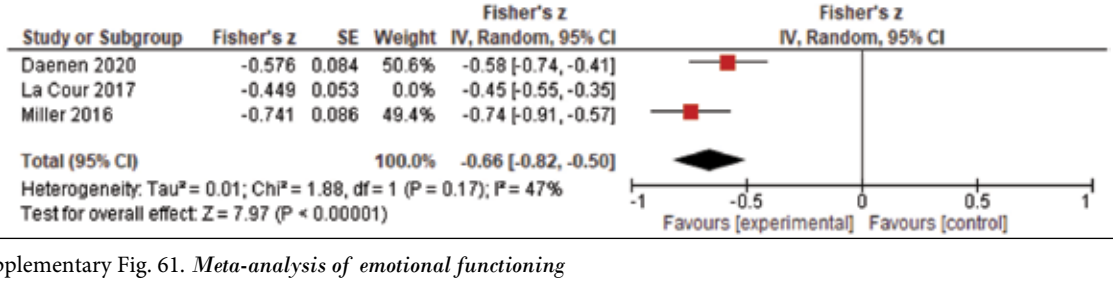
Supplementary Fig. 58. *Meta-analysis of physical functioning (sensitivity analysis: exclusion of paediatric pain population)*



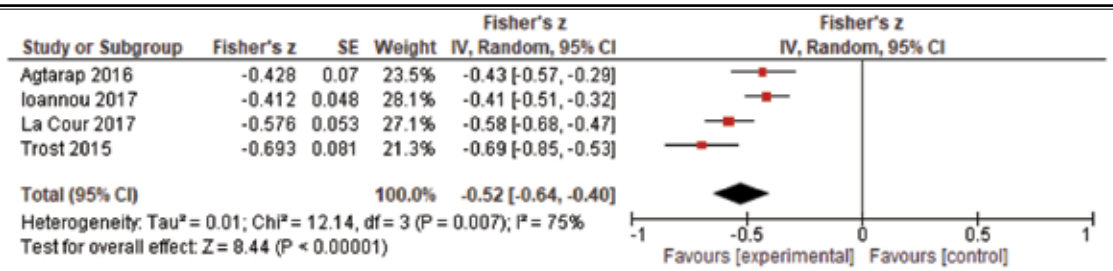
Supplementary Fig. 59. *Meta-analysis of social functioning*



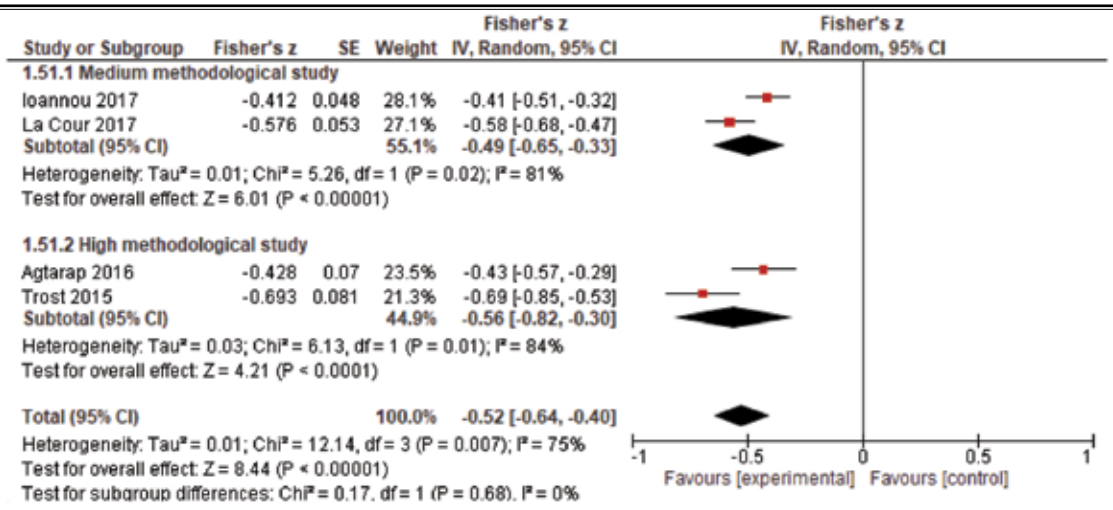
Supplementary Fig. 60. *Meta-analysis of social functioning (sensitivity analysis: exclusion of medium quality study and adult pain population)*



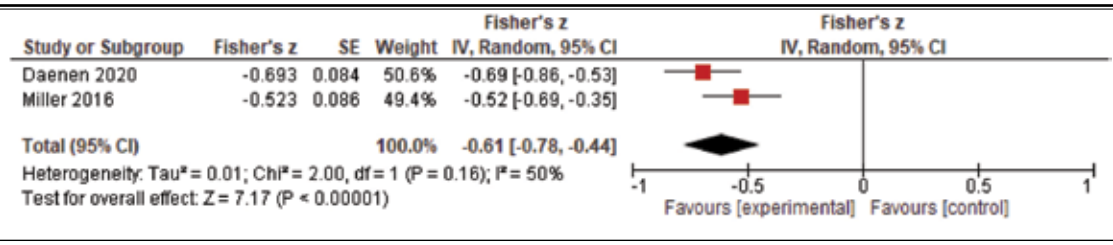
Supplementary Fig. 61. *Meta-analysis of emotional functioning*



Supplementary Fig. 62. *Meta-analysis of emotional functioning (sensitivity analysis: exclusion of adult pain population)*



Supplementary Fig. 63. *Meta-analysis of mental functioning*



Supplementary Fig. 64. *Meta-analysis of mental functioning (subgroup analysis: methodological quality)*

Supplementary Fig. 65. *Meta-analysis of academic functioning* {*missing last figure*}