

Health screening questionnaires used in the management of mental distress acquired during an injured worker's return to work: a scoping review.

Authors:

Joanna Bohatko-Naismith¹

Lynne McCormack²

Ishanka Weerasekara¹

Daphne James¹

Jeffrey Marley¹

¹School of Health Sciences, College of Health, Medicine and Wellbeing, The University of Newcastle, Callaghan, 2308, NSW, Australia

²School of Psychology, College of Engineering, Science and Environment, The University of Newcastle, Callaghan, 2308, NSW, Australia

Please send all correspondence to:

Dr Joanna Bohatko-Naismith
College of Health, Medicine and Wellbeing
School of Health Sciences,
The University of Newcastle,
University Drive,
Callaghan NSW 2308.
Tel - +61 02 49217038
Fax - +61 02 49217053
Email: Joanna.bohatko-naismith@newcastle.edu.au

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Background:

Mental distress is often endured by injured workers participating in the rehabilitation or return to work process following a physical injury. Delays in detecting the onset and treating mental distress can lead to a diverse range of cognitive and behavioural changes that may precipitate psychological distress such as anxiety, depression, and posttraumatic stress.

Objective:

The objective of this scoping review was to provide an overview of existing health questionnaires utilised by health care providers and affiliated researchers. It reviewed their effectiveness and suitability to detect mental distress endured by injured workers engaged in the return to work process.

Methods:

A scoping review methodology was conducted using the Arksey and O'Malley framework which examined peer-reviewed articles published between 2000 and March 2020 comprising health questionnaires. Database searches included Medline, CINAHL, EMBASE and PsycINFO combining specific MeSH terms and key words.

Results:

The full search identified 3168 articles. Following full screening a total of 164 articles reviewed the use of health questionnaires and specific criteria to determine their suitability. Most of the health questionnaires reviewed were used as screening measures for identifying both work and non-work-related psychological hazards. However, they were found to be limited in their application when considering all potential predictors of delayed return to work such as poor or stressful interactions with stakeholders, financial stress and the injured workers experience of the RTW process.

Conclusion:

Earlier identification of mental distress using an optimal MHSQ followed by appropriate intervention will reduce the risk of psychological injury becoming cumulative on a physical workplace injury. Without such complications, early return to work can be achieved with significant cost saving to the economy.

1. Introduction

Return to work (RTW) following an injury at the workplace should be a relatively straightforward process for the worker for the majority of physical injuries [1]. The longer an injured worker is absent from the workplace however, the less likely a sustainable RTW will occur [1-6]. While many injured workers recover from their injuries and RTW in a relatively systematic and predictable manner, others experience delays in their RTW schedule, with some never returning to their pre-injury duties [7-11]. Therefore, prevention of psychological distress following a physical workplace injury is an important priority for organisations and governments.

The economic cost associated with mental illness is significant. Even in a medium sized developed economy such as Australia, \$51 billion was spent in 2018/19 to address issues associated with mental illness [23]. \$11 billion of this total was directly borne by employers for workers' compensation payouts, absenteeism and a reduction in productivity [24-26]. This is largely due to the unrecognised complexity of workplace injuries in the individual's psychological wellbeing, particularly, loss of self-worth, uncertainty about the future, and the struggle to be supported adequately both psychologically and financially during the RTW process [12, 13].

The risk of a psychological injury becoming cumulative on a physical workplace injury increases when there is heightened anxiety around future pathways in the workplace [27]. The 2019/2020 Corona virus pandemic impact has further heightened that uncertainty none less in those injured in the workplace.

If left untreated, psychological distress over time can produce a diverse range of behavioural and cognitive changes including mood disorders (e.g. depression), anxiety disorders (e.g. posttraumatic stress), substance use disorders and even more protracted psychopathology [14-16]. Where workers' long-term health issues are not treated, alcohol and other drug-related deaths and suicides have contributing to increasing mortality rates associated with work injuries [17]. Depression is particularly often associated with the aftermath of an occupational injury, with symptoms usually presenting within the first 12 months following a work-related musculoskeletal injury [16, 18-20].

In many developed economies such as the United States, United Kingdom, France, Norway, Denmark, Finland and Australia, Primary Care Physicians or General Practitioners usually provide the primary medical care for an injured worker [1, 21, 34-36, 49, 60, 93, 125, 151]. Primary Care Physicians manage the medical treatment of workers by delivering ongoing care and referrals to other health care practitioners (HCPs) to assist with their rehabilitation and RTW [1, 4, 21, 34, 93, 125, 141, 151].

While there is general consensus that appropriate psychological screening can detect potential complications encountered during the rehabilitation process [16], Primary Care Physicians throughout many countries often indicate that they do not have adequate time or resources to fully assess an injured workers' physical injury and their mental health status [21, 23, [21], 49].

To prevent mental distress following a physical workplace injury, it is essential that Primary Health Practitioners and other relevant HCPs should have access to an effective Mental Health Screening Questionnaire (MHSQ) that is able to detect potential psychosocial risk factors in order to facilitate appropriate interventions to ensure the ongoing wellbeing of the injured worker.

Despite the association of workplace injuries and mental health there is a paucity of research that explores:

- How and when mental health distress is triggered during the RTW process and;
- The effectiveness of any current Mental Health Questionnaire (MHQ) applied to detect the onset and underlying cause of mental distress encountered during the RTW process.

The aim of this review is to:

- Identify and provide an overview of the MHQs and other health questionnaires (HQs) used to assess mental wellbeing in injured workers following a physical injury at the workplace and;
- Assess the suitability and effectiveness of these questionnaires to detect early changes in mental wellbeing following a workplace injury that predict further psychopathology.

Preventive health screening has long been promoted as one of the most important health care strategies to facilitate early diagnosis and treatment, with the potential outcome as an improvement

in the quality of life for those being screened [22, 23]. A study in 2005 suggested that when using a brief screening questionnaire, Primary Health Providers can recognise and manage common mental disorders, in addition may also influence a Primary Health Practitioners provision of care following the outcome of the screening questionnaire [24].

2. Methods

A scoping review methodology as described by Arksey & O'Malley [25] and Levac et al. [26] was adopted to explore the existing literature to identify the range of HQs used to assess mental health distress in injured workers following a workplace injury. This method allows for a rapid review and mapping of key concepts which underpin the research area to examine the extent, range and nature of research activity, identify gaps in all relevant literature, and summarise and disseminate research findings [16]. Our scoping review methodology follows a five (5) stage framework: (1) identifying the research question; (2) identifying relevant studies; (3) study selection; (4) charting the data and (5) collating, summarising and reporting the results.

Identifying the research questions

This study extends on earlier research undertaken by the Chief Investigator investigating the role of HCP and Return to Work Coordinators in the rehabilitation of injured workers [1, 27]

The research questions below that guide this study evolved through a brainstorming session conducted by the research team and informed by the literature [104, 63, 116, 64]:

- What work related and other psychosocial risk factors have been identified that potentially compromise a worker's mental wellbeing when rehabilitating from a physical injury?
- How does mental distress endured during the participation in a RTW process manifest in a physically injured worker?
- Has mental distress endured by the physically injured worker during a RTW process been shown to prolong or prevent their ultimate RTW?

- What screening tools are currently used to identify symptoms of mental distress in workers when participating in a RTW process? How effective are they?
- Where is the gap in the current knowledge, practice or evidence?
- Can current practice, knowledge or evidence be augmented or improved upon?

Identifying relevant articles and studies

A preliminary set of key words were developed, and an initial search conducted in Medline. The key words were then reviewed and used to search Medline, CINAHL, EMBASE and PsycINFO. The search strategy included a combination of Medical Subject Headings (MeSH) terms and key words for 'workers', 'physical injuries', 'mental health', 'return to work' and 'impact' (see Appendix 1). The search was limited to articles published from 2000 to March 2020. Observational studies, including longitudinal cohort studies were included. Systematic reviews, conference abstracts, protocol papers and studies looking at pre-existing mental illness (including depression) before the physical injury occurrence as well as studies not available in English were excluded. Abstracts and proceedings from conferences and meetings, as well as other unpublished sources were excluded due to lack of peer review. Commentaries, review articles, editorials and letters to the editor were also excluded.

Literature search and article selection

Details of the search, screening and selection process are found in the flow chart of search results and screening (see Figure 1).

The initial database search identified 3168 articles. Suitable articles were subsequently identified through an independently conducted review by two authors [IW, JM]. Each author screened the title and abstract to determine which articles would be included for full review. Articles were excluded if they were duplicates; the injuries were not work related or; the study concerned pre-existing mental illness (such as depression) being investigated in isolation from physical injury. Disparities between review authors were resolved by discussion and if required a third reviewer was consulted (JBN).

Title and abstract screening resulted in 2878 articles being excluded, leaving 276 for full text review.

A full text review to assess the eligibility of the 276 articles was then conducted by two researchers [JBN, JM] and on completion of a face to face review defence, 164 articles which utilised a MHQ (or a HQ with a significant mental health component) were retained for inclusion in this review. To assist in the analysis of the collated questionnaires, additional articles sourced from the literature were also referenced in the scoping review if they included an investigation of issues faced by a physically injured worker while engaged in a RTW process, including where involvement in the RTW process has been associated with any of the following:

- An impact on the worker's mental health (including the development of chronic mental health conditions or substance abuse) or,
- A delayed or prolonged return to work or an abandonment of employment or,
- A deterioration in a work, social or family relationship or,
- A subsequent loss of identity or self-worth or an increase in feelings of hopelessness, grief, stigmatisation or financial loss or,
- An analysis of the success or otherwise of any intervention (eg. physiotherapy, pain management and/or counselling) employed to aid rehabilitation or,
- An analysis of a methodology employed by the Treating Medical Practitioners to identify deteriorating mental health with the injured worker.

In addition, reference lists of key journal articles were hand searched to source other appropriate research articles resulting in a further eight (8) articles to report on in the scoping review. Disparities between reviewers were resolved by discussion and if required a third reviewer was consulted [DJ].

[Figure 1 inserted here]

Extracting and charting the data

All data extracted from the included studies was summarised by one of the authors [JM]. Two authors then collectively [IW, JBN] developed the data charting form to ascertain which variables to extract to answer the research questions. Using an iterative approach, the chart was updated

continually by the authors. The extracted information included: study characteristics (study design, year published); participant characteristics (sociodemographic, nature of the work); what Health Questionnaire was used within and what study outcomes were noted (such as impact on return to work process, duration and the nature of the impact on subjects' mental health).

3. Results

There were 164 studies identified from the literature where each of which had employed one or more of sixty-two (62) MHQ or HQ with a significant mental health component to augment the research being conducted. Analysis of these studies incorporating charted data and relevant criteria sourced from the literature is summarised in Appendix 2. Most of the studies sourced were from research institutions in Canada followed in decreasing numbers from the United States, Australia, Sweden, Norway, United Kingdom, The Netherlands, Denmark, Finland, Austria, Hong Kong, Switzerland, Japan, Finland, Korea, Taiwan, Germany, Malaysia, Iran and Spain.

The appraised range of 62 MHQ or HQ have been utilised within a wide range of study types including in seventy-two (72) prospective cohort studies, forty-nine (49) cross-sectional studies, nineteen (19) mixed methods study designs, fifteen (15) randomised control trials, five (5) retrospective cohort studies, four (4) longitudinal observational studies and one each in a non-randomised control trial and a pilot study. There was no discernible pattern of preference for a specific study type to favour the use of a particular MHQ or HQ.

In terms of participant characteristics, workers with (all cause, general) MSD were the most frequent studied subject cohort (42 studies); followed by workers with back pain (24 studies); workers on extended sick leave - all causes (17 studies); then workers with upper extremity pain (9 studies). Twelve (12) of the fifteen (15) randomised control trials sought to improve the outcome of rehabilitation through appropriate interventions designed to expedite the injured workers' recuperation and/or return to work. While there were only 10 studies which listed a specific study attribute associated with an impact on the worker's mental health (as indicated in the article's descriptive "study population"), 142 studies considered mental health impacts as a secondary

consideration associated with the specific topic of research being conducted. Of the 164 studies reviewed, 68 involved the active participation of a HCP independent of the team conducting the research.

The most significant work-related psychosocial risk factors highlighted within the literature that is linked to the efficacy of rehabilitation and which, if uncontrolled, could potentially undermine the physically injured worker's return to work schedule includes:

[Table 1 inserted here]

How effective are the reviewed health questionnaires in identifying (and to potentially predict) critical aspects of mental health of workers or others suffering from a physical occupational injury?

From the full text review, sixty-two (62) diagnostic MHQs and HQs were identified. Each was appraised in terms of their attributes and ability to detect, predict or record impacts from the above psychosocial risk factors (subsequently summarised in Appendix 3).

As well as detecting symptoms of depression or anxiety, an effective MHSQ should also consider all work-related and non-work-related psychosocial risk factors that could impact on an injured worker's mental health and wellbeing and delay their RTW. For example, while a recent study which trialled the ÖMPSQ-SF questionnaire and its value as a simple screening measure for workers at risk of a delayed RTW concluded that it is a suitable questionnaire for measuring a diverse range of work-related injuries, it does not notably account for all potential predictors which can impact on injured workers RTW [28]. Consulting table 3 it can be seen that the ÖMPSQ-SF satisfies only two (2) of the nine (9) criteria covered within this study.

In terms of questionnaire content, forty-one (41) HQs solicit for clinical symptoms of depression or anxiety, thirty (30) solicit in part for (or fear of) physical pain and sixteen (16) include soliciting for both clinical symptoms of depression or anxiety and pain. Twenty-one (21) include soliciting for the level of social support, sixteen (16) HQ include soliciting for the level of family support and twelve

(12) HQ include soliciting for the level of support at work (be it supervisor or co-worker support). Six (6) HQ include soliciting for the impact of unreasonable work demands or timeframes (potentially indicating a mismatch of occupational task and health restriction where applied to a rehabilitation process), while four (4) HQ include soliciting for the impact of discrimination, harassment, bullying or stigma. No HQ included consideration of the impact of poor or stressful interaction with healthcare providers or financial stress on the injured worker's return to work progress.

The HQs that cover a majority of the above work and non-work-related psychosocial risk factors are the Return to work Obstacles and Coping Efficacy – Musculoskeletal Disorder questionnaire [ROSES-MSD] and the Obstacles to Return-to-Work Questionnaire – ORQ, both of which cover seven of the nine work and non-work-related psychosocial risk factors assessed in this study.

Return to Work Obstacles and Self Efficacy Scale [ROSES-MSD]

The latest Return-to-Work Obstacles and Self-Efficacy Scale [ROSES-MSD] is a 46-item self-reported inventory spread out over 10 conceptual dimensions. The inventory comprises the following dimensions [29]:

- Fears of a relapse – [4] Questions:- Q1, 11, 24, 32
- Cognitive difficulties – [3] Questions:-Q 2, 12, 39
- Medication-related difficulties – [3] Questions:- Q3, 13, 29
- Job demands – [7] Questions:- Q4, 14, 22, 25, 28, 38, 45
- Feeling of organizational injustice – [4] Questions:-Q 5, 15, 30, 34
- Difficult relation – immediate supervisor – [7] Questions:- Q6, 16, 21, 31, 36, 41, 44
- Difficult relations – co-workers – [7] Questions:- Q7, 19, 23, 27, 33, 43, 46
- Difficult relations – insurance company [4] Questions: - Q8, 17, 35, 40
- Difficult work/life balance – [4] Questions:- Q9, 18, 37, 42
- Loss of motivation to return to work – [3] Questions:- Q10, 20, 26

Obstacles to Return-to-Work Questionnaire (ORQ)

The Obstacles to Return-to-Work Questionnaire (ORQ) is a 55-item self-reported inventory comprising the following nine (9) subscales [30]:

- Depression – [4] Questions
- Pain intensity – [4] Questions
- Difficulties at work return – [8] Questions
- Physical workload & harmfulness – [8] Questions
- Social support at work – [6] Questions
- Worry due to sick leave – [3] Questions
- Work satisfaction – [9] Questions
- Family situation and support– [7] Questions
- Perceived prognosis of work return – [6] Questions.

Both ROSES-MSD and ORQ lack the ability to solicit and assess the impact of poor or stressful interaction with healthcare providers and financial stress on the injured worker's mental health with both psychosocial risk factors potentially prolonging or preventing a timely RTW.

Without consideration of the full range and their accumulated impact on a physically injured person's mental wellbeing and RTW progress, the range of articles assessed, including those utilising HQs have been found limited in their further application to assist in improving the efficacy of the return to work process.

A majority of the sixty (62) HQs sourced from the review and represented in Appendix 3 could be applied during an RTW review meeting to determine the presence of certain elements and symptoms associated with the worker's mental health. However, no one HQ is structured to identify or solicit for all of the psychosocial risk factors and obstacles potentially associated with their readiness to RTW. There is also little evidence to indicate that any are structured to chronologically record the point(s) within the RTW program where mental distress has occurred.

Outside of use by academics with specific arms-length research questions, no study examined the use and efficacy of the HQ to improve the HCP or injured party's experience of the RTW process.

Moreover, while many of the assessed HQ have been utilised in research focussed questions on specific aspects of the RTW process, there is no evidence that the efficacy of using a HQ in the context of participation within the RTW program has been investigated from the perspective of the primary health care providers as the coordinating HCP.

4. Discussion

This review aimed to identify and provide an overview of the MHQs and other health questionnaires (HQs) used to assess mental wellbeing in injured workers following a physical injury at the workplace. Furthermore, it aimed to assess the suitability and effectiveness of these questionnaires to detect early changes in mental wellbeing following a workplace injury that predict further psychopathology. In seeking these aims, the review found the questionnaires limited in their application with improving the effectiveness of the return to work process.

Rehabilitation, associated with participation within a return to work program, is utilised within many countries and industry sectors to facilitate workers returning to their pre-injury duties, following a workplace injury. However, workers who have been injured can experience hostility and frustration with the workers' compensation system and obstacles within the rehabilitation program can be detrimental to their timely RTW [25]. This is possibly due to a disparity between the needs of the returnee and the needs of compensation system with evidence indicating that timely RTW can be less reliant on physical functioning and more on the influence of psychosocial risk factors [31]. We have compiled a comprehensive manifest of these factors (see table 1)

Both positive and adverse impacts on mental health outcomes in injured persons participating in a RTW process were revealed in this review. Importantly, this review highlighted anxiety and depression developing from anticipation of a RTW after a physical injury which was found to be closely associated with a perceived lack of control over potential obstacles that may be encountered in the work environment [13, 14, 28, 31-34]. Fear avoidance belief significantly impacted on the resumption of normal work duties. Reducing the effectiveness of rehabilitation interventions and ultimately prolonging or preventing a RTW, some studies identified the fear of pain and its

consequences pre-empted catastrophizing thoughts and resulted in avoidance of activities believed to be harmful or that aggravated pain, [4, 31, 35-42]. Several studies have utilised the Fear-Avoidance Components Scale (FACS) to help HCP to better identify and address fear-avoidance related barriers to recovery, and to measure treatment responsiveness of related symptoms [43-46]. Workers recovering from musculoskeletal injuries also have a demonstrably reduced expectancy for recovery and a lower likelihood that they will participate fully in treatments conducive to a timely RTW [47].

A continuing concern for injured workers is the emotional stress and frustration encountered with the RTW process and the workers' compensation scheme [1, 5, 48-50]. In fact, delays in the RTW process often leave injured workers with a growing sense of hopelessness, grief and stigmatisation and a loss of confidence, self-worth and financial support [39].

Additionally, mental distress for an injured worker can also be associated with negative interactions with the employer, the insurer, family members or work associates during the RTW process [1, 18, 51-53]. Moreover, the procedural complexities inherent within the workers compensation system also act as an obstacle to a timely RTW [1, 5, 27, 49, 54].

Workers with physical occupational injuries throughout the developed world experience these and other obstacles including mental distress encountered during the rehabilitation process and subsequent attempts to return to work [16, 95, 96, 100, 103, 130, 137, 146, 187]. Encountering such obstacles can diminish an injured workers' perceived control over their progress [66] and detrimentally affect their social, work and family relationships [18, 31, 53]. The worker's self-efficacy beliefs and confidence that these obstacles can be overcome may significantly influence the speed and ultimately the success of their rehabilitation [29]. If these cumulative factors persist or remain unrecognised and untreated, the resulting impact on their mental health can undermine injured workers' timely rehabilitation and RTW [12, 31, 53].

While desired health and functional capacity outcomes are not always achieved during the RTW process, there is significant evidence that timely rehabilitation and the earliest possible RTW are associated with beneficial mental health outcomes for workers with physical injuries [21, 31, 55-58].

Where the HCP recommends interventions to expedite an injured worker's RTW, the injured worker should have confidence that they are acting in their best interest. To obtain the best possible therapeutic outcome, the ongoing relationship between the HCP and injured worker should be underpinned with trust, respect and consistent agreement on, and collaboration towards completion of tasks required to reach the goals of treatment [21, 27, 31, 55, 59]. In terms of a general response to therapeutic treatment, the placebo response has been extensively studied and consistently shown to result in beneficial outcomes with the quality of the HCP-recipient level of established trust significantly contributing to these outcomes [60]. Positive treatment outcomes in part due to the placebo response have also been associated with a range of interventions facilitated by HCPs designed to treat chronic lower back pain [61]

Additionally, persons experiencing mental distress including panic disorders or mild to moderate depression, or generalized anxiety disorder experience significant relief and a greater sense of control over distressing symptoms, regardless of the treatment interventions proposed or ultimately implemented, merely through regular, quality interaction with their treating HCP [60].

An injured worker in the process of rehabilitation and return to work is best supported by a person-centred approach in which the development of a trusting therapeutic relationship that promotes authenticity and unconditional positive regard, provides the best environment for therapeutic success [62, 63]. For example, where the HCP has been trained in improved communication, consultation and rapport including practicing appropriate eye contact and normalizing difficult experiences related by those under care, less anxiety and depression were present in those care recipients, over the period of treatment [4, 60, 64].

Primary Health Care Practitioners are critical HCPs in the rehabilitation process and the injured worker's ultimate return to work. When the Primary Health Care Practitioner provides the injured worker with relevant information about their health and rehabilitation possibilities and projects an empathic attitude toward the patient's plight, better rehabilitation and RTW outcomes are achieved [65].

Timely mental health screening has also been demonstrated to enable the treating HCP to better identify workers [who have been physically injured] with underlying or concomitant psychological distress / disorders and to refer them for further investigation, diagnosis and appropriate tailored intervention / treatment with a psychologist or counsellor [56, 66]. This and/or other treatment options such as the application of cognitive-behavioural therapy in which problem-solving skills are taught have previously been shown to reduce psychological distress impacting the worker [2, 47, 67-69]

Where is the gap in the current knowledge, practice, or evidence?

There is clear evidence which supports early screening and interventional treatment of injured workers highlighting the positive effects on their physical and mental health and RTW efficacy.

However, there is a paucity in the literature on primary health care providers and other HCPs regarding their access to, or their use of a MHSQ which may assist with early detection of potential psychosocial risk factors which can impact an injured workers mental health and wellbeing following a workplace injury. Additionally, there is little supporting evidence to suggest the existence of an appropriate MHSQ for primary health care providers and HCPs that could identify all potential predictors of psychological distress for a worker following a workplace injury.

Ideally such a screening tool would, even on one application assist primary health care providers and HCPs determine the onset of psychological distress (post physical injury) during the return to work process and facilitate early referrals and interventions to support an injured worker during their

rehabilitation. Subjective reporting of changes in mental health status could alert the practitioner by using the same instrument at different times and stages of the RTW process.

We all exist in an age of heightened anxiety from increased biological and psychosocial stresses including work uncertainty anxiety around future pathways now threatened by the Coronavirus pandemic. Therefore, prevention of psychological distress following a physical workplace injury should be treated as a priority.

Further research and recommendations to address the gaps in current practice

How and when and at what cost mental health distress is encountered during the rehabilitation and RTW process needs to be addressed in subsequent research.

It is essential that a suitable MHSQ be developed or refined from existing questionnaires and trialled to achieve the most suitable tool to assist primary health care providers, other HCPs and researchers. This will assist in screening for and identifying when and at what stage the onset of psychological distress (post physical injury) has occurred during the return to work program. An additional provision within the MHSQ to prompt the treating medical practitioner to consider employing an intervention to arrest deteriorating mental health would be beneficial also to the ongoing wellbeing of the injured worker.

The optimised MHSQ should also be capable of being completed by the HCP in consultation with, or in part, independently by the injured party and facilitate the identification of the broadest possible range of psychosocial risk factors that are potentially impacting on the efficacy of the return to work process.

Such screening that is applicable and effective, and useful to researchers, would also need to be concise enough to be useful to the HCP in a clinical setting. Excessive alcohol consumption is associated with deteriorating mental health in many injured workers [17, 70-74] and is associated with prolonged rehabilitation times [8] and/or termination of employment [43]. Therefore, we would recommend that the Alcohol Use Disorders Identification Test (AUDIT; a 10-item screening

tool developed by the World Health Organization) be incorporated within the final screening to assess hazardous and harmful consumption of alcohol over time.

An optimum and timely response to address the impact of psychosocial risk factors on the mental wellbeing of injured workers navigating the RTW process may ultimately yield a more expeditious return to work while contributing to significant fiscal savings within the national workers' compensation system.

Finally, contemporary research now identifies that growth out of adversity is possible with the right support, highlighting the gains to be made both personally and in the workplace from a focus on the holistic approach to recovery following a workplace injury which in turn can be to the benefit of the organisation. [75].

5. Conclusion

A broad range of health questionnaires (HQ) were sourced from the literature and reviewed for this scoping review. Many have been used by academics to screen and identify a limited range of both work and non-work-related psychosocial risk factors to investigate specific arms-length research questions with some focusing on specific aspects of the RTW process. Individually they were all found to be limited in their application when considering all potential predictors of delayed RTW.

Earlier identification of mental distress using an optimal mental health screening questionnaire (MHSQ) followed by appropriate intervention will reduce the risk of psychological injury becoming cumulative on a physical workplace injury. Without such complications, anticipated long term outcomes resulting from the effective application of MHSQ include an improvement in the wellbeing and mental health of persons completing the workers' compensation process, a shortening of the recovery and rehabilitation times of injured persons, and given the positive impact of the above, a significant decrease in the overall financial burden on the national economy.

Declaration of interest

The authors report no declaration of interest.

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Table 1: Psychosocial risk factors potentially adversely impacting on return to work

No.	Psychosocial risk factors potentially adversely impacting on return to work
1	Development of symptoms of depression &/or anxiety [1, 10, 11, 15, 100-104, 106, 109-111, 115, 120, 123, 128, 131-4, 138, 141-6, 149, 167, 172, 190].
2	Development of the fear of, or the increased presence of uncontrolled pain or restricted physical movements when performing occupational tasks [18, 31, 34, 142, 197, 198].
3	Imposition of unreasonable work demands or timeframes including where tasks are considered by the injured party to be not compatible with their impaired functional capacity (potentially being an inappropriate match of occupational task and health restriction) [13, 18, 170, 197].
4	Inappropriate management of WHS and ergonomic risks through for example, a lack of equipment and resources required to facilitate a phased return to work [1, 13, 170, 189, 199].
5	The impact of bullying, harassment, discrimination or stigma [12, 14, 200-203].
6	Low supervisor/co-worker support or poor workplace relationships [13, 21, 31, 34, 38, 189, 199, 204, 205].
7	Poor or stressful interaction with healthcare providers [27, 68, 202, 206].
Non-work-related psychosocial risk factors which may also adversely impact on a timely return to work include:	
8	Financial stress resulting from reduced income subsidies (many Workers' Compensation systems incorporate decreasing wage subsidies for the injured worker over time) [12, 16, 21, 40, 41, 54, 120, 200]
9	Family and social relationships under stress from the immediate impact of the occupational injury as well as any subsequent ongoing pain and/or suffering impacting the injured worker [4, 13, 14, 29, 40, 41, 49, 170, 189, 196, 199, 200, 207]

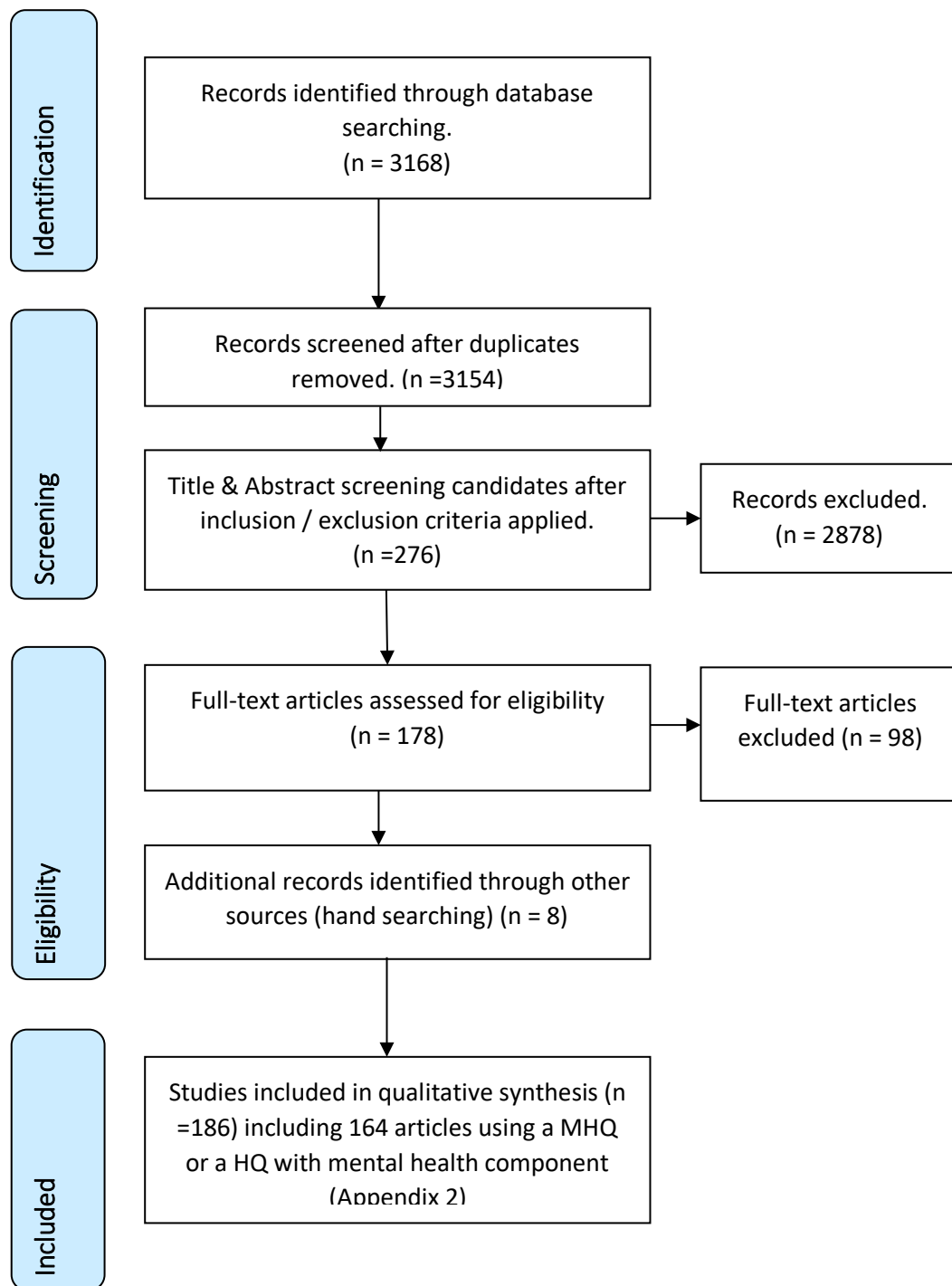


Figure 1: Flow chart of search and screening results

Appendix 1: Search concepts and associated key terms

Condition	Key terms
Worker	construction adj3 [claimant(s), client(s), employee(s), employment, labo(u)rer(s), occupation(s), occupational, work site, work* based, worker(s), workforce, workplace.
Physical injuries	musculoskeletal injur*, arm injur*, neck injur*, muscle weakness, forearm injuries, wrist injur*, hand injur*, sprains and strains, soft tissue injur*, finger injur*, tendon injur*, repetitive trauma, neck pain, back pain, occupational injur*, work disability, work injur*, worker injur*, worker illness(es), workplace injur*, disabilities, musculoskeletal disease*, musculoskeletal disorder*, occupational disease*, occupational disorder*.
Mental health	mental health problem(s), mental disorder(s), mental ill-health, depression, anxiety, adjustment disorder, mood and anxiety disorder(s), mental health, mental illness, mood disorder(s), neurotic disorder(s), self-harm, suicid* , attempted suicid*, parasuicid*, intentional self-harm, mental wellbeing, suicidal behavior
Return to work	return to work, work participation, re-employ(ment), return employees to work, work accommodation, work adjustment, work conditioning, work re-integration, work reintegration, work role functioning, work visit, work* accommodation, work* intervention*, work* trial(s), work* re-integration, work* reintegration, workplace linked, worksite visit, Absenteeism, alternative work, attendance (at work), benefit duration, communication with employer(s), communication with health care, communication with healthcare, communication with work place(s), communication with workplace(s), return employees to work
Impact	Claims, compensation costs, continuance costs, continuance rate, functional limitation(s), graded activity, Health, health-related work role functioning, health

status, injury experience, labo(u)r market re-entry, labo(u)r market re-entry, liability reduction, LMR, long term disability, long term insurance plan, lost time, lost workday(s), maintenance at work, physical capacity, precarious work arrangement, Presenteeism, re-employ(ment), re-injury, Reinjury, reasonable accommodation, Recurrence, redeployed with job, reemploy(ment), Relapse, second employer program, secondary injury, short term disability, sick leave, sick listed, sickness absence, sickness related absence, social exclusion, suitable duties, suitable employment, supportive co-workers, supportive colleague(s), supportive co-workers, supportive manager, supportive supervisor, sustainable employment, time loss, time lost, time on benefit, wage replacement, work ability, workability, work capacity, work disability, work limitation(s), work maintenance, work re-integration, work readiness, work role functioning, worklessness

Appendix 2: Summary of relevant criteria sourced from within the literature

#	Author(s)	Ref	Study Design	Year	Impact on MH?	HCP Involved?	Work Sector/ Cohort Attributes	Questionnaire Used (Appendix 3)	Summary of relevant outcomes & recommendation(s) to improve MH or RTW process
1	Collie A, Sheehan L, Lane TJ & Iles R	[68]	Cross-sectional study	2020	Y	Y	Australian MSD or MH workers' compensation claimants	(KPD)	Screening, early intervention and referral programs may reduce the prevalence and impact of psychological distress.
2	Lee JE, Yoo SB and Leigh JH	[45]	Cross-sectional study	2020	Y	Y	Korean MSD workers' compensation claimants	(FABQ, PHQ-9, RTWSE, SF-12)	A Korean version of the Return-to-Work Self-Efficacy (RTWSE)-19 was validated.
3	Orchard C, Carnide N & Smith P	[76]	Prospective cohort study	2020	Y	Y	Australian MSD workers' compensation claimants	(KPD)	Perceived injustice in interactions with claimants following a work-related MSK injury must be considered to ensure MH outcomes & timely RTW.
4	Aasdahl L, Gismervik S, Marchand G, et al.	[36]	Clinical trial	2019	Y	Y	Workers' comp claimants enrolled in Norway trial	(FABQ, HADS)	Reduced fear avoidance belief was associated with subsequent greater work participation.
5	Aasdahl L, Pape K, Vasseljen O, Johnsen R & Fimland M	[77]	Prospective cohort study	2019	Y	Y	Workers' comp claimants enrolled in Norway trial	(BPI, HADS)	Positive RTW expectation in injured workers is a strong predictor for RTW.
6	Aasdahl L, Pape K, Vasseljen O, Johnsen R, Gismervik S et al.	[78]	Randomized clinical trial	2017	N	N	Sick leave – MH or MSD Norway	(BPI, HADS, SHC)	No significant outcome/improvement in MH or RTW.
7	Kim EJ, Chotai S, Wick JB, Khan I, et al.	[79]	Prospective cohort study	2019	Y	Y	U.S. patients: cervical or degenerative disease surgery	(EQ-5D)	Labour intensive versus sedentary occupation is one of multiple factors associated with a lower likelihood of RTW at 3 months after cervical spine surgery.

#	Author(s)	Ref	Study Design	Year	Impact on MH?	HCP Involved?	Work Sector/ Cohort Attributes	Questionnaire Used (Appendix 3)	Summary of relevant outcomes & recommendation(s) to improve MH or RTW process
8	Marfeo EE, McDonough C, Ni P, Peterik K, et al.	[80]	Cross-sectional study	2019	Y	Y	U.S. Disability claimants	(WD-FAB)	The revised Work Disability Functional Assessment Battery (WD-FAB) was found to be a useful work disability assessment tool.
9	Nicholas MK, Costa DSJ, Linton SJ, Main CJ, Shaw WS, et al.	[28]	Case Control Study	2019	Y	N	Australian injured health workers	(ÖMPSQ)	The ÖMPSQ-SF was found to be useful for identifying injured workers likely to have delayed RTW when administered within 15 days of their injury.
10	Qudsyi H, Kusumaningrum FA, et al.	[81]	Cross-sectional study	2019	Y	N	Indonesian subjects – not described	AVEM	No significant outcome/improvement in MH or RTW.
11	van Zaanen Y, van Geenen RCI, Pahlplatz TMJ, et al.	[82]	Cross-sectional study	2019	N	Y	Working patients undergoing total knee arthroplasty in The Netherlands	(WORQ)	7 out of 10 patients have high expectations about their ability to perform work-related knee demanding activities 6 months after total knee arthroplasty [TKA]. 28% of patients expected no clinical improvement, no improvement at all or even a deterioration of ability to perform work-related knee-demanding activities 6 months postoperatively compared to preoperatively. These results emphasize the importance of discussing these expectations pre- and postoperatively, so that health care professionals can timely advise patients on whether additional care is needed after TKA. There was no discussion of mental health of the cohort.
12	Kievit AJ, Kuijer PPFM, de Haan LJ et al.	[83]	Retrospective cohort study	2020	N	Y	Patients having undergone either UKA or TKA surgery in The Netherlands	(WAI, WORQ)	TKA and UKA patients have similar WORQ, WAI, and satisfaction scores. However, in this study population, UKA patients to return to work after surgery sooner than TKA patients. There was no discussion of mental health of the cohort.

#	Author(s)	Ref	Study Design	Year	Impact on MH?	HCP Involved?	Work Sector/ Cohort Attributes	Questionnaire Used (Appendix 3)	Summary of relevant outcomes & recommendation(s) to improve MH or RTW process
13	Husmann A, Escorpiao R & Finger ME.	[84]	Prospective cohort study	2019	Y	Y	Switzerland MSD outpatients in physical therapy	(EQ-5D, HADS, WHODAS, WHOQoL, WORQ)	When evaluating self-reported work-related functioning, the WORQ-German version was demonstrated to be a valid, reliable, and easy to administer questionnaire for our sample of patients with MSDs in an outpatient PT clinic. The WORQ remains to be proven in other health conditions, especially in mental health or combined physical and mental health conditions.
14	Finger ME, Escorpizo R & Tennant A.	[85]	Longitudinal observational study	2019	Y	N	Switzerland MSD patients undertaking in-patient rehabilitation	(HADS)	Evidence was found that the French version of WORQ, WORQ-BRIEF, and the clinical sub-scores are reliable and well targeted measures of work-related functioning. WORQ can be used in clinical practice to reliably measure change and comprehensively identify problems in work-related functioning in MSK. However, further studies are needed to evaluate psychometric properties of WORQ in other health conditions with a specific focus in populations with mental problems or multiple comorbidities and in prevention activities.
15	Finger ME, Wicki-Roten V, Leger B & Escorpizo R	[86]	Cross-sectional study	2018	Y	N	Switzerland MSD patients undertaking in-patient rehabilitation	(HADS)	Evidence was found that WORQ-French is a valid, reliable and easy to administer instrument to evaluate self-reported work-related functioning [given the limitations of the study setting & sample characteristics]. Results of WORQ may be used to guide intervention planning and document changes in functioning throughout the VR process. However, further studies will shed light on the use of WORQ in clinical practice and research, as well as in diverse patient populations and settings.

#	Author(s)	Ref	Study Design	Year	Impact on MH?	HCP Involved?	Work Sector/ Cohort Attributes	Questionnaire Used (Appendix 3)	Summary of relevant outcomes & recommendation(s) to improve MH or RTW process
16	Voltmer J-B, Voltmer E & Deller J.	[87]	Cross-sectional study	2018	Y	N	Employees of German international financial services Company	(AVEM, WAI)	Being at risk for burnout not only affects job-related well-being and coping resources, but also work ability and work engagement. A need for personnel and organizational development and health promotion is indicated by a high number of individuals with reduced working motivation and risk patterns for overexertion or burnout. No significant outcome/improvement in RTW
17	Aasdahl L, Pape K, Jensen C, Vasseljen O, et al.	[88]	Prospective cohort study	2018	N	Y	Norway sick listed workers with MSD, psychological or other.	(HADS, RRTW)	No significant outcome/improvement in MH or RTW.
18	Bauernhofer K, Bassa D, Canazei M, et al.	[89]	Cross-sectional study	2018	Y	Y	Austrians with clinical burnout diagnosis.	(BDI, MBI-GS, RESTQ-W, SCID)	The study classified different groups of clinically diagnosed burnout patients enrolled in an employee rehabilitation program. Different interventions may be needed in the future to treat each subtype.
19	Brendbekken R, Vaktskjold A, Harris A, et al.	[4]	Randomized clinical study	2018	Y	Y	Norway sick listed workers with MSD.	(CPAQ, HADS, SHC)	Multidisciplinary intervention may benefit workers (with musculoskeletal injuries) and hasten RTW within 12 months of injury.
20	de Wind A, Boot CRL, Sewdas R, et al.	[90]	Longitudinal study	2018	N	N	sick listed workers with MSD, psychological or other in The Netherlands.	(COPSOQ II, JCQ, SF-12)	No significant outcome /improvement in MH or RTW.
21	Hara KW, Bjorngaard JH, Brage S, et al.	[91]	Randomized Controlled Trial	2018	Y	N	Norway workers with chronic pain, chronic fatigue or	(NFAS, HADS)	Improved RTW noted in completed rehabilitation program participants when augmented by follow-up telephone contact by RTW Coordinators.

#	Author(s)	Ref	Study Design	Year	Impact on MH?	HCP Involved?	Work Sector/ Cohort Attributes	Questionnaire Used (Appendix 3)	Summary of relevant outcomes & recommendation(s) to improve MH or RTW process
							common mental disorders on long-term sick leave		
22	Kristiansen D & Kvåle A	[92]	Cross-sectional study	2018	N	Y	Norway health care workers or school- and kindergarten workers	(NFAS)	No significant outcome /improvement in MH or RTW.
23	Marfeo EE, Ni P, McDonough C, et al.	[93]	Cross-sectional study	2018	Y	N	U.S. random sample of Social security claimants	(WD-FAB)	The revised Work Disability Functional Assessment Battery (WD-FAB) with enhanced MH provisions was found to be a useful work disability assessment tool.
24	Park J, Roberts MR, Esmail S, Rayani F, et al.	[94]	Cross-sectional study	2018	Y	N	Canadian MSD compensation claimants	(RRTW, SF-36, VAS)	Construct and concurrent validity of the RRTW Scale were supported in this study.
25	Asih S, Neblett R, Mayer TG & Gatchel RJ	[95]	Prospective cohort study	2018	Y	Y	U.S. chronic MSD patients in FRP.	(BDI, PDQ, VAS)	Early participation in a Functional Restoration Program (FRP) decreased the number of injured persons not RTW and reduced average time to RTW by workers with musculoskeletal injuries.
26	Vendrig A & Schaafsma F	[96]	Cross-sectional study	2018	Y	Y	A variety of employed persons / patients – The Netherlands	(4DSQ, FABQ, JCQ, WAI, WBI)	The WBI was found to be a valid and reliable tool for occupational health practitioners to screen for risk factors for prolonged or future sickness absence.
27	Mroczek B, Kotwas A,	[97]	Cross-sectional study	2017	Y	N	Polish Physicians, Nurses, and Paramedics	AVEM	The AVEM part ‘Work-related Behaviour and Experience Patterns’ [1,9,10] were utilised. Symptoms of burnout syndrome (Type B and A) were observed in one-fourth of medical workers. No significant outcome for RTW.

#	Author(s)	Ref	Study Design	Year	Impact on MH?	HCP Involved?	Work Sector/ Cohort Attributes	Questionnaire Used (Appendix 3)	Summary of relevant outcomes & recommendation(s) to improve MH or RTW process
28	Groot JAM, Jonkers FJ, Kievit AJ, Kuijer P & Hoozemans MJM,	[98]	Retrospective cohort study	2017	Y	N	ACL reconstruction surgery among patients in one hospital in The Netherlands.	WORQ, EQ-5D	Following ACL reconstruction, 92% of the patients in the study population returned to work within 7 months and 50% of those patients returned fully to work within 78 days. Patients that perform heavy knee-demanding work have a higher chance of a prolonged RTW, and the longer patients walk with crutches, the higher the chance of a prolonged RTW. No significant outcome for MH
29	Aasdahl L, Pape K, Vasseljen O, Johnsen R, et al.	[99]	Prospective Cohort Study	2017	N	Y	Workers' comp claimants enrolled in Norway trial	(BPI, HADS, SHC)	No significant outcome /improvement in MH or RTW.
30	Abegglen S, Hoffmann-Richter U, et al.	[100]	Mixed methods study design	2017	Y	Y	Injured Swiss workers.	(HADS, FABQ, VAS, WHQ)	The WHQ was found to be valid and reliable screening tool and clinically useful to identify injured persons with multiple psychosocial risk factors.
31	Agaliotis M, Mackey M, Heard R, Jan S, et al.	[101]	Cross-Sectional Survey	2017	Y	N	Older Australian workers with chronic knee pain in a randomized clinical trial.	(SCQ, SF-12, WAI)	Allowing access to sitting and promoting positive affiliations between co-workers are likely to provide an enabling workplace environment for older workers with chronic knee pain
32	Amick B, Lee H Hyunmi, Hogg-Johnson S, Katz J, et al.	[102]	Prospective Cohort Study	2017	Y	N	Canadian MSD compensation claimants	(CES-D, RMQ, RTWSE, SF-12)	Worker-reported Organisational Policies & Practices found to be key determinants of RTW efficacy.
33	Black O, Sim MR, Collie A & Smith PP	[103]	Prospective Cohort Study	2017	N	N	Australian workers with MSD or MH injury	(RTWSE)	No significant outcome /improvement in MH or RTW.

#	Author(s)	Ref	Study Design	Year	Impact on MH?	HCP Involved?	Work Sector/ Cohort Attributes	Questionnaire Used (Appendix 3)	Summary of relevant outcomes & recommendation(s) to improve MH or RTW process
34	Black O, Sim MR, Collie A & Smith PP	[104]	Prospective Cohort Study	2017	Y	N	Australian workers with MSD or MH injury	(RTWSE)	Job autonomy and interaction with a RTW coordinator may improve self-efficacy among injured workers attempting to RTW.
35	Corbiere, M Negrini M, Durand MJ, St-Arnaud L, et al.	[29]	Prospective Cohort Study	2017	Y	Y	Canadian individuals with a CMD or an MSD	(ORQ, ROSES)	The Return-to-Work Obstacles and Self-Efficacy Scale (ROSES) was deemed valid & reliable.
36	Giummarra, M J, Cameron P A, Ponsford J, et al.	[105]	Prospective Cohort Study	2017	Y	N	Trauma cases admitted to emergency departments in Victoria.	(BPI, EQ-5D, HADS, PCL-C)	Perceived injustice in interactions with injured persons following traumatic injury must be considered to ensure timely RTW.
37	Howard KJ, Castaneda RA, Gray, AL, et al.	[106]	Prospective cohort study	2017	Y	Y	U.S. chronic MSD patients in FRP.	(BAI, BDI, TSK, VAS)	Participation in psychosocial and functional restoration programs positively contribute to both functional restoration and 3 month RTW outcomes
38	Kellezi B, Coupland C, Morriss R, et al.	[8]	Prospective cohort study	2017	Y	N	U.K. hospital admission for a range of unintentional injuries	(EQ5D, HADS, SCID, SFQ)	Depression & time spent in hospital 1 month post-physical injury is a predictor of efficacy of recovery.
39	Kendrick D, Dhiman P, Kellezi B, et al.	[107]	Prospective cohort study	2017	Y	N	U.K. hospital admission for a range of unintentional injuries	(HADS, SCID)	Health care professionals, including PRIMARY HEALTH CARE PROVIDERSs are well placed to identify psychological morbidity post-injury and coordinate interventions for timely RTW.
40	Milani D, Alexandre NM, Campos JAD et al.	[46]	Mixed methods study design	2017	Y	N	Brazilian workers with	(FABQ, ORQ, WHOQoL)	The WHOQoL was found to be valid and reliable screening tool and clinically useful to identify

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							MSD work absence		injured persons with multiple psychosocial risk factors.
41	Neblett R, Mayer TG, Williams MJ, et al.	[108]	Prospective cohort study	2017	Y	Y	U.S. chronic MSD patients in FRP.	(BDI, FABQ, FACS ODI, TSK)	The Fear Avoidance Components Scale (FACS) was found to be valid and reliable in this study.
42	Rahman HA, Khadizah AM, Naing L	[109]	Cross-Sectional Study	2017	Y	N	ER & CC nurses in Brunei	(COPSOQ II)	The study provided good insight into the impact of psychosocial work stressors, work-related fatigue & musculoskeletal disorder prevalence in nurses
43	Shearer HM, Cote P, Boyle E, et al.	[9]	Prospective cohort study	2017	Y	N	U.S. workers' compensation claim for back pain	(RMQ, SF-12)	Longer term RTW efficacy can be predicted more accurately by measuring back pain intensity & mental health-related quality of life approximately 1 month & 6 months post injury.
44	Sullivan MJ, Adams H, Thibault P, et al.	[110]	Prospective cohort study	2017	Y	Y	Canadian sufferers of fibromyalgia	(BDI, PCS)	Return to work significantly contributes to the maintenance of treatment gains made over the course of rehabilitation interventions for whiplash injury.
45	Sundstrup E, Jakobsen MD, Thorsen SV et al	[111]	Prospective cohort study	2017	Y	N	Danish workers suffering MSD using pain medication	(COPSOQ I, SF-36)	Use of medication due to musculoskeletal pain is prospectively associated with long-term sickness absence & its regular use should be considered when intervening to ameliorate sickness absence.
46	Baskan E, Yağci N, Atalay OT & Telci, EA	[112]	Cross-Sectional Study	2016	Y	Y	QoL, depression & MSD in Turkish employed women and housewives	(BDI, PDQ, NHP, VAS)	The study of MS Pain between employed and unemployed women found lower levels of depression among the employed cohort: social ambience at workplace, focusing at work and economic independence play a role in decreasing depression in this group.
47	Carnide N, Franche RL, Hogg-Johnson S, et al.	[16]	Prospective cohort study	2016	Y	N	Canadian workers'	(CES-D, RMQ)	Depressive symptoms are common in the first year following a lost-time musculoskeletal injury with problematic RTW outcomes 12 months post-

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							compensation claimants for back or upper extremity MSD		injury. The first 6 months represent a window of opportunity for early screening.
48	Degen RM, Macdermid JC, Grewal R, et al.	[66]	Cross-sectional cohort study	2016	Y	N	Canadian upper extremity injured-worker clinic	(PHQ-34, SF-36)	Upper extremity injured workers have a high prevalence of symptoms of depression, PD or PTSD. Diagnostic processes should be employed early to assist with appropriate treatment strategies.
49	Freimann T, Paasuke M & Merisalu E	[113]	Cross-sectional Study	2016	Y	N	Musculo-skeletal [MSK] pain in Estonian nurses	(COPSOQ II)	Work-related psychosocial risk factors (work pace, low justice and respect in the workplace, influence on work organisation, and role conflicts) and mental health problems are associated with MSK pain.
50	Aasdahl L, Pape K, Vasseljen O, Johnsen R, Fimland MS	[78]	Randomized clinical trial	2016	Y	N	Sick leave – MH or MSD Norway	(HSCL-10, SHC)	The at Work intervention tool will allow more effective interventions for Musculoskeletal & mental health problems.
51	Myhre K, Lau B, Marchand GH, et al.	[33]	Prospective cohort study	2016	Y	N	Sick leave – neck or back pain in Norway	(FABQ, HADS, MSPSS, NGQ)	Disability, anxiety, depression and fear-avoidance beliefs about work were significantly associated with the perception of the work environment, whereas neck and back pain were not.
52	Rayner L, Simpson A, Matcham F, et al.	[114]	Cross-sectional survey	2016	Y	Y	U.K. patients attending tertiary referral centre for limb reconstruction	(GAD-7, PHQ-9)	Patients who develop post-operative (limb reconstruction) depression, anxiety or PTSD are more likely to be unemployed or unable to work There is a need for routine psychological assessment and support during the rehabilitation process.
53	Rath HM, Steimann M et al.	[115]	Prospective cohort	2015	Y	Y	477 German cancer patients	AVEM	The AVEM can be used during rehabilitation to assess the extent to which patients report work

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			study				starting rehabilitation		behaviours associated with occupational stress and dissatisfaction. Patients who exhibit the tendency to feel overwhelmed and helpless in stressful work situations should be identified early so they can be offered support.
54	Brouwer S, Amick III BC, Franche RL, et al.	[116]	Prospective cohort study	2015	Y	N	Canadian lost time claimants with low back or upper extremity MSD	(CES-D, RMQ, RTWSE)	Evidence of the predictive validity of the 10 item Return-to-Work Self-Efficacy (RTWSE) Scale was documented.
55	Carriere J, Thibault P & Sullivan M	[20]	Mixed methods study design	2015	Y	Y	Canadian work disabled claimants with lumbar or cervical strain	(BDI, MPQ)	More severe depressive symptoms and lower recovery expectancies were associated with a lower probability of RTW.
56	Costello E, Bogue JE, Sarma K, McGuire BE	[117]	Mixed methods study design	2015	Y	N	Chronic Pain in Irish Prison Officers	(BPI, CD-RISC, CSQ, HADS, MSPSS)	Chronic pain appears to be prevalent in prison officers and is associated with both physical and psychological impairment. Correctional facilities HCP should be aware that these health difficulties are prevalent in the prison work environment.
57	Cougot B, Petit A, Paget C, Roedlich C, et al.	[43]	Non-randomized controlled trial	2015	N	Y	French health care workers with chronic low back pain	(HADS, FABQ)	No significant outcome /improvement in MH or RTW.
58	Hartzell MM, Mayer TG, Neblett R, et al.	[118]	Prospective cohort study	2015	Y	Y	U.S. chronic disabling MSD patients in FRP.	(BDI, PDQ, SF-36, VAS)	Workers suffering from chronic occupational musculoskeletal disorders who completed a functional restoration program in a poor economy (PE) year were less likely to return to work 1-year after discharge. A PE can be an additional barrier to post-discharge work outcomes.

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59	Meterko M, Marfeo EE, McDonough CM, Jette AM, Ni P, et al.	[119]	Cross-sectional study	2015	Y	N	U.S. disabled workers.	(SF-36, WD-FAB)	The Work Disability Functional Assessment Battery (WD-FAB) was found to be a useful work disability assessment tool in terms of physical and also behavioural health function.
60	Watt BD, Ford LA, Doley RM, Ong S, et al.	[120]	Mixed methods study design	2015	Y	N	Australian vocational rehabilitation participants	(FABQ, SF-36)	Fear avoidance beliefs were found to hinder recovery from physical injury, contributing to deterioration in mental health. Identifying and addressing fear avoidance beliefs early in the treatment process may decrease the likelihood of long-term disability and work absence.
61	Portmann Bergamaschi R, Escorpizo R, Staubli S, Finger ME	[121]	Mixed methods study design	2014	Y	N	Switzerland spinal cord injury (SCI) patients	(BDI, HADS, SF-36, MPQ, WORQ-SELF)	The WORQ-SELF proved to have content validity for utility in patients with SCI within the context of VR. Further studies to evaluate content validity in post-acute or chronic SCI patients engaged in VR are needed to gain evidence of the validity of the WORQ-SELF throughout the whole VR process across the health-care continuum
62	Becher S, Smith M, Ziran B	[122]	Prospective cohort study	2014	Y	Y	U.S. orthopaedic trauma patients admitted as In-patients.	(DUSOCS, PHQ-9)	Patients with traumatic orthopaedic injuries have a high prevalence of depression - selective pre & post-operative screening of patients with risk factors for depression will facilitate referral to a mental health provider.
63	Bergbom S, Flink I, Boersma K, Linton SJ	[37]	Randomized controlled trial	2014	N	Y	Swedish workers with back pain	(EQ-5D, FABQ, HADS, ÖMPSQ, PCS, TSK)	No significant outcome /improvement in MH or RTW.
64	Booth-Kewley S, Schmied EA, et al	[38]	Prospective cohort study	2014	Y	N	U.S. Marines with musculoskeletal	(BPI, CES-D, FABQ, PCS)	More optimistic recovery expectations were associated with better recovery outcomes in workers recovering from musculoskeletal injuries.

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							injuries of the back, knee, or shoulder		
65	Carstens JKP, Shaw WS, Boersma K, et al.	[123]	Prospective cohort study	2014	Y	N	U.S. volunteer patients seeking treatment for work-related, acute back pain	(CES-D, PCS, TSK)	Decreases in expectancies for recovery seem as important as baseline values in terms of outcome, which has clinical and theoretical implications.
66	Fimland MS, Vasseljen O, Gismervik S, et al.	[124]	Randomized controlled trial	2014	N	Y	Workers on Sick leave – MH or MSD in Norway	(CSQ, HADS, MSPSS, NGQ, BPI, RRTW, SHC)	No significant outcome /improvement in MH or RTW.
67	Hartzell MM, Neblett R, Perez Y, et al.	[125]	Retrospective cohort study	2014	N	Y	U.S. sufferers of fibromyalgia	(BDI, PDQ, SF-36)	No significant outcome /improvement in MH or RTW.
68	Kennedy L, Dunstan DA	[126]	Mixed methods study design	2014	Y	N	Australian workers with chronic MSD	(ZSDS)	The Injustice Experience Questionnaire (IEQ) was found to be a useful assessment tool to support the psychosocial assessment of injured workers with long-term disability secondary to a musculoskeletal disorder.
69	Lin KH, Shiao J, Guo NW, Liao SC, et al.	[127]	Mixed methods study design	2014	Y	Y	Injured Taiwanese workers	(BSRS-50, PTSC)	Occupational injury can cause long-term psychological impact in workers. Injured workers would benefit from targeted screening and early mental health interventions.
70	Punakallio A, Lusa S, Luukkonen R, et al.	[128]	Mixed methods study design	2014	Y	N	Finnish fire fighter's workability trajectories	(POMS, WAI)	When planning preventive actions and workplace health promotion among firefighters, even one site musculoskeletal pain and mild signs of depression should be taken into account.

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									Prevention of adverse lifestyle habits is also essential.
71	Wilkie R, Phillipson C, Hay E and Pransky G	[129]	Prospective cohort study	2014	N	N	U.K. workers in primary health care facility with osteoarthritis	(HADS, SF-12)	No significant outcome /improvement in MH or RTW.
72	Coutu MF, Durand MJ, Marchand A, Labrecque ME, Berbiche D and Cadieux G	[130]	Mixed methods study design	2013	N	Y	Canadian vocational rehabilitation participants	(BDI, GAD, WAQ)	No significant outcome /improvement in MH or RTW.
73	Gagnon CM, Stanos SP, van der Ende G, Rader L R and Harden RN	[131]	Prospective cohort study	2013	Y	Y	U.S. Workers Compensation recipients enrolled in pain rehab program.	(BDI, MPQ, PCS, STAI, VAS)	The efficacy of an interdisciplinary pain rehabilitation program in decreasing emotional distress, reducing pain intensity, and improving return-to-work status in the majority of workers with chronic pain, is validated.
74	Grete A and Jensen C	[132]	Randomized controlled trial	2013	Y	Y	Sick leave – MH or MSD Norway	(SF-36, WAI)	The intervention provided to injured workers on sick leave due to musculoskeletal and/or common mental illnesses positively influenced RTW and the employees' attitudes, behaviour and health.
75	Jacobsen H, Caban-Martinez A, Onyebeke L C, et al.	[133]	Cross-sectional study	2013	Y	N	U.S. Construction Workers	(HSCL, KPD)	Mental distress is associated with both injury rate and self-reported pain in construction workers.
76	Laisne F, Lecomte C, Corbiere M	[34]	Prospective cohort study	2013	Y	N	Canadian workers with chronic occupational	(BDI, MPI, STAI, BSI, MPSS)	Gender, work recovery expectations & importance of work was predictive of work outcomes at 2 months and age, medical consolidation, trauma

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							injuries on compensation benefits		symptoms, work support and importance of work were predictive of work outcomes at 8 months post compensated injury.
77	Long M, Bogossian F, & Johnston V	[12]	Cross-sectional study	2013	N	N	Australian midwives with work-related spinal musculoskeletal symptoms	(CES-D, JCQ, PCS, SF-36, TSK)	No significant outcome /improvement in MH or RTW.
78	Mayer T, Choi Y, Howard K & Gatchel R et al.	[134]	Prospective cohort study	2013	Y	Y	U.S. chronic lower extremity disorder patients in FRP.	(BDI, SCID, VAS)	Participation in a Functional Restoration Program seems to be effective equally for injured workers with chronic lower extremity disorders and those with chronic lower back pain.
79	Murad M, O'Brien L, Farnworth L & Chien C	[135]	Cross-sectional study	2013	N	Y	Malaysian workers with MSD	(DASS 21)	Low levels of perceived occupational competence were associated with higher levels of negative emotional states in injured workers.
80	Vargas-Prada S, Serra C, Martínez J, Ntani G, et al.	[136]	Prospective cohort study	2013	Y	N	Spanish nurses and office workers	(FABQ, SF-36)	Psychological and culturally influenced factors have an important role in low back pain development & persistence.
81	Roddy E, Zwierska I, Jordan K, Dawes P et al.	[137]	Longitudinal observational study	2013	Y	Y	U.K. patients referred for a musculoskeletal CATSCAN	(HADS, SF-36)	Chronic pain, anxiety, & depression in workers suffering from musculoskeletal injuries (causing absence from work) are psychosocial issues which are easily under recognised and under-treated. Appropriate training for health professionals must be provided to enable an effective bio-psychosocial model of care to be provided to injured workers
82	Clay F, Fitzharris M, Kerr E,	[138]	Prospective cohort study	2012	Y	N	Australian workers with	(AQoL, SF-36)	Both injury-related and psychosocial factors are associated with duration of time to RTW following acute unintentional injuries.

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	McClure R & Watson W						unintentional injuries		
83	Hansen C, Rasmussen K, Kyed M, Nielsen K et al.	[139]	Cross-sectional study	2012	N	N	Danish ambulance personnel	(COPSOQ II, SF-12)	No significant outcome /improvement in MH or RTW.
84	Kendrick D, Vinogradova Y, Coupland C, Christie N, et al.	[140]	Longitudinal observational study	2012	Y	N	U.K. workers attending hospital for injuries	(EQ-5D)	Problems with pain control, mobility and anxiety and depression were common in employed injured persons and persisted in a considerable proportion of participants up to four months post injury.
85	Lin KH, Shiao J, Guo NW, Liao SC, et al.	[141]	Mixed methods study design	2012	Y	Y	Injured Taiwanese workers	(BSRS-50, PTSC)	At 3 months after occupational injury, a significant proportion of the Taiwanese worker cohort suffered from depression or Post-traumatic stress disorder.
86	Phillips LA, Carroll LJ, Voaklander DC, Gross DP, et al.	[70]	Cross-sectional study	2012	Y	N	Canadian injured workers enrolled in a RTW program.	(BDI, CSQ)	Injured workers with high pain & high self-perceived disability are more likely to catastrophize their pain, leading to poor recovery outcomes.
87	Reme S, Shaw W, Steenstra I, Woiszwilllo M, et al.	[53]	Prospective cohort study	2012	Y	N	U.S. Workers seeking initial evaluation for acute, Work - related low back pain	(CES-D, PCS, TSK)	Classifying injured workers in terms of difficulties of; overcoming emotional distress; or resuming normal activity; or of obtaining workplace support, may improve the cost-benefit of early intervention strategies to prevent long-term sickness absence and disability due to low back pain.
88	Scott W & Sullivan M	[142]	Cross-sectional study	2012	Y	N	Canadians with persistent musculoskeletal Pain.	(BDI, PCS)	Perceived injustice augments the relationship between pain severity and depressive symptoms. Interventions aimed at reducing symptoms of depression for individuals with persistent

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									musculoskeletal pain should also include provisions to deal with perceptions of injustice in the cohort
89	Stochl J, Jones PB & Croudace TJ	[143]	Mixed methods study design	2012	N	Y	Scotland General Health Survey respondents	(GHQ-12, WEMWBS)	No significant outcome /improvement in MH or RTW.
90	Truchon M, Schmouth ME, Cote D, Fillion L, et al.	[144]	Prospective cohort study	2012	Y	N	Canadian injured workers receiving compensation	(FABQ, HADS, JCQ, PCS, RMQ)	The assessed Absenteeism Screening Questionnaire did not present better psychometric properties than other questionnaires but was noted as one of the first to identify psychosocial organizational aspects as significant in the development of long-term absenteeism among workers with low back pain
91	Saltychev M, Laimi K, Oksanen T, Pentti J, et al.	[145]	Prospective cohort study	2012	N	Y	Finland Public Sector Workers	(GHQ-12, SAI)	No significant outcome /improvement in MH or RTW.
92	Wåhlin C, Ekberg K, Persson J, Bernfort L, & Öberg B	[146]	Prospective cohort study	2012	Y	Y	Swedish Workers on sick leave – MH or MSD	(EQ-5D, WAI)	Receiving combined clinical & work-related interventions increased the probability of return-to-work for patients with mental disorders, but not for patients with musculoskeletal disorders. Better health, positive expectations of return-to-work & better workability were associated with return-to-work for patients with musculoskeletal disorders.
93	Wideman TH, Scott W, Martel MO & Sullivan MJL	[147]	Prospective cohort study	2012	Y	Y	Canadian patients with work-related musculoskeletal injuries and	(BDI, PCS, SCID, TSK)	For many patients, depressive symptoms resolve over the course of physical therapy, and resolution is associated with long-term improvements in pain and disability. These findings will help identify patients whose depressive symptoms are least likely to respond

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							symptoms of depression		to physical therapy and may therefore warrant additional treatment.
94	Brouwer S, Franche RL, Hogg-Johnson S, Lee H, et al.	[148]	Prospective cohort study	2011	Y	N	Canadian patients with work-related musculoskeletal injuries	(CES-D, RTWSE, SF-12)	Evidence of the validity of the 10 item Return-to-Work Self-Efficacy (RTWSE) Scale was documented as applied to a sample of injured workers with work-related MSK disorders who had made a lost time claim.
95	Dawson A, Schluter P, Hodges P, Stewart S, et al.	[149]	Longitudinal observational study	2011	Y	N	Australian nursing and midwives	(CES-D, JCQ, NGQ, PCS, SF-36, TSK)	The fear of movement, passive coping, frequent manual handling, and severe or radiating pain increase the likelihood of sick leave due to lower back pain.
96	Devereux J, Rydstedt L & Cropley M	[150]	Prospective cohort study	2011	Y	N	U.K. workers	(GHQ-12)	The need for recovery from work was the strongest predictor, relative to psychosocial work characteristics (job demands, decision latitude and social support), and musculoskeletal problems, of psychological distress 15 months later in individuals initially free from distress.
97	Jensen C, Jensen O, Christiansen D & Nielsen C	[151]	Randomized Clinical Trial	2011	Y	Y	Danish patients sick-listed from work for 4 to 12 weeks because of low back pain.	(ÖMPSQ, RMQ, SF-36)	Hospital-based multidisciplinary intervention has not proven to be better than brief intervention to increase RTW efficacy and improve health in sick-listed employees with low back pain.
98	Mahmud N, Kenny T, Zein R, & Hassan S	[152]	Cluster randomized controlled trial	2011	N	Y	Malaysian University Officer Workers	(DASS 21)	Consistent reductions were observed for all musculoskeletal disorders. No significant outcome /improvement in MH or RTW.
99	Park S	[73]	Cross-sectional study	2011	Y	N	Injured Korean workers	(BDI)	Serious mental health issues are significant among physically injured workers - rehabilitation should include interventions for depression.

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100	WåHlin-Norgren C, Ekberg K & Öberg B	[67]	Cross-sectional study	2011	N	Y	Swedish Workers on sick leave – MH or MSD	(EQ-5D, WAI, ZSDS)	No significant outcome /improvement in MH or RTW.
101	Wideman T & Sullivan M	[153]	Prospective cohort study	2011	Y	N	Canadian patients with MSD injury referred for physical therapy	(BDI, PCS, TSK)	Evidence of the relationships between pain catastrophizing and pain intensity, fear of movement and work disability, and pain self-efficacy & medication use.
102	Haddadi P, Beshharat MA	[154]	Cross-sectional study	2010	Y	N	Iranian college students	(BAI, BDI, CD-RISC, GHQ-28, MHI)	No significant outcome /improvement in RTW.
103	Steenstra IA, Ibrahim SA, Franche R, Hogg-Johnson S, et al.	[155]	Prospective cohort study	2010	Y	N	Canadian workers with low back pain	(FABQ, RMQ)	A risk factor-based intervention strategy using data from the Readiness for Return to Work Cohort Study was validated.
104	Sullivan M, Adams H	[47]	retrospective two-cohort study	2010	Y	Y	Canadian workers receiving rehabilitation for disabling back pain	(BDI, PCS, TSK)	A psychosocial intervention by physiotherapists can lead to meaningful reductions in psychosocial risk factors for pain and disability and may contribute to more positive rehabilitation outcomes.
105	Franché RL, Carnide N, Hogg-Johnson S, Côté P, et al.	[3]	Prospective Cohort Study	2009	Y	N	Canadian workers compensation for work-related musculoskeletal disorder of the back or upper extremity	(CES-D, RMQ)	Depressive symptoms are pervasive in workers with musculoskeletal injuries, but transient for some and rarely diagnosed or treated.

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106	Franché RL, Severin CN, Hogg-Johnson S, Lee, H, et al.	[156]	Cross-sectional study	2009	Y	N	Canadian workers compensation for work-related musculoskeletal disorder of the back or upper extremity	(SF-12)	No significant outcome /improvement in RTW.
107	Girgis A, Cockburn J, Butow P & Bowman D, et al.	[64]	Randomized-controlled trial	2009	Y	Y	Australian medical and radiation oncologists	(HADS)	Oncologists who participated in a consultation skills training (CST) program demonstrated effectiveness in reducing psychological distress in patients.
108	Howard K, Mayer T & Gatchel R	[72]	Prospective Cohort Study	2009	Y	N	U.S. workers with chronic disabling musculoskeletal disorders	(BDI, SCID, VAS)	Both employees and employers' benefit if the injured employee can stay at work post-musculoskeletal injury in lieu of short- or long-term disability.
109	Opsteegh L, Reinders-Messelink H, Schollier D & Groothoff, J, et al.	[157]	Prospective Cohort Study	2009	Y	N	Dutch patients operatively treated for a hand disorder or a hand injury, and who were employed prior to surgery	(SF-36, STAI)	Pain, accident location and symptoms of PTSD were most important in resuming work in hand injured patients or in patients with a hand disorder. The treatment of pain and impacts on mental health should also be considered during rehabilitation.
110	Sardá Jr J, Nicholas MK, Asghari A & Pimenta C	[158]	Cross-sectional study	2009	Y	N	Australian & Brazilian chronic pain patients	(CPAQ, DASS 21, RMQ)	Demographic, pain & psychosocial factors found to contribute in varying degrees to disability and work status in chronic pain patients in Australia & Brazil.

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111	Stice B & Dik B	[159]	Cross-sectional study	2009	Y	N	U.S. injured workers undergoing a vocational rehabilitation evaluation	(BDI-II, MPQ)	Injured workers experiencing higher levels of pain and stress and who prefer to avoid workplace challenges may be more vulnerable to experiencing the onset of depression.
112	Hincapie C, Cassidy D & Cote P	[160]	Cross-sectional study	2008	Y	N	Canadian participants in Health and Back Pain Survey	(CES-D, SF-36)	Analysis shows an association between previous occupational low back injury and increasing severity of prevalent low back pain, but not depression. These results suggest that past work-related low back injury may be an important risk factor for future episodes of low back pain and disability in the general population.
113	Li-Tsang C, Li E, Lam C & Hui, K,	[10]	Prospective Cohort Study	2008	Y	Y	Injured workers from Hong Kong Workers' Health Centre	(SF-36, STAI)	Engaging in the job placement (PS) program appeared to have enhanced the employability of injured (MSK) workers. Workers who participated in the program also showed higher levels of work readiness and emotional status in coping with their work injuries.
114	Hartzell M, Mayer T, Neblett R, Marquardt D,	[118]	Prospective Cohort Study	2015	Y	Y	U.S. chronic MSD patients in FRP.	(SCID)	CDOMD patients who completed an FRP in a PE year were less likely to return to, or retain, work 1-year after discharge, demonstrating that a PE can be an additional barrier to post-discharge work outcomes
115	Smith B, Dalen J, Wiggins K, Tooley E, et al.	[52]	Cross-sectional study	2008	Y	N	BRS tested on undergraduate students & cardiac rehabilitation patients	(BRS, CD_RISC, HADS, MHI)	The evidence suggests that the Brief Resilience Scale is a reliable means of assessing resilience as the ability to bounce back or recover from stress.

#	Author(s)	Ref	Study Design	Year	Impact on MH?	HCP Involved?	Work Sector/ Cohort Attributes	Questionnaire Used (Appendix 3)	Summary of relevant outcomes & recommendation(s) to improve MH or RTW process
116	Sullivan M, Adams H, Horan S, Maher D, et al.	[161]	Cross-sectional study	2008	Y	N	Canadian pain patients in functional restoration rehabilitation program.	(BDI, MPQ, PCS, TSK)	The psychometric properties of the 12-item Injustice Experience Questionnaire (IEQ) designed to assess perceived injustice associated with injury are validated in this study.
117	Sullivan M, Adams H, Tripp D & Stanish W	[162]	Prospective Cohort Study	2008	Y	Y	Canadian patients in community-based disability management intervention	(BDI, MPQ, PCS, TSK)	Pain reduction, but not catastrophic thinking or fear of movement/ re-injury, mediated the relation between chronicity and improvement in depressive symptoms (in MSK injuries) and underpin the importance of early detection and treatment of depressive symptoms.
118	Zatzick D, Jurkovich G, Rivara F, Wang, J, et al.	[74]	Prospective Cohort Study	2008	Y	N	U.S. patients with traumatic injury	(PCL-C, SF-36)	PTSD and depression occur frequently and are independently associated with enduring impairments after traumatic injury hospitalization. Early acute care interventions targeting these disorders have the potential to improve functional recovery after injury and a timely RTW.
119	Harris I, Young J, Rae H, Jalaludin B, et al.	[163]	Mixed methods study design	2008	Y	N	Australian patients with traumatic injury	(SF-36)	General health after major physical trauma is more strongly associated with factors relating to compensation than with the severity of the injury. Processes involved with claiming compensation after major trauma may contribute to poor patient outcomes
120	Baldwin M, Butler R, Johnson W & Cote, P	[164]	Prospective Cohort Study	2007	Y	N	U.S. workers who filed claims for occupational back pain	(RMQ, SF-12)	Baseline physical functioning and overall mental and physical health status are more predictive of specific patterns of post-injury employment than pain intensity measures.

#	Author(s)	Ref	Study Design	Year	Impact on MH?	HCP Involved?	Work Sector/ Cohort Attributes	Questionnaire Used (Appendix 3)	Summary of relevant outcomes & recommendation(s) to improve MH or RTW process
121	Corbiere M, Sullivan M, Stanish W & Adams H	[165]	Prospective Cohort Study	2007	Y	Y	Canadian patients in pain management intervention program	(BDI, MPQ)	Evidence showed that depression and pain were significantly associated over time and that depression and affective pain were the most significant variables for predicting RTW regardless of the time of assessment.
122	Dersh J, Mayer T, Gatchel RJ, Towns B, et al.	[71]	Prospective Cohort Study	2007	Y	Y	U.S. chronic disabling occupational spinal disorders patients in FRP.	(SCID)	Poorer work outcomes were more common with specific (and comorbid) Axis I psychiatric disorders. Opioid dependence was the single disorder associated most often with less successful outcomes.
123	Dunstan D and Covic T	[166]	Uncontrolled, repeated-measures, pilot study	2007	Y	Y	Australian workers with compensable MSD	(DASS 21, ÖMPSQ, PCS, RMQ, TKS)	Independent, rural or community-based practitioners, working collaboratively using an integrated treatment program, can produce positive outcomes for pain disabled injured workers, and achieve results similar to those reported by metropolitan-based pain clinics.
124	Franché R, Severin C, Hogg-Johnson S, Côté P, et al.	[167]	Prospective Cohort Study	2007	Y	Y	Canadian claimants with work-related musculoskeletal injuries	(CES-D, RMQ, SF-12)	Work accommodation and targeted HCP communication with the workplace are critical for effective early RTW interventions.
125	Franché R, Corbière M, Lee H, Breslin F, et al.	[168]	Cross-sectional study	2007	Y	N	Canadian claimants with work-related musculoskeletal injuries	(CES-D, RMQ, SF-12)	Psychometric properties of the newly developed instrument suggest that the application of the Readiness for Change model to return-to-work is relevant to work disability research
126	Harris I, Young J, Rae H, Jalaludin B et al.	[169]	Cross-sectional study	2007	Y	N	Australian patients with traumatic injury	(PTSC, SF-36)	The study highlights psychosocial factors as predictors of back pain after major physical trauma but does not support physical factors as important contributors to future low back pain.

#	Author(s)	Ref	Study Design	Year	Impact on MH?	HCP Involved?	Work Sector/ Cohort Attributes	Questionnaire Used (Appendix 3)	Summary of relevant outcomes & recommendation(s) to improve MH or RTW process
127	Holtedahl R and Veirsted K	[170]	Mixed methods study design	2007	Y	N	Norwegian workers' compensation claimants referred for a medicolegal assessment.	(SF-36)	Better health and function were mainly associated with a higher level of education and more serious injuries. The extent of social support in the workplace after the accident was only partly related to outcome. The importance of psychosocial factors when making injury assessments in a medicolegal setting is highlighted
128	Lange C, Burgmer M, Braunheim M & Heuft G	[171]	Prospective Cohort Study	2007	Y	N	German patients with traumatic injury	(HADS, SCID, VAS)	Labourers after a traffic or work accident, who estimate the accident as severe, are at greater risk of developing long-term disability.
129	Lillefjell M & Jakosen K	[172]	Prospective Cohort Study	2007	Y	N	Norwegian chronic nonspecific musculoskeletal pain patients, included in multidisciplinary rehabilitation program	(HADS, VAS)	The study clarifies the role of Sense of Coherence in chronic pain and emotional distress and question the role of SOC in predicting work re-entry in long-term chronic musculoskeletal pain conditions
130	Li-Tsang C, Chan H, Lam C, Lo-Hui K, et al.	[173]	Randomized control trial	2007	N	N	Hong Kong injured workers in training program	(SF-36, STAI)	Injured workers' employment readiness appeared to be associated with injured workers perceived physical function, bodily pain, self-perception of general health and the success of RTW rate.
131	Shaw W, Means-Christensen A, Slater M, Patterson T, et al.	[174]	Prospective Cohort Study	2007	Y	N	U.S. males With Subacute Low back pain	(FABQ)	No significant outcome /improvement in MH or RTW.
132	Brattberg G	[175]	Randomized control trial	2006	Y	Y	Swedish workers on	(HADS, SF-36)	A 20-week rehabilitation program over the Internet resulted in significant improvements in

#	Author(s)	Ref	Study Design	Year	Impact on MH?	HCP Involved?	Work Sector/ Cohort Attributes	Questionnaire Used (Appendix 3)	Summary of relevant outcomes & recommendation(s) to improve MH or RTW process
							long-term sick leave with chronic pain and/or burnout		health, quality of life, increased work capacity and decreased depression in the participants
133	Gatchel R, Mayer T & Theodore B	[176]	Prospective Cohort Study	2006	Y	Y	U.S. workers with chronic disabling occupational MSD	(BDI, ODI, PDQ, SF-36, VAS)	The evidence suggested that the Pain Disability Questionnaire was validated in predicting treatment outcomes in patients with chronic disabling occupational musculoskeletal disorder.
134	Gauthier N, Sullivan M, Adams H, Stanish W et al.	[7]	Prospective Cohort Study	2006	Y	Y	Canadian workers with MSD who participated in a community-based secondary prevention program	(BDI, MPQ, PCS, TSK)	Pain catastrophizing and pain severity were found to be significant predictors of prolonged RTW.
135	Kosny A, Franche R, Pole J, Krause N, et al.	[177]	Cross-sectional study	2006	Y	N	Canadian injured workers	(CES-D)	The HCP playing an active role early in the RTW process including direct contact with the workplace and giving a patient a RTW date and guidance on how to prevent recurrence and re-injury were positively associated with an early RTW.
136	Li, E, Li-Tsang C, Lam C, Hui K, et al.	[173]	Randomized control trial	2006	Y	Y	Hong Kong injured workers	(SF-36, STAI)	Participation in the “training on work readiness” program appeared to reduce the anxiety and stress levels and improve the motivation and employment readiness of injured workers.
137	Lillefjell M, Krokstad S & Espnes G	[178]	Prospective Cohort Study	2006	Y	Y	Norwegian chronic musculoskeletal	(HADS, VAS)	Age, sleeplessness, cognitive function, overall health, pain experience & anxiety were the strongest predictors of work ability.

#	Author(s)	Ref	Study Design	Year	Impact on MH?	HCP Involved?	Work Sector/ Cohort Attributes	Questionnaire Used (Appendix 3)	Summary of relevant outcomes & recommendation(s) to improve MH or RTW process
							pain patients, included in multidisciplinary rehabilitation program		
138	Lotters F, Franche R, Hogg-Johnson S, Burdorf, A, et al.	[40]	Prospective Cohort Study	2006	Y	N	Norwegian workers receiving total compensation benefits due to MSD	(CES-D, FABQ, SF-12)	The presence of depressive symptoms and poor physical health in workers on benefit due to musculoskeletal disorders increases the number of days on total compensation benefits significantly.
139	McGeary D, Mayer T & Gatchel R	[179]	Prospective Cohort Study	2006	Y	Y	U.S. chronic musculoskeletal pain patients, included in multidisciplinary rehabilitation program	(BDI, VAS)	High pain ratings before rehabilitation are associated with higher rehabilitation dropout rates. The patients with chronic disabling occupational musculoskeletal disorders who reported extreme pain after completing a full course of extended treatment were at risk for poor outcomes in terms of lost productivity, high utilization of health care, and cost-shifting of state Workers' Compensation payments to federal resources
140	Gauthier N, Sullivan M, Adams H, Thibault P, et al.	[7]	Prospective Cohort Study	2006	Y	Y	Canadian workers with MSD who participated in a community-based secondary prevention program	(BDI, MPQ, PCS, TSK)	To maximize return to work potential, the content, structure, and duration of rehabilitation programs requires modification as a function of the injured Workers' level of the depression severity (mild, moderate or severe).

#	Author(s)	Ref	Study Design	Year	Impact on MH?	HCP Involved?	Work Sector/ Cohort Attributes	Questionnaire Used (Appendix 3)	Summary of relevant outcomes & recommendation(s) to improve MH or RTW process
141	Takahashi N, Kikuchi S, Konno S, Morita S, et al.	[180]	Cross-sectional study	2006	Y	N	Sample of Japanese residents who had low back pain (low back pain) within the past month	(JCQ, RMQ, SF-36, VAS)	Workers with low back pain should be screened for psychosocial factors and appropriate interventions developed and applied to suit.
142	Wall C, Ogloff J & Morrissey S	[181]	Cross-sectional study	2006	Y	N	injured Australian workers who had completed vocational rehabilitation	(GHQ-28, SCID)	Personality factors are associated with rehabilitation outcome, particularly cost and health. The type of personality characteristics of injured workers may have important implications when designing rehabilitation programs.
143	Allen H, Hubbard D & Sullivan S	[182]	Cross-sectional study	2005	Y	N	U.S. workers	(BPI, SF-12)	Pain was linked to degradation of physical and mental health.
144	Cheng J & Li-Tsang C	[183]	Mixed methods study design	2005	Y	N	Hong Kong injured workers (upper limbs or lower limbs, low back pain, or cumulative trauma disorder)	(SF-36, STAI)	Injured workers with chronic injury such as low back pain or cumulative trauma had poorer self-perception of physical health and psycho-social/mental health compared to those with direct trauma. Self-perceived pain and physical functioning were significant factors influencing the readiness for returning to work. Workers with low back pain were found to have lower motivation for returning to work.
145	Chibnall J, Tait R, Andresen E & Hadler N	[184]	Prospective Cohort Study	2005	Y	N	U.S. Workers' Compensation claimants with single incident low back injury	(PCS, PDI, SF-12)	African American race and lower socioeconomic status [SES]—relative to Caucasian race and higher SES—were found to be risk factors for poor outcomes after occupational low back injury.

#	Author(s)	Ref	Study Design	Year	Impact on MH?	HCP Involved?	Work Sector/ Cohort Attributes	Questionnaire Used (Appendix 3)	Summary of relevant outcomes & recommendation(s) to improve MH or RTW process
146	Coutu M, Durand M, Loisel P, Dupuis G, et al.	[185]	Correlational prospective cohort study	2005	Y	N	Canadian workers on sick leave due to musculoskeletal disorders (MSD)	(QLSI, RMQ, SF-12, VAS)	Results support the concurrent validity and responsiveness of the Quality of Life Systemic Inventory (QLSI) with an MSD population. This instrument could serve in future research as an outcome measurement instrument in the evaluation of more long-term effects of rehabilitation programs.
147	Gheldof E, Vinck J, Vlaeyen J, Hidding A, et al.	[44]	Cross-sectional study	2005	Y	N	Workers with low back pain (low back pain) and sick leave (SL) in employees from Belgium and the Netherlands	(FABQ, JCQ, TSK)	Physical load factors are relatively more important in the process leading to short-term low back pain and short-term sick leave, whereas job stressors, severe pain and pain-related fear are more important in determining the further course and maintenance of the inability to work.
148	Harman K and Ruyak P	[186]	Case Control Study	2005	Y	Y	Canadian office workers	(BDI, MPQ, PASS, SCID)	No significant outcome /improvement in MH or RTW.
149	Rasmussen K and Andersen J	[65]	Prospective Cohort Study	2005	Y	Y	Injured Danish workers in a work ability programme	(SF-36)	PRIMARY HEALTH CARE PROVIDERSs are critical HCPs in the rehabilitation process. When the injured worker is provided with relevant information about their health and rehabilitation possibilities and the PRIMARY HEALTH CARE PROVIDERS projects an empathic attitude toward their plight, better rehabilitation and RTW outcomes are achieved.
150	Schultz I, Crook J, Berkowitz J, Milner R, et al.	[187]	Prospective Cohort Study	2005	Y	N	Injured Canadian workers	(JCQ, SF-36)	Predicting return to work after low back injury using the Psychosocial Risk for Occupational Disability Instrument is further validated in this study.

#	Author(s)	Ref	Study Design	Year	Impact on MH?	HCP Involved?	Work Sector/ Cohort Attributes	Questionnaire Used (Appendix 3)	Summary of relevant outcomes & recommendation(s) to improve MH or RTW process
151	van Duijn M, Lötters F & Burdorf A.	[188]	Prospective Cohort Study	2005	Y	N	Netherlands employees on sick leave due to MSD	(EQ-5D, RMQ, SF-12)	Employees were more likely to return to modified work when they had a better mental health, had prolonged periods of standing in their regular job and had less skill discretion.
152	Amick B, Habeck R, Ossmann J, Fossel A, et al.	[189]	Prospective Cohort Study	2004	Y	N	U.S. workers receiving carpal tunnel release surgery	(SF-36)	The significance of improved self-efficacy at 6 months and depression at 2 months post-surgery highlighted the importance of psychosocial management of musculoskeletal disorders.
153	Gustafsson M & Ahlstrom G	[190]	Prospective Cohort Study	2004	Y	N	Swedish patients with acute traumatic hand injuries	(HADS)	The results of this study show that treatment of patients with traumatic hand injuries should also include preventive action and follow-up of trauma-related distress and pain.
154	Schultz I, Crook J, Meloche G, Berkowitz J, et al.	[191]	Prospective Cohort Study	2004	Y	N	Canadian Workers Compensation claimants with low back disability	(CES-D, DUSOCS, JCQ, MPQ, SAI, STAI, SF-36)	The key psychosocial predictors identified as being predictive of occupational low back disability were expectations of recovery and perception of health change. Also implicated, but to a lesser degree, were occupational stability, skill discretion at work, co-worker support, and the response of the workers' compensation system and employer to the disability.
155	Dersh J, Gatchel R, Polatin P & Mayer T	[19]	Cross-sectional study	2002	Y	Y	U.S. patients with work related chronic musculoskeletal pain / disability	(SCID)	Prevalence of psychiatric disorders was significantly elevated in workers with chronic work-related musculoskeletal pain disability compared with base rates in the general population. Moreover, a much higher ratio of these workers was diagnosed with at least one current disorder, compared with the general population. Mental health professionals need to be employed to assist in identifying and stabilizing these patients.

#	Author(s)	Ref	Study Design	Year	Impact on MH?	HCP Involved?	Work Sector/ Cohort Attributes	Questionnaire Used (Appendix 3)	Summary of relevant outcomes & recommendation(s) to improve MH or RTW process
156	Fritz J and George S	[39]	Mixed methods study design	2002	Y	Y	U.S. workers with work-related low back pain participating in a clinical trial	(BAI, CES-D, FABQ, SF-36)	Fear-avoidance belief about work was found to be the psychosocial factor that could best predict return to work in patients with acute work-related low back pain.
157	Kopta S, and Lowry J	[192]	Cross-sectional study	2002	Y	N	U.S. adults, college students, college students in counselling, and adults in outpatient psychotherapy	(BHQ-20, SAI)	The Behavioral Health Questionnaire-20 is assessed as a valid and reliable brief measure that assesses symptoms common to psychotherapy outpatients as well as well-being and critical areas of life functioning (i.e., work, relationships, enjoyment).
158	Marhold C, Linton S & Melin L	[30]	Cross-sectional study	2002	Y	N	Swedish workers on sick leave with MSD	(CSQ, MPI, ORQ)	The Obstacles of Return-to-Work Questionnaire (ORQ) was found to be a good predictor of sick leave. Future research needs to investigate if the ORQ also can be of use in the planning of occupational rehabilitation.
159	Peele P and Tollerud D	[193]	Case Control Study	2002	Y	N	U.S work-related injured workers & non- injured who completed a self-administered depression screening instrument	(PHQ-9)	Overall, injured workers in this study were found not to be more likely to be depressed than a comparison group of non-injured workers. Injured women had significantly higher depression scores than non-injured women.

#	Author(s)	Ref	Study Design	Year	Impact on MH?	HCP Involved?	Work Sector/ Cohort Attributes	Questionnaire Used (Appendix 3)	Summary of relevant outcomes & recommendation(s) to improve MH or RTW process
160	Shaw W, Feuerstein M, Lincoln A, Miller V, et al.	[50]	Cross-sectional study	2002	Y	N	U.S. government employees with an accepted workers' compensation claim for upper extremity disorder	(SF-12)	To improve functioning in injured workers with persistent upper extremity disorders, rehabilitation programs needs to also include pain coping techniques, employ active problem solving and ensure the worker RTW is exposed to less ergonomic risk in the workplace.
161	DeBerard, M, Masters K, Colledge A, Schleusener R et al.	[194]	Retrospective Cohort Study	2001	Y	N	U.S. injured / compensated workers who underwent posterolateral lumbar fusion	(RMQ, SF-20)	Outcomes of posterolateral lumbar fusion among compensated workers in Utah are inconsistent. Outcomes can be predicted by pre-surgical socio demographic variables. Screening for such pre-surgical risk factors may assist in prudent surgical decisions and rehabilitation planning.
162	Marhold C, Linton S & Melin L	[195]	Randomized control trial	2001	Y	Y	Two groups of Swedish women with musculoskeletal pain in treatment program	(BDI, CSQ, MPI)	The cognitive behavioural return-to-work program assessed was more effective than the treatment-as-usual control condition in reducing the number of days on sick leave for patients on short-term sick leave, but not for patients on long-term sick leave.
163	Keogh J, Nuwayhid I, Gordon J & Gucer P.	[196]	Cross-sectional study	2000	Y	N	U.S. workers with work-related upper extremity cumulative trauma disorders	(CES-D, UM-ADL)	Work-related upper extremity cumulative trauma incurs persisting symptoms and difficulty in performing simple activities of daily living, impacting home life even more than work. Job loss, symptoms of depression and family disruption were common in the cohort.

#	Author(s)	Ref	Study Design	Year	Impact on MH?	HCP Involved?	Work Sector/ Cohort Attributes	Questionnaire Used (Appendix 3)	Summary of relevant outcomes & recommendation(s) to improve MH or RTW process
164	Pransky G, Benjamin K, Hill-Fotouhi C, Himmelstein, J, et al.	[6]	Retrospective Cohort Study	2000	Y	N	U.S. workers with work-related MSD (Upper extremity & low back injuries)	(SF-12)	Occupational musculoskeletal injuries result in significant, long-term adverse physical, economic, and psychological consequences.

Appendix 3: Analysis of Mental Health Factors in Health Questionnaires sourced from the literature

Questionnaires sourced from the literature		Consideration of potential impact on worker's mental health due to:								
		Presence of symptoms of depression &/or anxiety	Fear of, or actual pain / physical limitations	Unsafe or unreasonable RTW work demands or timeframes	Poor or stressful interaction with healthcare providers	Financial Stress	Discrimination, harassment, bullying or stigma	Level of Family Support / Interaction	Level of Social Support / Interaction	Level of Work Support / Interaction
1	Assessment of Quality of Life (AQoL) Instrument	•						•	•	
2	BASIS-24 (Behaviour And Symptom Identification Scale)	•						•	•	
3	Beck Anxiety Inventory (BAI)	•								
4	Beck Depression Inventory (BDI)	•	•							
5	Behavioural Health Questionnaire-20 (BHQ-20). A 20-item self-report measure that assesses mental health with the following scales: Well-Being (3 items), Psychological Symptoms (13 items), and Life Functioning (4 items).	•								
6	Brief Pain Inventory (Short Form) (BPI)		•							
7	Brief Symptom Rating Scale (BSRS-50) consists of a 50-item self-report rating scale that is used to measure 10 psycho-physiological symptoms	•	•							
8	Center for Epidemiologic Studies Depression (CES-D)	•								
9	Connor–Davidson Resilience Scale (CD-RISC) a 25-item general questionnaire	•						•		
10	Coping Strategies Questionnaire (CSQ) a 44-item questionnaire assessing 7 dimensions		•							

Questionnaires sourced from the literature		Consideration of potential impact on worker's mental health due to:								
		Presence of symptoms of depression &/or anxiety	Fear of, or actual pain / physical limitations	Unsafe or unreasonable RTW work demands or timeframes	Poor or stressful interaction with healthcare providers	Financial Stress	Discrimination, harassment, bullying or stigma	Level of Family Support / Interaction	Level of Social Support / Interaction	Level of Work Support / Interaction
11	Copenhagen Psychosocial Questionnaire Version 1 or 2 (COPSOQ) Short Version with 40 items measuring 23 subscales	•		•			•	•	•	•
12	Depression, Anxiety and Stress Scale. DASS 21 is a set of 3 self-report scales designed to measure the negative emotional states of depression, anxiety, and stress. The DASS-21 has seven items for each scales	•								
13	Duke Health Profile: Social Support & Stress Scale (DUSOCS) Questionnaire	•					•	•	•	
14	EuroQol five-dimensional (EQ-5D)	•								
15	Fear-Avoidance Beliefs Questionnaire (FABQ)		•							
16	Four-Dimensional Symptom Questionnaire (4DSQ)	•	•							
17	General Health Questionnaire (GHQ-12 or 28). 28 items in 4 subscales measuring somatic symptom (7items), anxiety and insomnia (7 items), social dysfunction (7 items), and depression (7 items)	•								
18	Generalised Anxiety Disorder Questionnaire- 7 (GAD-7)	•								
19	Hopkins Symptom Checklist (HSCL)	•	•							
20	Hospital Anxiety and Depression Scale (HADS)	•	•							

Questionnaires sourced from the literature		Consideration of potential impact on worker's mental health due to:								
		Presence of symptoms of depression &/or anxiety	Fear of, or actual pain / physical limitations	Unsafe or unreasonable RTW work demands or timeframes	Poor or stressful interaction with healthcare providers	Financial Stress	Discrimination, harassment, bullying or stigma	Level of Family Support / Interaction	Level of Social Support / Interaction	Level of Work Support / Interaction
21	Job Content Questionnaire (JCQ) assesses psychological job demands (5 items), decision latitude (9 items), supervisor support (4 items) and co-worker support (4 items)			•						•
22	Kessler Psychological Distress (K6) scale (KPD)	•								
23	Maslach Burnout Inventory – General Survey (MBI-GS)	•								
24	Mental Health Inventory (MHI) 34 items designed to measure a psychological well-being and psychological distress	•								
25	Multidimensional Pain Inventory (MPI)	•	•					•	•	
26	Multidimensional Scale of Perceived Social Support (MSPSS)								•	
27	Nottingham Health Profile (NHP)	•	•					•	•	
28	Nordic (General) Questionnaire for Psychological and Social factors at Work (NGQ)						•	•	•	•
29	Norwegian Function Assessment Scale (NFAS) is a 39-item questionnaire consisting of 7 domains of 3 to 8 questions: walking/standing; holding/ picking things up; lifting/carrying; sitting; managing; cooperation /communication; and senses		•							
30	Obstacles to Return-to-Work Questionnaire (ORQ) is a 55-item self-reported inventory	•	•	•			•	•	•	•

Questionnaires sourced from the literature		Consideration of potential impact on worker's mental health due to:							
		Presence of symptoms of depression &/or anxiety	Fear of, or actual pain / physical limitations	Unsafe or unreasonable RTW work demands or timeframes	Poor or stressful interaction with healthcare providers	Financial Stress	Discrimination, harassment, bullying or stigma	Level of Family Support / Interaction	Level of Social Support / Interaction
31	Orebro Musculoskeletal Pain Screening Questionnaire (ÖMPSQ)	•	•						
32	Pain Catastrophizing Scale. The Pain Catastrophizing Scale (PCS) The PCS consists of 13 items, describing thoughts and feelings related to pain		•						
33	Patient Health Questionnaire (PHQ) The PHQ is a 34-item self-reported inventory that is used as a diagnostic MHSQ to identify symptoms of depression	•							
34	Patient Health Questionnaire (PHQ-9) self-administered for depression screening,	•							
35	Post-traumatic Symptom Checklist (PTSC) for screening of mental conditions	•	•						
36	Posttraumatic Stress Disorder Checklist (PCL-C)	•	•						
37	Profile of Mood States (POMS): short version of POMS includes 38 adjectives that reflect both positive and negative affective states	•							
38	Recovery-Stress-Questionnaire for Work (RESTQ-W)	•		•			•	•	•
39	Return to Work Self-efficacy scale - a 10-item scale (RTWSE)	•	•						•
40	Return-to-Work Obstacles and Self-Efficacy Scale (ROSES)	•	•	•		•	•	•	•
41	Roland-Morris Low back pain and Disability Questionnaire (RMQ)		•						
42	Structured Clinical Interview for the DSM (SCID) consists of a questionnaire to be completed by the patient	•	•				•	•	

Questionnaires sourced from the literature		Consideration of potential impact on worker's mental health due to:							
		Presence of symptoms of depression &/or anxiety	Fear of, or actual pain / physical limitations	Unsafe or unreasonable RTW work demands or timeframes	Poor or stressful interaction with healthcare providers	Financial Stress	Discrimination, harassment, bullying or stigma	Level of Family Support / Interaction	Level of Social Support / Interaction
43	Self-Administered Co-morbidity Questionnaire (SCQ)	•	•						
44	SF-12 is a 12 Item Short Form Health Survey Questionnaire summarised into a physical component score (PCS12) and a mental component score (MCS12). (SF-12 is a subset of SF-36)	•						•	
45	SF-20 is a 20 Item Short Form Health Survey Questionnaire. (SF-20 is a subset of SF-36)	•	•					•	
46	SF-36 Health Survey questionnaire - 36 Item Short Form Health Survey Questionnaire (SF-12 & SF-20 are subsets of SF-36)	•	•					•	
47	Spielberger's Anxiety Inventory (SAI)	•							
48	State-Trait-Anxiety Inventory. The State-Trait-Anxiety Inventory (STAI) is a widely used 40-item self-report measure of general anxiety	•							
49	Subjective Health Complaints (SHC) inventory	•	•						
50	Tampa Scale of Kinesiophobia (TSK) is a 17-item [and a shorter 11 item] self-report scale developed (using a Likert Scale) to measure activity avoidance, or 'kinesiophobia, the fear of movement or re-injury'	•	•						
51	University of Maryland Department of Physical Therapy developed the impairment to activities of daily living (UM-ADL) scale		•						

