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Systematic review

Psychosocial aspects of everyday life with chronic musculoskeletal pain: A systematic review

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HIGHLIGHTS

- Living with chronic pain can have consequences for quality of life and disability.
- Consequences of chronic pain can be depressive thoughts and interpersonal conflicts.
- Tendency towards that nonspecific pain patients are more affected than specific pain patients.
- Living with chronic pain can have far-reaching consequences for everyday life.

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ABSTRACT

Background and objective: Chronic pain is a growing phenomenon worldwide. It is considered a medical problem because, besides the socio-economic issues involved, pain is often accompanied by psychosocial problems. Apart from the physical pain, living with chronic pain has many additional consequences. People living with chronic pain generally suffer from other physical and psychological consequences. The impact of chronic pain varies enormously between individuals, but the suffering is frequently pervasive and detrimental. The objective of this study was to review the evidence concerning, ways in which people living with chronic pain are affected in their everyday lives.

Methods: Electronic databases Scopus, Cinahl and PsycINFO were searched from 2008 to September 2012 using a 'building blocks' approach and reference lists were scanned. PubMed was also searched and checked for duplicates compared to Scopus, Cinahl and PsycINFO. Data were extracted from included studies and methodological quality assessed with a view to exploring quality differences. To guide the review and interpretation, individual components of methodological quality were compared against a checklist. A narrative synthesis was formulated involving three categories: (1) clinical aspects, (2) everyday life aspects and (3) interpersonal aspects.

Results: The search strategy identified 1140 citations; one study was found during the preliminary searching through references, and a search of reference lists provided five publications. Of these, 24 publications, representing 23 populations, met the inclusion criteria. In total, there were 22 cross-sectional studies and 2 cohort studies. Study populations ranged from 74 to 3928 participants and were heterogeneous in nature across studies with respect to age, duration and localisations of pain and outcome measures. We found a general consensus that life with chronic pain was associated with higher prevalence and higher levels of depression and diagnoses of widespread pain and nonspecific pain are more clearly associated with depression than is specific pain. The results of link between chronic pain and anxiety and stress were not obvious. Overall, there is plausible evidence to suggest a positive relationship between chronic pain and disability and the evidence is stronger for a significant positive association between nonspecific

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pain and disability, compared to specific pain. It can be summarized that there is a lack of evidence for a relationship between intensity of pain and quality of life. However, there is evidence that nonspecific pain is more compellingly associated with low quality of life than is specific pain.

The evidence of a positive relation between pain and problems in close relations is not convincing but there is an indication to suggest that there is a pain-related issue regarding participation in many social aspects of everyday life.

Conclusion: Besides the pain itself, people living with chronic pain are affected in other aspects of life. In particular, it is evident that they experience challenges with respect to depressive thoughts, disability, lower quality of life and conflicts in close relationships.

Implications: When designing interventions for people with chronic pain, it is essential to take into consideration the fact that living with chronic pain has far-reaching consequences beyond the pain suffered.

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1. Introduction

Chronic pain is a growing phenomenon worldwide. It is considered a medical problem because, besides the socio-economic issues involved, pain can also have psychosocial consequences [1,2]. Apart from the physical pain, living with chronic pain has many additional consequences. People living with chronic pain generally suffer from other physical and psychological consequences. The impact of chronic pain varies enormously between individuals, but the suffering is frequently pervasive and detrimental. A comprehensive investigation of Breivik et al. [3] shows that chronic pain of all causes occurs in 19% of adult Europeans and musculoskeletal related disorders are the most common causes. They emphasizes that chronic pain is a major health care problem in Europe and it needs to be taken more seriously. In the present review we focus on chronic musculoskeletal pain.

The link between chronic musculoskeletal pain and psychological risk factors has already been investigated in reviews of the literature [4–6]. Conclusions vary greatly. In one review, psychosocial risk factors show very modest predictive ability on low back pain [5], while in other conclusions psychosocial factors are shown to play a significant role in the development and maintenance of chronic pain problems [4,6]. The present study concerns how people suffering from chronic pain are affected in their everyday lives. In other words, consequences of living with chronic pain on psychosocial factors.

The review was conducted with a view to enhancing knowledge about the relationship between chronic musculoskeletal pain and psychosocial factors and to inform healthcare professionals as well as decision-makers within the health care system about this knowledge.

The term ‘chronic pain’ and related terms are not used in a consistent way, e.g., persistent pain and long lasting pain are used synonymously in the literature. In this review, the term ‘chronic pain’ is defined as pain that continues or recurs over a prolonged period, caused by various abnormal conditions, and with a duration ≥3 months [7].

The objective of this study was to review the evidence concerning, ways in which people living with chronic musculoskeletal pain are affected in their everyday lives. The discussion of results is thematised according to the results of the systematic search and inspired from The World Health Organization’s definition of psychosocial factors.

The World Health Organization defines psychosocial factors as those factors pertaining to a person’s ability to deal effectively with the demands and challenges of everyday life. This involves a person’s ability to maintain a state of mental well-being and to demonstrate this in adaptive and positive behaviour while interacting with others, his/her culture and environment [8]. To capture the totality and complexity of consequences of an everyday life with pain, this systematic review thematises the results in three categories: (1) clinical aspects, (2) everyday life aspects and (3) interpersonal aspects.

2. Methods

The methods employed in the search strategy, inclusion criteria, data extraction and quality assessment were specified in advance. The PRISMA [9] statements were used as a guideline for reporting this systematic review with qualitative synthesis.

2.1. Search strategy

Studies were identified by searching the electronic databases Scopus, Cinahl and PsycINFO from 2008 to September 2012 and supplemented by scanning reference lists of the selected publications. We have also searched PubMed and checked for duplicates between PubMed and Scopus, Cinahl and PsycINFO, respectively, and we did not find new publications.

The primary search strategy employed was the 'building blocks' approach because it allows the complexity of the subject in this review to be addressed. We used three facets to cover the issue to be searched: 1. Chronic, 2. Pain and 3. Consequences of living with chronic pain. The full search strategy, including vocabulary related to each of the three facets can be seen in Table 1.

2.2. Eligibility criteria and selection

To determine which studies would be further assessed, a reviewer (MK) screened the title ($n = 1140$) of every record. Following this screening process and after removing duplicates, the abstracts ($n = 159$) were screened for eligibility. The full-text of each potentially eligible publication ($n = 46$) was assessed by the reviewer (MK), and studies were selected if they met a set of pre-determined eligibility criteria, or if eligibility was uncertain. The following selection criteria were defined: (1) the article was written in the English language, (2) population from Western countries, to minimize cultural differences, (3) population were adults with musculoskeletal pain $\geq$3 months, (4) consequences of living with chronic pain were psychosocial, related to clinical aspects, everyday life or interpersonal aspects. In the case of doubt about selection, a consensus decision was reached between two researchers (MK and LNA) based on discussion. Apart from reviews, all types of study were included. Exclusion criteria are listed in Fig. 1.

2.3. Data collection process

Two types of data extraction sheets were developed, based on published guidelines [10] for cross-sectional studies and cohort studies, respectively. The data extraction form was tailored to this specific review and took into account the objective of the study, the type of study and subsequent quality assessment. For each of the included studies, data extraction included: the objective of the study, characteristics of the study population, pain for the population and for recruitment of participants. In addition, the outcome parameters were reported. One researcher (MK) extracted the data, while a second researcher (LNA), checked the data extraction forms for accuracy.

2.4. Quality assessment

The majority of studies included are descriptive and observational in nature, describing characteristics of people with chronic pain. We did not have a quality assessment tool for this type of study. Accordingly, we developed a quality assessment tool relevant for this review (see legend Table 2). Items 2–7 are modified from Khan et al.'s [11] checklist for quality assessment of observational studies designed to assess case series. Case series are comparable to the cross-sectional studies in this review because of their descriptive nature [12] that does not aim to determine cause-and-effect relationships. Items 1 and 8 are substantiated from assessment tools in clinical research [13], while item 9 is inspired from Khan et al.'s [11] checklist for case–control studies. These added items are from preexisting and well-known checklists.

The level of evidence is defined by taking into consideration the type of study design and the quality assessment of methodological quality. To explore quality differences and guide the review and interpretation of the systematic literature search, we

Table 1
Search profiles.

	Facet 1: Chronic OR	AND	Facet 2: Pain OR	AND	Facet 3: Consequences OR
Vocabulary	"chronic* pain" "prolonged pain" "long-term pain" "longstanding pain" "long-lasting pain" "persistent pain"		"back pain" "neck pain" "muscu* pain"		stress depression distress anxiety "psychological *distress" "psychological* problem*" "psychological* functioning" "psycho-social distress" "psychosocial distress" "psycho-social functioning" "psychosocial functioning" "interpersonal distress" "interpersonal functioning"
Scopus					10 September 2012
Search records:	=39,338		=69,298		=1,993,041
Results using AND					=1790
Results using AND and OR with limitations					**=**738
Limitations: 2008–September 2012; Subject areas: medicine + psychology + health professions + nursing + social sciences					
PsycINFO					11 September 2012
Search records:	=7377		=3005		=207,861
Results using AND					=447
Results using AND and OR with limitations					=233
Limitations: 2008–September 2012					
Cinahl					12 September 2012
Search records:	11,098		=19,159		=138,976
Results using AND					=440
Results using AND and OR with limitations					**=**168
Limitations: 2008–September 2012					

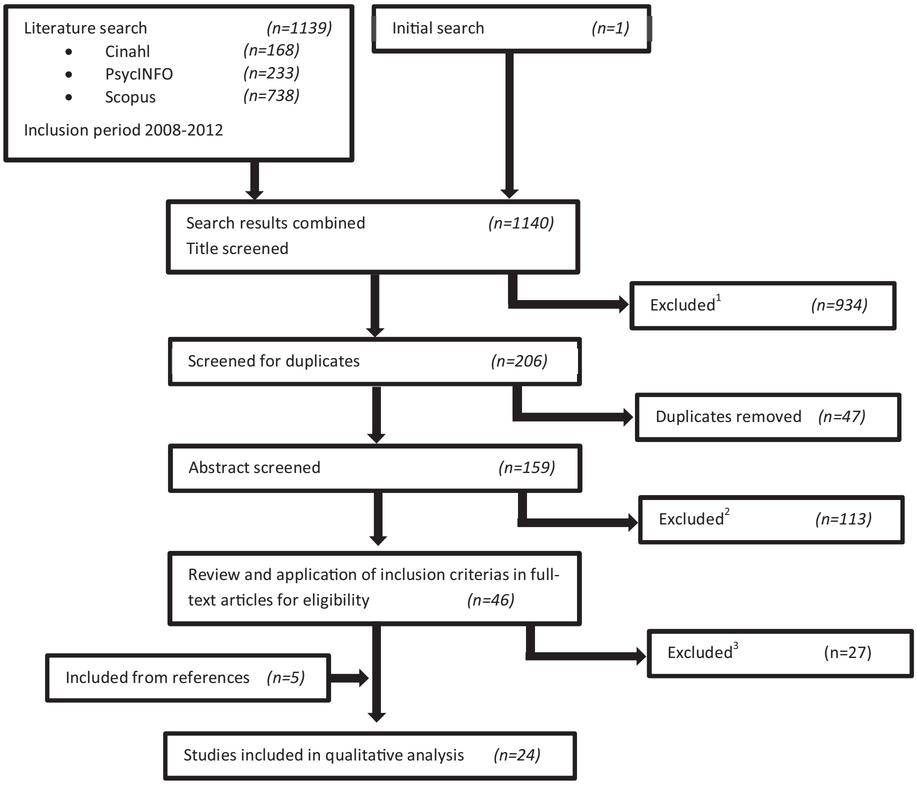

Figure 1. Flow diagram of study selection

[1] Titles excluded (934)
- Study of treatment (medical, alternative, cognitive etc.)
- Validation of measurement systems
- Populations were children, elderly and military veterans
- Diseases; virus, cancer, Parkinson, migraine etc.
- Cost/benefit analysis'
- Prevalence studies

[3] Full-text articles excluded (27):
- Effect of psychological factors on psychological factors (8)
- Outcome not relevant (10)
- Not written in article form (3)
- Predictors for pain intensity (1)
- Population from foreign cultures (4)
- Efficacy studies on treatment (1)

[2] Abstracts excluded (113):
- Review (2)
- Not scientific (16)
- Populations from foreign cultures, e.g. China and Africa (10)
- Outcome not relevant (25)
- Rewerse association between pain and outcome (28)
- Validation of measures, index and scales (3)
- Not relevant population (18)
- Abstract/article not written in English (11)

Fig. 1. Flow diagram of study selection.

explored individual components of methodological quality and not summary scores. The individual components in our quality assessment of included studies encompass assessment of risk of bias in individual components, items 1–9 in Table 2 [9,11].

2.5. *Data analysis*

Included studies were content analyzed and relevant information are presented under each of the three categories that form the headings in the Results section. A narrative synthesis was formulated which took into account the quality of the studies.

3. Results and discussion

The systematic review found 1139 citations; one study was found during the preliminary search in references and five studies were found while searching references in studies selected for screening of full-text articles. After screening and thorough review, 19 publications were included. Searching in reference lists provided five more publications. In total, 24 publications were found to fully meet the inclusion criteria. These publications were then subjected to a final phase of data extraction and quality assessment. Extracted data are listed in Appendix A, which provides an overview of included studies.

3.1. *General results*

The 24 publications spanned from 2001 to 2012 and contained 23 study populations. Kroenke [14] and Stubbs [15] investigated the same population however with different aims and methods. In total 22 studies were cross-sectional and two were cohort studies. Study populations ranged from 69 to 3928 participants; they were heterogeneous in nature and the age of populations ranged from 15 to 98 years, although data were sparse at the low and high ends of the range. In most studies, the mean age was 43–50 years. Women formed the majority of the study populations, with a range from 49 to 93%, but most often 55–66%. Three studies included only women [16–18] and one study included only men [19]. Participants were recruited (1) as patients referred to primary care clinics or hospital-based services, (2) from the general population or, (3) from advertisements in newspapers. Study populations were mostly outpatients. Only two studies also included inpatients [17,20]. Pain duration varied from 3 months to 53 years, with an average of

Table 2
Reviewers' quality assessment for each included study.

First author Year	1.	2.	3.	4.	5.	6.	7.	8.	9.
Ambler [20] 2001	A	A	I	I	A	A	NR	A	A
Bergman [26] 2005	A	U	I	I	A	A	A	A	A
Börsbo [22] 2008	A	I	I	U	U	A	A	A	A
Capraro [16] 2012	A	I	A	U	A	I	A	A	A
DeCarvalho [31] 2012	A	A	I	U	A	A	A	I	I
Fredheim [34] 2007	A	I	A	A	A	I	A	A	A
Friedrich [24] 2009	I	I	A	I	A	A	A	A	A
Gerhardt [2] 2011	A	I	A	U	A	A	NR	A	A
Harris [38] 2003	A	A	A	I	A	I	NR	I	A
Huber [17] 2008	A	I	A	U	A	A	I	I	A
Kindermans [39] 2010	A	A	I	I	U	A	NR	I	A
Kowal [37] 2012	A	A	A	I	A	A	NR	U	A
Kroenke [14] 2011	A	A	A	I	A	A	A	A	A
Lundberg [27] 2011	A	A	A	U	A	A	I	A	A
Newcomer [30] 2010	A	A	A	I	A	A	A	A	A
Nordeman [18] 2012	A	A	A	U	A	I	A	A	A
Peilot [35] 2010	A	I	I	I	A	I	A	A	A
Raftery [25] 2011	A	I	A	I	A	A	A	A	I
Reme [28] 2011	A	A	A	I	A	A	NR	A	A
Silvemark [36] 2008	A	I	A	I	A	I	I	I	A
Stubbs [15] 2010	A	A	A	I	A	A	A	A	I
Tajar [19] 2011	A	I	A	I	A	A	U	A	A
Waxman [23] 2008	A	I	A	I	I	A	NR	A	A
White [29] 2002	A	A	I	I	A	A	A	A	A

1 = Is the objective of the study clearly stated?; 2 = Is the study based on a representative sample selected from a relevant population?; 3 = Are the criteria for inclusion and exclusion explicit?; 4 = Are all participants at the same stage in their disease progression, when they entered the study? If no; is their individual stage in disease progression clearly stated?; 5 = Was follow-up long enough for important events to occur?; 6 = Was outcomes assessed using objective criteria or was blinding used? 7 = If comparisons of sub-series are being made, were there sufficient description of the series and the distribution of prognostic factors? 8 = Are methods clearly stated, so bias can be evaluated? 9 = Were relevant confounders adequately managed in the analysis? A = adequate, I = inadequate, U = unclear, NR = not relevant.

between 5 and 11 years. Not all publications stated the average pain duration.

The pain exposures in the included studies varied: six studies investigated similar groups of participants with variant pain localisations, six investigated only participants with low back pain, five investigated chronic pain versus no pain, seven investigated specific pain versus nonspecific pain and fibromyalgia, and one study investigated non-malignant pain versus cancer pain. Non-specific pain covers both symptoms with no pathological findings in either a medical or technical assessment [18], and widespread pain, which is commonly defined as pain present in both sides of the body, above and below the waist, and in the axial skeleton [18]. Conversely, specific pain is distinct and regional pain, e.g., chronic regional low back pain.

There was a broad span of outcome parameters in the included studies. In accordance with the objective of the review, the outcome parameters were selected and categorized as: (1) clinical aspects, (2) everyday life aspects and (3) interpersonal aspects, in order to form an overview of the impact of chronic pain on everyday life. Other outcome parameters were excluded, e.g., cognitive factors, such as fear-avoidance beliefs and coping. The rationale for their exclusion was that they can also represent a cause of the link between pain and the consequences of pain, since such cognitive processes are a means by which biomedical, corporeal, societal or environmental factors can affect an individual's behaviour and, hence, level of disability [21].

3.1.1. Quality assessment

The included studies were assessed in accordance with the guide developed for quality assessment (see Section 2.4). The aim of the present quality assessment was, primarily, to explore quality differences as an explanation for heterogeneity in study results to weight the study results and guide the interpretation of findings when data are synthesized [11]. Therefore, the assessment is included in the discussion of results only when the quality assessment influences our interpretation. Table 2 presents an overview of the quality assessment.

3.2. Discussion

3.2.1. Clinical aspects

Depression and anxiety are the parameters that are most often investigated under this category, while stress is represented in fewer studies (Table 3).

3.2.1.1. Depression. Depression appeared as an outcome parameter in 12 of the selected studies. The term depression was used comprehensively and included depressed mood as well as clinical severe depression, both of which are relevant to this study. We found a general consensus that life with chronic pain was associated with higher prevalence and higher levels of depression [14,22,23], including in comparison with groups without chronic pain [19,24,25]. It should be noted that a comparison with a no pain group is not the same as a comparison with the normal population, because a no pain group has less pain and often reports higher quality of life than the normal population [26]. It follows, that prevalence of depression will be lower in the no pain group. Börsbo [22] and Waxman [23] both had study limitations with respect to methods and selection, while the cohort study by Kroenke [14] was strong in methods and states that pain is a distinct predictor for subsequent depression severity.

The prevalence of depression in populations with pain varies greatly. Besides the value for depressed mood of 80% [27], clinical depression spanned between 0 and 33.4% [2,18,25]. Different scales are used in different studies for diagnosing depression (SCID and HADS). Different cutoff points are also used for diagnosing depression but even though those two studies use the same method (HADS) and cutoff point at 8 they still found different prevalences of depression of 33.4% and 4%. That means that different cutoff points could not be the only explanation of different prevalences of depression [25,28]. However, using a cutoff at 10 means that, the span for prevalence of clinical depression decreases to 0–15%. In this narrower span, there was agreement about prevalence of depression, although this was complicated by heterogeneous methods employed. When comparing different populations with pain, it was evident that patients with fibromyalgia had a higher prevalence and level of depression, compared to patients with rheumatoid arthritis, low back pain and chronic widespread pain [16,29].

In two studies [18,27], it was not clear if nonspecific pain was more firmly associated with depressive thoughts than was specific pain, when the outcome parameters were depressive thoughts and depressed mood. Both studies had controlled for confounders; however, Lundberg [27] controlled for fewer confounders, and there was a substantial dropout, which strengthens the evidence to suggest that nonspecific pain is more firmly linked to depression than is specific pain, as shown in Nordeman [18]. An agreement on differences in levels of depression between different pain groups was seen in two studies [16,29] and emphasises that diagnoses of widespread pain and nonspecific pain are more clearly associated with depression than is specific pain. Furthermore, fibromyalgia is more strongly linked with depression than is widespread pain.

3.2.1.2. Anxiety. Anxiety was an outcome parameter in eight of the selected studies. Different measurements were used, e.g., STAY-Y2 and SLC-90 were both used in one study [17]. This means that different forms of anxiety were measured, i.e., clinical anxiety as well a more general unease, worries and fear.

On the whole, the results of link between chronic pain and anxiety were not obvious. Two studies found no significant correlation between chronic pain and anxiety [17,30], while Friedrich [24] found a significant correlation between chronic pain and a higher level of trait anxiety, compared to acute pain. This was supported by Huber [17], who found a correlation between pain intensity and anxiety, but no correlation between pain duration and anxiety. Furthermore, Newcomer [30] showed both a correlation between pain and anxiety and, anomalously, a lack of correlation, because the existing correlation is only evident at baseline and cannot be shown at one-year follow-up.

Prevalence of anxiety in three studies that used valid measurements to diagnose anxiety varied from 0% to 20.9% [2,18,28]; the study [2] that showed the highest prevalence of anxiety disorders used The Structured Clinical Interview (SCID). SCID diagnoses axis-1 anxiety disorders which can mean a wider range for diagnosis while Nordeman [18] and Reme [28] used Hospital Anxiety and Depression Scale (HADS) to diagnose anxiety. Different diagnostic measures could explain differences in prevalence, or cutoff points, which were not reported. Another explanation for varying prevalence could be heterogeneity. Participants with chronic pain in the study [2] with the highest prevalence were recruited from the general population, including participants who did not seek treatment of their own volitions. One study [18] only included women with low back pain recruited from primary care clinics, while another study [28] included men and women with low back pain who were on sick leave. Recruitment methods can influence the results regarding prevalence of anxiety, so that anxiety is higher in the general population than among a group of pain patients who are already involved in courses of treatment.

Regarding specific pain and nonspecific pain, the results for anxiety were in general comparable to results for depression. There is agreement that prevalence of anxiety in patients with fibromyalgia was higher than among groups with low back pain, rheumatoid arthritis or chronic widespread pain [16,29], yet Nordeman [18] found no significant differences when comparing different pain populations.

3.2.1.3. Stress. Two studies investigated different forms of stress [31] and symptoms of stress [18]. Although these studies found some positive correlation between chronic pain and different forms of stress, there was no clear agreement. However, there seems to be a tendency for nonspecific pain patients to suffer to a higher extent from stress than specific pain patients. Decarvalho [31] found a positive significant link between level of pain and level of post-traumatic stress disorder (PTSD). However, this association should be questioned, because the questionnaire was developed and validated to measure severity of PTSD symptoms related to a single identified traumatic event [32] while the studied population

Table 3
Results selected from studies on clinical aspects: depression, anxiety and stress.

Ref.	Design and population	Sample size (n=)	Results	Measures
Data from studies with one population with pain				
Börsbo [22]	Cross-sectional study 'WAD'	275	Pain intensity and depression occur at the same time, varying from a great extent 24.7% to a lesser extent 22.6%.	BDI
Decarvalho [31]	Cross-sectional study 'LBP'	161	Prevalence of PTSD = 51%. Significant positive association between level of pain severity and PTSD symptom severity.	PDS
Friedrich [24]	Cross-sectional study 'CLBP + WMP', 'CLBP' and 'pain free'	246	Significantly more depression among 'CLBP + WMP' than 'pain-free' Significantly higher prevalence of anxiety in 'CLBP + WMP' compared to 'no pain'.	GDS, STAI
Gerhardt [2]	Cross-sectional study 'CLP + CWP'	110	Prevalence of affective disorders = 12.7% Prevalence of anxiety disorders = 20.9%	SCID
Huber [17]	Cross-sectional study 'Nonspecific pain'	69	No significant correlation between pain duration and anxiety. Significant correlation between anxiety and pain intensity.	SLC-90, STAI-Y2, MAPS
Kroenke [14]	Cohort study 'Different pain symptoms'	500	Pain severity a strong predictor for depression severity.	HCSL-20
Lundberg [27]	Cross-sectional study 'Specific pain' and 'nonspecific pain'	147	Prevalence of depressed mood = 80%	SDS
Newcomer [30]	Cohort study 'Acute LBP' and 'Chronic LBP'	245	No significant difference between groups in state anxiety. 'Chronic LBP' have significant higher level of trait anxiety than 'Acute LBP'.	Spielberger State-Trait Anxiety Inventory
Nordeman [18]	Cross-sectional study 'CLBP + WP' and 'CLBP'	130	No signs of clinical depression or clinical anxiety. No significantly higher level of clinical stress symptoms among 'CLBP+WP' compared to 'CLBP', but higher in 'CLBP + WP' and 'CLBP' compared to reference studies.	HADS, SCI-93
Reme [28]	Cross-sectional study 'CLBP'	565	Prevalence of depression = 4% Prevalence of anxiety = 12%	HADS, MINI Plus
Waxman [23]	Cross-sectional study 'CLBP'	54	Significant positive association between pain and depression.	CES-D
Raftery [25]	Cross-sectional study 'Different pain symptoms' and 'no pain'	1204	Significantly higher levels of depression among 'Different pain symptoms' than 'no pain'. Prevalence of anxiety = 33.4%	HADS
Tajar [19]	Cross-sectional study 'No pain', 'some pain' and 'CWP' (=FM)	3206	Significantly more depression among 'some pain' and 'CWP' than 'no pain'	BDI
Data from studies comparing different populations with pain				
Capraro [16]	Cross-sectional study 'FM', 'AR' and 'LBP'	74	Significantly more depressed in 'FM' compared to 'AR' and 'LBP'. Significantly higher levels of depression among 'FM' compared to 'AR'. Significantly higher levels of trait anxiety in 'FM' than 'AR'. Prevalence of clinical anxiety in 'FM' = 26.5%; values not reported for 'AR' and 'LBP' other than *normal.*	BDI-II, STAI-Y
Lundberg [27]	Cross-sectional study 'Specific pain' and 'nonspecific pain'	147	No significant difference between 'specific pain' and 'nonspecific pain' in relation to depressed mood. No significant difference between 'CLBP + 'WP' and 'CLBP' in trait anxiety.	SDS, HADS-A
Nordeman [18]	Cross-sectional study 'CLBP + WP' and 'CLBP'	130	'CLBP + WP' have significantly higher levels of depression than 'CLBP'.	HADS-D
White [29]	Cross-sectional study 'CWP' and 'FM'	122	Significantly more depressed and higher levels of depression and anxiety in 'FM' than 'CWP'. Significantly higher prevalence of state and trait anxiety among 'FM'.	CES-D STAI

Diagnoses: AR = rheumatoid arthritis; CLBP = chronic low back pain; CLP = chronic local pain; CWP = chronic widespread pain; FM = fibromyalgia; LBP = low back pain; WAD = Whiplash-associated Disorders; WMP = widespread musculoskeletal pain; WP = widespread pain; Measures: BDI = Becks Depression Inventory; CES-D = Centre for Epidemiological Studies Depression Scale, GDS = General Depression Scale, HADS = The Hospital Anxiety and Depression Scale; HSCL-20 = 20-item Hopkins Symptom Check-list; MAPS = Multidimensional Affect and Pain Survey; MINI = Mini-International Neuropsychiatric Interview; MINI Plus = Mini-International Neuropsychiatric Interview; PDS = Post-traumatic Stress Diagnostic Scale; SCI-93 = not reported; SCl-90 = Symptom Check List-90; SCID = Structured Clinical Interview for DSM Disorders; SDS = Zung Self-Rating Depression Scale; STAI = State-Trait Anxiety Inventory; STAI-Y2 = State-Trait Anxiety Inventory form Y.

Table 4
Results selected from studies on inconvenience in everyday life aspects: disability and quality of life.

Ref.	Design and population	Sample size (*n*=)	Results	Measures
Data from studies with one population with pain				
Bergman [26]	Cross-sectional study 'NCP', CRP and CWP (incl. FM)	3928	Significant correlation between pain intensity and disability in 'CLBP + WMP' and 'CLBP'. CRP and CWP have significantly worse health than the norm. FM significantly worse health than the norm. NCP significantly better health than the norm.	ODI, SF-36
Börsbo [22]	Cross-sectional study WAD	275	Patients with high pain intensity differ from those with low pain intensity in quality of life aspects (level of significance not reported)	Li-Sat 11, SF-36, EuroQol
Fredheim [34]	Cross-sectional study 'CNMP', 'PC' and 'norm data'	288	'CNMP' showed significant reduction of quality of life, compared to age- and gender-adjusted norms.	EORTC QLQ-30, SF-36
Friedrich [24]	Cross-sectional study 'CLBP + WMP', 'CLBP' and 'pain free'	2009	'CLBP + WMP' significantly lower (physical and mental aspects) quality of life compared to 'CLBP' and 'pain free' 'CLBP' have significantly lower (physical aspect, not mental) quality of life, compared to 'pain free'	SF-36
Huber [17]	Cross-sectional study Nonspecific pain	69	No significant association between pain intensity and well-being.	MAPS WB-5
Lundberg [27]	Cross-sectional study 'Specific pain' and 'nonspecific pain'	147	Pain intensity strongest predictor for disability among 'CLBP + WMP' and 'CLBP', compared to kinesiophobia and depression.	ODI
Newcomer [30]	Cohort study 'Acute LBP' and 'Chronic LBP'	245	At baseline, no significant differences in prevalence of disability between 'Acute pain' and 'Chronic pain'. At 1-year follow-up significant improvements in disability in both 'Acute pain' and 'Chronic pain', but significantly higher level in 'Acute LBP', compared to 'Chronic LBP'.	ODI
Peilot [35]	Cross-sectional study 'FM', 'CWP', 'CRP' and 'normative controls'	75	Pain groups reported significantly impaired quality of life compared to matched normative controls, the category *role limitation caused by physical problems* is most severely impaired.	SF-36
Raftery [25]	Cross-sectional study 'Different pain symptoms' and 'no pain'	1204	Pain intensity the strongest predictor of disability, compared to depression. Pain group reported lower quality of life on both domains, compared with 'no pain'.	Chronic Pain Questionnaire SF-12
Silvemark [36]	Cross-sectional study 'long-term non-malignant pain' and 'reference group'	294	Significantly more satisfied people in reference group than pain group, largest difference in the domains 'physical health', 'psychological health' and 'life as a whole'. No significant differences between pain intensity and life satisfaction	LiSat-11
Stubbs [15]	Cross-sectional study 'Different pain symptoms' and 'no pain' Men and women	500	Women reported significantly more pain-related disability than men, also when adjusted for depression, anxiety and other psychological variables. No significant differences in disability between men and women when adjusted for pain severity.	BPI, GCPS, RDS
Data from studies comparing different populations with pain				
Bergman [26]	Cross-sectional study 'NCP', 'CRP' and 'CWP' (incl. FM)	3928	CWP worse quality of life than CRP (level of significance not mentioned). FM significantly worse quality of life than CRP.	SF-36
Capraro [16]	Cross-sectional study 'FM', 'AR' and 'LBP'	74	Significantly more impairment in quality of life referring to pain, lack of energy and emotive reactions among 'FM' compared to AR, but no significant differences between FM and LBP.	NHP

Table 4 (*Continued*)

Data from studies with one population with pain				
Ref.	Design and population	Sample size (*n*=)	Results	Measures
Fredheim [34]	Cross-sectional study 'CNMP', 'PC' and 'norm data'	288	'CNMP' reported poorer global quality of life than 'PC'.	EORTC QLQ-30, SF-36
Friedrich [24]	Cross-sectional study 'CLBP + WMP', 'CLBP' and 'pain free'	246	'CLBP + WMP' reported significantly more disabilities than 'CLBP'. 'CLBP + WMP' significantly lower quality of life on physical and mental aspects compared to 'CLBP'.	ODI SF-36
Lundberg [27]	Cross-sectional study 'Specific pain' and 'nonspecific pain'	147	Pain intensity strongest predictor for disability among 'CLBP + WMP' and 'CLBP', compared to kinesiophobia and depression.	ODI
Nordeman [18]	Cross-sectional study 'CLBP + WP' and 'CLBP'	130	Women with 'CLBP + WP' have significant higher risk for developing future disability than 'CLBP'. 'CLBP + WP' showed lower quality of life in three dimensions (physical function, bodily pain and vitality) compared to 'CLBP'.	ÖMPSQ, SF-36

Diagnoses: AR = rheumatoid arthritis; CLBP = chronic low back pain; CNMP = chronic non-malignant pain; CRP = chronic regional pain; CWP = chronic widespread pain; FM = fibromyalgia; LBP = low back pain; NCP = no chronic pain; PC = palliative cancer patients; WAD = Whiplash Associated Disorder; WMP = widespread musculoskeletal pain; WP = widespread pain. Measures: BPI = Brief Pain Inventory; Li-Sat 11 = Life Satisfaction Questionnaire-11; GCPS = Graded Chronic Pain Scale; MAPS WB-5 = Multidimensional Affect and Pain Survey Well-Being-5; ODI = Oswestry Disability Index; RDS = Roland Disability Scale; ÖMPSQ = Örebro Musculoskeletal Pain Screening Questionnaire; SF-36 = Short Form-36 Health Survey; SF-12 = Short Form-12 Health Survey; NHP = Nottingham Health Profile; EORTC QLQ-C30 = assess quality of life of cancer patients.

comprised low back pain patients. Nordeman [18] found no significant results and the higher level of clinical stress among 'Chronic Low Back Pain' (CLBP) together with 'Widespread Pain' (WP) and 'CLBP' was not compared to a reference group but to reference studies. Despite the fact, the study in general had a high level of quality; the methodology used in regard to this finding can be called into question. It can be concluded that agreement on a positive relationship between chronic pain and stress is not evident.

3.2.2. *Everyday life aspects*

People with chronic pain can experience discomfort and suffer from varying degrees of disability. These issues, along with the pain, can have an influence on their quality of life (Table 4).

3.2.2.1. Disability. Six studies examined disability as a consequence of life with chronic pain. Disability is not restricted only to physical limitations caused by pain pathology. Because pain interferes with everyday life [7,21], WHO describes disability as an umbrella term. It is considered not only as a health problem, but as a complex relationship between a person's health condition, personal factors and external factors that represent the circumstances in which the person lives [33]. This complexity is reflected in the methods used for measuring disability, that evaluate the influence of pain on, e.g., mood, sleep, walking, activity level, relations with others, enjoyment of life [15] and on personal care, sex life, social life and travelling [27].

Four cross-sectional studies agreed that pain intensity is significantly linked to disability [15,24,25,27]. Even though the evidence level in the cohort studies is more compelling than in the cross-sectional studies, Newcomer's cohort study [30] which did not show an association at baseline, does not have a more convincing level of evidence, due to the fact that it is a baseline characteristic. At one-year follow-up, they found significant improvements among patients with either acute or chronic pain, with significantly higher levels of improvements among acute patients. This finding emphasizes the fact that chronic pain patients have higher levels of disability in the long-term. Two studies [25,27] found that pain intensity was the clearest predictor of disability, compared to, e.g., depression. Moreover, pain intensity was the most significant confounding factor in the levels of disability between women and men [15]. Overall, there is plausible evidence to suggest a positive relationship between chronic pain and disability.

Two studies [18,24] showed a greater link between nonspecific pain and disability compared to specific pain, while one study [27] found no difference between specific and nonspecific pain regarding disability. Accordingly, the quality assessment showed that a classification of participants into groups can be problematic, because patients are divided in relation to 'having a specific diagnosis' or 'not having a specific diagnosis'. This process of division can be argued for when there is a lack of guidelines. On the other hand, the method of classification in two other studies [18,24] was carried out according to: (a) specific criteria for widespread pain from the American College of Rheumatology and (b) according to non-standardised criteria. The quality assessment of this diagnostic classification into groups means, that the quality was higher in those studies that succeeded in finding a difference between the types of diagnosis. On the whole, the evidence is stronger for a significant positive association between nonspecific pain and disability, compared to specific pain.

3.2.2.2. Quality of life. Quality of life is a broad term and encompasses a wide range of measures. It can be measured as health-related quality of life, quality of life, well-being or life satisfaction. All in all, quality of life was investigated in 10 of the included studies and questions regarding quality of life related to physical mobility, energy, sleep, social isolation, emotional reactions, general health, emotional role limitation, physical role limitation, mental health, vitality and social functioning.

Six studies found a positive link between chronic pain and low quality of life [24–26,34–36]. The populations in these studies were compared to normal populations, as well as to control groups without pain. The methodological quality varied in the components assessed. Despite these issues, the consensus still exists regarding an association between pain and quality of life. The link is also underpinned by the fact that Fredheim [34] found that chronic pain patients have significantly lower quality of life than palliative cancer patients.

No agreement was found regarding the significance of pain intensity for quality of life. One study [22] found an association between pain intensity and quality of life aspects, but level of significance was not reported. Conversely, two studies [17,36] showed

Table 5
Results from selected studies on interpersonal aspects.

Ref.	Design and population	Sample size (*n*=)	Results	Measures
Data from studies with one population with pain				
Ambler [20]	Cross-sectional study Different chronic pain patients	327	25% had no sexual problems. 73% had current sexual difficulties associated with their pain. 17% had sexual problems predating pain onset.	DISF
Bergman [26]	Cross-sectional study 'NCP', 'CRP' and 'CWP' (incl. FM)	3928	Low social support, as not having a personal support to cope with distress and problems in life was associated with 'CRP' and 'CWP', but level of significance not reported.	One question
Harris [38]	Cross-sectional study Different chronic pain patients	80	Pain significantly negatively correlated with estimates of current roles and attributes. Participants 25% loss of their roles and 29% reduction in attributes since the onset of chronic pain. Significant loss of roles in the domains: friendship, occupation and leisure, but not in the family.	RAT
Kindermans [39]	Cross-sectional study 'Nonspecific CLBP'	80	The majority of the attributes that patients generated appear to relate to their social interpersonal attributes. 'Ought self' was significantly characterized by more personal attributes than 'ideal self' and 'feared self'. Attributes related to *close interpersonal relationships* were mentioned more often in the feared self in contrast to the ideal self.	HSQ
Kowal [37]	Cross-sectional study Different chronic pain patients	238	73% had elevated level of self-perceived burden based on clinical level. Pain intensity significantly positively associated with self-perceived burden.	SPBS
Tajar [19]	Cross-sectional study 'No pain', 'some pain' and 'CWP'	3206	'Some pain' and 'CWP' associated with significantly higher score in '*change in sexual functioning*' and '*sexual function-related-distress*', compared to 'no pain'. 'Some pain' and 'CWP' associated with lower '*overall sexual functioning*' than 'no pain' but not significant.	EMAS-SFQ
Waxman [23]	Cross-sectional study 'CLBP'	54	Significant relationship between pain and relationship satisfaction.	MPI DAS
Data from studies comparing different populations with pain				
Bergman [26]	Cross-sectional study 'NCP', 'CRP' and 'CWP' (incl. FM)	3928	The risk of low personal support is higher among an FM-subgroup than 'CRP' and 'CWP', but not significant	One question
Nordeman [18]	Cross-sectional study 'CLBP + WP' and 'CLBP'	130	'CLBP + WP' report significantly lower private social support.	MOS-SSS
Tajar [19]	Cross-sectional study 'No pain', 'some pain' and 'CWP'	3206	'Some pain' and 'CWP' associated with significantly higher score in '*change in sexual functioning*' and '*sexual function-related-distress*' compared to 'no pain'. 'Some pain' and 'CWP' associated with lower '*overall sexual functioning*' than 'no pain', but not significant.	EMAS-SFQ

Diagnoses: CLBP = chronic low back pain; CRP = chronic regional pain; CWP = chronic widespread pain; NCP = no chronic pain; FM = fibromyalgia; WP = widespread pain. Measures: DAS = Dyadic Adjustment Scale; DISF = the Derogatis Inventory of Sexual Functioning; EMAS-SFQ = EMAS Sexual Functioning Questionnaire; HSQ = Hardin's Selves Questionnaire, MOS-SSS = Medical Outcome Study Social Support; MPI = Multi-Dimensional Inventory-Part II; RAT = Role-Attribute Test; SPBS = 10-item Self-Perceived Burden Scale.

no significant relation between pain intensity and quality of life. It can be summarized that there is a lack of evidence for a relationship between intensity of pain and quality of life.

When the relationship between specific pain and nonspecific pain was investigated, there was agreement that nonspecific pain, e.g., widespread pain or fibromyalgia, was accompanied by a significantly lower quality of life than was the case for specific pain [18,24,26]. Moreover, one study [16] showed that patients with fibromyalgia had a significantly lower quality of life than patients with rheumatoid arthritis, but no significant difference between patients with fibromyalgia and low back pain was shown. Another study [34] showed that patients with chronic pain have a significantly lower quality of life than palliative cancer patients. Overall, there is evidence that nonspecific pain is more compellingly associated with low quality of life than is specific pain.

3.2.3. *Interpersonal aspects*

Interpersonal relations and social conditions are important aspects of life. In some studies, these factors were studied under the quality of life-category, while other publications had a separate category for elaboration of interpersonal aspects. Results represented here are within two categories 'Close relations' and the general social interaction of 'Roles and personal attributes' (Table 5).

3.2.3.1. Close relations. 'Close relations', which covers close and intimate relationships, e.g., the relationship to one's spouse or another caregiver were investigated in six studies. A range of evaluation measures was used, e.g., issues surrounding sex life and social support. One study examined 'self-perceived burden' that arises from the impact on others of one's own illness and care needs. This results in guilt, distress, feelings of responsibility and a diminished sense of self [37].

Four studies [19,23,26,37] investigated relationships between chronic pain and problems in close relationships. Waxman [23], Bergman [26] and Kowal [37] found a significantly positive link between pain and problems in interpersonal relations, though Bergman did not report levels of significance. Tajar [19] found a significantly lower score for changes in sexual functioning and sexually related distress among chronic pain patients, compared to a no pain group. An agreement can be reached on a relationship between pain and problems in close relationships in the studies with one population with pain, as well as when compared to a pain-free control group.

Prevalence of problems in close relationships was reported in two studies [20,37]; 73% had sexually related problems and problems of 'self-perceived burden' [35] and Ambler [20] showed that only 17% of patients had sexual problems before their pain occurred. Both studies had high levels of methodological quality regarding measurement methods. Likewise, Kowal [37] reported that the questions with the highest score regarding 'self-perceived burden' were "I feel guilty about the demands that I make on my caregiver" and "I feel I am a burden to my caregiver" while Ambler [20] reported that the most frequently endorsed problem was "Worry about worsening the pain through sexual activity". These problematic issues reflect the fact that problems within 'close relationships' are associated with living with chronic pain.

When populations with specific and nonspecific pain are compared, a significant difference could not be shown in two studies [19,26]. On the other hand Nordeman [18] showed that nonspecific pain patients reported significantly lower private, social support compared to specific pain patients. Furthermore, Bergman [26] found a tendency towards an association that fibromyalgia patients report lower social support compared to patients with regional pain and chronic widespread pain.

The evidence of a positive relation between pain and problems in close relations is not convincing because results are mixed and equivocal, and the methodological quality is mixed. One reason for variance in the level of evidence could be the heterogeneity of populations. While the study [19] that found absolutely no difference between pain groups examined a small representative sample from the general population with a response rate of 41%, the study [18] that found a non-significant difference examined a representative sample of women, recruited on the basis of low back pain.

3.2.3.2. Roles and attributes. Interpersonal aspects with significance for the individual also encompass friendship, colleagues and other bonds related to the family. When people experience chronic pain, they can also be burdened by the risk of losing their social roles [38].

Two studies investigated this issue in different ways. Kindermans [39] content analyzed selves in patients with chronic pain by defining and placing personal attributes within different categories, e.g., personal attributes, personal abilities, physical appearance, close interpersonal relationships and within three different domains of self: 'ideals' reflected ambitions, 'ought' reflected duties, and, finally, 'fears'. Harris [38] examined the individual's number of roles and personal attributes within different domains and found that pain was significantly negatively correlated with estimates of current roles and attributes. On average, the population with pain reported a loss of 25% of their roles and 29% reduction in attributes and unique attributes since the onset of pain. While there was a significant role and attribute loss in the domains of friendship, occupation and leisure, this was not the case in the family domain. On the whole [39], social life was characterized by the domain *ought self*, which means that patients often impose on themselves or feel imposed upon by others. Regarding attributes related to close interpersonal relationships, they were mentioned significantly more often in the *feared self* as opposed to the *ideal self*, which means that participants to a higher extent fear what will happen to their roles, e.g., becoming a bad parent is something patients fear more than ideally wanting to be a good parent.

Results in these studies [38,39] can be affected by recall bias, and the results are based on patients reporting on generate estimates regarding past roles and attributes. Harris [38] used a novel method for assessing roles and attributes that was self-devised, so the methodological quality was low. All things considered, the evidence for a connection between chronic pain and roles and personal attributes is not strong; however, there is an indication to suggest that there is a pain-related issue regarding participation in many social aspects of everyday life.

3.3. Assessments of risk of bias in qualitative synthesis of results

A large-scale diversity within the different categories and outcome measures is encompassed in this synthesis of results. The inconsistency in results can be due to differences in methodological quality, as already discussed. In this section, some general constraining factors in the synthesis of results will be discussed [5,6,40].

Heterogeneity derives from different ways of recruiting and different inclusion criteria, which makes it difficult to compare results. In terms of the recruitment of participants, there is a lack of consensus among the included studies. It is not clear whether representativity is higher when the participants constitute a nonselective, population-based sample that is not confounded by a high rate of help-seeking behaviour [2], or when participants are recruited from primary care clinics where they are looking for care [15,30]. The most suitable way of recruiting is defined in the aim of every single study. In the present review, the study populations vary regarding pain status. This offers a higher degree of external representativity than would a review that included only studies with more narrow inclusion criteria. However, this wide variety of study populations causes limitations in the internal validity of the synthesis of results, regardless of the fact that representativity is high. Whether grouping participants into specific and non-specific pain patients is useful or excessive could also be discussed.

In most of the included studies, the majority of patients that make up the populations are women. This can lead to an overestimation of the significance of results, compared to populations with an equal distribution of men and women, because women are more often reported to suffer from, e.g., mental comorbidity and disability [2,15,24].

Diversity in measurement methods, e.g., questionnaires, clinical evaluations and structured interviews also restricts the synthesis of results across studies. These methods are based on different definitions, criteria and cut-off values and they are not all validated for investigations concerning pain patients.

3.3.1 . Strength and limitations of this review

In a continuation of the discussion regarding the synthesis of results across studies, it is relevant to consider search profiles. This presents challenges, since different terminology and measurement methods are used to assess similar concepts. A more specific and strict search profile could focus the search and enhance the internal validity, although it would diminish representativity.

Another question that arises is whether it is possible to meet the study objective, when the most frequently used design in this area is the cross-sectional approach that, unfortunately, has weaknesses that restrict the extent to which conclusions can be drawn. The design of the cross-sectional approach makes it impossible to determine whether the chronic pain patient's life becomes complicated by psychosocial consequences, or if there is an inverse reciprocal relationship, i.e., a "which came first, the chicken or the egg" dilemma. Prospective cohort studies, on the other hand, that are concerned with causality in associations, still have limitations because the relations may be temporal and, need not be causal in nature [6]. It is possible to date pain onset, but it cannot be identified categorically if other important aspects are also involved. However, when the cross-sectional study design can only infer causation it is on the contrary the best way to determine prevalence and identify associations. These associations can be more rigorously studied using the cohort design that is a good way to determine causes. Besides, these limitations of observational designs the advantages of using cross-sectional as well as cohort studies are evident, they are not that expensive, fairly quick and not unethical [41].

This review examines quite a number of descriptive studies that put forward results in terms of prevalence values, in so far as they are not related to values for control groups, these values are not crucial. It could be suggested for coming reviews only to include descriptive studies that compare groups within the study.

The presence of so many of cross-sectional studies in this review required that we devise and use a checklist for methodological quality assessment. An evaluation checklist can be an advantage in ensuring that studies are not defined merely as having either 'high' or 'low' quality on the basis of components that should be evaluated separately. On the other hand, the method can give rise to a confusion, because all the separate components can be relevant within a discussion. The checklist that we constructed could form a solid basis for the further development of a descriptive checklist for observational studies. In general, it is a strength of this literature review that, in principle, it adheres to criteria set out in "The PRISMA Statement for Reporting Systematic Reviews" [9].

4. Conclusion

The results of this systematic review indicate strong evidence for a link between chronic pain and depression, while there is no evidence for a connection between either chronic pain and anxiety or chronic pain and stress. Within the clinical aspects of depression, anxiety and stress, there is a tendency towards patients with nonspecific pain and fibromyalgia being affected to a greater degree than patients with specific pain. However, in relation to anxiety, and specifically in relation to stress, it is only a tendency and not high quality evidence.

To live with chronic pain has consequences for everyday life in general and across the studies in this review, there is agreement on a relationship between pain and disability and quality of life. It is only in relation to disability, however, that the evidence is strong and consistent. Social relations also constitute an important aspect of everyday life. When close relationships are investigated separately, there is evidence to suggest a link between chronic pain and problems in close relationships. In a wider context, taking into consideration roles in everyday life, e.g., in relation to occupation, friendships and family, based on the current knowledge a consistent link cannot be agreed upon, but it is evident that patients with chronic pain meet challenges in everyday life related to their pain situation. This review does not address whether there are differences in interpersonal factors depending on the presence of specific or nonspecific pain.

Based on this review it can be concluded that, besides experiencing pain, people living with chronic pain are affected in other aspects of life. In particular, it is evident that they experience challenges in relation to depressive thoughts, disability, lower quality of life and conflicts within close relationships.

4.1. Implications

When designing and providing interventions aimed at people with chronic pain, it is essential to take into consideration that living with chronic pain can have far-reaching psychosocial consequences for everyday life.

Conflict of interest

The authors declare no conflict of interest.

Funding sources

No funding sources have been involved in this study.

Appendix A. Characteristics of included studies

Cross-sectional studies

First Author Year Country	Objective	Study population	Pain	Recruitment	Outcome measurements
Ambler 2001 [20] United Kingdom *Identified from reference list*	1. Describe patients' perceived causes of sexual difficulties. 2. Investigate associations between sexual problems and measures of physical function and psychological distress.	327 participants w = 57%, age: 22–79 (mean 47) years Response rate = 72%. In- and outpatients	Duration: 1–49 years, median = 5.1. Region: primary low back, head, neck and/or shoulder	Mixed group referred from primary care- or hospital-based services. All attending chronic pain management programme in one of three places.	Sexual problems, anxiety and depression (HADS), physical function (SIP, Roland Morris)
Bergman 2005 [26] Sweden *Identified from reference list*	1. Examine the impact on psychosocial aspects of life in groups of subjects from the general population having chronic musculoskeletal pain with different degrees of generalization. 2. Investigate associations between pain groups and socio-demographic, psychosocial and lifestyle factors.	A representative sample of 3928 participants Response rate: 61.7% (*w* = 66%, *m* = 57.5%). Response rate varied with age: Higher rate with higher age.	Responders classified with respect to their report of pain: No chronic pain = 1466; chronic regional pain = 588; CWP = 303; Unknown = 68 Subgroups under CWP: CWP-M ('Manchester definition') = 109 FM = 15	A representative sample selected for initial postal survey with questionnaire from a population register of 70,704 inhabitants aged 20–74 years in two municipalities in Sweden.	Quality of life (SF-36) Chronic pain assessment on duration and localization Personal social support Clinical assessment of FM.

First Author Year Country	Objective	Study population	Pain	Recruitment	Outcome measurements
Börsbo 2008 [22] Sweden	1. Classify subgroups according to the degree of pain intensity, depression, and catastrophizing and to investigate the distribution in a group of patients with chronic WAD. 2. Investigate how these subgroups are distributed and interrelated multivariately with respect to consequences such as health and quality of life outcome measures.	275 participants w = 65%, age 15–76 (mean 38 ± 11.6) years	Whiplash associated disorders No chronic pain definition	During 3 years from the consecutive flow of patients seeking care at the Pain and Rehabilitation Centre of the University Hospital, Linköping, Sweden	Pain intensity (VAS), depression (BDI) Well-being (SF-36), perceived state of health (EuroQol), Life Satisfaction (LiSat11)
Capraro 2012 [16] Italia	Analyze the illness perception in patients with FM in order to highlight a possible relationship between such disorder and the emotional–affective state and the quality of life of the patient.	74 participants All women Age 22–70 years	Duration of pain = 12–456 months: Subgroups: a. FM = 34, pain duration 12–420 months b. Rheumatoid arthritis = 20, pain duration 48–348 c. Low back pain = 20, pain duration 48–348 months	Patients who visits the Unit Care of Pain and the Palliative Care and the Psychology Service of Vicenza Hospital. Patients selected by a physician and a psychologist at the clinic during 2.5 year.	Depression (BDI-II), anxiety (STAI-Y), quality of life (NHP), pain intensity (VAS)
Decarvalho [31] 2010 USA	Hypotheses: 1. Patients with chronic low back pain would evidence clinically significant levels [mild to severe] of PTSD symptoms. 2. There would be a significant main effect for the groups based on patients' pain severity levels.	161 participants w = 102, *m* = 59 Age 18–86 years, mean age = 45.3 ± 15.09	Low back pain ≥ 6 months Pain severity from mild to severe. Duration = 11 years [135 ± 1 months]	Patients received treatments ranging from medication management for pain control, chiropractic treatments, massage therapy, physical therapy, and psychotherapeutic services at the Loma Linda Health Care International Rehabilitation Institute and Physical Medicine and Rehabilitation Centre for Pain Management	Post-traumatic stress disorder symptom (PDS), pain severity (MPQ)
Fredheim [34] 2007 Norway *Identified from reference list*	Compare self-reported quality of life between 'Chronic Non-malignant Pain' and palliative cancer patients and between 'Chronic Non-malignant pain' and general population.	288 participants Chronic non-malignant pain patients w = 61%, mean age = 45.1 years Palliative cancer patients = 434 w = 53% Mean age = 68.4 years	Chronic non-malignant pain ≥3 or 6 months. Chronic Non-Malignant Pain: Duration = 6.8 years, location: generalized pain = 16%, neck pain = 15%, lumbal = 19%, local musculoskeletal = 11% somatoform=9% and miscellaneous = 15% Palliative cancer: Duration = 2.3 years	Chronic non-malignant pain patients as out-patients admitted to the multidisciplinary pain centre at Trondheim University Hospital. Palliative cancer patients recruited to a trial of comprehensive palliative care.	Quality of life (EORTC QLQ-C30, SF-36)
Friedrich 2009 [24] Austria	To identify a pattern of specific variables associated with chronic low back pain and widespread musculoskeletal pain by comparing a number of variables in these study groups.	246 participants: w = 76%, *m* = 24% Mean age = 42.9 ± 8.74 years	3 Subgroups: a. Chronic low back pain + widespread pain = 97 b. Control group, pain free ≥3 months c. chronic low back pain = 52	Primary health care physicians, specialists in physical medicine and rehabilitation, pain specialists in orthopaedics, neurologists, and psychiatrists encouraged to refer patients with back disorders in combination with widespread pain. Additionally participants drawn from a pain clinic. Control group: no information.	Pain location and intensity (101-NRS), disability (Oswestry Low back Pain Disability Index), quality of life (SF-36), depression (The General Depression Scale), anxiety (STAI), interview regarding personal issues. Clinical assessment

First Author Year Country	Objective	Study population	Pain	Recruitment	Outcome measurements
Gerhardt 2011 [2] Germany	Investigate the prevalence and the type of mental co-morbidity in a representative population-based sample of individuals with chronic back pain.	110 participants: w = 57% Mean age = 48 ± 13.3	Back pain ≥45 days during the last 3 months.	Study population a random sample of 4000 persons drawn from communities. 3899 returned a questionnaire, all individu-als (*n* = 427) suffering from back pain ≥45 days contacted. 303 accepted invitation for a clinical examination and 117 could be included for interviewing. 110 evaluated. Non-specific pain evaluated at clinical assessment.	Mental comorbidity (SCID)
Harris 2003 [38] United Kingdom *Identified from reference list*	Hypotheses: In addition to any impact of interruption and interference that pain might have, identity, assessed both functionally and structurally, would be associated with poor psychological adjustment, measured as depression.	80 participants w = 46, *m* = 34 Mean age = 44.5 years	Chronic pain ≥6 months Duration = 1–40 years (mean = 9.2 years) Location: low back (34%), post-surgical (21%), arthritis (11%)	Attendees at a pain clinic between 16 and 65 years were invited. 99 agreed to participate. 18 were unable to schedule an interview and one person withdrew consent.	Pain severity (MPQ-SF), disability (PDI), depression and anxiety (BDI, HADS), role and attributes (RAT)
Huber 2008 [17] Italy	Identify the predictors of psychological distress and well-being.	69 participants All women In- and outpatients	Chronic diffuse musculoskeletal pain ≥3 months. Duration = 113.5 ± 106.2 FM (*n* = 41); Widespread pain (*n* = 13); Multiregional pain, not widespread (*n* = 15)	The University of Siena Rheumatology Unit. Both outpatients and inpatients who had been subjected to systematic evaluation for various diseases now referred to confirm or exclude a suspected diagnoses of FM.	Physical symptoms: pain duration, pain area/extent (body pain drawing), pain intensity (VAS 0–100) Psychological distress and well-being: general psychiatric symptoms and psychological distress (SCL-90), trait anxiety (STAI-Y), well-being (MAPS WB)
Kindermans 2010 [39] The Netherlands	1. Provide a content analysis of selves in patients with chronic low back pain. 2. Explore, whether the content of the selves was related to the level of disability. 3. Explore the role of depression.	80 participants w = 39, *m* = 41) Age: 22–65 years, mean age = 47.8 years	Non-specific chronic low back pain. Duration = 5 months 44–years, mean 11.2 years	Departments of rehabilitation medicine in hospitals and a rehabilitation centre in the South of The Netherlands and through advertisements placed in local newspapers.	Self-guides (HSQ): semistructured interview Disability (RDQ), depression (BDI-II), pain intensity (VAS)
Kowal 2012 [37] Canada *Preliminary searching*	Evaluate to which extent self-perceived burden (SPB) is relevant to individuals with chronic pain.	238 participants w = 141, *m* = 97, age: 21–73 years (mean = 47.1)	Duration = 5 months–53 years, mean = 6.8 years. Location: back = 33.6%, generalized = 29%, neck = 8.8%, and shoulder, arm, leg, other	Consecutive patients admitted to an outpatient, group-based, interdisciplinary chronic pain self-management programme at a rehabilitation hospital.	Self-perceived burden (SPBS), pain intensity, functional limitations

First Author Year Country	Objective	Study population	Pain	Recruitment	Outcome measurements
Lundberg 2011 [27] Sweden	1. Describe the occurrence and; 2. Investigate the association of the fear-avoidance model variables (pain intensity, kinesiophobia, depression, and disability) in patients with specific or nonspecific chronic low back pain.	147 participants w = 81, m = 66 Age: 18–65 years	Persistent pain Duration: 3–12 months (n = 42) 1–2 years (n = 23) ≥2 years (n = 82)	205 patients consecutive patients with chronic low back pain, attending the orthopaedic outpatient clinic at Sahlgrenska Univeristy Hospital, were invited to participate in the study. Recruited through one year.	Disability (ODI), depressed mood (SDS), pain intensity (VAS) Clinical examination: Diagnosed as 'specific' low back pain or 'nonspecific' low back pain (ICD-10)
Nordeman 2012 [18] Sweden	1. Estimate prevalence of widespread pain in women with CLBP consulting primary health care. 2. Evaluate differences in body function, activity, participation, environmental factors, health-related quality of life, and other health-related aspects between patients having chronic low back pain with or without widespread pain.	130 participants All women Age: 18–60 years Chronic low back pain (n = 93): 44 ± 11 years Chronic low back pain + widespread pain (n = 37): 47 ± 9.7 years	Chronic low back pain ≥ 12-week duration Duration of symptoms, mean: 9.5 ± 8.7 years	Systematic journal search for low back pain diagnoses at 8 primary health care settings in South Western Sweden, a mixture of urban and rural populations, from 2004–2005.	Pain intensity (VAS), distress (HADS), private social support (MOS-SSS), risk for future disability (ÖMPSQ), stress symptoms (SCI-93), quality of life (SF-36) Clinical assessment: pain location, tender points
Peilot 2010 [35] Sweden	1. Assess quality of life with the SF-36 in two populations of patients with long-term pain, sick-listed full or part time one from a company health service and the other from psychiatric and; 2. Compare their results with a normative population.	75 participants w = 79% 1. With psychical co-morbidity (n = 30), age: 26–61, mean: 41 years. 2. From company health service (n = 42), age: 25–58, mean: 44 years Normative control group 8930 (w = 51.5) Age: 15–93 years	All patients long-term pain ≥3 months With psychiatric comorbidity: FM (40%), CWP (20%), chronic regional pain (10%), whiplash trauma (20%), lumbago (10%) From company health service: FM (35.5%), CWP (19%), Chronic regional pain (33.1%), whiplash trauma (2.4%), lumbago (10%)	1. From a psychiatric consultation in Mariestad, Sweden. Referred for psychiatric consultation, had not benefited from conventional treatment. Sicklisted. Included over 2 years. 2. Assessed of a company health service in Mariestad, Sweden. Sicklisted for 3 months or more. Included over 3 months. Normative control croup: Selected from population studies (n = 13,152)	Quality of life (SF-36)
Raftery 2011 [25] Ireland	1. Identify prevalence of chronic pain in Ireland. 2. Examine the physical and psychological profiles of individuals with chronic pain compared with a sample without pain.	1204 participants w = 51.8% Age: 18–98, mean 46.8 ± 16.25 years	Groups: Chronic pain (n = 428) Pain ≥3 months, duration: range=3 months-50 years, mean 7.6 ± 9.5 Location: Lower back (47.2), knee (30.4), neck (29.7), shoulder (27.3), etc. Mean number of pain sites: 4.2 ± 3.6, range = 1–25 Pain-free group (n = 776)	3300 patients identified from general practitioners databases. After exclusion by general practitioner 3136 were sent a questionnaire. 1204 were returned. Response rate: 40.1%	Chronic pain (defined from IASP), quality of life (SF-12), depression (HADS), pain severity and disability (Chronic Pain Grade Questionnaire)
Reme 2011 [28] Norway	Assess the prevalence of psychiatric co-morbidity in a population of chronic low back pain patients.	565 participants w = 50.5%, sick listed Age: mean 45 ± 9.8 range = 20–60 years	Unspecific low back pain Duration, mean: 3 months Pain intensity, mean: 6.5 ± 1.9	Patients were consecutive participants in an ongoing trial with different treatments for low back pain. Invited of the National Insurance Administration about possibility to participate in a multicenter RCT.	Pain (BPI, modified), anxiety and depression (HADS), psychiatric disorders (MINI Plus)

First Author Year Country	Objective	Study population	Pain	Recruitment	Outcome measurements
Silvemark 2008 [36] Sweden	1. Investigate the level of satisfaction with life in a group of patients with long-term pain, and compare the results with earlier findings in a large reference group. 2. Study the relation of life satisfaction levels in patients with long-term pain to basic demographic data. Study the relation of life satisfaction to pain intensity.	294 participants *w* = 66% Age: 38.1 ± 9.4 years, range 18–64 years	Long-term non-malignant pain ≥6 months Duration, mean: 2344 ± 2264 days Location: Neck (20%), shoulder and/or arm (15%), thoracic back (4%), lumbar back (8%)	Patients referred from regional general practitioners, company doctors and specialist clinics to the Pan nd Rehabilitatino clni, University Hospital, Uppsala, Sweden.	Life satisfaction (Li-Sat11), pain intensity (VAS)
Stubbs 2010 [15] USA	1. Assess sex differences in pain-related disability among patients with chronic musculoskeletal pain. 2. Assess whether observed sex differences are accounted for by psychiatric or psychological factors	500 participants w: 51.8%, age: 57.2 ± 13 years. M: 48.2%, age 60.9 ± 14 years. 250 with clinical depression and 250 with minimal to no depression.	Persistent ≥3 months Location: W: back = 54%, leg = 45% M: back = 57%, leg = 43%	Participants identified through electronic medical records in two urban sites, the Indiana University Medical Group community-hospital affiliated primary care clinics and the Richard Roudebush Veterans Affairs Medical Centre general medicine clinics	Computer-assisted telephone interviews: Pain intensity (BPI), disability (BPI, GCPS, RDS), depression (SCL-20), anxiety (GAD-7)
Tajar 2011 [19] United Kingdom	Hypotheses: Musculoskeletal pain would be associated with sexual dysfunction in men and that observed associations could be confounded by lifestyle and/or health-related factors.	3206 participants All men Mean age = 59.9 years, range = 40–79 years	Groups: No pain: 40.99% Some pain: 50.34% CWP: 8.67%	Those with full dataset of 3369 men who participated in The European Male Ageing Study.	Lifestyle, pain, sexual functioning and sexual health (EMAS-SFQ), depression (BDI)
Waxman 2008 [23] Canada	Determine which psychosocial variables mediate the relationship between pain and relationship satisfaction and the degree to which each variable accounts for this relationship.	54 participants w = 30 Age, mean = 50.5 ± 10.85 years Age, range = 27–75 years	CLBP ≥3 months Duration, mean = 13.20 ± 10.47 years Duration, range = 1–41 years	A local community-based chronic pain clinic at Southeastern Ontario Hospital or asked through newspaper or medical office solicitation.	Patients' perceptions of the range and frequency of responses by a significant other to displays of pain and suffering (MPI), pain intensity (MPQ-SF), depression (CES-D), quality of current relationship as perceived by married or cohabitating couples (DAS)
White 2002 [29] Canada *Identified from reference list*	1. Estimate the proportion of community cases of FM who have significant evidence of depression and anxiety using validated psychometric instruments. 2. Compare this FM cohort with a cohort of community controls with chronic widespread musculo-skeletal pain, but who did not meet current classification criteria for FM.	122 participants 74 FM cases w = 93.2% Mean age = 50.0 years 48 CWP patients w = 66.7% Mean age = 53.7 years	Chronic = minimum 3 months Assessment 18 months after baseline confirmed: 74 FM cases, 48 CWP patients	Recruited through the London FM Epidemiology Study, a general population survey with a sample of 3395 noninstitutionalized adults in London, Ontario, Canada	Psychological distress (CES-D), anxiety (STAI), general Health (OHS), FM impact (FIQ), course of symptoms since symptom onset

Cohort studies

First Author Year Country	Design	Objective	Study population	Pain	Recruitment	Follow-up	Outcome measurements
Kroenke 2011 [4] USA	Observational longitudinal cohort study	Hypothese: Over 12 months, pain and depression will exhibit predictable influences on one other.	500 participants w = 52%, age, mean = 59 years 250 depressed, 250 nondepressed	Musculoskeletal pain in low back, hip or knee ≥3 months Duration, range = 8–10 years	Indiana University Medical Group Primary Care system, 6 community-based clinical sites and Richard L. Roudebush Veterans Administration Medical Centre, 5 general medicine clinics	3, 6 and 12 months	Pain severity (GCPS), depression (SCL-20)
Newcomer 2010 [30] USA	Observational prospective cohort study	Hypothese: The patients with CLBP would initially have a higher level of disability than patients with acute LBP, as well as higher fear-avoidance belief scores and anxiety levels and that their improvement in all these measures would be less that for the acute LBP patients.	245 participants 138 acute LBP, w = 66%, mean age = 39.2 ± 11.4 107 chronic LBP, w = 57%, mean age = 44.5 ± 12. Follow up: 197 completers: 111 acute LBP, 86 chronic LBP	Chronic pain >3 months Acute pain ≤3 months	Patients presenting to various clinics in our institution for initial evaluation of their pain: the spine centre, the outpatient physical medicine and rehabilitation clinic, and the employee health centre	12 months	Disability (ODI), anxiety (STAI)

Abbreviations: 101-NRS = Numeric Rating Scale; BDI = Beck Depression Inventory; BDI-II = Beck Depression Inventory-II, BPI = Brief Pain Inventory; CES-D = Centre for Epidemiological Studies Depression Scale; CLBP = Chronic low back pain; CWP = Chronic widespread pain; DAS = Dyadic Adjustment Scale; EORTC QLQ-C30 = The European Organization for Research and Treatment of Cancer Quality of Life Questionnaire Core-30; EMAS-SFQ = Europe Male Ageing Study-Sexual functioning Questionnaire; FM = Fibromyalgia; FIQ = Impact Questionnaire; GAD-7 = Generalized Anxiety Disorder; GCPS = Graded Chronic Pain Scale; HADS = Hospital Anxiety and Depression Scale; HSQ = Health Status Questionnaire; ICD-10 = International Classification of Diseases-10; LBP = Low back Pain; m = men; LiSat-11 = Life Satisfaction Questionnaire-11; MINI-Plus = The Mini-International Neuropsychiatric Interview-Plus; MOS-SSS = Medical Outcome Study Social Support Survey; MPQ = McGill Pain Questionnaire; MPQ-SF = McGill Pain Questionnaire Short-form; NHP = The Nottingham Health Profile; MPI = Multidimensional Pain Inventory-Part II; MPQ = McGill Pain Questionnaire; ODI = Oswestry Disability Index; OHS = Ontario Health Survey; PDI = Pain Disability Index; PDS = Post-traumatic Stress Diagnostic Scale; PTSD = Posttraumatic stress disorder; RDQ = Roland Disability Questionnaire; RDS = Roland Disability Scale; RAT = Role and Attribute-test; SCID = The Structured Clinical Interview for the Diagnostic and Statistical Manual of Mental Disorders IV; SCL-90 = Symptom Checklist 90; SDS = Zung Self-Rating Depression Scale; SF-12 = Short Form-12; SF-36 = Short Form-36; SIP = Sickness Impact Profile; STAI = State-Trait Anxiety Inventory; SPBS = Self-Perceived Burden Scale; STAI-Y = State-Trait Anxiety Inventory Form-Y; SCL-20 = Symptom Checklist-20; VAS = Visual Analogue Scale; w = women; WAD = Whiplash associated disorders; ÖMPSQ = Örebro Musculoskeletal Pain Screening Questionnaire.

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