

Facilitators and Barriers to Return to Work: A Literature Review

**A Report prepared for the
South Australian
WorkCover Corporation**

July 2006



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La Trobe University**
A body politic and corporate
ABN 64 804 735 113

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Suggested citation for this report:

Foreman, P. Murphy, G., & Swerissen, H. (2006). Barriers and facilitators to return to work: A literature review. Australian Institute for Primary Care, La Trobe University, Melbourne.

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Executive Summary

Aims and methodology

The main aims of this literature review are: (i) to provide an overview of the facilitators of, and barriers to, return-to-work after injury, and, (ii) to provide direction for a research agenda for the South Australian Work Cover Corporation consistent with the development of best practice in return-to-work following injury.

A three-stage search strategy was employed to identify relevant research. In the initial stage a broad search of electronic data bases was undertaken to identify peer-reviewed, original research and systematic reviews conducted on the topic of barriers and facilitators of return-to-work published since 1995. The other main inclusion criterion was that the research was reported in English. In the second stage only studies that included an objective measure of return-to-work were retained. In the third stage a final set of articles were identified which met specified design and coverage standards. For the main review studies addressing injuries encountered only relatively infrequently within workers compensation settings were excluded. A subset of the literature identified at stage 3 that addressed return-to-work for persons with injuries resulting from motor vehicle accidents was separately reviewed and is reported in an Appendix A.

Key findings

Work disability and return-to-work are multi-determined outcomes that cannot be accurately predicted just from knowledge of the medical or physical dimensions of the injury or condition. On the contrary, a very wide range of determinants of return-to-work have been identified in the research reviewed.

Characteristics of the injured worker, components of particular medical and occupational rehabilitation interventions, physical and psychosocial job characteristics, workplace factors, the insurance or worker's compensation scheme and broader societal factors such as labour market conditions and the prevailing legal framework have all been shown to have some role to play in influencing return-to-work outcomes independently of the underlying medical condition.

Key findings from this literature are summarized in the main report under the following headings:

- Medical or rehabilitation interventions
- Workplace factors
- Organisational, industry and system factors
- Individual worker characteristics

An overall summary of the literature in terms of its implication for service delivery is that:

- That effective management of return-to-work requires addressing individual psychological characteristics (particularly cognitions and expectations about the condition and return-to-work, and negative emotions) and workplace factors (particularly job design and workplace support) in addition to appropriate clinical management.
- A coordinated approach between all stakeholders is essential (particularly important is linking the clinician/treating practitioner with those rehabilitation and workplace personnel who are involved with the injured worker).
- There is an increasing body of research on best practice clinical management of various work related conditions that should be incorporated into practice guidelines for clinicians working with workers compensation clients.
- That return-to-work interventions may need to differ in emphasis and content depending on time since injury.

A major limitation of the current research literature in the area is that, both at the level of the individual study as well as when considering the literature as a whole, there is inadequate recognition of the range of factors involved in influencing the actual return-to-work achievements of any individual or group. The continued conduct of research designed around examination of an almost endless combination of demographic, injury and individual psychosocial variables without proper assessment of workplace factors cannot be expected to lead to advances in knowledge useful in the development of more effective return-to-work practices

Future research

The review has identified requirements for future research into of return-to-work following injury including: the need for multivariate research that addresses the range of factors, including workplace variables, involved in influencing the actual return-to-work achievements of any individual or group; the need for studies which address system variables; and, the need for research which takes into account the unique attributes of the Australian industrial relations and health systems.

In terms of a local research agenda the review concludes that there are two broad levels of intervention that need to be considered to achieve optimal return-to-work outcomes¹: systems level interventions (e.g. payment systems, regulation, education & social marketing, workforce development and training) and practice based interventions (e.g. workplace involvement, treatment that addresses psychosocial variables, coordinated return-to-work planning etc) and that a research agenda that addresses both these levels should be developed.

It is suggested that an important starting point could be the development of a monitoring and information system that addressed the important determinants of outcome following occupational injury identified here. Once a monitoring and information system had been developed a number of studies to examine population level effects and variation in particular practice become possible.

A number of specific projects to develop better practice organized around the three main stakeholder groups (clinicians, occupational rehabilitation providers, employers) are proposed.

¹ Varying return to work rates for specific conditions are reported in the published literature, 'optimal' in this context refers to the best return to work rates that are likely to be achieved given implementation of best practice in a specific context.

Introduction

Purpose of the review

A key purpose of this review is to provide an overview of the facilitators of, and barriers to, return-to-work after injury. It aims to answer the questions:

- What are the barriers to successful return-to-work after injury?
- What has been or would be helpful for workers to return-to-work after injury?
In other words, what are the key facilitators (drivers) of return-to-work after injury?

This is a strategic review that focuses on those factors associated with return-to-work achievements that are amenable to change (for example we have focused less on fixed demographic characteristics) and that are generalisable across different conditions. In addition, in order to reduce the literature review to studies most relevant to workers' compensation authorities or to occupational rehabilitation (OR) service providers, we have in the main excluded studies whose subjects suffered injuries not frequently represented within the population of those with work-related injuries (e.g., traumatic brain injury, burns, spinal cord injury).

While the above is the basis for our report, we have provided in a separate appendix (Appendix A) a summary of our findings of barriers and facilitators of return-to-work following a motor vehicle accident (MVA).

Overview of the research literature on return-to-work following work injury

Scope

Work disability and return-to-work are multi-determined outcomes that cannot be accurately predicted just from knowledge of the medical or physical dimensions of the injury or condition. On the contrary, a very wide range of determinants of return-to-work have been identified in the research reviewed in this Report (see for example, findings from reviews by Krause, Frank, Dasinger, Sullivan, & Sinclair, 2001b; Turner, Franklin, & Turk, 2000).

Characteristics of the injured worker, components of particular medical and occupational rehabilitation interventions, physical and psychosocial job characteristics, workplace factors, the insurance or worker's compensation scheme and broader societal factors such as labour market conditions and the prevailing legal framework have all been shown to have some role to play in influencing return-to-work outcomes independently of the underlying medical condition.

Reflecting this multi-factorial nature of the return-to-work process, relevant research crosses many disciplines including epidemiology, medicine, public administration, psychology as well as being well represented in unpublished reports from various statutory authorities and other stakeholders in the return-to-work process. This has resulted in an extremely large literature which at the same time is difficult to compare and synthesise because of the great variation in: (i) the variables of interest that are the focus of the study; (ii) the population studied; (iii) the study design; and, (iv) the way that variables (including outcome variables such as return-to-work) are defined and measured in the research.

Research issues

Multi-factorial nature of return-to-work determinants

The very wide range of variables across different domains that have been shown to influence return-to-work outcomes presents a significant challenge to research in this area; not only are the relevant determinants numerous, but many are likely to interact such that the impact of particular variables such as worker characteristics may vary depending on the particular condition injury or disease, treatment and rehabilitation strategies, or jurisdictional differences in compensation and system demands. This multi-factorial nature of return-to-work determinants needs to be addressed when attempting to understand or examine return-to-work outcomes. Multivariate studies that incorporate assessment of at least the key determinants in each of the major domains, and the use of multivariate statistical methods to accurately estimate the independent and combined effects of the many factors involved would seem to be prerequisites for applied research that is useful in guiding the development of occupational rehabilitation services likely to facilitate improved return-to-work outcomes for injured employees. We have taken this requirement into account below in developing a best evidence strategy to identify and analyse the most relevant

studies from the extensive literature nominally relevant to identified predictors of return-to-work.

Design issues

Studies investigating return-to-work can vary in terms of whether they are prospective studies, retrospective studies or employ a comparison group. They also differ in terms of the population studied (for example, patients, workers, rehabilitation clients, variously defined by injury type, work type and jurisdiction) and how information is collected (e.g. from records, telephone follow-up). Generally prospective studies with repeated measures of the key variable of interest provide stronger evidence of a reliable relationship between outcome and influencing factors. Prospective here means that putative predictors of return-to-work that are likely to change over time such as clinical findings and measures of individual psychosocial domains are collected prior to assessment of outcomes.

The recognized ‘gold standard’ for assessing the quality of research that is aiming to establish a causal relationship between variables - for example between particular rehabilitation interventions or return-to-work practices and return-to-work outcomes- is the randomized controlled trial. We found that this type of study is rare in the return- to-work research literature. This probably reflects the difficulty in randomly allocating injured workers to different interventions or levels of intervention when many of the ‘interventions’ of interest are typically part of a broader system, or a common feature of a wider approach, to management of work injury (e.g. introducing work place return-to-work coordinators within a particular workers compensation scheme). However, quasi-experimental designs that employ some form of control or comparison could be used more extensively in return-to-work research.

In our synthesis and analysis of the literature below we have given more weight to prospective studies and studies which have used a control group.

Return-to-work criteria

The criterion of return-to-work is not straightforward and there are a number ways of defining a return-to-work outcome. Research findings can vary with the way that return-to-work is defined and measured. One way of defining “return-to-work” in the

literature that we have reviewed is to measure return-to-work status at a certain point in time after injury, for example after three months, six months or a year (i.e. a point prevalence measure). This is a convenient measure but one that may underestimate or over estimate the total effect of an individual's injury on their work capacity, because return-to-work rates vary over time. Other criteria for return-to-work that are used in the literature include time from injury to first return-to-work, or the duration of all days lost from work since the injury. In addition to these differences, the measurement of return-to-work may be based on actual days off work or use a proxy measure such as compensation days. In this review we have not distinguished studies on the basis of the criterion used for return-to-work – so long as an objective measure was utilized the study was considered to be in scope.

Theoretical models

One of the limitations of the research on return-to-work is that it is rarely informed by theory. A well developed theory provides a basis for organizing and integrating empirical research and provides direction for future research. Although the field of return-to-work research has been described as under-theorised (Krause et al., 2001b) and lacking a comprehensive theory of the disablement and return-to-work process, some specific conceptual frameworks to help describe and understand the return-to-work process have been proposed (Krause, Dasinger, Deegan, Rudolph, & Brand, 2001a; Sullivan, Feuerstein, Gatchel, Linton, & Pransky, 2005; Young, Roessler, Wasiak, McPherson, Poppel, & Anema, 2005a). We discuss these where appropriate in the following sections of this Report.

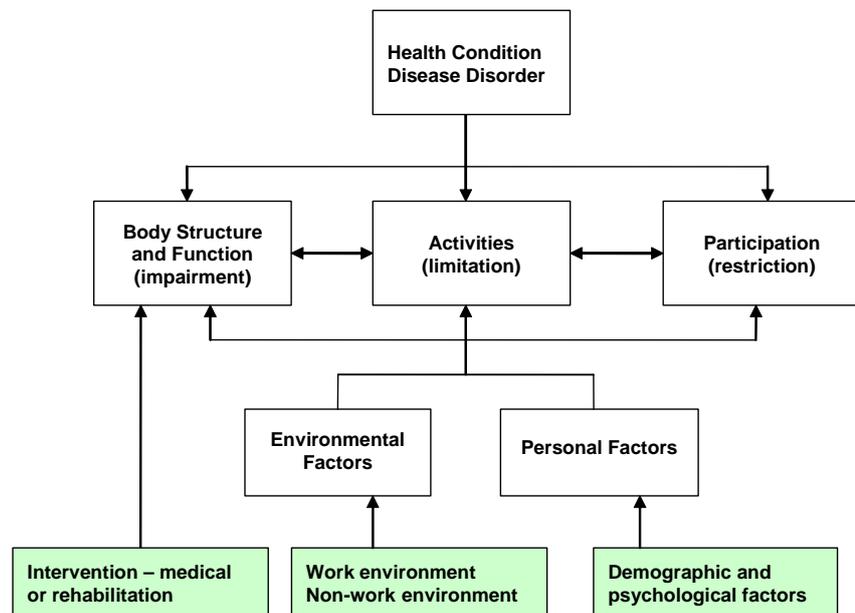
For the purpose of organizing the reviewed literature we have adopted the generic biopsychosocial model of health, illness and disability developed by the World Health Organisation ².

The WHO International Classification of Functioning, Disability, and Health model of disease and disability is summarized Figure 1. The model considers the influence of disease and its intermediaries on an individual's participation in society (including

² World Health Organization (2001) International classification of functioning, disability and health. Geneva: World Health Organization. Available: <http://www.who.int/classifications/icf/en>.

work). Diseases or disorders affect the triad of “body structure and function”, “activities”, and “participation”, which lead to either disability or lack of significant disability depending on important conditional factors of environmental origin (e.g. support from others), and of personal origin (e.g. behavioural traits, or expectancies relevant to personal performance on key target behaviours).

Figure 1 The ICF model of health and disability (adapted to include possible return-to-work interventions)



The model also suggests three broad types of intervention (i) those that address the condition or injury, or its sequelae. (ii) interventions that address environmental factors (both work environments as well as non-work environments) and (iii) interventions that focus on malleable person-related factors such as expectations and beliefs.

This model has the advantage of being general and inclusive, it highlights the interactive nature of the variables that are likely to result in a participation restriction such as non-return-to-work, and locates particular return-to-work issues within a broader conceptualization of health and disability which can facilitate comparisons of the return-to-work literature with research in related fields - for example, studies of re-engagement with non-vocational activities following chronic illness or serious injury.

The ICF model highlights the multiple and interacting physical, personal and environmental determinants of health outcomes and thus provides a useful and applicable framework for considering return-to-work issues. However the particularity of return-to-work issues require a more specific description of those biomedical, behavioural, organizational and workplace factors which influence return-to-work outcomes.

Figure 2 Summary of specific biopsychosocial factors influencing return-to-work following work injury

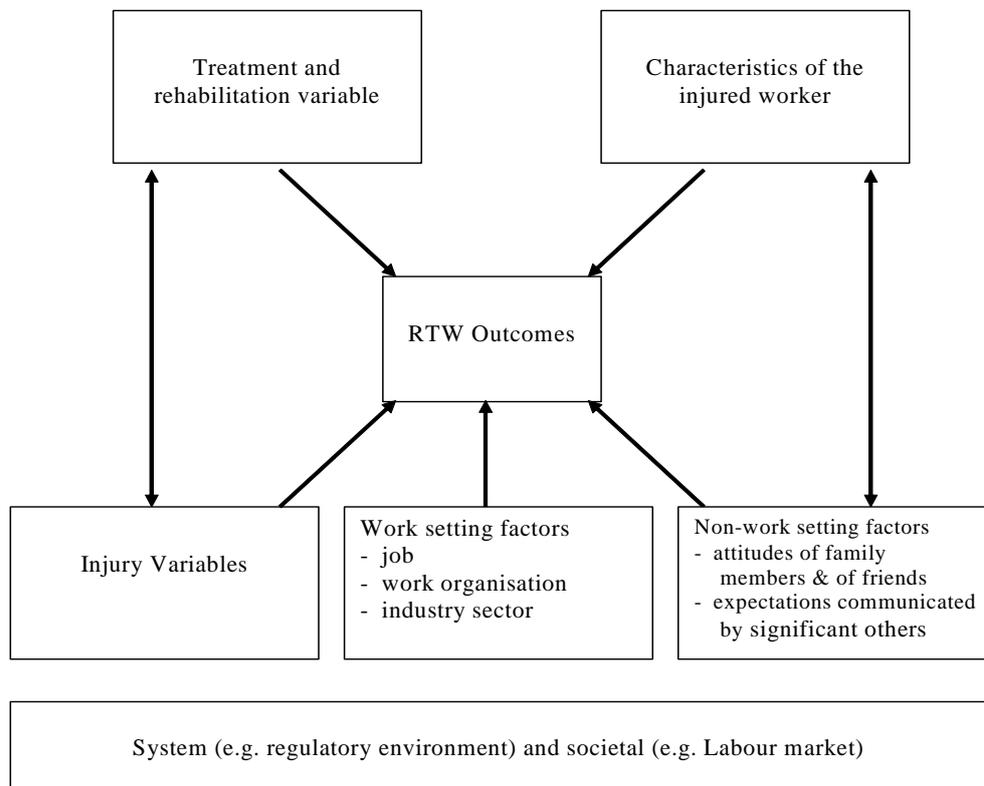


Figure 2 indicates that return-to-work outcome is likely to be jointly determined by the interaction between a range of biological, personal and environmental factors including the legislative and regulatory context (e.g. the obligations on all parties, and benefits paid to injured workers).

Adopting the above framework suggests that an injured worker’s level of motivation to return-to-work is influenced by workplace variables such as the presence or absence of supportive co-workers, attitudes of significant others and availability of appropriate duties in addition to the role played by the severity of injury and/or the

quality and appropriateness of the treatment received. With respect to treatment variables, it has been reported that the injured worker's expectations regarding likely return-to-work is an important determinant of eventual occupational outcome (Niemeyer, 2000), and the behaviour and attitudes of treating practitioners have a direct input to these expectations (Vroom, 1994).

In this review we have used the above biopsychosocial models of work disability to organize and interpret the very wide range of studies on factors related to return-to-work following injury.

Methodology and approach

Search strategy

A three-stage search strategy was employed to identify relevant research:

Stage 1

For the purposes of the review, a total of ten electronic databases were initially searched (Medline, EMBASE, CINAHL, PSYCH INFO, AMED, Proquest 5000, Expanded Academic, Informit, Emerald and ABI Inform) to identify peer-reviewed, original research, reviews conducted on the topic of on the broad areas of barriers and facilitators of return-to-work published since 1995. The other main inclusion criteria was that the research was reported in English.

The key search terms employed included: 'return-to-work', 'injury or wound', 'worker's compensation', and 'accident traffic'. These key terms were exploded and all resulting cognate terms including 'industrial disease' were used in the subsequent searches. All combinations of the search terms were used in the searches. Following elimination of duplicates, 892 articles remained for review.

Stage 2

The abstracts of the identified articles were scanned to see if the research was likely to have an actual measure of return-to-work, if the article did include an objective measure of return or if it was judged that there was a strong likelihood of this

being the case the full article was retrieved for inclusion in the review. This resulted in 190 articles for review. This number was supplemented by articles from a separate Cochrane search and publications retrieved from a search of the grey literature. This latter search mainly employed internet search engines supplemented by word of mouth advice. Approximately 100 organizations of potential interest were identified and relevant websites searched. These search strategies were supplemented by checking references of a random selection of key articles. At the end of stage two, 280 articles were available for review.

Stage 3

To be included in the set of studies for detailed review, we originally specified a minimum level of study comprehensiveness in terms of the sets of variables needing to be assessed if a study were to yield practically-significant findings. As a minimum, studies were to be retained for further analysis only if they included data from three domains: (i) injury severity (or range of injury conditions that could be treated as a potential predictor variable); (ii) characteristics of the individual; and, (iii) environmental factors; and employed a prospective or other design with some form of control.

We specified this minimum level of study complexity because, if data is not collected on at least some aspect of these three sets of factors, then study results are essentially uninterpretable in terms of their practical implications for the design of services to enhance the return-to-work achievements of those suffering an occupational injury. To illustrate, studies that attempt to predict post-injury work achievement by measuring just injury and individual attributes (see, for example Whiteneck, Tate, & Charlifue, 1999) tell us little re the improvement in return-to-work to be expected in particular industrial or organizational settings, which are the priority considerations of any OR authority or providers of OR services to a particular employer.

Having applied the above inclusion criteria, we were left with a very limited set of studies. Thus a subsequent decision was made to include systematic reviews and relax the design criteria so to include retrospective or cross-sectional studies but only if these met the criteria for study comprehensiveness previously described and

incorporated multivariate analysis, and involved a suitably large sample so as to yield reliable results.

After arriving at our set of reviewed papers, we then excluded studies whose participants suffered from injuries encountered only relatively infrequently within workers compensation settings. Thus comprehensive studies of return-to-work among those suffering TBI, SCI etc. were not retained for further analysis in the main report.

A subset of the literature identified at stage 3 that addressed return-to-work for persons with injuries resulting from motor vehicle accidents - including some of the literature excluded from the main report — was separately reviewed and reported in an appendix to this report.

The final list of studies analysed below is presented in Tables 1 to 4 and in Appendix A.

Qualitative Studies

While the current review is based mainly on the results from quantitative studies identified using the criteria describe above, findings from qualitative studies of return-to-work barriers and facilitators were reviewed when located. Such studies are important because of the complex set of factors impacting on return-to-work achievements post injury, and the difficulty of designing and conducting suitable studies (see Krause, et al., 2001b). We agree with Krause et al. that studies need a suitably comprehensive set of independent or predictor variables as will yield practically useful results in terms of the identification of their independent contribution to return-to-work outcomes (having accounted for other relevant variables). Especially important is that study predictors need to include some variables that are amenable to change. Because the majority of return-to-work studies use a too restricted range of predictor variables, the results from qualitative studies can identify unusual combinations of variables that seem to be associated with, for example, unpredicted success or failure at return-to-work (see Murphy & Young, 2006). Further, because of the above-mentioned complex set of predictors to be measured, qualitative studies can identify novel variables (such as transportation

access for those with mobility limitations) whose influence will need to be properly analysed in subsequent quantitative multivariate studies.

Organisation of findings

Consistent with the models outlined above we have organized the findings from the literature reviewed under the following broad headings:

- A. Medical or rehabilitation interventions
- B. Workplace factors
- C. Organisational, industry and system factors
- D. Individual worker characteristics

In addition, in an appendix to the main body of this report we present an overview of return-to-work barriers and facilitators from the literature that deals more specifically with those injured in motor vehicle accidents.

Summary of Key Findings

A. Medical or Rehabilitation Interventions

Scope of the literature

The scientific literature on particular work injuries and work related conditions is now so extensive that a comprehensive review using primary sources of all aspects of treatment and management is virtually impossible within any reasonable time and resource considerations. Therefore in this section we have focused on (i) sound published systematic reviews rather than primary research and (ii) musculoskeletal conditions including back injury rather than the less typical injuries and conditions that can result from work and which have their own extensive treatment and management literature.

A further general principle for organizing research findings is related to the stage within the process of disablement that is the focus of the treatment or management intervention. Primary prevention interventions for example have the aim of preventing the onset of disability, secondary prevention aims to prevent the progression from acute condition to chronic disability and tertiary programs aim to prevent the development of further disability in someone whose condition has already evolved into a state of extended disability. Consistent with the overall strategic aims of this review we have concentrated on literature addressing secondary prevention interventions i.e. those interventions relevant to the worker presenting with pain or injury and particularly to the situation of the worker still having difficulty returning to normal occupational duties after the acute phase of injury.

Return-to-work as a series of stages

Recent research has supported the notion of return-to-work as a process requiring different interventions at different stages post-injury, see, for example, Franche & Krause, (2002); Krause, et al. (2001a) and Young et al., (2005a). Krause et al. argue that work absence and the processes leading to return-to-work need be viewed from a

developmental perspective and that the physical, psychological and social factors influencing return-to-work may differ at different points of time after the injury. Franche & Krause (2002) identified three disability phases defined by the number of days off work: acute (up to 1 month), sub-acute (2-3 months), and chronic (more than 3 months) and reviewed evidence in support of phase specific risk factors. Young et al. (2005a) have proposed a developmental model of return-to-work which identifies a cycle of phases in the overall process from work injury to normal work progression and includes a taxonomy of return-to-work actions and associated outcomes relevant to each phase. For example the initial phase in this model is an *off-work* phase during which at least partial physical recovery is required before work re-entry can be attempted. At this phase key return-to-work tasks would include determining work abilities, work intentions, employment goal, formulating plan to achieve goal etc. The return-to-work tasks in the next phase (work re-entry) are likely to be different and focus on facilitating the match between job and abilities. Increasingly there is evidence that effective intervention needs to take account of the stage or phase of injury and return-to-work (Ozguler, Loisel, Boureau, & Leclerc, 2004; Meijer, Sluiter, & Frings-Dresen, 2005).

Summary of key findings from studies of intervention

There is strong evidence that advice to continue usual activities as normally as possible despite pain is associated with better outcomes than traditional medical treatment and rest and this also applies to work activities. For example most workers with low back pain are able to continue working or return-to-work within a few days or weeks even with residual or recurrent symptoms (Waddell & Burton, 2000).

There is also evidence that communication, cooperation and establishing common agreed goals between the injured worker, health providers, supervisors and management is critical for improvement in both clinical and occupational outcomes (see e.g. Bernacki & Tsai, 2003; Franche & Krause, 2002).

There is strong evidence that the longer the worker is off work with a musculoskeletal condition the lower their chances of ever returning to work and that various treatments for chronic conditions may provide some clinical improvement but clinical

interventions alone are likely to be ineffective in returning people to work once they have been off work for a protracted period. For injured workers in the subacute or chronic stages changing the intervention focus from purely symptomatic treatment to a less narrow rehabilitation approach e.g. a multidisciplinary rehabilitation approach is likely to be more effective (Blackwell, Leierer, Haupt, Kampitsis, & Wolfson, 2004; Elders, van der Beek, Burdorf, & Elders, 2000; Karjalainen, 2001; Schonstein, Kenny, Keating, & Koes, 2003). However as Waddell and Burton (2000) note in their review of occupational health guidelines for the management of low back injury at work such programs differ widely in their content and intensity and there is a lack of good evidence about the 'best' type of such programs. There is evidence that psychosocial factors such as workers' fears and beliefs about their conditions and the impact of re-entry to the work place on their health, and the promotion self-responsibility and self-care are critical domains that need to be included in these rehabilitation approaches (Staal, Rainville, Fritz, Mechelen, & Pransky, 2005; Sullivan, Adams, Rhodenizer, & Stanish, 2006; Waddell & Burton, 2000).

Table 1 below summarises key reviewed studies investigating the impact of particular medical or rehabilitation interventions on return-to-work outcomes

Table 1 Medical or Rehabilitation Interventions and Return-to-Work

| Author(s) year | Treatment variable | Design | Summary of findings |
|---------------------------------------|---|--------------------------------------|--|
| (Anema et al., 2004) | Ergonomic intervention | Prospective (n= 1631, six countries) | Ergonomic adaptation of job tasks effective for low back pain |
| (Beissner, Saunders, & McManis, 1996) | Work hardening program | Retrospective N=115 | The more treatment subjects received prior to entering the return-to-work program, the less likely they were to have returned to work or had their case closed (spine related injuries) |
| (Bernacki & Tsai, 2003) | Workplace disability management (WDM) approach. | Retrospective N=39,000 | WDM led to workers' compensation costs being reduced over a multi-year period by using a small network of clinically skilled health care providers who address an individual workers' psychological as well as |

| Author(s) year | Treatment variable | Design | Summary of findings |
|---------------------------------|--|--|---|
| | | | physical needs and where communication between all parties, (eg, medical care providers, supervisors, and injured employees) is constantly maintained. |
| (Blackwell et al., 2004) | Mandated Vocational Rehab – yes or no | Retrospective N=502 | More likely to return-to-work if required to attend vocational rehab |
| (Elders et al., 2000), | Review of interventions for back disorders | Systematic review | Some evidence that interventions that included exercise and functional conditioning, and training in working methods and lifting achieved better return-to-work than average |
| (Hagen, Erikson, & Ursin, 2000) | Medical early intervention | Trial | Early intervention reduces length of sick leave |
| (Hlobil et al., 2005) | Graded activity intervention or usual care for low back pain | RCT | The graded activity group returned back to work faster with a median of 54 days compared to 67 days in the usual care group. The graded activity intervention was more effective after approximately 50 days post-randomization |
| (Karjalainen, 2001) | Multi-disciplinary intervention for low back pain | Systematic Review (RCT's and Non-randomised clinical control trials) | Found 'moderate scientific evidence that multidisciplinary rehabilitation, which includes a workplace visit or more comprehensive occupational health care intervention, helps patients to return-to-work faster, results in fewer sick leaves and alleviates subjective disability'. |
| (Marnetoft & Selander, 2002) | Early vs later vocational rehabilitation | Prospective (four year follow-up) | Effect of early intervention interacted with gender and age – early vocational rehabilitation was more effective than late for young women |
| (Schonstein et al., 2003) | Physical conditioning programs for back and neck pain | Systematic Review 18 RCTs | Little evidence for or against the efficacy of specific exercises that are not accompanied by a cognitive-behavioural approach, in reducing sick days lost due to |

| Author(s) year | Treatment variable | Design | Summary of findings |
|---|---|---|---|
| | | | back pain: Physical conditioning programs that include a cognitive-behavioural approach plus intensive physical training (specific to the job or not) that includes aerobic capacity, muscle strength and endurance, and coordination; are in some way work-related; and are given and supervised by a physiotherapist or a multidisciplinary team, seem to be effective in reducing the number of sick days for some workers with chronic back pain, when compared to usual care. However, there is no evidence of their efficacy for acute back pain. |
| (Meijer, Sluiter, & Frings-Dresen, 2005) | Return-to-work interventions with musculoskeletal conditions | Systematic review (18 high quality studies) | Findings were inconsistent regarding the effectiveness of treatment programs for workers with non-specific musculoskeletal disorders to return-to-work. |
| (Ozguler, Loisel, Boureau, & Leclerc, 2004) | Intervention for return-to-work for back injury (cognitive-behavioural therapy, reassurance and back exercises) | Review of reviews and selected recent studies | Promoting return-to-work at an appropriate stage (subacute stage) could help low back pain sufferers to avoid prolonged disability |
| (Scheer, Radack, & O'Brien, 1995) | Interventions for acute back injury – bed rest, case mgt, back school | Systematic review 10 RCT | “Demonstrated the meagre scientific foundations on which our industrial rehabilitation programs are based” |
| (Staal et al., 2005) | Physical exercise interventions for low back pain | Descriptive literature review | Effects of interventions vary depending on content-related factors (i.e., type of exercises, etc.) and contextual factors (i.e., treatment setting, compensation system, etc.). Treatment confidence and patients' expectations also significantly |

| Author(s) year | Treatment variable | Design | Summary of findings |
|---------------------------|---|-------------------|--|
| | | | influence outcomes of physical exercise interventions |
| (Sullivan et al., 2006) | Psychosocial intervention vs. functional restoration physical therapy intervention (whiplash) | Trial 130 | Participation in Progressive Goal Attainment Program plus physical therapy resulted in a higher return-to-work rate (75%) than participation in physical therapy alone (50%) |
| (Waddell & Burton, 2000) | Guidelines for managing back injury in workplace | Systematic Review | Presents best evidence guidelines for prevention, assessment and management of low back pain at work. |

B. Workplace Factors Influencing Return-to-Work

There is growing consensus that while attending to the physical/medical aspects of the work-disabled employee is important, much of the variability in return-to-work outcomes is accounted for by what takes place at the workplace (Franché, Cullen, Clarke, Irvin, Sinclair, Frank, 2005; Loisel, Durand, Baril, Gervais, & Falardeau, 2005). For example, there is increasing evidence for the greater effectiveness of workplace-based interventions as opposed to interventions provided outside the workplace (Anema, Cuelenaere, van der Beek, Knol, de Vet, & van Mechelen, 2004).

The evidence for the impact of specific workplace interventions and characteristics on return-to-work are discussed in this section. The impact of broader organization factors including disability management intervention are discussed in the following section.

Franché et al. (2005) recently reviewed quantitative studies of workplace based return-to-work interventions. Their aim was to synthesise and assess the literature on return-to-work interventions and strategies provided at the workplace for workers with a work disability due to musculoskeletal or other pain related conditions. An extensive search of peer refereed literature from 1990 to 2003 was undertaken and the resulting very large number of studies (4124) that met initial inclusion criteria were filtered on

the basis of methodological quality using quite rigorous quality appraisal criteria. Conclusions were based a smaller number of studies (10) that were ranked as high quality and showed consistent findings. These authors concluded that there was strong evidence that two factors, contact between health care provider and workplace, and work accommodation³ offers, significantly reduce work disability. This review also concluded that there was moderate evidence that early contact with the worker by the workplace, ergonomic site visits and the presence of a return-to-work coordinator also independently reduced the time off work with the condition. Finally the authors pointed out that evidence for the sustainability of these effects was negligible or insufficient.

Work accommodation

Crook, Moldofsky, & Shannon (1998), for example, reported that after controlling for sex and age, psychological distress and functional disability, the rate of return-to-work for workers who were provided with modified jobs was two times higher than that for those with no such accommodation in employment. These findings support the conclusions drawn from an earlier review of 29 studies by Krause, Dasinger, & Neuhauser (1998) which concluded that injured workers who are offered modified work return to work about twice as often as do those who are not. Similarly, modified work programs cut the number of lost work days in half. The importance of being able to return to the pre-injury job has also been demonstrated with long term serious injury. Krause (2003) researched employment after injury for people who had suffered traumatic spinal cord injury and found early return work both for the first post injury job and the first full time post injury job was reduced when the person was returning to their pre-injury job.

However, as Van Duijn, Latters, & Burdorf, (2005) point out, these results summarise a wide range of different interventions ranging from modified work as the only intervention given, to modified work as one of the elements in multidisciplinary rehabilitation programs. In their prospective study of workers off work with

³ An accommodation in this context is an adjustment to a job, the work environment or the way things are usually done with the aim of reducing or eliminating workplace barriers to enable a qualified individual with a disability to return to work. Accommodation can include modified or alternate duty, graded work exposure, work trials, workstation redesign, activity restrictions, reduced hours or other efforts to temporarily reduce physical work demands

musculoskeletal complaints there was no difference in duration of work absence for those performing modified duties compared with employees returning to full duty if the recommendation for modified duties was not part of a broader multidisciplinary program.

Health provider contact with the workplace

The conclusions of Franche et al. (2005) regarding the importance of contact between the workplace and health provider in reducing duration of work disability are consistent with Australian research on this topic. A 1998 study commissioned by WorkCover WA (Morrison, Wood, & Munrowd, 1998) confirmed that higher levels of liaison between the injured workers' general practitioners and the workplace were independently associated with better return-to-work rates and lower claim costs after controlling for potentially confounding influences in multivariate analysis of over 2500 workers compensation claims.

Other workplace factors

Anema et al (2004) studied the effects of ergonomic interventions on return-to-work across six different countries and concluded that ergonomic intervention may support return-to-work by changing the work environment of workers being on the threshold of disability.

Other psychosocial aspects of the workplace that have been shown to be related to return-to-work outcomes include low or inadequate support from supervisors and colleagues (Feuerstein, Berkowitz, Haufler, & Huang, 2001; Janssen, van den Heuvel, Beurskens, Nijhuis, Schroer, & van Eijk, 2003; Krause et al. 2001b; Post et al. 2005; Marhold, Linton, & Melin, 2002). However what type of support is beneficial is rarely examined in any detail although this may be critical for successful social support based interventions. Van Duijn's 2004 study of modified duties cited above, for example, indicated that a lack of co-worker support for modified work re-entry programs was perceived as a major obstacle for return-to-work. One interesting suggestion was reported by Elfering, Semmer, Schade, Grund, & Boos (2002) who noted that social support at work needs to be global, as feeling supported only by a

supervisor or single colleague can lead to feelings of dependence, incompetence and reciprocity obligations. This is consistent – at least to the extent to which it confirms that social support is not a unitary concept – with the findings of Post, Krol, & Groothoff, (2005) that low co-worker support were related to longer duration to return-to-work but low supervisor support was associated with a higher return-to-work rate.

Stressful work (Feuerstein et al. 2001) and low job satisfaction (Fayad, Lefevre-Colau, Poiraudau, Fermanian, Rannou, Wlodyka, 2004) have also been shown to be related to low return-to-work achievements. These factors are likely of course to be related in complex ways. Krause et al. (2001a) demonstrated high psychological job demands and low supervisory support to be associated with 20 percent lower return-to-work rates.

Sullivan et al. (2005) make a strong case for considering both workplace psychosocial factors and characteristics of the individual in planning and implementing return-to-work. In their analysis of return-to-work issues for individuals with musculoskeletal conditions, they distinguish between worker-related psychosocial risk factors for work disability and workplace or system-related psychosocial risk factors. The former are referred to as Type 1 Psychosocial Risk factors and include the individual's pain-related fears, their beliefs about the severity of their health condition, expectancies about the probability of return-to-work and lack of confidence in ability to perform work related tasks, and pain severity and depression – all of which have shown to be related to prolonged work disability (see below). Workplace or system related Psychosocial Risk factors (Type 11) include the psychosocial dimensions of work environment that have been demonstrated to be related to extended disability. Factors in this category would include: job stress, work dissatisfaction, lack of availability of modified work and lack of co-worker support. Sullivan et al. (2005) note that there has been limited research of interventions addressing workplace psychosocial factors, however there is some evidence that interventions which are provided by case managers or occupational health nurses can effectively target such factors (Pranksky et al., 2001; Schultz et al., 2002).

Table 2 below summarises key reviewed studies investigating reporting relationships between various workplace factors and return-to-work achievements following work injury

Table 2 Workplace Interventions and Return-to-Work

| Author(s) year | Work setting variable | Design | Summary of findings |
|---------------------------------------|--|---|---|
| (Anema et al., 2004), | Ergonomic intervention | Prospective (n= 1631, six countries) | Ergonomic adaptation of job tasks effective for low back pain |
| (Crook, Moldofsky, & Shannon, 1998) | Modified duties – y/n | Prospective (n =148) | The rate of return-to-work for workers who were provided with modified jobs was 2 times higher than for those with no such accommodation (mixed conditions) |
| (Fayad et al., 2004), | Risk factors for non return-to-work for low back pain including job attitude | Systematic Review (54 high quality studies) | Strong evidence for history of low back pain, low level of job satisfaction and poor general health predicting poor return-to-work outcome (low back pain) |
| (Feuerstein, et al., 2001) | Multiples risk factors including workplace variables | Case-control study (n=421) | Lack of support from others in workplace and stressful job along with physical job characteristics and demographic factors predicted lost days (lower back injury) |
| (Franché et al., 2005) | Workplace interventions | Systematic Review (10 high quality studies (from 4124 papers) | Work disability reduced by work accommodation offers, contact between healthcare provider and workplace, early contact with worker by workplace, ergonomic work site visits, and presence of a return-to-work coordinator (musculo skeletal) |
| (Janssen et al., 2003) | Workplace support. | Prospective | High supervisor support was predictive of return-to-work (mixed conditions) |
| (Krause, Dasinger, & Neuhauser, 1998) | Modified duties | Systematic review (13 high quality studies) | Modified work programs facilitate return-to-work for temporarily and permanently disabled workers. Injured workers who are offered modified work return-to-work about twice as often as those who |

| Author(s) year | Work setting variable | Design | Summary of findings |
|---------------------------------------|--|--|---|
| | | | are not (mixed conditions) |
| (Krause, et al, 2001b) | Job demands and supervisor support | Retrospective (n=433) | High physical and psychological job demands and low supervisory support associated with lower return-to-work rates during all disability phases. High job control, especially control over work and rest periods, is associated with over 30% higher return-to-work rates, but only during the sub acute/chronic disability phase starting 30 days after injury. , but only during the sub acute/chronic disability phase starting 30 days after injury.(low back injury) |
| (Morrison, Wood, & Munrowd, 1998) | General practitioner communication with workplace | Cross-sectional survey including matched sample of GPs, employers and workers (n=2500) | GPs who were proactive in their contact with employers and/or vocational rehabilitation providers secured better return-to-work outcomes (mixed conditions) |
| Post, Krol, & Groothoff, (2005) | Work-related determinants of return-to-work | Prospective (n=926) | Low co-worker support were related to longer duration to return-to-work but low supervisor support was associated with a higher return-to-work rate (mixed conditions) |
| (van Duijn, Latters, & Burdorf, 2005) | Modified work as prescribed by an occupational physician | Prospective (n=164) | Modified work, as the only advice given by an occupational health physician, did not influence the total duration of sick leave. (mixed conditions) |

C. Organisational, Industry and System Factors and return-to-work

Table 3 below contains the main studies reviewed reporting results relating to the role of organizational, industry and system factors in rates of return-to-work achieved in particular situations.

Table 3 Organisation, Industry and System Factors and Return-to-Work

| Author(s) year | Organisational variable | Design | Summary of findings |
|---|---|---------------------------|---|
| (Ash & Goldstein, 1995) | Demographic, emotional, cognitive, financial incentive, and miscellaneous variables | Prospective | Level of workers compensation benefit significantly added to the prediction of return-to-work |
| (Baril, Berthelette, & Massicotte, 2003), | Size of company (small, medium, large) Type of industry (according to Quebec Industrial Classification system) Structural – assessment rate | Retrospective (n= 13,728) | Large company size and belonging to the rubber and plastics industry significantly associated with early return-to-work measures |
| (Bartys, Burton, & Main, 2005), | Work-related psychosocial risk factor assessment. | Prospective | Although-work related psychosocial factors were associated with the occurrence of absence due to musculoskeletal disorders, these findings do not lend support to the use of routine occupational psychosocial screening in order to predict prolonged absence. |

| Author(s) year | Organisational variable | Design | Summary of findings |
|----------------------------|---|---|---|
| (Bernacki & Tsai, 2003) | Workplace disability management (WDM) approach. | Retrospective | WDM led to workers' compensation costs being reduced over a multi-year period by using a small network of clinically skilled health care providers who address an individual workers psychological, as well as physical needs and where communication between all parties, (e.g., medical care providers, supervisors, and injured employees) is constantly maintained. |
| (Blackwell, et al., 2002) | Attorney involvement | Retrospective | More likely to return-to-work if not represented by an attorney |
| (Cottle, 1998) | Occupational title | Retrospective | Shorter time off work for professionals and paraprofessionals |
| (Cunningham & James, 2000) | Organizational size, workplace disability management. | Cross-sectional survey (77 organisations) | Finds that larger organizations and those which recognized trade unions offered the most extensive range of assistance to workers. Also finds the presence of return-to-work policies to be associated with favourable trends in absence. |
| (Feuerstein et al., 2001) | Workplace Disability Management | Case-control study | The results support the potential utility of interventions targeting ergonomic workplace and individual psychosocial risk factors in secondary prevention. |
| Franché et al., (2005) | Workplace Disability Management | Systematic Review (data from 10 high-quality studies following on from the initial identification | Work disability duration is significantly reduced by work accommodation offers and contact between healthcare provider and workplace; and moderate evidence that it is reduced by interventions which include early contact with |

| Author(s) year | Organisational variable | Design | Summary of findings |
|---------------------------|--|----------------------------------|---|
| | | of over 4,000 papers) | worker by workplace, ergonomic work site visits, and presence of a return-to-work coordinator. |
| (Hemingway & Smith, 1999) | Organizational Climate | Cross-sectional survey | Organizational climate (among other study variables) was related to withdrawal behavior and injury. |
| (Huang et al., 2005) | Workplace Disability Management | Cross-sectional survey (n=2,943) | Multivariate linear regression results show that age, gender, job dissatisfaction before injury, prior difficulty performing job tasks, injury severity, back injury and lost time were all associated with negative organizational responses. |
| (Janssen et al., 2003) | Work demands, worker control, and workplace support. | Prospective | High skill discretion in combination with high job demands predicted working with adjustments in comparison with not working. Finally, high supervisor support was the most predictive of return-to-work without adjustments, and the least predictive of not working. |
| (Krause et al., 2001a) | Workplace Disability Management | Retrospective (n=433) | High physical and psychological job demands and low supervisory support are each associated with about 20% lower return-to-work rates during all disability phases. High job control, especially control over work and rest periods, is associated with over 30% higher return-to-work rates, but only during the sub acute/chronic disability phase starting 30 days after injury. |

| Author(s) year | Organisational variable | Design | Summary of findings |
|----------------------------------|---|---|--|
| (Oleinick, Gluck, & Guire, 1996) | Rate of compensation, organization size | Retrospective (n=8,628) | In the acute phase, which contributes 15.2% of first episode missed work time, gender, age, number of dependents, industry (construction), occupation, and type of accident predict continued work disability. Marital status, weekly wage compensation rate, and establishment size do not. Beyond 8 weeks, age, establishment size and, to a lesser degree, wage compensation rate predict duration of work disability |
| (Post, Krol, & Groothoff, 2005) | Vocational group, co-worker support. | Prospective | Working in one of the vocational sectors of public administration, construction, financial and commercial services, transport, or education and having low co-worker support were related to longer duration to return-to-work in the multivariate model. |
| (Schultz et al., 2002) | Workplace Disability Management | Prospective | In predicting return-to-work, the winning variables identified in the integrated model are dominated by cognitions, which are accompanied by disability behaviours. A cognitive-behavioural model with an adaptation-oriented rather than a pathology-oriented focus is favoured for early intervention with high-risk workers since cognitions are amenable to change. |
| (Seland, Cherry, Beach, 2006), | Industry, Company size. | Retrospective (4 years of data from Alberta Compensation Board) | Increased duration of temporary disability (TD) was associated with older age, female gender, work in construction and construction trade services, |

| Author(s) year | Organisational variable | Design | Summary of findings |
|-------------------------|--|--------|--|
| | | | smaller company size and better information on injury severity would considerably enhance WCB administrative data research potential. |
| (Sullivan et al., 2005) | Psycho-social risk factors “outside” of the individual | Review | Successful disability prevention will require methods to assess and target psychosocial risk factors “outside” of the individual, (e.g., interpersonal conflict in the workplace, job stress, etc.) Effective secondary prevention of work disability will require research to develop cost-effective, multipronged approaches that concurrently target both worker-related and workplace psychosocial risk factors. |

Examination of the design of studies included in Table 3 suggests three clear conclusions.

First, that (apart from simple studies which we did not report comparing return-to-work among workers compensation vs. non workers compensation patients) there are almost no studies on return-to-work outcomes of study participants from different compensation systems (see Bednar, Baesher-Griffith, & Osterman, 1998, for a rare example). Studies such as those of Bednar et al. (1998) which involve a variety of compensation systems provide invaluable information about system performance which obviously cannot be obtained from studies of injured workers employed within the one prescribed workers compensation system.

Workplace Disability Management

Second, well designed studies of the contribution of Workplace Disability Management (see Shrey and Lacerte, 1995) are almost non-existent. What is present

in Table 3 are a group of studies which involve various elements of the Workplace Disability Management approach. The studies are not properly testing the contribution of varied degrees of organisational adoption of Workplace Disability Management on actual return-to-work achievements of employees within the varied organisations. Rather they typically examine the extent to which various workplace-based rehabilitation practices, or various organisational behaviours relevant to employee health and well-being are associated with various indices of desirable post-injury outcomes (not necessarily return-to-work per se). Third, studies involving analysis of industry variations are relatively rare. Yet these studies (similar to studies across corporate systems) are crucial to longer-term strategic planning re occupational health and safety (OH& S) and rehabilitation effort.

The studies in Table 3 however do highlight the potential of the Workplace Disability Management approach to achieve better employee post-injury return-to-work rates.

The findings of researchers such as Baril, Berthelette, & Massicotte, (2003) that company size and particular industries are associated with improved return-to-work rates highlights the need for more research into the particular organisational elements correlated with increased company size or with particular industry work environments that explain enhanced return-to-work achievements of larger companies, or of different industry sectors. Similarly, some of the conclusions from Franche et al.'s (2005) systematic review identify rarely-studied work-related variables (such as health professional-workplace contact) that have been shown to be associated with reduced work disability duration. In a related vein, Krause et al's (2001a) study of the influence of supervisor support on return-to-work highlights the influence of a workplace factor that is central to Workplace Disability Management but relatively rarely studied by return-to-work researchers.

It seems important to note the conclusions from the review of Sullivan et al. (2005) – that return-to-work studies too rarely examine psychosocial factors “outside” of the individual (such as social integration, supervisor support, etc). As a group, the findings of Table 3 studies suggest a variety of workplace-focused variables that require better quality research if we are to realise the potential return-to-work

enhancements that seem to be reliably associated with adoption of a Workplace Disability Management approach by an employing organisation.

D. Individual Worker Characteristics and return-to-work

Demographic factors

The most commonly assessed demographic factors pertaining to return-to-work are age, gender, marital status and education. There is a high degree of consensus among researchers about the impact on return-to-work of these three variables, with most researchers suggesting that return-to-work following injury may depend more on these variables than on medical variables (Adams and de C Williams, 2003).

Research has consistently demonstrated that older or increasing age is associated with poorer return-to-work outcomes (Blackwell, et al, 2004; Dasinger, Krause, Deegan, Brand, & Rudolph, 2000; Drake, Gray, Yoder, Pramuka, & Llewellyn, 2000; Hennessey & Muller, 1998; Jang, Li, Hwang, & Chang, 1998). It is important to note however, that there may be a modulation of the age effect by other factors such as worker characteristics, the nature of the injury and employer characteristics (Baril, et al. 2003).

Research regarding gender is similarly consistent in the finding that males demonstrate better to return-to-work outcomes than do females (Carmona, Faucett, Blanc, & Yelin, 1998; Hennessey & Muller, 1998); Feuerstein et al., 2001). A study by Ash & Goldstein (1995) found that male gender was associated with return-to-work at initial assessment and remained so at 6 month follow up; and Crook and Moldofsky (1995) found that the relative rate of return-to-work for males was one-and-a-half times that for females following a work-related musculoskeletal injury. A study of patients with wrist and ankle fractures indicated that increased duration of temporary disability was associated with female gender (Ashworth 1999). It has been suggested that lower rates of return-to-work in females may be related to greater physical, stress and time demands related to domestic and home duties (Feuerstein et al., 2001).

In regard to marital status, Hennessy & Muller (1998) have proposed that their finding of a lessened tendency to return-to-work in married people may be explained by spousal financial support. Their findings are, however, divergent from the majority of findings regarding marital status which indicate that individuals who are married are more likely to return-to-work (Jang, Wang, Y. H., & Wang, J. D. 2005; Selander 2002; Yasuda, Wehman, Targett, Cifu, & West, 2002), or that unmarried people are less likely to return-to-work (Kreutzer, Marwitz, Walker, Sander, Sherer, Bogner, 2003). The positive association between marriage and improved return-to-work outcomes may be attributable to the social support sustained through marriage.

A number of studies have identified education as a useful predictor of return-to-work outcomes (Balckwell et al., 2002; Balckwell et al., 2004; Hennessy & Muller, 1998; Brown, Burnett-Stolnack, Hashimoto, Hier-Wellmer, Perlman, & Seigerman, 1996). Hennessy & Muller reported that the likelihood of disability insurance claimants returning to work increases with every additional year of education. They suggest that the improved outcomes for workers with higher levels of education may be attributed to greater adaptability to injury-related impairments and greater ability to accept changes in occupational activities and / or new job skills.

While research indicates that younger age, male gender, more pre-injury education and being married are all predictive of better return-to-work outcomes, the utility of such variables in terms of intervention is limited by their static nature. There is however a number of psychosocial variables which have been demonstrated to be useful in predicting work outcomes following injury that are amenable to change. Several of these appear in Table 4.

Table 4 Individual Psychosocial Characteristics and Return-to-Work

| Author(s) year | Psychosocial variable | Design | Summary of findings |
|---------------------------------|---|--------------------------|--|
| (Alexy, 1999) | Personality as measured by MMPI-2 | Prospective | Patients with elevated L- scale (defensiveness) scores were significantly less likely to return-to-work. |
| (Ash & Goldstein, 1995) | Demographic, emotional, cognitive, financial incentive, and miscellaneous variables | Prospective | Depression (as measured by BDI) only significant predictor of return-to-work |
| (Ashworth, 1999) | Depression, state anxiety, trait anxiety, disability appraisals, and catastrophic coping | Retrospective | In the multivariate analyses, lower depression significantly predicted one- month return-to-work and catastrophic coping significantly added to prediction of six-month return-to-work. |
| (Atroshi et al., 2002) | SF-36 health questionnaire and the sense of coherence (SOC) scale | Prospective | SF-36 and the sense of coherence scale useful in predicting patients at being off work at follow up within one year. |
| (Baril et al., 2003) | Personal and socio- demographic factors, beliefs and attitudes, and motivation. | Qualitative | Characteristics of injured workers described as influencing return-to-work success included personal and socio-demographic factors, beliefs and attitudes, and motivation |
| (Bartys et al., 2005) | Psychological distress (measured by GHQ) Job satisfaction Social support Perceived control at work | Prospective (n=4,637) | Psychosocial risk factors were associated with increased occurrence of absence due to musculoskeletal disorders (1.5 – 3 times increased risk of absence). |
| (Berglund & Gerner, 2002) | Motivation and perceived ability to return-to-work | Prospective | Strong correlation between motivation and perceived ability and return-to-work status at 2 year follow up. |
| (Chapin & Kewman, 2001) | Optimism Self esteem Achievement | Matched controls | Optimism, self esteem, achievement orientation and positive role models |

| Author(s) year | Psychosocial variable | Design | Summary of findings |
|------------------------------------|---|---------------|---|
| | orientation Role models | | associated with return-to-work. |
| (Crook et al., 1998) | Psychological distress | Prospective | Controlling for sex and age, psychological distress and functional disability were associated with a slower rate of return. |
| (Gatchel, Polatin, & Kinney, 1995) | Personality, self report pain/disability | Prospective | Three measures: self-reported pain and disability, the presence of a personality disorder, and scores on Scale 3 of the Minnesota Multiphasic Personality Inventory differentiated between those patients who were back at work at 6 months versus those who were not because of the original back injury |
| (Gillen, et al 2004) | Health Assessment Questionnaire (HAQ) and the Short Form-36 (SF-36) | Prospective | Functional limitations persisted in workers after relatively minor workplace injuries despite a 91% return-to-work rate. |
| (Schultz, et al, 2005) | Psychosocial Risk-for-Disability Instrument | Prospective | The instrument can be useful and practical for prediction of return-to-work outcomes in the subacute stage after low back injury in the workers' compensation context |

Cognitions and expectations

A number of studies have examined the role of cognitions regarding injury, recovery, and work as a predictive factors in return-to-work. Research indicates that initial levels of perceived pain and perceived functional disability are predictive of prolonged work disability (Crook & Moldofsky, 1995). High levels of pain-related fears and catastrophising about pain have been associated with longer periods of disability (Feurerstein et al., 2001) and an individual's beliefs about the severity of

their health condition have been associated with poorer return-to-work outcomes (Schultz, Crook, Berkowitz, Milner, & Meloche, 2005).

Of particular interest are studies which consider the importance of motivation as a predictive factor. Berglund & Gerner (2002) found that in long-term, sick-listed back and neck patients viewed their own will to work as the second most important factor in their return-to-work, behind only the reduction of physical symptoms. Moreover, within the same sample of back and neck patients, self administered assessments of motivation to work at the beginning of the sickness period were predictive of work status at two-year follow up.

Patient expectation of longer sick leave has been demonstrated to predict longer recovery (Steenstra, Koopman, Knol, Kat, Bongers, Vet, et al., 2005), as have expectations of longer recovery time. Low expectancies about the probability of returning to work and lack of confidence in the ability to perform work-related activities have also been associated with longer periods of disability (Feuerstein et al., 2001). A comprehensive study of psychosocial factors related to return-to-work and back pain has demonstrated that expectations about recovery were the greatest predictor of return-to-work (Schultz et al., 2005). This is consistent with findings that modifying beliefs about back pain to be more positive can reduce claims for back-pain-related compensation and sick leave, and reduces medical payments for claims for back pain (Buchbinder, Jolley, Wyatt, 2001). Franche & Krause (2002) stress the importance of expectations about recovery as a predictive factor in return-to-work. They have considered an individual's beliefs about their ability to return-to-work and to engage in the functions necessary to return-to-work (return-to-work self efficacy) and suggest that attention to return-to-work self efficacy must be an important component of any model used to guide return-to-work efforts of researchers or occupational rehabilitation practitioners. They propose that expectations about recovery and motivation to return-to-work should be considered together in a readiness to return-to-work model. Their proposed model encompasses both the "readiness for change" model and the "phase" model of disability, both of which have wide theoretical acceptance; empirical testing of Franche and Krause's proposed model is warranted.

Emotions

Research indicates that the presence of psychological distress or a diagnosable mental disorder is likely to increase the likelihood of a chronic disability developing in injured workers (Fransen, Woodward, Norton, Coggan, Dawe, & Sheridan, 2002). Elevated levels of anxiety, insomnia, social dysfunction and depression (as measured by the General Health Questionnaire) have been demonstrated to significantly predict chronicity in patients with lower back pain, even when controlling for age, gender and workplace risk factors (Fransen et al., 2002). Studies of patients with musculoskeletal disorders have demonstrated that psychological distress, somatization, negative attitudes, mistaken beliefs and poor coping strategies are all associated with poorer recovery and decreased likelihood of return-to-work (Pincus, Burton, Vogel, & Field, 2002; Croft, Papageorgiou, Thomas, Jayson, & Silman, 1995).

Relative contribution of individual psychosocial factors

While there is general consensus that demographic and psychosocial factors are important considerations in predicting return-to-work, opinions regarding the degree to which psychological and demographic factors contribute to return-to-work outcomes vary. Brown (1996) found that combined cognitive and demographic variables accounted for less than 30 percent of the variance in return-to-work outcomes. Schade, Main, Hora & Boos (1999) found that in back-injured patients return-to-work was not affected by clinical factors, but solely by psychological factors (i.e., depression) and psychological aspects of work (i.e., occupational mental stress). These findings are consistent with research that proposes that individual and psychosocial factors are more predictive of chronicity of back pain than are objective physical or biomechanical measures (Fransen et al., 2002).

Chapin & Kewman (2001) have also demonstrated that the most powerful differentiating variable between those who are employed and those who are not following traumatic injury to be psychological functioning. Specifically, increased self esteem, experience of positive work role models and optimism were all associated with employment as were positive coping styles and work-oriented goal setting and motivation. This is consistent with findings that work attitude and locus of control

contribute more to job seeking behaviour than does injury level (Murphy, Young, Brown, & King, 2003).

One of the complexities of research in this area is due to the fact that individual psychosocial factors are likely to interact with the less-frequently-assessed psychosocial factors that are specific to the workplace or organization. Research with individuals suffering from lower back pain has indicated that those who reported higher levels of job stress and greater perceived effort at work were associated with more lost work time due to back pain, while individuals who reported higher levels of work involvement and felt that they received supervisor support were at lower risk for lost time (Feuerstein et al., 2003).

Findings regarding social support are consistent with the notion that both work-related and more general psychosocial factors require consideration. The importance of social support in the workplace has been reported above, higher perceived levels of social support or available social support outside of work have also been consistently associated with better return-to-work outcomes (Crisp, 2005; Kendall, 2003).

Steenstra et al., (2005) note that as many prognostic psychosocial factors can be measured by self report (but others obviously require reports from other parties), early routine assessment of these factors may be useful in identifying workers requiring intervention on a psychosocial level. This is supported by a number of studies which have proposed that psychosocial screening is a time and cost effective way of identifying those likely to be at risk of long term sick leave, consequently reducing medical costs and human suffering (Bartys, Burton, & Main, 2005; Gatchel, Polatin, & Kinney, 1995). Hurley, Dusoir, McDonough, Linton, Baxter, David, (2000) have developed a biopsychosocial screening tool with demonstrated efficacy for predicting return-to-work in lower back pain patients and Schultz et al.(2005) successfully predicted return-to-work in 79 percent of low back injury cases using the Psychosocial Risk for Occupational Disability Instrument. Empirical investigation into the refinement and utility of such instruments in other injured worker populations would likely make a valuable contribution to return-to-work research. Moreover, research indicates that psychosocial factors such as beliefs regarding injury and return-to-work,

self esteem, self efficacy and depression are not only good predictors of return-to-work but potentially are highly modifiable (Sullivan, & Stanish, 2003).

Future Research

Research gaps

For return-to-work research to usefully inform government policy and the design of effective occupational rehabilitation service delivery system, there are a number of issues that need to be addressed by those funding or leading research programs in the area of return-to-work following injury.

Workplace variables

A major limitation of the current research literature is that both at the level of the individual study as well as when considering the literature as a whole there is inadequate recognition of the range of factors involved in influencing the actual return-to-work achievements of any individual or group. The continued conduct of research designed around examination of an almost endless combination of demographic, injury and individual psychosocial variables without proper assessment of workplace factors cannot be expected to lead to advances in knowledge useful in the development of more effective services capable of reliably delivering improved return-to-work rates (holding aside the sustainability of those returns to work or their quality in terms of worker productivity and satisfaction, about which we know very little).

The current situation of too many studies whose design includes no or inadequate measurement of workplace factors, is the result of two problems - one theoretical, and one practical. The theoretical problem is a huge one – the lack of a widely-accepted, comprehensive conceptual framework. Without advocating for the pre-eminence of any particular model of return-to-work (see for example Young et al., 2005a), we agree wholeheartedly with the conclusion of Krause et al. (2001b) following their review of determinants of return-to-work after work-related injury: “...the entire return-to-work field is under-theorised”. The practical problem holding back research advances in this field is associated with the large increases in time and effort demanded if one is to assess such variables as organisational climate, supervisor

support, or family support for various return-to-work behaviours. Such effort must be made if we are to be in a position to decide where it is best to allocate resources in our attempts to enhance return-to-work achievements. At this stage we know almost nothing about such practical questions as “Is it better to try and improve return-to-work rates by developing more skilled clinicians able to adopt best-practice in the management of key occupational injuries, or is it more worthwhile to put resources into training local workplace supervisors in how to identify and harness effective social support from peers of the injured employee?”

Cross system studies

The second major limitation of the return-to-work literature is the lack of studies across systems. While in practice most injured workers’ rehabilitation is conducted within a particular prescribed workers compensation system, for optimal performance of any workers compensation system, there is a need for information about comparative system performance, especially in the case of common injuries not unique to any one system. Return-to-work studies involving injured workers from more than one workers compensation system are almost non-existent (see, for a rare example, Bednar et al., 1998).

Local context

One final characteristic of the return-to-work literature that needs to be addressed by local workers compensation authorities is that Australia has a unique industrial relations system. This means that we cannot expect to borrow largely from findings of overseas researchers. Studies must be done locally, state by state, industry by industry, organisation by organisation. We cannot acquire the knowledge required for optimal local system performance if we rely on trying to import the results from overseas studies, which themselves are overly concerned with attributes of the individual and of the injury, and apply them to the Australian context, which has a unique industrial relations and health system.

Implications for a local research program

The above general recommendations for filling research gaps touch on important areas to be addressed if WorkCover South Australia is to be in possession of the knowledge required to position the South Australian Workers Compensation system as a world-class reformer in terms of post-injury return-to-work attainments.

The above analysis suggests that there are two broad levels of intervention that need to be considered to achieve optimal return-to-work outcomes: systems level interventions (e.g. payment systems, regulation, education & social marketing, workforce development and training) and practice based interventions (e.g. workplace involvement, treatment that addresses psychosocial variables, coordinated return-to-work planning etc).

A research agenda could be developed that addressed both these levels i.e. the identification of optimal practice for return-to-work; and, the identification of optimal systems to promote these practices.

In the suggestion that follow we have focused on research targeting the development of optimal practices rather than system variables, for two reasons: system variables such as payment schedules are likely to be less amenable to variation for research purposes, and, in general it would be useful a have better understanding of the impact of particular practices and behaviours of key stakeholders on return-to-work outcomes prior to adjusting system variables to promote particular practices. However an important project that could provide a basis for a range of research at both levels of intervention practices would be the development of a monitoring and information system that addressed the variables that this review has identified as important determinants of outcome following occupational injury. Once a monitoring and information system had been developed a number of studies to examine population level effects and variation in particular become possible. (see Iezzoni, 2004, for a suggested approach to the development of risk adjusted data for the evaluation of rehabilitation outcomes). Return-to-work outcomes for specific conditions could be compared across similar workplace settings and the impact of different types of interventions examined for their effectiveness within the given systemic environment.

In the following section we have suggested possible specific practice-based projects, organised under the three main stakeholder groups – clinicians, occupational rehabilitation providers, employers.

Applied research involving clinicians

Research designed to improve our understanding of how the knowledge, behaviour and attitudes of clinicians/treating practitioners impact on the RTW achievements of their clients would be useful and a number of feasible projects in this area suggest themselves: (i) One project could involve the implementation and evaluation of specific collaborative or communication practices, based on the research literature (e.g. conjoint meetings at workplace or elsewhere), between treating clinicians and other stakeholders such workers' compensation providers or rehabilitation case managers. An appropriate control group study could be designed to compare client outcomes for clinicians who utilise best practice clinical guidelines with a group who use best practice clinical guidelines as well as defined collaborative activities. (ii) A second area of investigation would be to do with the optimal use of occupational health physicians. A project that attempted to evaluate the additional value added by the early involvement or the targeted involvement of occupational physicians would be worthwhile. One of the problems with clinicians' responses to workers presenting with injuries is that clinicians have an inadequate understanding of general workplace factors and of workplace factors specific to particular industries and/or organisations. Occupational physicians typically have wide experiences of workplaces and can offer useful opinions to improve the prediction of the expected course of recovery. Both client outcomes and the impact on other treating practitioners could be explored. (iii) Thirdly, a study of clinicians and the accuracy of their early identification of clients at risk of extended work disability at the time of presentation would be useful in identifying whether targeted early intervention was feasible. A study could be usefully developed wherein a group of local medical officers used a checklist to identify clearly at risk individuals whose outcomes were followed over a 12-18 month period.

Applied research projects involving occupational rehabilitation providers

A useful overall strategy for researching effective occupation rehabilitation would entail a staged approach with the initial stage concentrating on the identification of best practices using observational approaches together with objective client outcome data, followed by intervention studies to more rigorously test findings from the first stage.

Because of the relatively small number of providers and because of their unevenness in terms of size and organisational characteristics, probably the best starting point in trying to better understand those occupational rehabilitation provider practices that lead to better outcomes would be a series of qualitative studies based around the identification of best vs worst providers in terms of a particular high frequency injury or a high cost injury. A qualitative study could be undertaken to try to identify what are the key organisational and/or workforce differences between the best and the worst providers, obviously controlling for injury and/or industry. A related approach to attempting to understand the role of providers in influencing return-to-work achievement would be to undertake a study of superior vs inferior rehabilitation case managers within particular providers. Thus a small number of high performing vs low performing rehabilitation consultants or case managers could be interviewed with a view to identifying any common practices which seem to differentiate between the groups. Obviously a series of providers could be utilised from whom the best vs worst employees within each provider were used as subjects.

Based on the finding from these sorts of studies, particular practices or approaches could then be implemented and evaluated prospectively with appropriate controls.

Research aimed at better understanding the role of employers in influencing return-to-work achievement

A similar two stage strategy to that outlined above could be used here also:

(i) Within a single industry sector (reliably identified from OH&S data re claim incidence) high vs low performing employers could be identified. Then a survey of those employers as to their disability management, safety practices and rehabilitation services could be undertaken. This study would obviously best involve high-

performing vs low-performing employers within a particular industry. (ii) A second study could be undertaken with self insurers. Within each or selected self insurers, a study could be undertaken of those within-enterprise departments which were high vs low in performance in terms of claim cost, return-to-work achievement, duration of claim, etc. (iii) Within certain large employers, again similar studies could be undertaken of high vs low performing corporations. For example, within service organisations such as education and health, a study could be done of 'similar' educational facilities that had high performances vs comparable educational facilities which had low performances; the same could be done within health department regions whereby better hospitals were compared with worse hospitals, better community health centres with worse community health centres, etc. It would be important to include a study of employers from the manufacturing sector. Thus, large manufacturers could be co-opted who could facilitate the conduct of research into high vs low performing plants within the manufacturer, etc.

The validity and generalisability of findings from these investigations could then be tested through systematic evaluation of appropriate intervention research.

Appendix A: Motor Vehicle Injuries: RTW and Key Conditions

Serious injury

Little detail is known about the process of return-to-work for those suffering serious injury in a motor vehicle accident or related event. Research into the post-injury vocational achievements of the two most common, expensive serious-injury groups (those with TBI and those with traumatic SCI) has established some general rates of return-to-work, which are useful for bench marking purposes when comparisons are sought with employment outcomes achieved by “similar” populations. However, in both sets of literature there is inconsistency in the way that return-to-work is measured. This inconsistency has severely limited what we know about the most influential predictors of return-to-work, particularly what we know about the malleable factors involved in the return-to-work attempt. Thus, in summarising what has been learned after two decades of research into productivity following TBI, Wehman, Targett, West, & Kregel (2005) criticised that fact that studies frequently included training participation, sheltered work and supported employment along with regular paid employment when reporting “vocational outcomes”. A second, major limitation of the research is that, when studying predictors of post-injury “employment”, researchers typically assess injury and demographic factors, but largely ignore psychosocial factors, particularly environmental factors (see Keyser-Marcus, Bricout, Wehman, Campbell, Cifu, Englander, 2002 for a typical example of such research).

Research investigating return-to-work following traumatic spinal cord injury is generally more advanced than that describing TBI post-injury vocational achievement, particularly because of its more standardised measurement of the employment outcome. But a major limitation of the SCI research is that, similar to that which occurs within TBI outcome research, there is a predominance of studies using injury and demographic predictors to the exclusion of environmental variables more amenable to intervention by vocational rehabilitation practitioners.

A brief summary of research findings in the area of employment following traumatic SCI is presented below. It is important to note that no studies were located that both measured return-to-work in a satisfactory way and then specifically reported post-injury return-to-work rates for those involved in transport accidents. In interpreting the figures presented below, it is important to note that, typically, return-to-work achievements of those receiving compensation following serious injury are significantly lower than the rates achieved by those not receiving salary replacement benefits (see MacKenzie, Morris, Jurkovich, 1998; Zelle, Panzica, Vogt, Zelle, et al., 2005)⁴. In view of this fact, the lower end of the range of rates reported probably represent a reasonable standard against which local transport accident insurance schemes might *initially* compare their performance. In reality though, these figures, for a variety of reasons, underestimate the vocational potential following traumatic SCI.

Because of large differences between nations in the nature and extent of social security sickness benefits, as well as compensation systems for work and motor vehicle accidents, it is most meaningful to concentrate on results from Australian studies. Results from North American studies (the most common) are difficult to translate to the Australian context, especially as the North American traumatic spinal cord injury population contains large numbers of those injured from firearms and also contains disproportionate numbers of low SES persons who would be unlikely to be employed even without a spinal cord injury.

Table 5 below provides an overview of employment rates following traumatic spinal cord injury, when people are followed up at least one-year post injury. The rates describe the percentage employed at the time of survey.

⁴ There is no evidence available to indicate that the better return to work rates of those not receiving salary compensation are associated with longer term adverse outcomes

Table 5 Aggregate Number Employed at the Time of Data Collection by SCI Population's Geographical Location.

| Region | N | % Working | 95% confidence | |
|---------------|------|-----------|----------------|-------|
| | | | Lower | Upper |
| North America | 1670 | 30.06 | 27.86 | 32.26 |
| Europe | 735 | 50.75 | 47.13 | 54.37 |
| Australia | 684 | 43.27 | 39.55 | 47.00 |
| Asia | 625 | 31.36 | 27.21 | 35.01 |
| Total | 3714 | 36.81 | 35.25 | 38.36 |

Based on the above figures, it would seem reasonable to expect that around 40 percent of Australians with traumatic spinal cord injury would be employed when followed up at least one year post injury. This is what one could expect with no special resource support for vocational rehabilitation.

Predictors of return-to-work

Few multivariate studies of return-to-work following traumatic SCI used a set of predictor variables that encompassed variables beyond the too-limiting combination of injury and demographic variables. Exceptional were the studies of MacKenzie et al. (1998), Murphy et al. (2003), and Zelle et al. (2005). Each of these, however, had study design or measurement characteristics that limited the direct interpretation of results with respect to the population of those injured in traffic accidents or motor-vehicle-related events. Only the study of Murphy et al (2003) is a pure study of employment achievement following traumatic SCI; the other two studies involved those admitted to level-I Trauma Centres whose patients included those other than spinal cord injured. Although MacKenzie and colleagues' sample contained a majority of persons (>70%) injured in traffic accidents, workers' compensation status, not transport injury status, was the predictor variable used in the relevant multivariate analyses undertaken. Murphy et al. did not use any index of compensation status in their main analysis and also used labour-force participation, rather than actual return-to-work status, as their criterion variable.

Notwithstanding these study design limitations, the studies produced the following interesting findings for rehabilitation facilities in terms of prediction of return-to-work (or labour force participation) following serious injury: (a) there was a consistent relationship between higher levels of practical (but not emotional) social support and increased return-to-work at 12 months post injury (see Mackenzie et al., 1998);

Workers compensation claimants were 70% more likely to drop out of the labour force than were their peers without such compensation (Zelle et al., 2005); and injury characteristics did not add significantly to the prediction of post-injury labour force participation, while patient psychological characteristics, particularly work attitude and locus of control measures, significantly improved predictive power (see Murphy et al., 2003).

Whiplash disorder

Although not as individually debilitating as SCI or TBI, whiplash injuries account for a large proportion of the overall impairment and disability from automobile accidents (Holm, Cassidy, Sjogren et al., 1999) and an increasing proportion of annual costs in terms of medical care and income support (Cassidy, Carroll, Cote et al., 2000; Gun, Osti, O'Riordan, Mpelasoka, Eckerwall, & Smyth, 2005; Spitzer, Skovron, & Salmi, et al., 1995).

Whilst there is an growing body of research on the pathophysiology, diagnosis, treatment, and prognosis of whiplash and related disorders (see, for example Rodriquez, Barr & Burns, 2004; Sterner & Gerdle, 2004; Rebbeck, Sindhusake, Cameron, Rubin, Feyer, Walsh, et al. 2006; Suissa, Giroux, Gervais, Proulx, Desbiens, Delaney, et al., 2006), prospective multivariate research studies that examine vocational achievements following whiplash are relatively rare. The return to employment research reported here generally suffers from the same limitations as noted above. With these caveats key findings from our literature search are outlined below.

Return-to-work rates

Athanasou (2005) has recently reviewed research on return-to-work following whiplash and back injuries, including work-related conditions and those resulting from traffic accidents. Overall, the reported return-to-work rates for the 71 studies that met the review criteria varied from 29% to 100% with a median rate of 67%. For whiplash injuries a median return-to-work rate of 95% was reported, which compared favourably with rates for back injuries (65%). These absolute rates of return of course

do not address the length of time off work which is the significant cost factor. The Quebec Task Force on whiplash associated disorders note that the condition is usually self limiting with a median time to recovery – measured by time to end of disability compensation – of 31 days with a significant fraction exhibiting prolonged disability (Spitzer et al. 1995)

Consistent with the above findings, Gozzard, Bannister, Langkamer, Khan, Gargan, & Foy, (2001) reviewed 717 medico legal reports on patients who had suffered a whiplash injury in a road-traffic accident between 1996 and 1999 and found that 7% had not returned to work a the time of the study. In this study the median time to return to full duties varied considerable with type of work, injury severity and other factors and ranged from 7 days to 336 depending on these factors. Kasch, Bach, & Jensen (2001) in a prospective study of acute whiplash similarly reported that at one year post injury 7.8% of the sample had not returned to usual level of activity or work. Malt & Sundet (2002) in a broad-ranging review of all available literature on whiplash and whiplash-associated disorders found that about 15% of whiplash patients suffer from long lasting disabling health problems and about 5% do not return to work.

Predictors of work disability

Physical, psychological and demographic factors have all been found to be related to delayed return-to-work in people who have incurred a whiplash injury following a motor vehicle accident (Cote, Cassidy, Carroll, Frank, & Bombardier, 2001; Gozzard et al. 2001; Gun et al. 2005; Kasch et al.,2001).

Cote et al. (2001) reviewed prognostic studies of acute whiplash published between 1995 and 2000. After applying standard review criteria, 13 cohort studies were included in the review and although the review focus was not on return-to-work specifically, some of the reviewed studies did include employment as an outcome. These authors concluded that besides age, gender, baseline neck pain intensity, baseline headache intensity and baseline radicular signs and symptoms there is little consistency in the literature for recovery of whiplash. It was reported however that that recovery from whiplash tends to be faster in jurisdictions operating under a system that does not compensate for pain and suffering, or in countries where litigation is less common. The magnitude of this influence is illustrated in the

Saskatchewan study of Cassidy et al. (2000) that showed a 54% reduction in median time to case closure after a change in insurance system from tort to no-fault (these authors also reported that the intensity of neck pain, the level of physical functioning, and the presence or absence of depressive symptoms were strongly associated with the time to claim closure in both systems)

Gozzard et al. (2001) concluded that increasing severity of injury, pre-injury employment and previous history of psychological disease were the key factors associated with disruption of work after whiplash injury. The risk of not returning to work was increased by three times in heavy manual workers, two and a half times in patients with prior psychological symptoms and doubled for each increase of grade of disability. The length of time off work doubled in patients with a psychological history and trebled for each increase in grade of disability. The self-employed were half as likely to take time off work, but recovered significantly more slowly than employees.

The influence of injury severity is well supported in the literature. Kasch et al. (2001) found the best single estimator of handicap in his prospective study was the initial cervical range-of-motion test. However emotional and psychological variables as risk factors for prolonged disability have also been demonstrated frequently; for example, Gunn et al. (2005) in a well designed prospective study using multivariate analysis showed that initial pain reports and emotional factors (the bodily pain score and role emotional scores of the Short Form-36 health questionnaire) showed a consistent significant positive association with better outcomes 12 months later. After taking account of these factors, legal involvement independently predicted some dimension of outcome but there was no significant association with a return-to-work. Malt & Sundet (2002) concluded that along with manual work, expectation of disability and an ongoing compensation claim case seemed to be important moderator variables affecting symptom formation. Linton's review of the psychological risk factors in back and neck pain (Linton, 2000) has demonstrated a clear link between psychological variables such as negative emotions and cognitive functions and acute subacute and chronic pain. Sterner & Gerdle (2004), in their review of whiplash disorders, concluded chronic whiplash-associated disorders are associated with problems concerning social functioning, daily anxieties and satisfaction with different aspects of life.

A number of implications for the management and rehabilitation of whiplash patient can be drawn from these findings. Firstly, a number of authors have suggested that, given the evidence for the predictive power of initial injury characteristics and the person's emotional response to these, early identification of those at risk of chronic disability could be possible. In this vein, Miettinen, Leino, Airaksinen, & Lindgren (2004) have suggested that initial objective measures of neck mobility together with subjective pain reports could be used to identify persons at risk of suffering long-term health problems after whiplash injury. Secondly, the importance of addressing patient fears and expectations at the acute stage and more generally addressing psychosocial factors during the rehabilitation phase appears to be strongly indicated (see, for example, Malt & Sundet, 2002; Sterner & Gerdle, 2004). Sullivan, Adams, Rhodenizer & Stanish (2006) have recently reported a controlled intervention which demonstrated that addition of a psychosocial intervention significantly improved return-to-work rates beyond those associated with participation in a functional restoration physical therapy intervention for subjects who had sustained whiplash injuries.

Post traumatic stress disorder

An increasing number of studies have shown that post-traumatic stress disorder (PTSD) is a common consequence of MVA with incidence estimates ranging from 10% to 50% (Bryrant and Harvey, 1995). Jaspers (1998) estimated that PTSD occurs in at least 25% of traffic accident victims who sustain physical injuries and has suggested it is probably higher in patients with chronic whiplash complaints. More recently Chan, Medicine, Air, & McFarlane (2003), using an Australian sample reported that 29% of MVA victims who responded to a follow-up survey nine months after the accident met criteria for PTSD.

PTSD and return-to-work

In a two-year follow-up study of injured road accident survivors, Matthews & Chinnery (2005) found that survivors with PTSD were significantly less likely to return to work after the accident and more likely to report long-term negative

occupational outcomes such as working fewer hours in positions requiring less skill than those without PTSD.

Matthews & Chinnery (2005) found that PTSD symptom severity influenced work functioning after controlling for the effects of other known risk factors including age, gender, education, occupation, and accident related risk factors such injury severity and pain. Those road accident survivors who had symptoms of PTSD – clinical or sub-clinical – were significantly less likely to return to work than those in the non-PTSD group. Other independent predictors of return-to-work in this study were psychiatric history, occupation (less skilled work associated with poorer return rates) and injury severity.

The specific barriers to return-to-work for MVA victims with PTSD have been identified as over concern or anxiety with physical injury, reduced time management ability and high levels of depression (Matthews, 2005).

Appendix B: Resources

Australian Organisations

Statutory worker compensation authorities

A useful starting point for sourcing documentation including research reports relevant to return-to-work is the workers' compensation statutory authorities in each Australian jurisdiction. Many of these organizations have commissioned return-to-work research, developed best practice guidelines and identified other sources of information relevant to occupation rehabilitation effectiveness. This information can typically be accessed from the relevant website.

ACT WorkCover

<http://www.workcover.act.gov.au/>

COMCARE

<http://www.comcare.gov.au/>

Northern Territory Worksafe

<http://www.worksafe.nt.gov.au/>

Queensland Division of Workplace Health and Safety

<http://www.dir.qld.gov.au/workplace/index.htm>

Victorian WorkCover Authority

<http://www.workcover.vic.gov.au/vwa/home.nsf>

WorkCover New South Wales

<http://www.workcover.nsw.gov.au/default>

WorkCover Queensland

<http://www.workcover.qld.gov.au/>

WorkCover South Australia

<http://www.workcover.com/>

WorkCover Tasmania

<http://www.workcover.tas.gov.au/node/workcover.htm>

WorkCover Western Australia

<http://www.workcover.wa.gov.au/>

Workplace Services South Australia (Worksafe South Australia)

<http://www.eric.sa.gov.au/>

Other Australian organizations

Other Australian organizations that can provide relevant documentation include

Australian Institute of Occupational Hygienists

<http://www.aioh.org.au/default.asp>

(Has a useful link page to a wide range of local and international organizations addressing work health issues)

Campbell Research & Consulting

<http://www.campbellresearch.com.au/publications.htm>

(This organization conducts the annual National Return-to-work (RTW) Monitor; site contains other relevant reports)

Employment and Workplace Relations Services for Australians

<http://www.workplace.gov.au/>

(Provides useful information on the wider employment policy environment)

Heads of Workers' Compensation Authorities – Australia and New Zealand

<http://www.hwca.org.au/>

(National annual return-to-work reports can be accessed from this site)

National Occupational Health and Safety Commission (Australia)

(The focus of NOHSC is on occupational health and safety but the site provides extensive links to related resources)

<http://www.nohsc.gov.au/default.asp>

Library <http://www.nohsc.gov.au/OHSInformation/LibraryServices/>

National Safety Council of Australia

<http://www.safetynews.com/dynamic/index.asp>

The Australian Council of Trade Unions

The ACTU website provides links to overseas government OHS organizations

<http://www.actu.asn.au/links/ohsoversgov.html>

Australian Universities

In addition, a number of Australian Universities provide links and resource guides to relevant research and publications. Examples include

Flinders University

<http://www.lib.flinders.edu.au/resources/sub/healthsci/a-zlist/occupationalhealth.html>

Monash University (Accident Research Centre)

<http://www.monash.edu.au/muarc/reports/Other/>

University of New South Wales

<http://info.library.unsw.edu.au/biomed/guides/occup/occuplink.html>

University of Adelaide

<http://www.adelaide.edu.au/library/guide/med/pubhealth/occhealth.html>

Other Countries

(We have limited our listing here to those overseas organisations that provide resources available in English)

Canada

Canadian Centre for Occupational Health and Safety

<http://www.ccohs.ca/>

(Similar to the Australian NIHSC)

Institute for Work and Health (Ontario, Canada)

<http://www.iwh.on.ca/>

(This organization provides an extensive database of publications including working papers and occasional papers – many related to return-to-work issues which can be accessed from their website)

Occupational Health and Safety Research Institute Robert Sauve

(Institute De Recherche Robert-Sauve en Sante et en Securite du Travail – IRSST)

(Quebec, Canada)

<http://www.irsst.qc.ca/en/home.html>

(A private non-profit organisation supported by unions and employers. Occupational rehabilitation is a priority research area. Website provides access to relevant publications and projects)

Association of workers' compensation boards of Canada

<http://www.awcbc.org/english/>

(This website provides access to a research inventory and links to all the workers' compensation boards in Canada)

Denmark

National Institute of Occupational Health (Denmark)

<http://www.ami.dk/?lang=en>

Europe

European Agency for Safety and Health at Work (EASHW)

<http://agency.osha.eu.int/info>

(An extensive site covering a wide range of occupational health issues; includes publication database and access to European Commission Publications)

European Forum of Insurances against Accidents at Work and Occupational Diseases

<http://www.europeanforum.org/>

(The emphasis of this organization is on occupational disease rather than return to work but their web site provides access to relevant publications and links to other European sites)

European Foundation for the Improvement of Living and Working Conditions

<http://www.eurofound.eu.int/ewco/index.htm>

European Network for Workplace Health Promotion

<http://www.enwhp.org/>

European Union Public Health Pages

<http://europa.eu.int/comm/health/>

Finland

Finnish Institute of Occupational Health

<http://www.ttl.fi/Internet/English/default.htm>

New Zealand

Environmental Risk Management Authority (Erma New Zealand)

<http://www.ermanz.govt.nz/>

New Zealand's Health and Safety Net

<http://www.osh.dol.govt.nz/index.htm>

United Kingdom

Department for Work and Pensions (UK)

<http://www.dwp.gov.uk/>

Health and Safety Executive (UK)

<http://www.hse.gov.uk/>

United States of America

Center for Research Occupational and Environmental Toxicology (CROET) (U.S.A.)

<http://www.ohsu.edu/croet/>

National Institute For Occupational Safety And Health (NIOSH) (U.S.A.)

<http://www.cdc.gov/niosh/homepage.html>

(Extensive site which includes a bibliographic database of occupational safety and health publications, documents, grant reports)

Occupational Safety and Health Administration

<http://www.osha.gov/>

Workers Compensation Research Institute

<http://www.wcrinet.org/>

(The focus of the Institute is on performance of workers' compensation systems; the Institute supports an active research program and research publications can be ordered from the website; the organisation also provides benchmark data for a number of state workers' compensation systems (in USA).

The individual State Workers Compensation Agencies provide a good source of further information about workers' compensation statistics, research and programs.

The WCRI provides links to some of these agencies; a complete listing can be found at:

http://employeeissues.com/workers_compensation_boards.htm

Center for International Rehabilitation Research Information and Exchange

<http://cirrie.buffalo.edu/>

(provides a searchable database; the focus is on rehabilitation and disability generally but work related research is included)

Workers' Compensation Health Initiative

<http://www.umassmed.edu/workerscomp/>

(This program of research was conducted by the University of Massachusetts Medical School and although the funded program has finished the above website provides an archive of the work of the Initiative and its projects)

The Rand Corporation

(This non profit organization researches a wide range of public and private sector issues including work and health and workers' compensation.)

<http://www.rand.org/icj/research/comp.html>

W E UPJOHN INSTITUTE for Employment Research

(Another non-profit research organization – has a research stream in disability and workers compensation. Not a lot of recent work but a body of archived research from late nineties can be accessed from the site below.)

<http://www.upjohninst.org/dishub.html>

Sweden

National Institute for Working Life (Sweden)

<http://www.arbetslivsinstitutet.se/en/>

<http://www.arbetslivsinstitutet.se/about/default.asp>

Swedish Work Environment Authority

<http://www.av.se/inenglish/index.aspx>

International Organisations

Safework, International Labour Organisation (ILO)

<http://www.ilo.org/>

World Health Organisation (Occupational Health) (WHO)

http://www.who.int/topics/occupational_health/en/

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