



Differences Over Time in the Prognostic Effect of Return to Work Self-Efficacy on a Sustained Return to Work

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Abstract

Purpose This study investigated the association between return to work self-efficacy (RTW-SE) and sustained return to work (RTW) at two different time points, over a 12-month period. The primary objective of the study was to examine if the relationship between RTW-SE and a sustained RTW changed over the RTW timeline. **Methods** This study used survey responses from a longitudinal cohort of $n = 410$ workers' compensation claimants with either an upper-body musculoskeletal injury or a psychological injury. A path analysis tested the associations between RTW-SE and a sustained RTW at two time-points. A Wald χ^2 test compared nested models to determine if the association changed over time. **Results** RTW-SE measured at time-point 1 (T1) was associated with a sustained RTW at time-point two (T2) ($\beta = 0.24$, $P < 0.05$) but no association was found between RTW-SE at T2 and a sustained RTW at time-point three (T3) ($\beta = 0.017$, n.s.). Model comparisons revealed significant differences in the associations between RTW-SE and a sustained RTW, with the relationship being stronger in the early phase of RTW compared to the latter phase ($\chi^2 = 5.002$, $p = 0.03$). **Conclusions** The results indicate that RTW-SE at 4–6 months post-injury is important for a sustained RTW 6-months later although RTW-SE at 10–12 months post-injury had a negligible association over the same duration. Further research should investigate whether these findings generalize to other populations and what factors other than RTW-SE are associated with RTW in the later stages of the RTW process.

Keywords Self efficacy · Return to work · Workers' compensation · Occupational injuries

Introduction

Injuries sustained in the course of employment generate substantial costs for many countries. For example, in Australia the cost of wage replacement and health care paid for by workers' compensation systems has been estimated at \$7.8 billion (AUD) annually [1]. In Victoria, Australia, approximately 91% of all employees in the state are covered

by the government scheme—administered by WorkSafe Victoria [2]. This scheme, and indeed most other schemes in Australia, covers injuries arising during the course of employment and therefore compensates acute and chronic injuries of a physical or psychological nature through providing wage-replacement and recovery resources to assist the injured worker back to work. The benefits of a successful return to work (RTW) following a workplace injury are well documented and include health, well-being and financial benefits for the injured worker [3], and financial benefits for the organisation and workers' compensation agencies [4]. While overall injury rates have declined year-on-year for much of the last decade [5], musculoskeletal and psychological injuries remain a focus of prevention strategies; musculoskeletal injuries compose the largest proportion of serious injuries while psychological injuries break the overall work injury trend by increasing as a proportion of all injuries [5] and incur higher than average costs [6]. Therefore, these injury groups will be the focus of the current study.

The biopsychosocial model of disability emerged as an inclusive perspective which acknowledged not only the

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dominant biomedical model but also the psychological and social considerations for returning to work following an injury [7]. One principle of the biopsychosocial approach that warrants further investigation is the changing influence of factors related to returning to work (RTW) throughout the recovery process. Although there are noted examples of disability models conceptualizing a stage-relevant approach to recovery [8–10], two recent reviews [7, 11] suggested that further empirical research is needed to better articulate the biopsychosocial approach by investigating possible temporal effects of different factors during the RTW process.

Expectations and beliefs have been emphasized in contemporary biopsychosocial models of work disability [7, 12] and have been reliably associated with RTW outcomes for injured workers with a physical or psychological injury [13]. Self-efficacy, a related construct which is characterized as person's belief in their ability to perform actions necessary to undertake behaviors towards a goal [14], has shown positive associations with RTW outcomes across different populations and injury types [15]. Because there is heterogeneity in the characteristics of the study design, including the construction of the RTW outcome [16], the sample, and the follow-up period [15, 16], summarizing the effect of self-efficacy on RTW at different points in the RTW process from the literature is difficult. Some studies have measured the impact of RTW-SE on the number of days until RTW [17, 18] and others have measured the impact on future RTW status [19–21]—one measuring the association at two different time-points [20]. One other study investigated how the change in RTW-SE over time impacts time until RTW [22], however the relative effect of RTW-SE at each time-point remains unknown.

The extant empirical literature examining temporal patterns in the RTW process is limited. In a review of prognostic factors for RTW outcomes for workers with musculoskeletal injuries, Laisne et al. [23] found consistent associations between expectations of recovery and RTW outcomes during the acute stage, but the evidence was inconclusive for the chronic stages. However, others have suggested psychosocial variables may become more important at the later stages of the recovery process [24]. Evanoff et al. [25] proposed a conceptual model of disability which recognized the potential for factors related to work-injury outcomes to have different effects over the course of recovery; ultimately suggesting that psychosocial factors are more influential in the transition from acute to chronic musculoskeletal injury than biomechanical demands. However, Evanoff et al. [25] also acknowledges gaps remain in our understanding of the temporal impacts of individual psychosocial factors on RTW and recovery.

The objective of this study was therefore to contribute to the understanding of: (1) the relationship between RTW-SE and a sustained RTW and (2) how this relationship

may change over a period of 12 months. To do this, this research investigated the relationship between RTW-SE and a sustained RTW approximately 6 months later, at two discrete time-points using a sample of injured workers who were off-work. The broader aim is to contribute to the understanding of the association of RTW-SE with RTW outcomes at different temporal stages of the RTW process, which may assist in constructing time-appropriate RTW interventions and help inform the construction of an applied biopsychosocial model of RTW.

Methods

Study Design

The current study used data from a prospective cohort study of $n = 869$ injured workers in the state of Victoria, Australia who had suffered a work-related upper-body musculoskeletal or psychological injury. Participants were recruited from the state's workers' compensation authority (WorkSafe Victoria) and were over-sampled compared to the Victorian compensated injured worker population based on their injury type and age. Data were collected at three time-points which was approximately 4–6 months (T1), 10–12 months (T2) and 16–18 months (T3) post-injury. Further information can be found in the study protocol [26]. Data were collected via Computer Assisted Telephone Interviews to limit missing data and loss to follow-up.

Participants

Participants were workers who suffered either a workplace psychological or upper-body musculoskeletal (UB-MSK) injury and were off-work at either of two measurement time points; T1 or T2. Work-related upper-body musculoskeletal injuries are characterized by soft tissue injuries to trunk or upper limbs while psychological injuries are characterized by having a work-related experience resulting in common mental disorders, including post-traumatic stress disorder, other reactions to stressors, and other mental disorders not elsewhere classified [26]. Those off work at T1 numbered $n = 357$ and those off-work at T2 numbered $n = 183$. All participants were receiving care as usual, which is the provision of wage-replacement and medical costs associated with approved injury-specific treatment. The RTW process in Victoria is characterized by a multiple-stakeholder relationship, principally between WorkSafe Victoria, the employer, the treating practitioners and the injured worker.

Outcome Variable

The outcome of this analysis is a RTW at 6 or 12 months post-T1 interview which has been sustained for at least 28 days. This definition, or similar, has been applied elsewhere [18, 27, 28] and therefore was chosen to endorse a standard definition of RTW, which has been the operationalisation of RTW for many recent Randomized Controlled Trials [27] measuring durable RTW. This outcome was constructed using self-reported data using the following two questions; ‘Are you currently working in a paid job?’ and ‘Approximately how long have you been back at work?’ The worker was considered to have a sustained RTW if they reported they were back at work ‘doing the same type of work (pre-injury duties)’ or ‘doing different work (alternative or modified duties)’ for at least 28 days. Those who reported they were back at work for less than 28 days and those who reported not being at work were considered not to have met the RTW criteria.

Independent Variables

RTW-SE was measured as the mean value of self-efficacy across 9 items constructed for the purposes of this study [29]. Each item was scored on a five-point Likert type scale from strongly disagree (1) to strongly agree (5) which resulted in a mean RTW-SE score between one and five. Participants who had fewer than five completed items were considered to be missing. RTW-SE was included in the models as the previous measurement point to when the outcome was measured i.e. the RTW outcome at T3 was regressed on RTW-SE measured at T2.

Covariates

In addition to the age and sex of the claimant, the following variables were considered as confounders in the models: injury type, categorised into workers with psychological or UB-MSK injuries; time from injury, measured as the logged number of days between the injury and the T1 interview; and previous work status (T2 only), categorised as being at work at T1 or not. Pre-injury job autonomy and RTW coordinator interactions were included as covariates as they have previously been shown to be associated with RTW-SE and conceptually may also relate to actual RTW [30]. Job autonomy relates to the degree of freedom a workers has over the way they approach their work and was [31] measured as the mean level across five items. A RTW coordinator is a nominated person at the workplace responsible for organising the RTW activities for injured workers. RTW coordinator interactions were categorised as no RTW coordinator, RTW coordinator but no contact, RTW coordinator with low-stress contact, and RTW coordinator with high-stress contact. Additional

paths were included between injury type, job autonomy and RTW coordinator contact, and RTW-SE at T1 and T2 as these relationships have previously been established [30].

Analysis

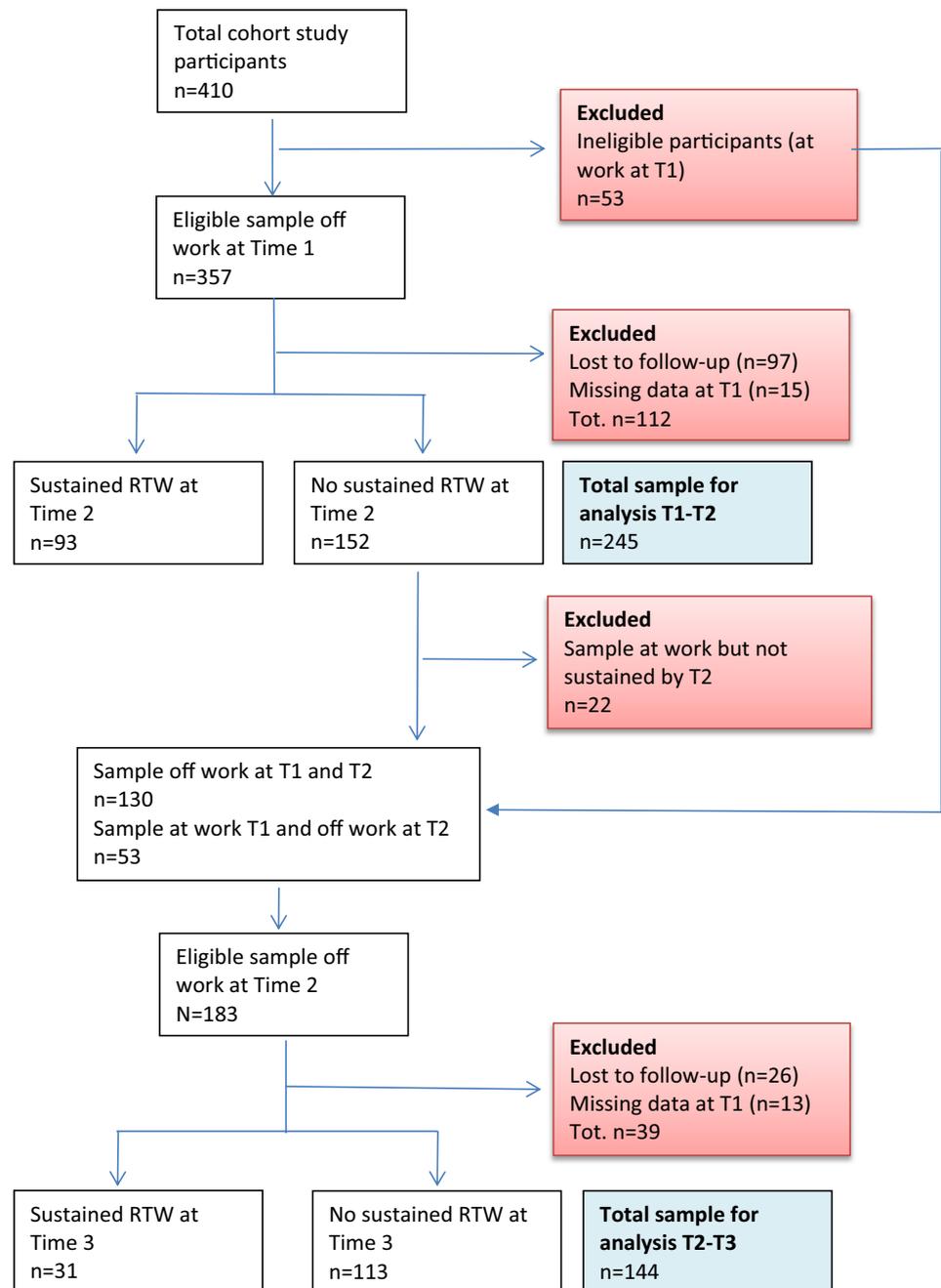
The RTW-SE scale was assessed and found to have suitable internal consistency ($\alpha = 0.89$). Information on the distribution of RTW-SE for each category of the outcome was extracted for each measurement time-point. Covariates were included if they changed the coefficient of the main independent variable (RTW-SE) and the outcome (a sustained RTW) by more than 10%. Additional separate paths were included between job autonomy and RTW coordinator interactions, and RTW-SE to specify previously established relationships [30]. Path analysis using Mplus Software [32] was conducted to test the hypotheses because it allows the association between RTW-SE and a sustained RTW to be compared at two time-points simultaneously. The estimation method used for the path model was variance and mean adjusted weighted least squares estimation (WLSMV) using the theta parametrisation for unbalanced data which uses all available information from covariates [32]. Model fit statistics and unstandardized Probit coefficients were produced and interpreted.

To determine if the effect of RTW-SE has a changing effect on sustained RTW at different stages of the RTW process, the coefficient of RTW-SE at T1 on RTW at T2 was constrained to be equal to the coefficient of RTW-SE at T2 on RTW at T3. If the model fit declines as a result of the constrained coefficients, compared to a model where the paths are not constrained, then this indicates the effect of RTW-SE on a sustained RTW could differ between the measurement time-points. Further χ^2 comparisons were used to determine if the difference in model fit is statistically significantly different at the $p < 0.05$ level.

Results

Figure 1 shows the construction of the sample for each time-point in the analysis. A total of $n = 410$ injured workers were off-work at T1 or T2. Of these workers, $n = 357$ were off work at T1, $n = 53$ were off-work at T2 but not T1 and $n = 140$ were off-work at T2 and T3. Of the $n = 357$ workers who were off-work at T1, $n = 97$ were lost to follow-up at T2 and of the $n = 183$ who were off-work at T2, $n = 26$ were lost to follow-up at T3—these workers were therefore not included in the analysis. A further $n = 15$ and $n = 13$, at T1 and T2 respectively, were removed from the analysis because more than four out of the nine RTW-SE items were missing. This left a sample of $n = 245$ to measure the association at time-point two and a sample of $n = 144$ to measure the

Fig. 1 Distribution of the sample of injured workers over three study time-points



association at time-point three (i.e. those with data at T1 and T2, and T2 and T3 respectively).

Table 1 shows a comparison of mean RTW-SE levels at T1 and T2 for RTW status at T2 and T3, respectively. Workers with a sustained RTW at T2 had significantly higher levels of RTW-SE at T1 compared to those who did not have a sustained RTW. There was no appreciable difference in mean RTW-SE levels among injured workers who had a sustained RTW at T3 compared to those who did not, with RTW-SE at T2 being lower on average than RTW-SE at T1. Table 2 shows descriptive information for the sample

off-work at T1 and T2. Injured workers off-work at T2 were slightly older, and were less likely to have a RTW coordinator or have low-stress contact with the RTW coordinator. There were no pronounced differences across sex, injury type, job autonomy and the number of days between the injury and T1.

Figure 2 shows the results of the path analysis model for the association between RTW-SE and a sustained RTW. Model fit was assessed to be suitable according to accepted criteria [33]; RMSEA = 0.03, CFI = 0.98, TLI = 0.95.

Table 1 Mean values of RTW-SE for injured workers who have a sustained RTW at the subsequent time-point

Time-point 2			Time-point 3		
RTW status	RTW-SE T1		RTW status	RTW-SE T2	
	Mean	SD		Mean	SD
No. Sus. RTW	2.86	0.95	No. Sus. RTW	2.80	0.97
Sus. RTW	3.19	0.89	Sus. RTW	2.78	1.18
	F-value	P value		F-value	P value
	7.28	0.007		0.01	0.940

Table 2 Descriptive information for the sample off-work at time-point one and two

	Time-point 1 n (%)	Time-point 2 n (%)
RTW status ^a		
Not off work ^a	53 (12.9%)	120 (29.3%) ^a
Off work	357 (87.1%)	193 (47.1%)
Age (years)		
Mean (SD)	45.1 (11.9)	46.0 (12.4)
Sex		
Male	158 (44.3%)	85 (44.0%)
Female	199 (55.7%)	108 (56.0%)
Injury type		
Psychological	113 (31.7%)	61 (31.6%)
UB-MSK	244 (68.4%)	132 (68.4%)
Time from injury to T1 (days)		
Mean (SD)	123 (67.6)	123 (63.7)
Job autonomy		
Mean (SD)	3.2 (1.1)	3.2 (1.1)
RTW coordinator interaction ^a		
No RTW coo	130 (36.4%)	78 (40.4%)
RTW coor./no contact	52 (14.6%)	25 (13.0%)
Low-stress contact	126 (35.3%)	60 (31.1%)
High-stress contact	46 (12.9%)	28 (14.5%)

^aTotals may not sum to total sample due to loss to follow-up or missing data

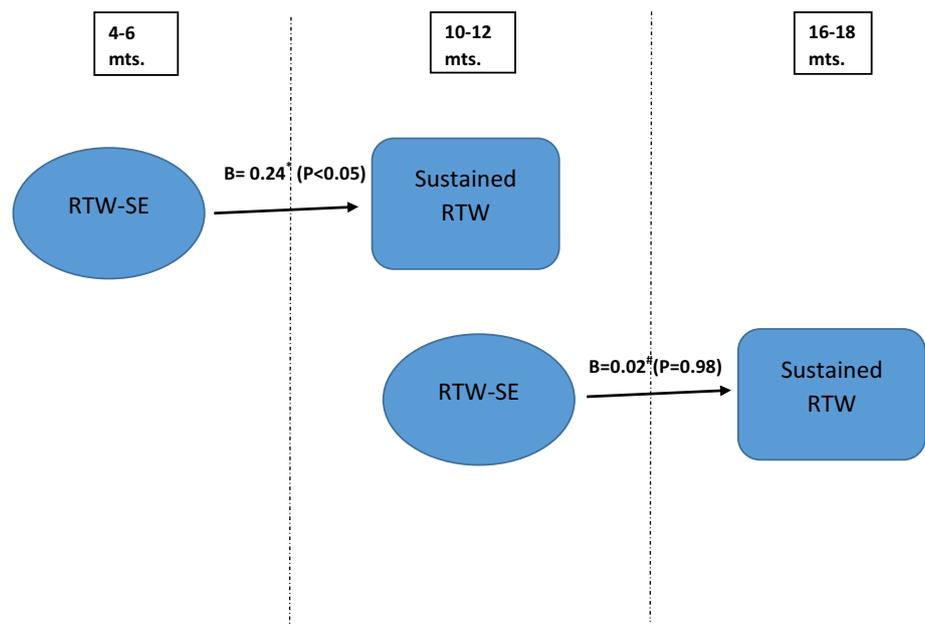
RTW-SE had a positive association with a sustained RTW at T2 ($\beta = 0.244$, $p = 0.017$) but the association between RTW-SE at T2 and a sustained RTW at T3 was close to zero and non-significant ($\beta = 0.017$, n.s.). To determine if the association of RTW-SE with a sustained RTW was different over time, the results from a Wald χ^2 indicated the relationship between RTW-SE and a sustained RTW at T2 is significantly higher than the same relationship between RTW-SE at 6 months and a sustained RTW at T3 (Wald $\chi^2 = 5.002$, $p = 0.03$).

Discussion

This study had two main objectives related to a cohort of injured workers off-work with either a psychological or UB-MSK injury; (1) to determine if RTW-SE is associated with a future sustained RTW of 28 days, and (2) whether the association changed between 6 and 12-months post-T1. RTW-SE at T1 was found to have a positive association with a sustained RTW at T2, however the association between RTW-SE at T2 and a sustained RTW at T3 was close to zero and non-significant. Differences were detected in the association of RTW-SE with a sustained RTW at each time-point through model difference testing, indicating the relative relationship between RTW-SE and a sustained RTW was stronger at an earlier stage in the RTW process.

The findings of this study add to a mixed pattern of evidence for the impact of psychosocial variables, such as RTW-SE, on RTW over time. A recent review of the association between self-efficacy and RTW outcomes found no discernible pattern of differences in the magnitude of effect among studies with follow-up periods ranging from 3 months to two years; although this review did not include a meta-analysis and it compared findings over different RTW definitions. In contrast, a recent empirical study found that increasing RTW-SE predicted future RTW beyond baseline levels of RTW-SE [22]. Our findings differ from the examples above as they show a decreasing association of RTW-SE with a sustained RTW, however, the results are congruent with other literature. Evanoff et al. [25] suggested that biomechanical factors are likely to be more prominent in the early phase of the injury but psychosocial variables would have an increasing influence thereafter. However, the same editorial acknowledged that this could be relative to specific factors as there is evidence that some psychosocial factors are more important in the early stages of injury, and vice versa for biomechanical factors. Similarly, Laisne et al. [23] concluded that some well-studied psychosocial factors, such as recovery and RTW expectations, were found to be predictive of RTW during the acute stages of injury but the evidence was inconclusive in the later stages.

Fig. 2 Path diagram with path coefficients for the association of RTW-SE on a sustained RTW at T2 and T3



* Controlled for sex, injury type and RTW coordinator interactions at T1.

[#] Controlled for sex, injury type, and previous work status at T1.

Differences in the findings may be due to contextual factors. For example, access to available work is a prerequisite to a sustained RTW, regardless of RTW-SE levels. In Victoria, employer obligations to reserve the position of the injured worker lapses after 52 weeks of compensation. Therefore, returning to the same workplace may be less likely after one year post-injury, which may have attenuated the relationship between RTW-SE and a sustained RTW at T3 (approximately 16–18 months post-injury). One other possible explanation for the differences in the findings may result from unrealistic levels of RTW-SE; a concept addressed in the formative work on self-efficacy [14]. Sustaining a RTW after 16–18 months of recovery may require more work fitness than anticipated and, as a result, remaining at work for 28 may be less likely. Shorter definitions of a sustained RTW are potentially more likely to capture workers with unrealistic levels of RTW-SE after a substantial time off-work.

Regardless, the results of this study indicate that RTW-SE may have utility in facilitating a RTW in the early phases of the RTW process. Therefore, the main recommendation from this study is the development of early interventions aimed at improving RTW outcomes for injured workers through increasing RTW-SE; however, this recommendation is made in light of other complimentary evidence. Research shows that early intervention, more broadly, has demonstrated benefits for RTW [34]. Furthermore, the theoretical underpinnings for self-efficacy indicate that developing realistic self-efficacy is likely to result in higher resilience and persistence towards a (behavioural) goal [14]. These

possible benefits, coupled with a lack of obvious drawbacks, support further exploration and implementation of activities aimed at increasing RTW-SE in the early stages of recovery.

One area which requires further exploration is how the determinants of RTW-SE may change over time and, more specifically, what factors are associated with increasing RTW-SE early in the RTW process versus later in the process. For example, if the acute stages of injury are primarily focussed on treatment and rehabilitation, then perhaps experiences or activities related to work functionality play a more dominant role in producing efficacy beliefs in the early stages. Similarly, other factors such as social encouragement may be more influential for efficacy beliefs when the injured worker has returned to better health. Some studies have identified determinants of self-efficacy which are predictive early in the recovery process, such as job autonomy [18] and low-stress contact from a RTW coordinator [30], however further research is needed across the range of potential factors. To add further complexity to the temporal pattern, RTW-SE is also potentially multidimensional [29, 35] and each of the dimensions may have different determinants and relationships with RTW over time.

Strengths and Limitations

A strength of this study is that it used path analysis to simultaneously estimate and compare the longitudinal associations of RTW-SE on a sustained RTW at two time-points. The study also used a definition of RTW which

encompassed sustainability and was included to capture recovery from injury rather than RTW status at a single time-point. However, a sustained RTW definition does exclude workers who, at the time of measurement, were back at work for fewer than 28 days and would meet the criteria for a RTW in this study in the future. By excluding workers who are back at work for less than 28 days at a single point, we may miss workers who go on to sustain their RTW later. The data were also self-report which can introduce common method variance, and because the data were longitudinal, loss-to-follow up is also a consideration. However, although participants who were lost to follow-up were slightly younger and had slightly less job autonomy, there were no differences on the other included variables.

Finally, the first measurement of RTW-SE in this study was conducted approximately 4–6 months post-injury. While the current study controlled for the differences between the workers in the time passing since the injury (shown to have limited impact), it is unknown whether the findings would be similar if the study was commenced at an earlier stage post-injury for all the workers. However, from a practical perspective, the T1 measurement point is likely to be a realistic point after an injury when interventions can be applied in standard workers compensation schemes, given administrative processing periods. Nevertheless, this timing should be considered in the interpretations of the results and the recommendations.

Conclusions

The findings of this study contribute to the understanding of how RTW-SE impacts RTW outcomes over time, which may assist in understanding theoretical perspectives of disability and inform interventions aimed at improving RTW outcomes for injured workers. That is, this paper suggests that addressing the psychosocial determinants of recovery early after a work injury, in addition to the clinical determinants, may be beneficial to an injured worker's return to work process. Further structured validation of biopsychosocial disability models and a consensus on a RTW definition would facilitate future research in the area, as well as improving practitioners' ability to provide evidence-based policy to improve RTW outcomes of injured workers.

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Compliance with Ethical Standards

Conflict of interest Oliver Black, Malcolm Sim, Alexander Collie and Peter Smith declare that they have no conflict of interest.

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