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Exploring extensions to working life: job lock and predictors of decreasing work function in older workers

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Abstract

Purpose. Job lock, one form of restricted job mobility that often prevents older workers from retiring, is linked to existing health and work place problems. This study explored (i) the rate of change in work limitation for job locked and non-job locked older workers and (ii) the factors associated with these changes over a 12-month period following a work injury.

Methods. Prospective observational cohort study of adults aged $\geq$55 years. Data were collected using self-completed questionnaires. Individual growth modelling was used to examine the pre- and post- injury influences on work limitation.

Results. Work limitation was greater in the job locked older workers pre-injury. Both job-locked and non-job locked respondents had initial post-injury decreases in work limitations, suggesting a positive impact of temporary post-injury accommodations. However, both groups had increases in work limitations over time, but the increases were greater in the non-job locked group. In those with job lock, return to work problems were associated with increases in work limitations; in those without job lock, greater increases were associated only with low education.

Conclusions. These results suggest that job accommodations may be important in moderating increasing work limitation in job-locked older workers. Results support prior findings that job-locked older workers have unique characteristics, perhaps requiring more tailored interventions to maintain them in the workforce.

Keywords: *Work limitation, older workers, accommodations, job lock, extensions to working life, work disability*

Introduction

Job lock is one form of restricted job mobility that occurs due to the need to retain employer benefits, especially health insurance [1,2]. In older adults, retirement related job lock occurs when the need for employer benefits prevents the transition to retirement [3]. This is common, with 54% of adults aged 55 years and over, who had recently had a work-related injury, reporting retirement related job lock. Job lock is strongly associated with poorer mental and physical health, and dissatisfaction with the workplace [3]. This suggests that job-locked older workers are a group who need to continue to work because of insufficient post-retirement financial resources or health insurance, despite health and workplace problems that may impair their ability to do so.

Retirement-related job lock will become an increasingly important issue for older workers and employers. Population aging means that even if prevalence is constant, the number of older adults who are job locked will increase. However, national policies directing extensions to pension age and recent economic conditions affecting individual wealth and pension funds will postpone retirement, so a greater proportion of workers will have to work longer because of financial needs [4]. An older workforce implies more influence of adverse health conditions [5] that lead to diminished physical and mental capacity [6] and threaten the ability of older adults to maintain their participation and performance at work [7–9].

An individual's ability to work can be characterised through their functional capacity and level of limitation [10], which is linked to future work

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absence [11]. In addition to health problems, limitation in work function is also linked to individual characteristics (e.g. low education [12]) and work issues (e.g. insufficient resources [13]). In this study, participants were interviewed following a work injury, which normally leads to at least a temporary decrement in physical capacities, and as a life event, may increase the focus on the need to retire [14]. In a previous cross-sectional study, job locked older adults had more limitation in work function than older adults who were not job locked [3]. But this study did not explore changes in work limitations over time, so it was not clear whether these differences persisted, and which factors were most important from a longitudinal perspective. This information is especially important to direct interventions to those at greatest risk of job loss – persons with significant decreases in their ability to work.

In this study, we compare changes in limitation in work function in older workers who were job locked to those who were not job locked, over a 12-month period, following a work injury. It was hypothesised that limitation in work function would be greater at baseline, and would increase more over time in the job locked group, as suggested by prior cross-sectional results [3]. It was also hypothesised that certain pre-injury demographic, health and workplace issues would be key determinants of increasing limitation in work function over time in both groups. This perspective is based on a biopsychosocial model of work function and work disability, where work limitations and inability to work is viewed as a consequence of how health, psychological, workplace and social factors combine [15]. In this study, we explore the role of these factors as an avenue to identifying potential interventions to enhance work function for these two distinct groups of older working adults.

Methods

Study design and participants

The design was a prospective cohort study using data collected by postal questionnaires, in the New Hampshire Older Workers and Work Injury study [16]. This study provided a representative sample of older workers from the general population, many of whom were blue collar workers who had experienced a work-related injury, most of them minor (as evidenced by a low rate of lost time from work). This sample has advantages of being derived from a broad cross-section of blue collar workers, where a work injury has drawn their attention to how their health affects their work performance. Ethical approval for the study was obtained from the Institutional Review Boards at the University of Massachusetts Medical School and the Liberty Mutual Research Institute for Safety.

Details of recruitment have been presented previously [3]. The sampling frame was drawn from the records of all work injuries reported to the New Hampshire Department of Labor (NHDOL) between 15 November 2000 and 31 March 2002. State law requires reporting by employers of all work injuries within 14 days of occurrence. All workers aged 55 years and over who met the eligibility criteria were included ($n = 3004$) and were sent a baseline questionnaire. Those who responded were sent the follow-up questionnaire, 12 months later. At both baseline and 12-month follow-up, non-respondents were mailed a second questionnaire or contacted by telephone within 7–10 days from the initial mailing.

Data collection

The baseline and follow-up questionnaires were developed and tested in a process which included literature review, focus groups and cognitive interviews [16,17]. The two questionnaires provided data regarding three time points (pre-injury, 4–6 weeks post-injury and 11–12 months post-injury) selected to describe and allow the short- and long-term impact of injury to be compared with pre-injury status. The first questionnaire, mailed within 3 weeks post-injury, captured information on demographics, pre-injury (health, work function and workplace factors) and post-injury characteristics (injury characteristics, post-injury health and work experiences, medical care received for the work injury, presence and duration of work disability). The second questionnaire collected information on health and workplace circumstances and various outcomes, about 12 months post-injury.

In the baseline questionnaire, one item was included to address job lock: 'Right now, would you like to leave work altogether, but plan to keep working because you need the money or health insurance?'. Those who responded 'yes' formed the job lock group in the analyses; those who responded 'no' formed the non-job lock group.

Limitation in work function was measured at each of the three time points using eight single items. These items measured the percentage of time that individuals had difficulty doing work tasks (do your work without stopping to take breaks or rests; lift, carry or move objects at work, walk or move around different locations; bend, twist or reach; use hand held tools, pens or computer equipment; concentrate on work; see and hear well enough to do all work tasks; make the same movements repeatedly).

Responses were on a four-point ordinal scale (75% or more/about half/about a quarter/none of the time). Responders could also indicate if the work function was not part of their job – such responses were treated as missing. Scores for limitation in work function were calculated for those with responses to five or more items, summed and transformed to give a score from 0 to 100, roughly corresponding to the mean percentage limitation across the range of evaluated items [18].

The independent variables were comprised of demographic and health variables, injury characteristics, injury management and workplace environment factors. The demographic factors included were age (5 year age bands) and gender, and single items were used to measure educational attainment, household income and type of occupation. Pre-injury health was captured using single items that captured the presence of health conditions and were used to derive two variables; number of physical comorbidities – a simple count of physical health conditions (overweight, high blood pressure/hypertension and other physical health condition) and the presence of depression. The Medical Outcomes Short-Form 12 [19] was used to provide measures of mental health (mental component summary score) and general health at 6 weeks and 12 months post-injury. In addition, these scores were used to derive a score for the amount of relative decrease in mental health and general health at 12 months.

The injured body part was taken from the record of the injury held by the New Hampshire Department of Labor (NHDOL). Injury severity was captured by self-report using a single item (mild/moderate/severe). Post-injury pain at work was measured using a single item (In the last 7 days, is your pain: not worse after work; somewhat worse after work; much worse after work; I have no pain). Data were collected by single items on management of the injury: one to measure satisfaction with medical care and the other to capture satisfaction with workers compensation (completely; mostly; somewhat; not at all satisfied). Self-report of re-injury was measured at 12 months.

Workplace predictors were captured using single items [16,17]. Pre-injury job satisfaction was derived from four items (satisfaction with (i) relationship with coworkers, (ii) relationship with supervisor, (iii) opportunities for promotion or pay rises, (iv) overall job satisfaction level (completely/mostly/somewhat/not at all)) to give an overall score (0–16). At 12 months, return to work problems (derived from four items; job wasn't changed enough, coworkers resented having to do extra work, were not in light duty enough, you didn't like the changes made to your job) and job support (from employer, immediate supervisor and coworkers) were measured.

Statistical analysis

Mean scores for limitation in work function were calculated for the job lock and non-job lock groups at each time point. General linear models were used to compare the means of limitation in work function from pre-injury to 12 months post-injury.

Individual growth modelling was used to derive a prediction model for the changes in limitation in work function over the 12-month period, for the job lock and non-job lock groups separately. This multilevel linear modelling technique is based on a generalisation of the standard linear model that allows for both fixed and random effects across the time period, in this case 12 months (data captured at three time points) [20]. In this technique, the intercepts and slopes for time are considered as random variables. We fitted unconditional growth models to explore whether variation in slope was related to the independent variables. Variation in the slope refers to differences in the rate of limitation change over the 12-month period (i.e. a variable associated with a more positive slope, is linked to an increasing rate of limitation). The growth model can be defined as $Y_{ij} = \beta_{00} + \beta_{10}(\text{TIME})_{ij} + \beta_{01}(\text{COVAR}_j - \text{COVAR}) + \beta_{11}(\text{COVAR}_j - \text{COVAR})(\text{TIME})_{ij} + u_{0j} + u_{1j}(\text{TIME})_{ij} + r_{ij}$. In which β_{00} represents the intercept for the reference groups, β_{10} the slope for the reference groups, β_{01} the departure from the reference group intercept and β_{11} the departure from the reference group slope. Each u terms represent residuals for intercept and slope respectively.

First, the relationship between each demographic, health and workplace variable, and work limitation over the 12-month period was examined in a bivariate analysis, stratified by job lock status. Later, multivariate analyses were performed using backwards stepwise regression, with the variables significant in bivariate analyses ($p < 0.05$). If they were not confounders, variables with the highest p-value were removed at each iteration until all variables in the final model were significant ($p < 0.05$). No variables were forced into the final model. Analysis was performed using SAS 9.2 [21].

Results

Response

At baseline, responses were received from 1449 responders (53% of those who were sent a mailed questionnaire), of whom 1406 completed the job lock item and were sent a second questionnaire at 12 months (Figure 1). Of the baseline responders, 757 (53.8%) indicated that they were job locked; there

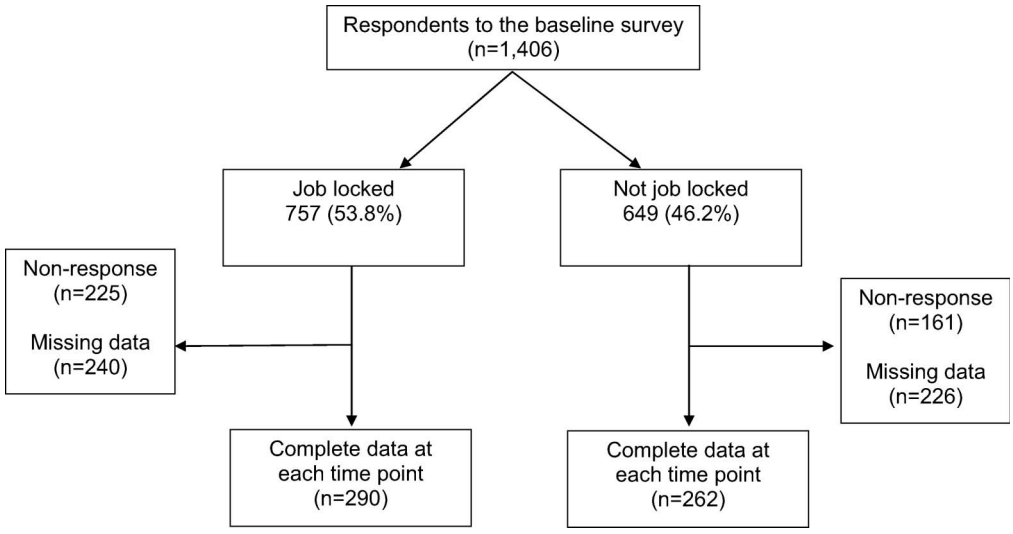

Figure 1. Flow diagram of participants.

was no difference between the job and non-job locked groups for the severity of injury or the anatomical areas injured ($p = 0.58$). Of this group, 227 did not respond to the second questionnaire and a further 240 had missing data that prevented them from being included in the analysis, leaving 290 who were included in the job lock group for the analysis (Table I). Of the 649 baseline responders who were not job locked, 161 did not respond to the follow-up questionnaire and a further 226 had missing data, leaving 262 in the non-job lock group for analysis.

Compared to those who did not respond or had missing data respectively, respondents in the job lock and non-job lock groups who were included in the analysis were similar in age (for job lock $p = 0.11$; for non-job lock $p = 0.15$)) and gender ($p = 0.43$; $p = 0.27$) but were more likely to be a college graduate or had some college education ($p < 0.01$; $p = 0.02$), have gone back to the same job after injury ($p < 0.01$; $p < 0.01$), had lower levels of limitation in work function pre-injury ($p < 0.01$; $p < 0.01$) and were less likely to be prevented from doing a regular job ($p < 0.01$; $p < 0.01$) or working regular hours because of the injury ($p < 0.01$; $p < 0.01$) (Table I).

Limitation in work function over 12 months

A floor effect was observed for each measurement of limitation in work function, with around 45% of those with job lock and 55% of the non-job lock group had a score of 0 (no limitation) at each time point. The residuals of the mean score of work limitation were normally distributed. Limitation in work function was significantly greater in the job lock group compared to the non-job lock group, pre-injury (23.9 compared with (cf.) 18.3; $p < 0.05$) and 6 weeks post-injury (22.2 cf. 16.2; $p < 0.05$). Although still worse at 12 months, the difference between the two groups was not significant (27.7 cf. 24.9; $p = 0.35$). In the job lock group, mean limitation in work function increased from pre-injury (23.9) to 12 months post-injury (27.7) (Figure 2), although the difference between these means was not significant ($p = 0.17$). In contrast, mean limitation in work function for the non-job lock group did increase significantly over the 12-month period ($p < 0.05$). Notably, average limitation in work function was slightly lower at 6 weeks post-injury for both groups, compared to pre-injury (e.g. for job lock: 23.9 cf. 22.2 ($p = 0.19$).

Predictors of increasing levels of work limitation over the 12-month period

In the job locked group, in the bivariate analysis, greater increase in work limitation was significantly associated only with return to work problems; the level of work limitation for those with one return to work problem would increase by 1.4% per year more than for those with no return to work problems. Adjusting for factors significantly associated with the amount of limitation in the multivariate analysis, the influence of return to work problems on the increasing rate of limitation remained significant ($p < 0.05$), but small in effect (Table I).

In the non-job locked group, in both the bivariate and multivariate analyses, greater increases in work limitation were significantly associated only with low educational attainment ($p < 0.05$).

Table I. Baseline characteristics of those included in the analysis, lost to follow-up and those with missing data; stratified by job lock and non-job lock.

	Job locked			Non-job locked		
	Responders	Lost to follow-up	Missing data	Responders	Lost to follow-up	Missing data
	($n=290$)	($n=225$)	($n=240$)	($n=262$)	($n=161$)	($n=226$)
	No. (%)	No. (%)	No. (%)	No. (%)	No. (%)	No. (%)
Age (years)						
55–59	182 (62.8)	131 (57.7)	120 (50.0)	155 (59.2)	81 (50.3)	115 (50.9)
60–64	74 (25.5)	63 (27.8)	79 (32.9)	63 (24.1)	38 (23.6)	59 (26.1)
65–69	25 (8.6)	19 (8.4)	21 (8.8)	24 (9.2)	23 (14.3)	35 (15.5)
70–74	5 (1.7)	9 (4.0)	11 (4.6)	14 (5.4)	10 (6.2)	13 (5.8)
75+	4 (1.4)	5 (2.2)	9 (3.8)	6 (2.3)	9 (5.6)	4 (1.8)
Gender						
Male	146 (50.3)	127 (56.0)	124 (50.3)	153 (58.4)	98 (60.9)	120 (53.1)
Female	144 (49.7)	100 (44.1)	116 (48.3)	109 (41.6)	63 (39.1)	106 (46.9)
Educational attainment						
College grad	56 (19.4)	22 (9.7)	31 (13.0)	57 (21.9)	15 (9.4)	45 (20.0)
Some college	79 (27.4)	43 (19.0)	52 (21.8)	73 (28.1)	42 (26.3)	60 (26.7)
High school grad	117 (40.6)	112 (49.6)	115 (48.1)	100 (38.5)	70 (43.8)	88 (39.1)
Less than HS grad	36 (12.5)	9 (21.7)	41 (17.2)	30 (11.5)	33 (20.6)	32 (14.2)
Income						
$75K+	24 (8.8)	12 (5.9)	19 (8.9)	43 (18.1)	16 (12.1)	33 (16.0)
$51 to $75K	62 (22.7)	32 (15.7)	31 (14.5)	59 (24.9)	23 (17.4)	50 (24.2)
$31 to $50K	87 (31.9)	73 (35.8)	65 (30.4)	78 (32.9)	32 (24.2)	54 (26.1)
$21 to $30K	58 (21.3)	40 (19.6)	53 (24.8)	41 (17.3)	30 (22.7)	35 (16.9)
$11 to $20K	35 (12.8)	43 (21.1)	35 (16.4)	13 (5.5)	23 (17.4)	29 (14.1)
>=$10K	7 (2.6)	4 (2.0)	11 (5.1)	3 (1.3)	8 (6.1)	6 (2.9)
Gone back to same job						
Yes	287 (99.0)	203 (89.4)	196 (81.7)	261 (99.6)	137 (85.1)	176 (77.9)
No	3 (1.0)	24 (10.5)	44 (18.3)	1 (0.4)	24 (14.9)	50 (22.1)
Injury prevents going back to a regular job						
Yes	26 (9.0)	31 (13.7)	43 (17.9)	17 (6.5)	17 (10.6)	35 (15.5)
No	264 (87.9)	196 (86.3)	197 (82.1)	245 (93.5)	144 (89.4)	191 (84.4)
Injury prevents going back to regular hours						
Yes	9 (3.1)	21 (9.3)	29 (12.1)	9 (3.4)	9 (5.6)	27 (12.0)
No	281 (96.8)	206 (90.8)	211 (87.9)	253 (96.4)	152 (94.4)	199 (88.1)
Work function						
Mean*	17.9	22.1	24.2	13.7	15.8	15.9

Note: *no standard deviation given because data are skewed.

Discussion

This objective of this exploratory study was to describe changes in work limitation over time in job locked and non-job locked older adults. Work limitation increased for both groups over time, perhaps reflecting the increased limitation associated with aging [22,23]. Contrary to our hypothesis, work limitation increased more in the non-job lock group. Possibly, the lower overall rate of change in the job locked older workers was due to a higher level of pre-injury limitations, resulting in more of this group (37% vs. 27% for the non-job locked group) already receiving job accommodations (reduced hours over time, or significant changes to their job demands) before the baseline survey. The presence of these accommodations would have moderated the impact of an absolute decrease in work ability over time. Similarly, because the measure of work limitation is relative to current job demands, short term temporary accommodations that were common immediately post-injury probably explains the transient reduction in limitations seen at 6 weeks post-injury. Another possible reason for a greater increase in work limitations in the non-job lock group may be drop-out of more job locked persons with the highest levels of work limitations; the mean work limitation score in those with job lock who dropped out was 23.1 compared with 15.8 in those who were not job locked and dropped out.

Return to work problems were associated with greater increases in work limitation over time in the job locked, but not in the non-job locked group. Most of the items that contribute to this scale reflect inadequate workplace accommodations to a worker's health problem. Work modifications are one of the

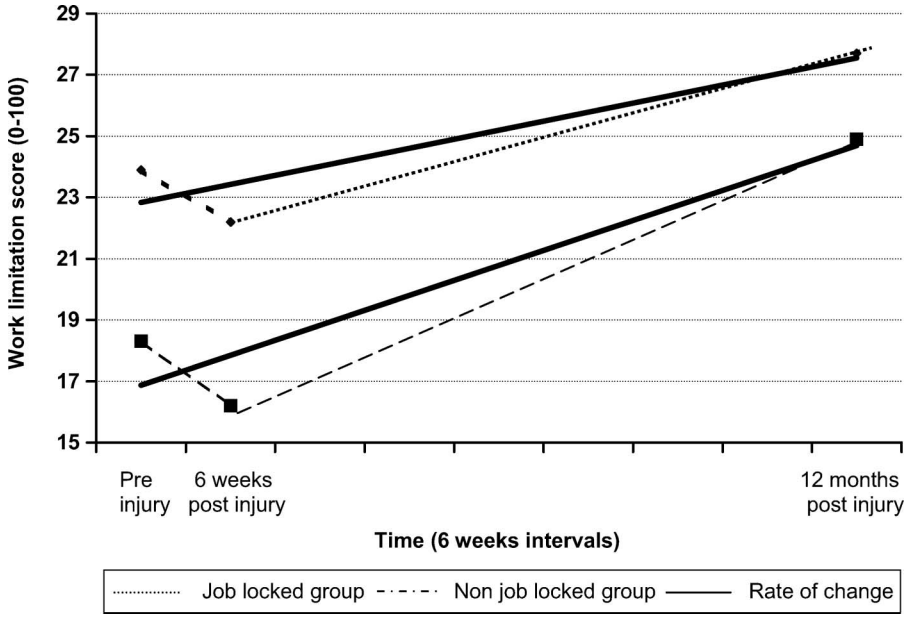

Figure 2. Work limitation over 12 months for the job-locked and non-job locked groups.

most effective strategies to enable return to work, and to prevent work loss in those with acute and chronic health problems [24]. When appropriate accommodations are in place, workplace disability and related costs decrease [24] and the likelihood of subsequently leaving work following a health related issue falls [25]. For those with job lock, the lack of available accommodations has long term implications, with increasing work limitation. These results compliment the findings from previous research [24] on accommodations and return to work, which have demonstrated that accommodations can maintain productivity and effective work function of those who stay in work. Job accommodations appear to be especially important for persons with job lock.

Low educational attainment was the only significant factor associated with greater increases in work limitations in the non-job locked group. This may be a surrogate for more blue-collar jobs that have less latitude for self-pacing or work modification. This effect could have also been present in the job-locked group, but may have been overshadowed by the impact of return to work problems. Or, they may have been less susceptible to return to work problems, had greater job satisfaction, and perhaps more latitude to modify their work as needed.

The finding of significant differences between the job-locked and non-job locked respondents was consistent with the prior cross-sectional study [3]. Baseline levels of work limitations were much higher in the job-locked group. This might represent increased vulnerability of job-locked workers, and further suggests that these two groups of workers are quite different. The job locked group had higher levels of health problems and work limitation.

The factors associated with being job locked were linked to greater levels of and increasing rates of work limitation [3]. Although the associated factors differed, the levels of limitation became similar for the two groups over the 12-month period of observation. Unfortunately in this study, we did not include the job lock item at 12 months, and we are unable to determine if those who were not job locked at baseline became job locked by the later time point, accounting for this convergence.

Some caution is required when interpreting the findings of our study. We chose to investigate limitation in work function as it gives a sense of an individual's ability to be productive on the job, meeting essential job requirements. As stated above, we measured current work function and by assuming that individuals continue to do the same work tasks at each time point, this approach may underestimate an increase in limitation for both groups. Appropriately measuring work function is a challenge, complicated by the impact of accommodations to routine tasks, in response to health problems [26]. A ceiling effect was observed at each time point for work limitation for both groups; however, this is to be expected in studies of working populations [27]. The report of limitation may also be affected by recall bias. In particular, pre-injury status was collected retrospectively after the injury [28]. Recall may also be influenced by a claim for workers compensation. A number of independent factors were measured using single items which capture information broadly but may not capture the richness or detail of some characteristics.

Attrition and missing data, may also have led to an underestimation of limitation and loss of information

Table II. Associations between limitations in work function and demographic, pre-injury health and workplace factors, post-injury health and workplace factors in job locked and non-job locked older adults; bivariate associations and final multivariate models of factors independently associated with limitation in work function for older adults who are job locked and non-job locked.

	Job lock		Non job-lock	
	Bivariate	Multivariate	Bivariate	Multivariate
Variables	Slope estimate (±SE)	Slope estimate (±SE)	Slope estimate (±SE)	Slope estimate (±SE)
Demographic factors				
Age				
55–59	0.1 (1.5)		0.3 (0.9)	
60–64	−0.0 (1.6)		1.3 (1.0)	
65–69	0.6 (1.7)		1.0 (1.2)	
70+	1.1 (1.5)		0.3 (0.9)	
Gender				
Male	0.1 (0.4)		−0.4 (0.4)	
Female	0.3 (0.3)		0.8 (0.3)	
Education				
College grad	0.1 (0.7)		**−2.2 (0.7)**	**−0.8 (0.3)***
Some college	0.0 (0.7)		**−1.2 (0.7)**	**−0.5 (0.3)***
High school grad	0.7 (0.7)		**−1.8 (0.6)**	**−0.7 (0.3)***
Less than HS grad	0.1 (0.6)		**2.2 (0.6)**	**0.3 (0.7)**
Household income				
$75K+	0.0 (0.9)		−1.1 (0.9)	
$51 to $75K	0.1 (0.7)		−0.9 (0.9)	
$31 to $50K	0.9 (0.7)		−0.9 (0.8)	
$21 to $30K	−0.1 (0.7)		−0.8 (0.9)	
=$20K	0.1 (0.5)		1.4 (0.8)	
Type of occupation				
Service	2.4 (1.6)		0.9 (1.6)	
Professional and skilled	2.4 (1.6)		0.7 (1.6)	
Farm/forest/fish	−2.0 (1.5)		−0.1 (1.6)	
Health factors – pre-injury				
Depression				
Yes	0.4 (0.7)		1.0 (1.0)	
No	0.0 (0.6)		−0.3 (1.0)	
No. of comorbidities				
0	−0.2 (0.5)		0.8 (0.3)	
1 or more	0.6 (0.6)		0.6 (0.3)	
Heath factors at 6 weeks				
Self-reported health at 6 weeks				
Excellent	0.2 (0.6)		0.5 (0.5)	
Very good	0.2 (0.7)		0.8 (0.6)	
Good/Fair/Poor	0.1 (0.7)		0.5 (0.7)	
Mental health status (MCS12) 6 weeks post-injury				
Decrease of 1 point	−1.3 (0.0)		0.0 (0.0)	
Health factors at 12 weeks				
Change in health status from 6/52 to 12/12 post injury				
Better/same	−0.0 (0.5)		−0.7 (0.5)	
Worse	0.4 (0.4)		1.2 (0.4)	
Change in mental health status from 6/52 to 12/12 post injury				
Better/same	0.4 (0.4)		0.3 (0.4)	
Worse	0.2 (0.3)		0.5 (0.3)	
Mental health status (MCS12) 12 weeks post-injury				
Decrease on 1 point	−0.0 (0.0)		**−0.3 (0.0)**	0.0 (0.0)
Self-reported health at 12 months				
Excellent	0.3 (0.6)		0.3 (0.5)	
Very good	−0.0 (0.7)		0.8 (0.6)	
Good	0.2 (0.7)		0.4 (0.7)	
Fair/poor	1.3 (1.2)		2.8 (1.7)	
Injury factors				
Injury severity				
Mild	0.9 (0.9)		0.4 (1.0)	
Moderate	0.0 (0.6)		−0.7 (0.7)	
Severe	0.1 (0.6)		−0.9 (0.7)	

(*continued*)

Table II. (*Continued*).

	Job lock		Non job-lock	
	Bivariate	Multivariate	Bivariate	Multivariate
Variables	Slope estimate (±SE)	Slope estimate (±SE)	Slope estimate (±SE)	Slope estimate (±SE)
Pain at work				
No	0.0 (0.5)		0.0 (0.5)	
Yes	0.4 (0.5)		0.7 (0.5)	
Re-injury				
Yes	0.9 (0.5)		−0.5 (0.5)	
No	1.1 (0.4)		1.1 (0.5)	
Satisfaction with response to injury				
Satisfaction with med care				
Completely/mostly	−0.7 (0.6)		−0.9 (0.6)	
Somewhat /not	1.0 (0.5)		1.5 (0.6)	
Satisfaction with workers comp				
Completely/mostly	0.4 (0.2)		0.9 (0.4)	
Somewhat /not	0.0 (0.4)		0.4 (0.3)	
Workplace – pre-injury				
Job satisfaction				
Highest	0.7 (0.5)	0.3 (0.2)	0.2 (0.5)	
Mid third	0.9 (0.5)	0.3 (0.2)	−0.1 (0.5)	
Lowest	−0.1 (0.3)	−0.0 (0.2)	0.6 (0.4)	
Workplace factors at 12 months				
RTW problems				
0	0.1 (0.6)	−0.1 (0.2)	−1.2 (0.8)	
1	**−1.4 (0.7)***	**−0.5 (0.3)***	−1.0 (0.9)	
2	0.5 (0.8)	0.2 (0.3)	0.2 (1.1)	
3	0.7 (0.8)	0.0 (0.2)	1.7 (0.8)	
Job support				
Decrease of 1 point	0.0 (0.0)		0.9 (0.0)	

*$p < 0.05$.

on some factors related to limitation changes in both groups. Those who did not respond at 12 months and were not included because of missing data were worse off pre-injury, with more limitation in work function and were more likely to report the adverse factors that were linked to increasing limitation in both groups. This may explain why some factors linked to being job locked in the prior cross-sectional study (e.g. income) were not associated with work limitation in this analysis. The latent growth modelling technique evaluates the association between independent factors and the trend between the amounts of limitation at each time point (Figure 2) which may underestimate the amount and the rate of change of limitation over the 12-month period.

This was an exploratory study and there is a need for further research to further support the findings. Notably, considering the increasing number of older adults who will remain in the workplace in future years, work limitation increased for both the job locked and non-job locked groups. The implications for this require further exploration. The second key issue is to further explore mechanisms to reduce limitation. Proactive identification of those who are job locked may be a useful first stage in beginning to improve the work function of older adults who have health and workplace problems and are at risk of increasing limitation. Previous work identified that those who are job locked are more likely to have pre-existing health and workplace problems, and these are linked to increasing limitation in work function with time. This study suggests that workplace accommodation may be particularly important to the job locked group for maintaining work function. However a more supportive work culture and environment, such as being allowed to go on lighter duties, to reduce the impact of adverse health conditions and abilities, and adapt work practice tasks appropriately, may be a key strategy for maintaining work participation for all older adults. The ability of employers to support employees may depend on the industry, their economy perspective and the benefit of not replacing but accommodating an injured old worker. The targeting of health conditions, particularly mental health conditions, may also prevent increasing limitation in work function. Since health has a major role in those with job lock, policies encouraging an integrated strategy to maintain health both at work and at home may be required to maintain work participation in older adults.

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Declaration of interest

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