REVIEW

Associations among gender, coping patterns and functioning for individuals with chronic pain: A systematic review

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BACKGROUND: Developing strategies for coping with chronic pain is an integral part of successfully living with this often debilitating health condition. While gender differences in pain coping strategies have long been investigated, the relationship between gender-specific engagement in coping and associated functioning in individuals experiencing chronic pain is yet to be clearly understood.

OBJECTIVE: The present systematic review focused on studies that address these relationships to critically evaluate the available evidence.

METHODS: A systematic search was conducted using MEDLINE via Ovid, EMBASE, PsycINFO and CINAHL, with 7247 titles retrieved. To be included, studies had to be in English, focus on adult participants, consider chronic nonmalignant pain, use measures of coping and functioning (or disability), report on gender-specific outcomes (for coping and functioning [or disability]), and investigate a relationship among gender, coping and functioning. One researcher screened abstracts and full-text articles, and extracted and tabulated data, while two researchers independently assessed potential articles for eligibility and methodological quality.

RESULTS: Only seven studies met the inclusion criteria – six of high quality and one of moderate quality. The presented findings suggest that women in pain are more likely to use coping strategies considered to be maladaptive, resulting in poorer functioning, while men tend to engage in coping strategies considered to be adaptive, leading to better functional outcomes.

CONCLUSIONS: While there is some evidence supporting gender-specific engagement in coping and associated functioning, future research is necessary to expand understanding of these interrelations.

Key Words: Chronic pain; Coping; Disability; Functioning; Gender; Sex; Systematic review

Chronic pain is a major health issue (1-3), one of the leading causes of disability (4,5) and the third most common reason for work absence in the United States (6). The implications of chronic pain for functioning in everyday life have received considerable empirical attention (7,8), and a variety of coping strategies that may support or hinder functioning when individuals are experiencing pain have been identified (9,10). These coping strategies are considered to be intentional efforts that people use to deal with the stress of ongoing pain.

The coping process, intimately linked with pain, also serves an important role in social expression and communication (11-13). Understanding more about this partly innate, partly learned and very individual process is critical for being able to provide more effective treatment of people in pain. This is highlighted by the fact that long-term pain relief and return to work have been documented to be successful in only approximately one-half of individuals living with chronic pain, even after completing multidisciplinary rehabilitation programs (14,15). After completion of these programs, women in particular appear to have difficulties in maintaining achieved successes to support their functioning in life; one study has shown that they frequently returned to their preintervention levels of catastrophizing, while men did not (16). This suggests that gender differences are still not well understood and gender-differentiated treatment requires more attention.

With the growing awareness of gender effects on coping and functioning in a chronic pain population, much research has been conducted in the recent years. Some differences in functioning and pain management behaviours between men and women with chronic pain have been documented (17-20), however, there are inconsistencies.

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While some results indicate that women and men are similar in their coping attempts (21,22) and level of functioning (23,24), others have observed gender differences in both coping (21,25,26) and functioning (21,27,28). Besides considerable research on these individual correlations, the more complex relation among all three terms of interest has received less attention. Men and women differ in their pain experience, with biological factors, such as differences in hormone levels, posited as one reason for these differences (21,29). However, other than biological reasons, gender differences in pain may also be related to psychosocial factors such as symptom reporting patterns (28).

The present systematic review was motivated by a need to provide guidance for future research and to highlight gaps and inconsistencies in the available literature. The particular focus has been chosen to promote better understanding of gender differences in pain behaviour. This, in turn, will guide the development and provision of the best possible treatment for each individual patient.

This systematic review addresses two goals: to review current knowledge about associations among gender, coping patterns and functioning in the face of chronic pain; and to provide directions for further research and clinical approaches.

METHODS

Inclusion criteria
To be included in the present systematic review, studies needed to be written in English, focus on adult participants (≥18 years of age), consider chronic nonallegiant pain (duration of ≥3 months), include a measure of coping/pain management strategies, include a measure of functioning (including activity, participation and/or disability), report gender-specific outcomes (ie, gender differentiation of coping/pain management and functioning) and investigate a relationship among these three variables (gender, coping and functioning). The focus was on associations among gender, coping and functioning in adults only because the heterogeneity of a mixed sample of adults and minors would confound findings due to different role participation in adulthood and childhood that determine functioning in daily living.

Articles focusing on malignant or experimental pain studies were excluded, as was research focusing on case or single-sex studies. No restrictions regarding publication dates were imposed.

In this systematic review to conduct a comprehensive literature search. For the purpose of the present study, the term ‘gender’ will be adopted, unless otherwise specified in relation to particular literature. Additionally, database-specific MeSH terms and headings were included to improve the search results. Using these search terms, 7245 articles were identified, and an additional two articles were retrieved from manual screening of reference lists and bibliographies.

Inclusion and data extraction process
The Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines and Participants, Interventions, Comparisons, Outcomes and Study design (PICOS) elements (32) were used to guide the present systematic review through all stages: planning, evaluating articles, conducting the research and writing the manuscript. After obtaining articles through the initial search process, one reviewer screened abstracts and full-text articles for eligibility. An abstract screening form and a full-text screening form were specifically designed for this purpose, based on previously described criteria for inclusion in the present systematic review. Any discrepancies that arose during the screening process were discussed by the team of three researchers until conciliation was reached. In the next step, two reviewers independently assessed potential articles for suitability for inclusion using another custom designed form. One reviewer extracted the data and tabulated them; a second reviewer verified the accuracy of the table with attention to each article. Study characteristics can be found in Table 1. Due to the small number of studies, and the variety of research designs, diagnoses and outcome measures evidenced in the studies, the focus of the present systematic review was on describing the available literature in the form of qualitative synthesis rather than a meta-analysis (32).

Methodological quality assessment
The methodological quality of each of the obtained studies was assessed using a modified version of the original Downs and Black Checklist (35) (Appendix 1). Reporting style, as outlined in the checklist, as well as external validity, internal validity and statistical power were assessed by two independent reviewers. Disagreements were resolved through objective discussion. No articles were excluded based on methodological quality.

RESULTS

Study selection
The process of study inclusion is presented in the flow diagram in Figure 1. A total of 7245 studies were identified through database searches and two additional studies were retrieved by the screening
of bibliographies of relevant articles. All were published documents. After the removal of 751 duplicates, the remaining 6496 articles were subject to further examination. Screening of the abstracts resulted in 6079 studies being excluded because of ineligibility for this systematic review. The full texts of the remaining 417 articles were analyzed in detail. This resulted in further exclusions, as detailed in Figure 1. The remaining seven studies met all of the inclusion criteria and were included in the present systematic review.

### Study characteristics

| Study                  | Design                        | Type of pain                      | Duration of pain, months, mean ± SD | Age, years, mean ± SD | Gender, M/F, n | Measure of coping/pain management | Measure of patient functioning | Methodological quality score, % |
|------------------------|-------------------------------|-----------------------------------|--------------------------------------|------------------------|----------------|-----------------------------------|-------------------------------|-------------------------------|
| Bergström et al (43), 1999 | Cross-sectional (n=235) | Long-term nonspecific low back pain and/or neck pain | 32.5±58.7 | 43.6±10.3 | 106/129 | CSQ-CAT | MPI-S | 71.43 |
| Edwards et al (46), 2000 | Cross-sectional (n=215) | Chronic pain | 58.8±61.2 | 42.9±10.9 | 101/114 | CSQ | MPI | 71.43 |
| Hirsh et al (48), 2011 | Cross-sectional (n=248) | Chronic pain secondary to a disability (SCI and MS) >3 months | – | SCI: 48.49±11.84 | 120/128 | CSQ-CAT | Pain Interference Scale | 85.71 |
| Keeve et al (44), 2000 | Cross-sectional (n=168) | Chronic pain due to osteoarthritis of the knees | – | M: 60.88±10.75 | 72/96 | CSQ-CAT | AIMS | 78.57 |
| Koopman et al (42), 2004 | Prospective cohort study (n=51) | Chronic low back pain >6 months | 76.5±102.6 | 41.7±8.5 | 30/21 | CSQ | QBPD | 57.14 |
| Smith et al (47), 2002 | Cross-sectional (n=80) | Chronic myofascial pain >6 months | 136.56±91.32 | 48.67±11.82 | 20/60 | EAC | RTW | 71.43 |
| Wijnhoven et al (45), 2007 | Cross-sectional (n=2517) | Chronic musculoskeletal pain >3 months | – | M: 55.7 | 1070/1447 | PCS | SQUASH | 71.43 |

**Aims** Arthritis Impact Measurement Scale; **BPI** Brief Pain Inventory; **CSQ** Coping Strategies Questionnaire; **CSQ-CAT** Catastrophizing Subscale of the CSQ; **DRI** Disability Rating Index; **EAC** Emotional Approach Coping Scale; **F** Female; **M** Male; **MPI** Multidimensional Pain Inventory; **MPI-S** MPI – Swedish Version; **MS** Multiple Sclerosis; **PCS** Pain Catastrophizing Scale; **PILE** Progressive Isoinertial Lifting Evaluation; **QBPCS** Quebec Back Pain Disability Scale; **RTW** Return to Work; **SCI** Spinal Cord Injury; **SQUASH** Short Questionnaire to Assess Health-Enhancing Physical Activity; **VMPCI** Vanderbilt Multidimensional Pain Coping Inventory; **WHYMPI** The West-Haven-Yale Multidimensional Pain Inventory

In all three cases, women were functionally impacted more than men. Significant differences in functioning between men and women with chronic pain were reported. In three of the high-quality studies, significant differences in functioning were reported in these articles. The most commonly used, in three studies, was the Multidimensional Pain Inventory Pain Interference Scale (MPI) (37). All other measures were used just once; the Brief Pain Inventory – Pain Interference Scale (BPI) (38), the Quebec Back Pain Disability Scale (QBPD) (39), the Arthritis Impact Measurement Scale (AIMS) (40) and the Short Questionnaire to Assess Health-Enhancing Physical Activity (SQUASH) (41) (for further information on measurements used, please see references 36-41). Additionally, 71.43% and 14.29% of the studies included measures of depression and anxiety, respectively.

### Methodological quality analysis

The outcomes of the methodological quality analysis are presented in Table 1. Six of the studies were of high quality, with scores ≥70% on the modified Downs and Black Checklist. The study by Koopman et al (42), with a score of 57.14%, was considered to be of moderate quality. Five different measures of functioning were used in these articles. The most commonly used, in three studies, was the Multidimensional Pain Inventory Pain Interference Scale (MPI) (37). All other measures were used just once; the Brief Pain Inventory – Pain Interference Scale (BPI) (38), the Quebec Back Pain Disability Scale (QBPD) (39), the Arthritis Impact Measurement Scale (AIMS) (40) and the Short Questionnaire to Assess Health-Enhancing Physical Activity (SQUASH) (41) for further information on measurements used, please see references 36-41). Additionally, 71.43% and 14.29% of the studies included measures of depression and anxiety, respectively.

### Gender and functioning in chronic pain

In three of the high-quality studies, significant differences in functioning between men and women with chronic pain were reported. In all three cases, women were functionally impacted more than men. The measurement of functioning differed in each of these studies, with...
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| TABLE 2 | Summary of the identified associations (including effect sizes) |
|----------------------|---------------------------------------------------------------|
| Associations between coping and functioning | Associations between coping and functioning |
| Catastrophizing and lower levels of functioning | Bergström et al (43), 1999 |
| | Hirsh et al (48), 2011 |
| | The association between gender and catastrophizing approached significance for pain interference (β=0.28; P=0.06). Women with greater catastrophizing were slightly more strongly associated with greater pain interference in activities of daily living than men (β=0.44; P<0.001) when compared with men (β=0.22; P=0.02) |
| | Keeffe et al (44), 2000 |
| | Catastrophizing appeared to function as a mediator in the relationship between gender and pain-related outcomes (including physical disability). It has been found that women were using catastrophizing significantly more often (mean ± SD 7.01±6.95 and 3.08±4.48) and also experienced greater physical disability levels (1.95±1.00 and 1.45±0.87) compared with men, respectively |
| | Wijnhofen et al (45), 2007 |
| | High levels of catastrophizing were associated with poorer levels of functioning in men (1.74 [95% CI 1.31–2.31]; P<0.05) and women (1.66 [95% CI 1.33–2.07]; P<0.05). The difference between the genders, however, has not been found to be statistically significant. Women, however, have been found to engage in this coping pattern more often (P<0.05). Men engaging in catastrophizing coping behaviours have been found to experience greater work disability (2.63 [95% CI 1.63–4.25]; P<0.05) when compared with women (1.35 [95% CI 0.89–2.04]; not statistically significant) |
| ‘Reinterpreting pain sensations’ and higher levels of functioning | Koopman et al (42), 2004 |
| | Male gender and engagement in ‘reinterpretation of pain sensations’ were factors related to return to work within 12 month (OR for sex in multiple logistic regression analyses: 1.00 and 0.10) |
| Emotional Approach Coping and higher levels of functioning | Smith et al (47), 2002 |
| | Men engaging in Emotional Approach Coping experienced lower physical impairment. This association was not found for women (partial correlation coefficients –0.30 and 0.06, respectively) |
| Presence of emotional states (eg, anxiety and depression) are associated with coping and functioning | Edwards et al (46), 2000 |
| | Men with high anxiety levels experienced greater pain interference when compared to men with low anxiety levels (P<0.05). This association was not found for women and did not appear to be mediated by coping strategies. |

Bergström et al (43) using the MPI Pain Interference Scale among other measurements, Keeffe et al (44) using the AIMS, and Wijnhoven et al (45) using a dichotomous low/moderate to high scale of physical functioning (41).

Three studies (all of high quality) found no significant differences in functioning between men and women with chronic pain. Measures used to assess functioning in this subset of studies included the MPI Pain Interference Scale, which was used by both Edwards et al (46) and Smith et al (47), and a modified version of the BPI Interference Scale, which was used by Hirsh et al (48).

In the remaining study (of moderate quality), Koopman et al (42) did not consider gender differences in disability despite using the Dutch version of the Quebec Back Pain Disability Scale. However, they reported on gender differences with respect to return to work, with men having better outcomes.

Gender and coping

In four of the seven studies (57.14%), differences were found in pain coping strategies used by men and women with chronic pain. These four studies specifically examined the associations among catastrophizing, pain intensity and gender. In three of these four studies (43-45), women in pain had higher rates of catastrophizing than men in pain, with Bergström et al (43) and Keeffe et al (44) using the Catastrophizing Subscale of the CSQ, and Wijnhoven et al (45) using a Dutch version of the Pain Catastrophizing Subscale. In the fourth study, Hirsh et al (48) reported a trend for men in pain to exhibit higher catastrophizing than women in pain (P=0.09). This study also used the Catastrophizing Subscale of the CSQ.

In contrast, the fifth study, by Smith et al (47), found no significant differences between men and women on the Emotional Approach Coping (EAC) scale, or on any of the Vanderbilt Multidimensional Pain Coping Inventory scales. Meanwhile, in the sixth study, Edwards et al (46) found no significant differences between the pain coping strategies used by men and women in chronic pain using the CSQ.

In the one longitudinal treatment study, Koopman et al (42) found that treatment significantly decreased the use of catastrophizing and praying and hoping strategies of the sample, and increased the use of reinterpreting coping strategies across the group who participated in a multidisciplinary back pain program. The CSQ scales were used in this study. They did not, however, find any interactions for gender differences on these pain coping strategies across the three time points.

Gender, function and coping

All of the included studies reported some findings about how all three of the variables of interest – ie, gender, coping strategy use and functioning – were linked. These are summarized in Table 2. Using Structural Equation Modeling, Keefe et al (44) found that catastrophizing appeared to mediate the relationship between gender and pain-related outcomes including physical disability. Higher levels of catastrophizing and higher physical disability were found in women. Similarly, a stronger correlation between catastrophizing and interference for women than men was reported by Bergström et al (43). Hirsh et al (48) found that the interaction between catastrophizing and gender approached significance for pain interference (P=0.06); that is, while they found a significant association between catastrophizing and pain interference for both genders, this was slightly stronger for women. Wijnhoven et al (45) also found a significant association between increased pain catastrophizing and poorer functioning in both men and women. Nevertheless, they also found that women used this coping attempt to a greater extent compared with men. Additionally, the authors found that catastrophizing was associated with greater work disability for men only.

Koopman et al (42) used multiple regression analysis to determine factors that predicted a successful return to work after treatment, and found that being male, younger age, lower levels of functional disability and increased use of the coping strategy ‘reinterpretation of pain sensations’ predicted increased return to work within 12 months.

Smith et al (47) found that increased use of EAC in men in pain tended to be associated with less life interference on the MPI Pain Interference Scale, although this association did not reach significance. No such association was found for women. With 60 women and 20 men in their study, the authors posited that the limited power to detect
significant gender differences may have affected their results. This study
did, however, find that increased use of EAC was associated with better
functioning for men. Edwards et al (46) found that men who were
highly anxious had greater pain interference than men with low anxiety.
This association was not found for women and was unrelated to the use
of specific coping strategies in both genders. Furthermore, there were
significant correlations for men, between high levels of anxiety and
catastrophizing, high levels of anxiety and praying and hoping, and high
levels of anxiety and reduced use of coping self-statements. In women,
higher levels of anxiety were associated with greater engagement in
praying and hoping and higher levels of catastrophizing.

DISCUSSION

The present systematic review was conducted to achieve two goals: to
review the current knowledge about associations among gender, coping
patterns and functioning in the face of chronic pain; and to provide
directions for further research and clinical approaches. It is, to
our knowledge, the first systematic review to have examined gender, coping
and functioning in people with chronic pain. The inclusion of more
than one synonym for the keywords and a very detailed data screening
process makes it unlikely that relevant work has been overlooked.

From 7,247 titles identified, 6,496 articles were initially retrieved for
review. Of the articles that met the inclusion criteria, only seven were
retained for inclusion in the present systematic review. Of these articles,
six were of moderate methodological quality, while the remaining article
was of high methodological quality. However, the limited number of articles and the variations in the measures and study designs
limited our capacity to draw definitive conclusions. While an examination
of these seven studies does not permit conclusions to be made on the relationships among gender, coping strategy use and func-
tioning in people with chronic pain, it does provide some preliminary
findings, which can help inform further research.

Tentative conclusions that can be drawn are that there appear to
be some gender-specific differences in the use of specific types of cop-
ing strategies, and in the influence of these strategies on functioning
in men and women in chronic pain. With regard to catastrophizing, most
studies reported associations with poorer functioning for both genders.
While there was a trend for these associations to be stronger for
women than for men, most of these analyses did not reach signifi-
cance. This general lack of differences between the genders in relation
to the association between catastrophizing and functioning appears to
be in contradiction with the expectation that women experience
lower functioning, related to the consistent finding in the coping lit-
erature and in most articles in the present review that women use this
coping strategy to a greater extent. Further research involving larger
sample sizes to obtain more significant results would be needed to
address this apparent discrepancy.

Pain expression – not only through language, but also through
nonverbal expression – is an important aspect of personal protection
and pain management, but also serves as a medium of social communi-
cation (12,33). The stronger engagement of women in catastrophizing
as a coping strategy could be explained on biological grounds. For
example, the hormone oxytocin, which women produce more than
men, is released in stressful situations and has been found to be associ-
ated with seeking social support (49). Because catastrophizing coping
behaviours are often discussed as a medium of communication (11),
this way of coping is more applicable to the general coping structure of
women. On the other hand, gender role socialization may also be asso-
ciated with women’s greater engagement in emotion-focused coping
behaviours such as catastrophizing. From an early age, women are
socialized to express their emotions and seek social support, while men
are more likely to be discouraged from doing so (49,50). In general,
emotional expression has been strongly linked with social interactions
and gender-specific relationship patterns, especially with regard to
displaying vulnerability (13). It is, therefore, possible that both innate
and learned aspects are associated with gender-specific engagement in
coping behaviours and associated functioning.

It has further been found in the present review that women experi-
ence greater interference from pain on their functioning, which was, in
part, associated with greater engagement in catastrophizing. Therefore,
it is possible, as opined by Keele et al (44), that clinical management of
women with chronic pain may require greater attention to reducing reli-
ance on catastrophizing. Keele et al suggested that women, in particular,
may benefit from ‘cognitive restructuring’ to decrease their catastrophic
thinking, with a subsequent increase in functional ability. However,
given the findings of the present systematic review, not only women, but
also men, may benefit from this intervention.

It is important to consider the possibility that women experience
greater functional interference from pain than men, independent of
the specific coping strategies used. This may be explained by greater,
or at least different, social role expectations for women. Bergström et
al (43) raised this issue, noting the wider and more numerous life
roles of women. For example, women with chronic pain may be ex-
pected to participate in “paid work, child-care, household activi-
ties and social relationships” (43). If they develop a chronic pain
condition, they may prioritize their family roles and responsibilities
over work-related roles (51). This aspect needs to be considered with
regard to implications for results on functional measures in previous
research and highlights the need for consideration in future studies.
In contrast, men may only have one major role, that of paid work. If
this was the case, then clinical management for women may be
addressed toward acquiring additional support to attend to their life
roles, such as task reassignment within families or acquisition of
additional, paid help.

Another tentative recommendation to emerge from the present
review is that men with chronic pain should be introduced to a wider
array of coping strategies, such as emotion-focused coping, which may
assist them to obtain better functional outcomes. The findings by
Smith et al (47) suggested positive associations between the use of
EAC and less physical impairment for men. This suggests that men
with chronic pain may benefit from training in the use of emotion-
focused coping strategies. The results that men and women did not
differ in their use of EAC appear to contradict the common belief that
women use emotion-focused coping strategies more often than men, as
reported by Linnuh (21). Understanding this discrepancy could pro-
vide essential insights into fundamental differences in pain behaviour
between men and women. In particular, although men tend to engage
in emotion-focused coping strategies less often, they appear to experi-
ence better functional outcomes when doing so. Up-skilling men in
the use of emotion-focused strategies may provide them with an addi-
tional tool to manage their pain.

The other coping strategy found to be associated with improved
functioning was the use of reinterpreting pain sensations. Men in the
respective study were also more likely to be in the group with improved
function after rehabilitation. Hence, women may benefit from learning
more about re-interpreting pain sensations as a coping strategy.

Other important factors that may impact upon an individual’s
pain experience, coping and functioning include emotional states
such as depression and anxiety (24,52). While not the focus of the
current review, five (71.43%) and one (14.29%) of the studies
included in the present systematic review used measures of depres-
sion and anxiety, respectively. In general, women are believed to be
more vulnerable to both depression and anxiety than men (24).
Furthermore, women with high levels of depression reported higher
degrees of disability than men (24). While women with chronic pain
complaints seemed more likely to experience higher levels of depres-
sion than men (51), men were more likely to experience anxiety.
Edwards et al (46) found that men with higher anxiety levels had
increased pain, increased pain interference and decreased activity
when compared with men with lower anxiety levels, while no such
association has been found for women. This suggests that future stud-
ies should include the variables of depression and anxiety, given
potential gender differences in these variables, which may mask
gender-related coping differences. Clinically, it may be important to
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initially assess and treat emotional states, before aiming to modify gender-related coping patterns. Individuals may be able to achieve greater improvement of their functional ability, when interventions targeting emotional states and coping factors are stepwise included in treatment programs in clinical practice.

Chronicity of the pain may also be a factor to consider when evaluating coping strategies and functioning in the light of gender. Keefe et al (44) theorized that gender may not moderate the effects on functioning as strongly in a sample of individuals with a higher level of disability. Longer pain duration is related to greater levels of disability, and more maladaptive coping strategies are observed at such times (53). It is possible that more prominent gender differences in coping may be observed in a sample of individuals with acute pain, or among individuals living with recently acquired chronic pain. Furthermore, sample characteristics, such as whether the participants are in active treatment and the types of pain conditions, may have an important influence on the findings and should, therefore, be taken into consideration and reported in detail in future research.

The review was hampered by the use of multiple measures of the same constructs. Greater consistency in the use of particular outcome measures across studies would be useful to enable a more direct comparison of results across studies. The IMMPACT guidelines (54) can provide some guidance, but it must be noted that IMMPACT did not suggest uniform measurement of the coping construct. The MPI Pain Interference Scale or the BPI Pain Interference Scale are both IMMPACT-endorsed scales.

It is possible that the present systematic review is affected by publication bias, resulting in a reduced number of studies due to the non-publication of nonsignificant findings. In addition, mostly self-report questionnaires were used in studies examining coping strategies and levels of functioning and disability. This could be seen as a limitation because no objective measures were used, but can also be seen as a strength, enabling examination of the subjectively perceived pain experience. Furthermore, the small number of male participants in some of the studies, while consistent with prevalence rates, may limit the chances of detecting gender differences.

Consideration of these articles collectively provides guidance for the areas which warrant further attention. The present body of literature is relatively small, and consists largely of cross-sectional studies. Further research using longitudinal or randomized controlled research designs are important to demonstrate predictive relationships (30,31). For example, further investigation of the influence of gender differences in the use of specific coping patterns with regard to return to work, in a randomized controlled trial or longitudinal design, would be particularly helpful to inform future efforts to reduce the large number of people absent from work due to a chronic pain condition (6). While it is acknowledged that a range of personal and environmental factors may affect coping with pain, all studies have focused only on personal coping strategies. This suggests the need for further research in relation to gender differences in environmental coping strategies (eg, availability of support) and associated functioning. It would also be interesting to examine why EAC was only associated with lower levels of physical impairment for men, even though women engage in emotion-focused coping behaviours more often than men. Additionally, studies with greater sample sizes, and possibly a matched number of male and female participants, would greatly improve the chances of detecting gender differences.

Future research on the interrelation among gender, coping and functioning is essential for the development of individually tailored interventions that meet the specific needs of both men and women experiencing chronic pain.

CONCLUSIONS

In the present systematic review, preliminary evidence for associations among gender, coping patterns and functioning in people experiencing chronic pain was obtained. The findings support the proposition that gender and related utilization of coping strategies are associated with functioning in individuals living with chronic pain; however, limitations in this literature were also observed. These results highlight the importance of future research with regard to gender-specific assessment and treatment approaches to meet the specific needs of men and women in chronic pain.

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APPENDIX 1

Modified Downs and Black Checklist

| Reporting |
|---|
| 1. Is the hypothesis/aim/objective of the study clearly described? |
| 2. Are the main outcomes to be measured clearly described in the Introduction or Methods section? |
| 3. Are the characteristics of the patients included in the study clearly described? (inclusion and/or exclusion criteria) |
| 4. Is the approach to coping and activity measure clearly described? |
| 5. Are the main findings of the study clearly described? |
| 6. Does the study provide estimates of random variability in the data for the main outcomes (eg, interquartile range for nonnormally distributed data; standard error, standard deviation, or confidence intervals for normally distributed data)? |
| 7. Have the actual probability values been reported (eg, 0.035 rather than <0.05) for the main outcomes except where the probability value is less than 0.001? |

**Score (Yes=1, No=0)**

| External validity |
|---|
| 8. Were the subjects asked to participate in the study representative of the entire population from which they were recruited? |
| 9. Were those subjects who were prepared to participate representative of the entire population from which they were recruited? |
| 10. Were the staff, places, and facilities where patients were treated representative of the treatment the majority of patients receive? |

| Internal validity |
|---|
| 11. If any of the results of the study based on “data dredging” (analysis that had not been planned at the outset of the study), was this made clear? |
| 12. Were the statistical tests used to access the main outcomes appropriate? |
| 13. Were the main outcome measures used accurate (valid and reliable)? |

**Power**

14. Did the study report on statistical power?

**Total**
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