Social Psychiatry and Psychiatric Epidemiology (2020) 55:1041–1051
https://doi.org/10.1007/s00127-020-01839-3

ORIGINAL PAPER

Are there differences in the return to work process for work-related psychological and musculoskeletal injuries? A longitudinal path analysis

Peter Smith[1,2,3] · Anthony D. LaMontagne[4] · Rebbecca Lilley[5] · Sheilah Hogg-Johnson[1,6] · Malcolm Sim[2]

Received: 25 October 2019 / Accepted: 3 February 2020 / Published online: 12 February 2020

Abstract

Purpose To examine differences in the return to work (RTW) process for workers' compensation claimants with psychological injuries compared to those with musculoskeletal (MSK) injuries.

Methods We collected data from 869 workers' compensation claimants in Victoria, Australia, at three time points over a 12-month period (21% with psychological injury claims). RTW was assessed through self-report. Potential mediators were identified at the personal, health-care provider, workplace and system levels. The relationships between injury type, mediating factors and RTW were assessed using path analysis, with adjustment for confounders through inverse probability weighting.

Results We observed better RTW outcomes for claimants with MSK injuries (compared to those with psychological injuries) at T1 and T2, but not at T3. We also observed differences between psychological injuries and MSK injuries and all but two of the mediating factors examined. These differences, in particular related to supervisor response to injury, consultative RTW planning and offers of accommodation, as well as differences in mental health symptoms, explained approximately two-thirds of differences in RTW between injury types at T1. Differences in RTW at T2 were explained by mediating factors, and differences in RTW at T1.

Conclusion Claimants with work-related psychological injuries experience a variety of challenges in RTW compared to those with MSK injuries. While treating and preventing further exacerbation of psychological symptoms should remain an important part of the rehabilitation process, other modifiable factors, in particular supervisor response to injury and consultative RTW planning and modified duties, should be prioritised to reduce inequalities in RTW across injury types.

Keywords Return to work · Occupational injuries · Psychological injury · Path analysis

Introduction

The last few decades have seen increased interest in work-related psychological injuries and illnesses.[1] This interest has been driven, in part, by the increase in the number of these conditions reported to workers' compensation systems and the observation that work-related psychological injuries have median durations of wage replacement and health-care expenditures up to 12 times higher than non-psychological (physical) work-related conditions [1, 2].

Much of what we know about what is successful in return to work (RTW) following a work-related injury has been generated from workers' compensation cohorts with physical injuries, in particular musculoskeletal (MSK) conditions

✉ Peter Smith
psmith@iwh.on.ca

1 Institute for Work and Health, 481 University Ave, Suite 800, Toronto, ON M5G 2E9, Canada

2 Department of Epidemiology and Preventive Medicine, Monash University, Victoria, Australia

3 Dalla Lana School of Public Health, University of Toronto, Toronto, ON, Canada

4 Centre for Population Health Research, Deakin University, Victoria, Australia

5 Department of Preventive and Social Medicine, University of Otago, Dunedin, New Zealand

6 Canadian Memorial Chiropractic College, North York, ON, Canada

[1] From here on we use the term "injury" and "injuries" to refer to both injury/injuries and illness/illnesses.

[3, 4]. Systematic reviews focused on MSK conditions have concluded that offers of modified work/accommodations to enable early and safe return to work, early employer contact with the worker, having a dedicated RTW coordinator, and communication between employers and health-care providers are all associated with better RTW outcomes, as is higher self-efficacy concerning return to work and positive expectations about recovery at the worker level [3, 5].

Systematic reviews on working populations with psychological injuries have identified similar potentially modifiable factors associated with better RTW outcomes, and in addition lower symptom severity, higher supervisor support and higher co-worker support [4, 6–14].

While this information contributes to understanding RTW outcomes among workers with psychological injuries, most of the studies in these reviews are from populations of workers who have a mix of work and non-work psychological injury. For example, in one of the most recent systematic reviews of RTW among workers with psychological injuries [8], only 2 of the 21 studies were from countries with stand-alone workers' compensation systems, compared to integrated systems that accommodate both work-related and non-work-related conditions, such as those in many European jurisdictions. It is likely that RTW from conditions that are work related differs from RTW when a condition is not work related [15]. Further, although similar factors may be associated with better RTW outcomes for MSK and psychological injuries, it is important to understand if there are differences in whether these factors occur across conditions and the extent to which these differences explain the previously noted differences in RTW outcomes [1, 2, 16].

The objective of this study was to examine differences in modifiable aspects of the RTW process (mediating factors) for workers' compensation claimants with psychological injury, compared to those with MSK conditions, and to determine the impact of these mediating factors on differences in sustained RTW over a 12-month period.

Methods

This study used data from a cohort study of workers' compensation claimants in the Australian state of Victoria. This cohort was specifically designed to assess differences in the RTW process for claimants with psychological injuries compared to upper body MSK conditions [17]. In Victoria the workers' compensation system covers approximately 85% of the State's labour force. In general, when an absence from work occurs due to a work-related injury, the first 10 days of incapacity are paid for and managed by the workplace.

The sample was recruited over a 12-month period (June 2014–July 2015) and consisted of 869 respondents, 22% with psychological injuries. The recruitment process involved the following steps: each month a sample of eligible claimants was sent a letter outlining the purpose of the study and providing an opportunity to opt out of the study. Those claimants who did not opt out of the study were approached by phone approximately 3 weeks after the initial letter was sent. Six attempts were made to contact each respondent at different times of the day, and days of the week, over a 2-month period. The 869 respondents represent a response rate of 36% from the eligible source population of claimants. While no differences were noted between the recruited population and the source population across injury type or age group, men and workers in the manufacturing and construction industries were less likely to participate in the cohort [17]. For the majority of respondents, the time one (T1) interview took place between 2 and 5 months from their first day of time lost from work. Follow-up interviews were conducted at 6 months (time two, T2) and 12 months (time three, T3) following the T1 interview. Participation rates at T2 and T3 were 73% and 66% of the original sample, respectively. More details on the study are available elsewhere [17]. The study was approved by appropriate ethical committees and is therefore in accordance with the ethical standards laid down in the 1964 Declaration of Helsinki and its later amendments.

Primary outcome: sustained RTW

The primary outcome for this study was sustained RTW. Sustained RTW was defined as respondents reporting returning to work for at least 28 days at the time of the interview, consistent with previous research [7, 18–21]. We further differentiated between respondents who had not attempted an RTW (at all for the T1 interview, and since the last interview for the T2 and T3 interviews), from those who had returned to work, but where this RTW was not sustained (i.e. at work, but for less than 28 days; or had returned to work, but were currently not at work). In the path models, this three-level variable was operationalised as an ordered latent construct with higher values indicating more sustained RTW.

Primary independent variable: injury type

Injury type was defined as a psychological or upper body MSK injury. MSK conditions included all soft-tissue injuries of the back or upper extremity (for more detail see [17]). Psychological injuries included conditions where the nature of injury classification used by the workers' compensation scheme (VCODE) [22] indicated a psychological injury, including post-traumatic stress disorder, other reactions to work stressors and other mental disorders, not elsewhere classified. The nature of injury was confirmed verbally by the respondent before conducting the T1 interview.

Situations where multiple conditions were present (e.g. an injury that resulted in a fracture and a psychological injury, or a burn and an MSK injury) were excluded from the study.

Potential mediators between injury type and RTW

Measures that might mediate the relationship between injury type and RTW were based on Loisel's Arena Model of work disability [23, 24] and systematic reviews in the area of work-related disability [3, 4]. We attempted to include at least one measure within each of the four broad areas within the Arena model (personal, health-care provider (HCP), workplace and system levels) to allow for representation of each dimension in our analyses. For all measures, we defined higher scores as being associated with more positive outcomes (e.g. either higher levels of a positive characteristic, or the absence of a negative characteristic). To ensure proper temporality between these measures and RTW outcomes, all measures were taken from the T1 interview.

Personal

Self-reported mental health was measured using the Kessler-6 (K6) [25, 26]. This measure provides a continuous score between 0 and 24, with higher scores indicating a greater presence of mental health symptoms/distress in the previous month. To ensure consistency between the direction of mediators, this scale was reversed for our analyses, with higher scores indicating lower distress, and lower scores indicating higher distress.

A question on recovery expectations was based on a previous RTW cohort study in Ontario, Canada [27]. Respondents were asked if they thought they would get better soon, were already recovered, would get better slowly, never get better or get worse. Respondents who indicated they would get better soon, get better slowly or were already better were defined as having positive recovery expectations.

Workplace

Respondents were given a list of eight different reactions their supervisor or manager might have had at the time they first notified them of their injury. Each of these reactions was defined as either positive (e.g. was supportive or helpful) or negative (e.g. blamed you for the injury). Using these responses, we defined the supervisor response as being positive (positive responses with no negative responses) versus mixed, negative or no responses.

Respondents with co-workers were also given a list of six responses concerning the reaction of their co-workers to their injury. These reactions were positive (e.g. concerned) or negative (e.g. unsympathetic). Similar to supervisor responses (above), we used these to define respondents who experienced positive co-worker reactions (with no negative reactions), compared to those who did not.

Respondents were asked if they had contact with the RTW coordinator in their workplace and how stressful these interactions had been. Using these responses, we defined having not at all stressful or not very stressful RTW interactions, compared to interactions that were a bit, quite or extremely stressful, or not having contact with the RTW coordinator.

Respondents were asked if they were offered alternative or modified duties since the time of their injury (yes/no).

Respondents were asked if they had been given an RTW plan. For respondents who said yes, they were further asked if they were able to express their views and feelings, had an influence and if they felt the process was not prejudiced or biased against them. Using responses for these questions we classified respondents who had a consultative RTW plan versus those who did not (including those who were not given a plan).

Health care provider

Respondents were asked if their main HCP had given them a date they would likely return to work (yes/no), and if their main HCP had contact with their employer or occupational rehabilitation provider (yes/no).

System

Respondents were asked about whether the claim agent's case manager: was polite, treated them with dignity and respect, provided them with information they needed, was open and truthful, explained the RTW process carefully and completely, communicated details at appropriate times and considered their specific needs. Respondents who agreed or strongly agreed with all of these seven statements were defined as having an effective claims agent (yes/no).

Respondents were also asked if their interactions with their claims agent had been stressful. Similar to RTW coordinators, we defined having not at all stressful or not very stressful claims agent interactions, compared to interactions that were a bit, quite or extremely stressful.

Confounders between injury type and mediators, and RTW

The following variables were hypothesised to be confounders between our primary independent variable (injury type) and our mediating variables, and/or our primary outcomes (sustained RTW). Self-reported age, sex (male/female) and

time since injury at the T1 interview (in weeks). Activity limitations pre-injury (yes/no) were defined using questions on whether a physical or mental condition restricted the amount or type of activity respondents could do at work prior to their injury, or if they had to slow the pace of their work or change the way they did their work due to a physical or mental condition prior to their injury. Physical demands of work pre-injury were defined based on four questions about the physical demands of work pre-injury (lifting, bending, working in awkward postures and standing for extended periods of time). Respondents who described doing one or more of these tasks often or always were defined as having physically demanding work pre-injury. Respondents were also asked how much they agreed or disagreed with five questions on their job autonomy pre-injury [28, 29]. Using these responses, we defined each respondent as having high or low pre-injury job autonomy using a median split approach. Workplace size was based on self-report and respondents were classified into one of the following four groups (less than 20 employees, 20 to 99 employees, 100 to 299 employees, more than 300 employees).

Analysis

All variables were first checked for missing data and adequate distribution across response categories. To handle confounding, we used inverse probability weights to balance the covariate distribution across injury types in our sample. This approach has the advantage of reducing model complexity, in particular concerning the correct relationships between each confounder and the outcome under investigation and potential interactions between confounders [30]. Inverse probability weights were developed following published approaches and involved checks of the distributions of weights and the capping of weight values at the 1st and 99th percentiles [31]. The distribution of covariates across injury type prior and subsequent to the inclusion of inverse probability weights is provided in Table 4 in the appendix.

We initially examined the relationship between injury type and RTW and mediating variables separately within personal, HCP, workplace and system level dimensions, using path models. Path models offer specific advantages over flat regression models for mediation analysis. Specifically, they allow examination of multiple mediators in the one model and require the relationships between mediators to be specified in the model (e.g. if mediators are proximal or distal to other mediators, and the relationships between mediators across different dimensions). Estimates available from path models include the direct effect between an exposure and outcome (i.e. injury type and sustained RTW not through mediators), the indirect effect between injury type and sustained RTW which is through each mediator, as well as the total effect. The total effect, which is the sum of the direct and indirect effects, is also equivalent to the effect that would be obtained in a model not adjusted for the mediator but adjusted for all covariates.

Three types of model fit were assessed. Absolute model fit, assessing the model's ability to reproduce the data, was measured using the Chi-square index, with a non-significant p value an indicator of good model fit. Incremental fit, concerned with comparing competing models, was assessed using the comparative fit index (CFI) and the Tucker–Lewis index (TLI) with good fit indicated by CFI and TLI values of 0.95 and higher [32]. Parsimonious fit, comparing the trade-off between the number of parameters in the model and overall model fit was measured using the root mean square error of approximation (RMSEA). An RMSEA value of 0.05 or lower indicates good fit [33].

Path models accommodate both linear and non-linear endogenous variables [34]. The relationships between measures and non-linear outcomes are estimated using a probit link, which assumes an underlying latent construct for the non-linear variable [35]. Unlike logistic estimates, the exponent of the probit estimate has no intuitive meaning (e.g. like an odds ratio); however probit estimates are preferable for prediction or classification [35].

We initially specified a path model with no relationships between mediating variables. We then specified theoretically plausible relationships between mediating variables as part of the path model. Missing values for outcomes at T2 and T3 were estimated using full information maximum likelihood estimates, to enable all observations with complete information on exogenous variables to be included in the analyses, providing more robust estimates [36]. All analyses included the inverse probability weights to account for confounders between injury type, mediating variables and outcomes.

In our initial descriptive analyses of the distributions and relationships between study variables, we observed a significant correlation between offers of modified duties and having a consultative RTW plan (polychoric correlation = 0.59). To avoid issues with collinearity, we combined these measures into a single three-level variable (consultative RTW plan; modified duties but without a consultative RTW plan; and no offer of modified duties or RTW plan). Initial analyses also indicated that certain mediators were either not associated with injury type, not associated with RTW or not associated with either injury type or RTW once confounders had been taken into account. These mediators included the HCP having contact with the workplace which did not differ across injury type and was not associated with RTW, and co-worker

responses to injury and good RTW coordinator interactions which were not associated with RTW. In addition, the effects of effective claim agent performance on RTW were completely mediated by reports of claim agent stress. As such, these variables were included in subsequent path models.

Results

The relationships between injury type and study outcomes and mediators are presented in Table 1. Differences in sustained RTW were observed between injury types at the T1 and T2 interview, but not at the T3 interview. At the T1 and T2 interviews, claimants with psychological injuries were less likely to have sustained RTW and more likely to have not attempted to RTW compared to those with MSK conditions, but this difference was not found at T3 (Table 1). MSK injuries were associated with more positive levels of all but two mediators (claim agent effectiveness and HCP contact with the workplace). Compared to psychological injuries, claimants with MSK conditions had a higher prevalence of positive supervisor and coworker responses to their injury, were more likely to indicate their interactions with their RTW coordinator and claims agent were not stressful, were more likely to be given an RTW date by their HCP and were more likely to have a consultative RTW plan or be offered modified/alternate duties. Respondents with MSK conditions also reported better mental health status in the previous month and had more positive recovery expectations than claimants with psychological injuries.

Table 2 presents direct estimates for variables associated with RTW status at the T1, T2 and T3 interviews from the final path model. A depiction of the final model linking psychological injury claims to RTW at each time point is also presented in Fig. 1. Table 2 presents probit estimates, with values above zero indicating higher likelihood of sustained RTW and values below zero indicating lower likelihood of sustained RTW. Statistically significant direct relationships were observed for the absence of mental health symptoms in the previous month and having a consultative RTW plan, which were both associated with a higher probability of sustained RTW at T1. Psychological injury type was associated with a reduced probability of sustained RTW at T1, although this relationship was not statistically significant. At T2, absence of mental health symptoms in the previous month, positive recovery expectations and sustained RTW at T1 were associated with a higher likelihood of sustained RTW. No relationship was observed between injury type and sustained RTW at T2 after accounting for mediating factors and RTW at T1. No mediating factors were directly associated with RTW at T3. Excellent model fit was observed as assessed by incremental and parsimonious fit indices.

Table 3 presents the total effect of having a psychological injury claim (compared to MSK injury claim) on RTW at T1 and T2, and the proportion of these effects that are mediated through personal, workplace, HCP and system level factors. A statistically significant total effect was observed between psychological injury and RTW at each time point (indicating that psychological injury was associated with a lower probability of sustained RTW). In addition, a significant total effect was observed between psychological injury claim and RTW at T3 (est = − 0.490, 95% CI = − 0.690, − 0.290); however, since this estimate was completely mediated through RTW at T2, this estimate is not presented. Statistically significant mediation between injury type (psychological versus MSK) and sustained RTW at T1 was observed for mental health symptoms (36.5% of the total effect), positive supervisor response (12.8%), and consultative RTW plans and modified duties (29.6%). Overall, mediating factors explained 66% of the total effect of psychological injuries on RTW at T1. The relationship between psychological injury claims and RTW at T2 was completely mediated by RTW at T1, and mediating factors. Similar to RTW at T1, mental health symptoms (35.1% of total effect) and positive supervisor responses (15.3%) were associated with statistically significant mediation effects between psychological injury and sustained RTW at T2, as was RTW at T1 (65.2%).

Discussion

Using a cohort of 869 workers' compensation claimants in the Australian state of Victoria, we identified differences in the RTW process for claimants with psychological injuries compared to those with MSK injuries and determined the impact of these factors in inequalities in RTW outcomes over a 12-month period. We observed better RTW outcomes for claimants with MSK injuries (compared to those with psychological injuries) at T1 and T2, but not at T3. We also observed differences between psychological injuries and MSK injuries and all but two of the mediating factors examined. These differences, in particular in supervisor response to injury, consultative RTW planning and offers of accommodation, as well as differences in mental health symptoms in the previous month, explained approximately two-thirds of differences in sustained RTW for psychological injuries compared to MSK injuries at T1. Differences in sustained

Table 1 Distribution of RTW outcomes and personal, workplace, HCP and system level mediators across injury types ($N=869$)

	Psych $N=196$	MSK $N=673$	p value for diff
Outcomes			
RTW T1 ($N=869$)			
Sustained	27.6%	46.6%	<0.001
Non-sustained	23.7%	32.7%	
No attempt	48.7%	20.7%	
RTW T2 ($N=628$)			
Sustained	53.9%	66.9%	<0.001
Non-sustained	19.5%	20.4%	
No attempt	26.6%	12.8%	
RTW T3 ($N=572$)			
Sustained	59.8%	64.9%	0.56
Non-sustained	18.2%	16.1%	
No attempt	22.1%	19.0%	
Personal mediators			
Self-reported mental health (higher = absence of symptoms)			
Mean	13.7	17.5	<0.001
Std	6.5	6.2	
Positive recovery expectations			
Yes	72.5%	80.9%	0.011
No	27.5%	19.1%	
Workplace mediators			
Positive supervisor response			
Yes	36.3%	50.3%	0.001
No	63.7%	49.7%	
Positive co-worker response			
Yes	44.1%	57.7%	0.001
No	55.9%	42.3%	
Good (non-stressful) RTW coordinator interactions			
Yes	17.8%	40.4%	<0.001
No	82.2%	59.6%	
Consultative RTW plan/modified duties			
Yes	15.6%	30.3%	<0.001
Non consultative plan or modified duties without plan	36.0%	44.1%	
No plan or modified duties	48.4%	25.6%	
HCP mediators			
Given return to work date			
Yes	24.4%	37.7%	0.001
No	75.6%	62.3%	
Contact with workplace			
Yes	57.0%	56.9%	0.99
No	43.0%	43.1%	
System mediators			
Claim manager did all required tasks			
Yes	42.6%	45.9%	0.42
No	57.4%	54.1%	
Good (non-stressful) claim manager interactions			
Yes	32.4%	56.3%	<0.001
No	67.6%	43.7%	

Proportions are adjusted for all covariates using inverse probability weights

Table 2 Standardised direct effect estimates for variables associated with RTW outcomes at T1, T2 and T3 ($N = 869$)

	RTW T1		RTW T2		RTW T3	
	Probit estimate	95% CI	Probit estimate	95% CI	Probit estimate	95% CI
Psychological injury claim	− 0.201	− 0.421, 0.019	–	–	–	–
Mental health symptoms	**0.351**	**0.269, 0.433**	**0.188**	**0.084, 0.292**	–	–
Positive recovery expectations	–	–	**0.154**	**0.011, 0.297**		
Consultative RTW plan/mod duties	**0.293**	**0.195, 0.391**	–	–	–	–
HCP provided a RTW date	0.099	− 0.021, 0.209	–	–	–	–
Good claim agent interactions	− 0.019	− 0.127, 0.089	–	–	–	–
RTW at T1	–	–	**0.460**	**0.356, 0.564**	–	–
RTW at T2	–	–	–	–	**0.761**	**0.690, 0.832**

Model Fit Statistics: Chisq 58.76, 36 DF, p-value = 0.010; RMSEA 0.027 (0.013–0.039); CFI: 0.976; TLI: 0.958

Estimates which are statistically significant ($p < 0.05$) are in bold

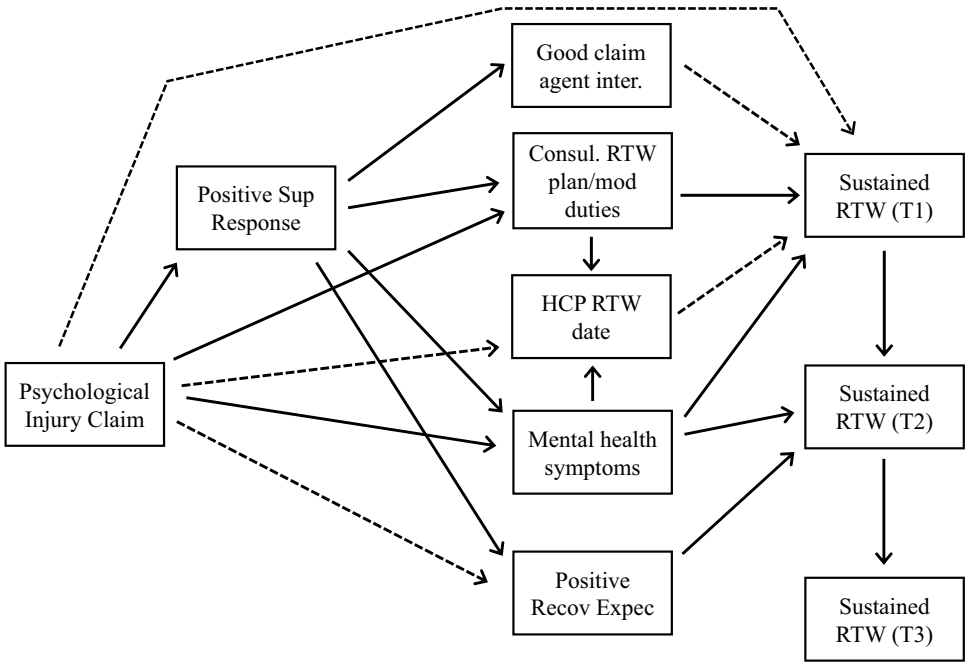

Fig. 1 Final Path Model of relationships between psychological injury claims, personal, workplace, HCP and system level mediators and RTW. Paths additionally directly adjusted for age and sex. Estimates also adjusted for other covariates using inverse probability weights. Solid paths = statistically significant relationship ($p < 0.05$). Dashed paths = estimate included in path model, but not statistically significant

RTW at T2 were explained by mediating factors, and differences in RTW at T1.

The results of our study should be interpreted considering the following strengths and limitations. All variables used in this study were based on self-report. It is possible that respondents with psychological injury claims could respond more negatively to questions, due to factors such as negative affect. While this bias is always potentially present in any self-reported survey, we note that psychological injury was not consistently associated with negative reporting across measures included in this study. For example, respondents with psychological injury claims were less likely to report that their work was physically demanding, but more likely to report they had lower job autonomy (see Table 4). T1 interview data were collected approximately 2–5 months after the start of incapacity for most respondents, and this might have an impact on the recall of measures such as supervisor response to injury and pre-injury work characteristics. In addition, the length of time between injury and the T1 interview was longer for respondents with psychological injury, likely due to longer time associated with claim adjudication and acceptance [37]. To partially address this, the time between the injury and the interview was included as a covariate in our analyses, and balance was achieved across

Table 3 Total effect estimates for psychological injury (compared to MSK injury) on RTW at time one and time two, and proportion of total effect mediated through personal, workplace, HCP and system level factors ($N = 869$)

	RTW at T1		RTW at T2	
	Probit estimate	95% CI	Probit estimate	95% CI
Psychological injury claim (total effect)	**− 0.592**	**− 0.812, − 0.372**	**− 0.419**	**− 0.560, − 0.278**
	RTW at T1		RTW at T2	
Percent mediation of total effect[a]	% med	95% CI	% med	95% CI
Via personal factors				
RTW expectations			8.8	− 4.3, 21.9
Mental health symptoms	36.5	22.6, 50.4	35.1	20.9, 49.4
Via workplace factors				
Positive supervisor response	12.8	2.6, 23.1	15.3	2.6, 27.9
Consultative RTW plan/mod duties	29.6	16.6, 42.8		
Via HCP factors				
Provided a RTW date	2.0	− 3.3, 7.3		
Had contact with the workplace				
Via system level factors				
Claim agent did all expected tasks				
Good claim agent interactions	− 1.5	− 10.5, 7.4		
Via RTW at time one			65.2	37.1, 93.2
Total mediated (all factors)	66.0	44.9, 87.2	100.0	

Model Fit Statistics: Chisq 58.76, 36 DF, p-value = 0.010; RMSEA 0.027 (0.013–0.039); CFI: 0.976; TLI: 0.958

Estimates which are statistically significant ($p < 0.05$) are in bold

[a]Given the mediators can impact other mediators, the percent mediated estimates will not add up to the total mediated effect as they can overlap

this measure using inverse probability weights (see Table 4). Although we were able to adjust for differences between injury types across a range of factors, it is possible that there are potential confounders between injury type and mediators and outcomes that were not accounted for in our models. In addition, while we were able to include measures of psychological symptoms for all respondents, we were not able to include a similar measure reflecting physical symptoms (e.g. pain) associated with physical conditions.

Our final path model required the specification of relationships between mediating variables, even though these variables were all measured at the same time point. This required us to propose theoretically plausible temporal relationships between these variables [38]. While the final fit indices indicated that these proposed relationships were consistent with the data, it should be noted that other specifications of these relationships could be mathematically similar and therefore provide similar model fit estimates [39]. Finally, our study only included claimants with psychological and MSK injuries. As such, our results cannot be extended to other types of injuries. Given the previously reported high levels of poor mental health among claimants with MSK conditions [40, 41], it is likely that differences observed across injury type in our study may be larger if a broader range of physical injuries was considered.

Our study also has a number of strengths, which include a novel examination of differences in the RTW process between work-related psychological and MSK injuries within a sample specifically designed for this purpose. We were also able to include a variety of potential measures of differences in the RTW process which were related to multiple areas at the individual, workplace, HCP and system level. Further, our modeling approach necessitated that we also specify relationships between all mediating variables and how they were related to both injury type and sustained RTW. This allowed for a comprehensive picture of the various relationships with injury type and each of these potential pathways linking psychological injuries to poorer RTW outcomes, within a single model.

Our results demonstrate that inequalities in RTW process existed between psychological and MSK injuries across individual, workplace, HCP and system level areas. This suggests that approaches to reduce inequalities in RTW outcomes between psychological and non-psychological injuries will need to consider the multitude of areas where differences are present in the RTW process [42]. Our final path model provided empirical support for the complex relationships between measures across different dimensions of the Arena model. Specifically, a positive supervisor response to injury was associated with better claim agent interactions, a more consultative RTW plan and the absence of mental health symptoms. Mental health symptoms and a consultative RTW plan were also associated with a higher likelihood of the main HCP providing the worker with an RTW date. Taken together, these results highlight that understanding disability and RTW requires the integration of multiple systems and perspectives, including the person, workplace, health-care and legislation and insurance system [23, 42]. To further clarify implications for improvements in policy and practice in this area, future studies should investigate the reasons for the observed differences using qualitative or mixed methods.

We observed that dimensions with the greatest influence on RTW inequalities across injury types were those at the individual level (symptoms and recovery expectations) and workplace levels (supervisor support and consultative RTW plans). Previous research has suggested that providing accommodation at work is particularly challenging for workplaces when dealing with employees with mental health conditions, related in part to the types of accommodations required (e.g. changes in the organisation of work or staffing changes) [43]. While systematic reviews have observed that RTW can be improved when workplace accommodations are in place to help facilitate the RTW process and when disruptions in interpersonal relationships within the workplace are addressed [6], the results of our study suggest that putting these findings into practice is still challenging in many work settings. The challenges in providing accommodation for claimants with psychological injuries (compared to those with MSK injuries) may also be a reason why health-care providers were less likely to provide an RTW date for claimants with psychological injuries, compared to those with MSK injuries. The importance of supervisor response to injury also highlights the need for integrated approaches to work-related psychological injury [44]. While promoting more positive responses from supervisors in response to a psychological injury claim should be encouraged, based on our findings, these efforts should also incorporate and acknowledge that the supervisor response does not occur in a vacuum, and may be embedded within a workplace culture that is related to poorer psychological health among employees to begin with [21]. As such, the workplaces least equipped to deal with work-related psychological injuries are likely the same workplaces where these types of injuries are more likely to occur [44].

Finally, we observed that much of the variation in sustained RTW at T2 and T3 was mediated by RTW at previous time points. In particular, RTW at T3 was fully mediated by RTW at T2. We also observed relative stability in RTW distributions at T2 and T3 (approximately 9–10 and 15–16 months post-injury), in particular among MSK claims. This highlights that attention should be given to intervening early in the RTW process where possible. Further, future work should examine factors associated with change in RTW status (both positive and negative) at this time period (approximately 1 year after the initial absence from work).

In conclusion, claimants with work-related psychological injuries experience a variety of challenges in RTW compared to those with MSK injuries. These include less positive supervisor responses to injury, less likelihood of consultative RTW planning with their workplace, more stressful claim agent interactions and being less likely to be given an RTW date by their HCP. These are in addition to a higher prevalence of mental health symptoms among psychological injury claims when measured early in the claim process. While treating and preventing further exacerbation of psychological symptoms should remain an important part of the rehabilitation process for claimants with psychological injuries, other modifiable factors, in particular supervisor response to injury and consultative RTW planning and modified duties, account for a similar proportion of differences in sustained RTW across injury types and should be prioritised to reduce inequalities in RTW for psychological injuries compared to MSK injuries.

Acknowledgements This study is funded through the Australian Research Council (ARC) linkage grant (Project number LP130100091). During the study, PS was supported by the Discovery Early Career Researcher Award from the Australian Research Council (DE120101580), and a Research Chair in Gender, Work and Health from the Canadian Institutes of Health Research. We would like to acknowledge the Social Research Centre (SRC) for undertaking the interviews. We acknowledge the assistance of WorkSafe Victoria, SafeWork Australia, Office of The Age Discrimination Commissioner, Beyond Blue and the Australian Industry Group as part of the project. The authors declare that they have no competing interests

Conflict of interest The authors declare that they have no conflict of interest.

Appendix

See Appendix Table 4.

Table 4 Distribution of covariates across injury type prior and subsequent to addition of inverse probability weights ($N=869$)

	Pre-weighting			Post-weighting		
	Psych	MSK	*p*-value for diff	Psych	MSK	*p*-value for diff
	$N=191$	$N=678$		$N=196$	$N=673$	
Sex						
Male	41.9%	57.7%	<0.001	55.3%	54.3%	0.79
Female	58.1%	42.3%		44.7%	45.7%	
Age						
Mean	46.0	43.7	0.022	43.5	44.2	0.52
(Std)	(11.1)	(12.3)		(11.8)	(12.3)	
Time since injury (weeks)						
Mean	18.2	16.2	0.001	16.9	16.7	0.66
(Std)	(8.2)	(7.0)		(7.4)	(7.3)	
Activity limitations at work pre-injury						
Yes	14.1%	8.3%	0.015	8.0%	9.2%	0.59
No	85.9%	91.7%		92.0%	90.8%	
Physical demands at work pre-injury						
Yes	51.8%	93.1%	<0.001	84.1%	84.7%	0.92
No	48.2%	6.9%		15.6%	15.3%	
Job autonomy pre-injury						
High	37.7%	53.2%	<0.001	53.8%	50.4%	0.40
Low	62.3%	46.8%		46.2%	49.6%	
Workplace size						
Less than 20 employees	35.6%	41.2%	0.004	37.2%	39.9%	0.63
20 to 99 employees	27.2%	32.5%		29.3%	32.2%	
100 to 299 employees	17.8%	13.3%		18.1%	14.2%	
300 + employees	16.8%	8.6%		10.7%	9.6%	
Missing information	2.6%	4.6%		4.7%	4.1%	

References

1. Dewa C, Chau N, Dermer S (2010) Examining the comparative incidence and costs of physical and mental health-related disabilties in an employed population. J Occup Environ Med 52(7):758–762
2. Safe Work Australia (2013) The Incidence of accepted workers' compensation claims for mental stress in Australia. Safe Work Australia, Canberra
3. Franche RL, Cullen K, Clarke J, Irvin E, Sinclair S, Frank J (2005) Workplace-based return-to-work interventions: a systematic review of the quantitative literature. J Occup Rehabil 15(4):607–631
4. Cullen K, Irvin E, Collie A, Clay FJ, Gensby U, Jennings P, Hogg-Johnson S, Kristman V, Laberge M, McKenzie D, Newnam S, Palagyi A, Sheppard D, Shourie S, Steenstra I, Van Eerd D, Amick BC III (2017) Effectiveness of workplace interventions in return-to-work for musculoskeletal, pain-related and mental health conditions: an update of the evidence and messages for practitioners. J Occup Rehabil 28(1):1–15
5. Cancelliere C, Donovan J, Stochkendahl MJ, Biscardi M, Ammendolia C, Myburgh C, Cassidy JD (2016) Factors affecting return to work after injury or illness: best evidence synthesis of systematic reviews. Chiropr Man Therap 24(1):32
6. Andersen MF, Nielsen KM, Brinkmann S (2012) Meta-synthesis of qualitative research on return to work among employees with common mental disorders. Scand J Work Environ Health 38(2):93–104. https://doi.org/10.6271/sjweh.3257
7. Black O, Keegel T, Sim M, Collie A, Smith P (2018) The Effect of self-efficacy on return-to-work outcomes for workers with psychological or upper-body musculoskeletal injuries: a review of the literature. J Occup Rehabil 28(1):16–27
8. de Vries H, Fishta A, Weikert B, Rodriguez Sanchez A, Wegewitz U (2018) Determinants of sickness absence and return to work among employees with common mental disorders: a scoping review. J Occup Rehabil 28(3):393–417
9. Ervasti J, Joensuu M, Pentti J, Oksanen T, Ahola K, Vahtera J, Kivimaki M, Virtanen M (2017) Prognostic factors for return to work after depression-related work disability: a systematic review and meta-analysis. J Psychiatr Res 95:28–36
10. Nigatu YT, Liu Y, Uppal M, McKinney S, Gillis K, Rao S, Wang JL (2017) Prognostic factors for return to work of employees with common mental disorders: a meta-analysis of cohort studies. Soc Psychiatry Psychiatr Epidemiol 52:1205–1215
11. White M, Wagner SL, Schultz IZ, Murray E, Bradley SM, Hsu V, McGuire L, Schulz W (2015) Non-modifiable worker and workplace risk factors contributing to workplace absence: a stakeholder-centred synthesis of systematic reviews. Work 52(2):353–373

12. van Vilsteren M, van Oostrom SH, De Vet HCW, Franche RL, Boot CR, Anema JR (2015) Workplace interventions to prevent work disability in workers on sick leave. Cochrane Database Syst Rev. https://doi.org/10.1002/14651858.CD006955.pub3
13. Mikkelsen MB, Rosholm M (2018) Systematic review and meta-analysis of interventions aimed at enhancing return to work for sick-listed workers with common mental disorders, stress-related disorders, somatoform disorders and personality disorders. Occup Environ Med 75(9):675–686
14. Vargas-Prada S, Demou E, Lalloo D, Avila-Palencia I, Sanati KA, Sampere M, Freer K, Serra C, Macdonald EB (2016) Effectiveness of very early workplace interventions to reduce sickness absence: a systematic review of the literature and meta-analysis. Scand J Work Environ Health 42(4):261–272
15. Lilley R, Davie G, Langley J, Ameratunga S, Derrett S (2013) Do outcomes differ between work and non-work-related injury in a universal injury compensation system? Findings form the New Zealand prospective outcomes of injury study. BMC Public Health 13:995. https://doi.org/10.1186/1471-2458-13-995
16. Comcare (2012) Costs of psychological injury. Commonwealth Government of Australia. https://www.comcare.gov.au/safety__and__prevention/your_working_environment/psychological_injury/costs_of_psychological_injury. Accessed 7 Sep 2012
17. Dimitriadis C, LaMontagne AD, Lilley R, Hogg-Johnson S, Sim MR, Smith P (2017) Cohort profile: Workers' compensation in a changing Australian labour market: the return to work (RTW) study. BMJ Open 7:e016366. https://doi.org/10.1136/bmjopen-2017-016366
18. Vogel N, Schandelmaier S, Zumbrunn T, Ebrahim S, de Boer WEL, Busse JW, Kunz R (2017) Return-to-work coordination programmes for improving return to work in workers on sick leave (Review). Cochrane Database Syst Rev 3:CD0011618
19. Steenstra IA, Lee H, de Vroome EMM, Busse JW, Hogg-Johnson SJ (2012) Comparing current definitions of return to work: a measurement approach. J Occup Rehabil. https://doi.org/10.1007/s10926-011-9349-6
20. Lane T, Lilley R, Hogg-Johnson S, LaMontagne AD, Sim MR, Smith P (2018) A prospective cohort study of the impact of return-to-work coordinators in getting injured workers back on the job. J Occup Rehabil 28(2):298–306
21. Jetha A, LaMontagne AD, Lilley R, Hogg-Johnson S, Sim MR, Smith P (2018) Workplace social system and sustained return-to-work: a study of supervisor and co-worker supportiveness and injury reaction. J Occup Rehabil 28(3):486–494
22. Victoria WorkSafe (2008) VCODE: The nature of injury/disease classification system for Victoria. WorkSafe Victoria, Melbourne
23. Loisel P, Buchbinder R, Hazard R, Keller R, Scheel I, van Tulder M, Webster B (2005) Prevention of work disability due to musculoskeletal disorders: the challenge of implementing evidence. J Occup Rehabil 15(4):507–524
24. Loisel P, Durand MJ, Berthelette D, Vezina N, Baril R, Gagnon D, Lariviere C, Tremblay C (2001) Disability prevention: new paradigm for the management of occupational back pain. Disabil Manag Health Outcomes 9(7):351–360
25. Kessler RC, Greif Green J, Gruber MJ, Sampson NA, Bromet E, Cuitan M, Furukawa TA, Gureje O, Hinkov H, Hu C-Y, Lara C, Lee S, Mneimneh Z, Myer L, Oakley-Browne M, Posada-Villa J, Sagar R, Carmen Viana M, Zaslavsky AM (2010) Screening for serious mental illness in the general population with the K6 screening scale: results from the WHO World Mental Health (WMH) survey initiative. Int J Methods Psychiatr Res 19(Supp 1):4–22
26. Kessler RC, Barker PR, Colpe LJ, Epstein JF, Gfroerer JC, Hiript E, Howes MJ, Normand S-L, Manderscheid RW, Walters EE, Zaslavsky AM (2003) Screening for serious mental illness in the general population. Arch Gen Psychiatry 60:184–189
27. Cole DC, Mondloch MV, Hogg-Johnson S, for the Early Claimant Cohort Prognostic Modelling Group (2002) Listening to injured workers: how recovery expectations predict outcomes—a prospective study. CMAJ 166(6):749–754
28. Breaugh JA (1985) The measurement of work autonomy. Hum Relat 38(6):551–570. https://doi.org/10.1177/001872678503800604
29. Breaugh JA (1998) The development of a new measure of global work autonomy. Educ Psychol Meas 58(1):119–128. https://doi.org/10.1177/0013164498058001010
30. Hernan MA, Robins JM (2016) Using big data to emulate a target trial when a randomized trial is not available. Am J Epidemiol 183(8):758–764
31. Cole SR, Hernan MA (2008) Constructing inverse probability weights for marginal structural models. Am J Epidemiol 168(6):656–664
32. Hu LT, Bentler PM (1999) Cutoff criteria for fit indexes in covariance structure analysis: conventional criteria versus new alternatives. Struct Equ Modeling 6(1):1–55
33. Kline RB (1998) Principles and practice of structural equation modeling. The Guilford Press, New York
34. Muthen LK, Muthen BO (2010) Mplus user's guide, 6th edn. Muthen & Muthen, Los Angeles
35. Long JS (1997) Regression models for categorical and limited dependent variables. Sage Publications, Thousand Oaks
36. Newman DA (2014) Missing data: five practical guidelines. Organ Res Methods 17(4):372–411
37. Cocker F, Sim MR, Kelsall H, Smith PM (2018) Injury reporting, employer lodgement and compensation payment delays and RTW outcomes in long-term injured workers. J Occup Environ Med 60(7):622–630
38. Tate CU (2005) On the overuse and misuse of mediation analysis: it may be a matter of timing. Basic Appl Soc Psychol 37(4):235–246
39. Kline RB (2015) The mediation myth. Basic Appl Soc Psychol 37(4):202–213
40. Carnide N, Franche RL, Hogg-Johnson S, Cote P, Breslin FC, Severin CN, Bultmann U, Krause N (2016) Course of depressive symptoms following a workplace injury: a 12-month follow-up update. J Occup Rehabil 26(2):204–215
41. Orchard C, Carnide N, Smith P (2019) How Does perceived fairness in the workers' compensation claims process affect mental health following a workplace injury? J Occup Rehabil. https://doi.org/10.1007/s10926-019-09844-3
42. Neilsen K, Yarker J, Munir F, Bultmann U (2018) IGLOO: an integrated framework for sustainable return to work in workers with common mental disorders. Work Stress. https://doi.org/10.1080/02678373.2018.1438536
43. Bastien M-F, Corbiere M (2019) Return-to-work following depression: what work accomodations do employers and human resources directors put in place? J Occup Rehabil 29(2):423–432
44. LaMontagne AD, Martin A, Page KM, Reavley N, Noblet A, Milner A, Keegel T, Smith P (2014) Workplace mental health: developing an integrated approach. BMC Psychiatry 14:131