

## ORIGINAL ARTICLE

# Delayed entry into employment after spinal cord injury: factors related to time to first job

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**Study design:** Data were cross-sectional and were collected by survey methodology.

**Objectives:** To investigate factors predictive of length of time between spinal cord injury (SCI) onset and start of first post-injury employment and full-time employment.

**Setting:** A large specialty hospital in the Southeastern United States, with additional participant samples from two hospitals in the Midwestern United States.

**Methods:** Participants were identified from patient records at the participating hospitals. They met the following three exclusion/inclusion criteria: traumatic SCI, at least 18 years of age at time of survey, and a minimum of 1-year after SCI. Outcome measures were years from injury onset to beginning first post-injury job and years to first full-time post-injury job. Two separate models were developed for each outcome using a regression analysis. All those 10 years and more post-injury were censored (that is eliminated) in the analysis.

**Results:** Having a higher level of education, less severe injury, being Caucasian, and returning to the pre-injury employer were associated with a shorter interval to initiation of employment with 10-year censoring. In addition to these variables, gender was associated with time to return to first full-time job.

**Conclusion:** The findings underscore the importance of using pre-injury education and opportunities to return to the pre-injury employer to minimize the length of time until initiation of employment after SCI. *Spinal Cord* (2010) 48, 487–491; doi:10.1038/sc.2009.157; published online 24 November 2009

**Keywords:** spinal cord injury; employment; vocational rehabilitation; participation; psychosocial

## Introduction

Return to employment is a prominent goal of rehabilitation after spinal cord injury (SCI). Employment is associated with both extrinsic economic rewards<sup>1,2</sup> and intrinsic rewards, such as greater life satisfaction, higher level of activities, and better overall health.<sup>3–5</sup>

Studies have identified highly variable employment rates after SCI, because of differences in samples sizes, study settings, and participant characteristics. Current employment has consistently been associated with race-ethnicity, age, injury severity, and years of education.<sup>6,7</sup> There are many other important vocational outcomes after SCI that have received relatively little attention, such as time between onset and employment and factors predictive of this interval.

Berkowitz<sup>8</sup> examined time until employment for individuals with SCI among a sample of 500 participants, reporting that it took an average of 3.8 years to return to gainful employment. A shorter time until employment was predicted by higher levels of education, fewer needs for assistance, having used a computer in pre-injury work, and driving a modified vehicle.

Krause<sup>9</sup> investigated the factors related to the length of time between SCI onset and return to work among 259 participants, all of whom had worked at some point since SCI onset. All participants were a minimum of 15 years after injury. An average of 4.8 years had passed since SCI onset to their first post-injury job and 6.3 years until their first full-time post-injury job. The fast track to employment was defined by either returning to the pre-injury job or having worked at a professional job pre-injury.

## Purpose

Our purpose was to identify factors associated with times between onset and (1) first post-injury job and (2) first full-

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time post-injury job, using a larger participant sample and more diverse predictor variables than in earlier studies.

## Materials and methods

### Participants

Participants were selected from rehabilitation hospitals in the Southeastern and Midwestern United States. There were three inclusion criteria, including traumatic SCI, a minimum of 1-year after SCI, and a minimum age of 18 years at the time of study. There were 1543 respondents from 2010 cases (78%). For this analysis, we excluded participants <18 or >64 years of age at injury onset, leaving a total of 1134.

### Procedures

Participants were sent preliminary letters describing the study. An initial packet of materials was mailed 4 to 6 weeks later, followed by a second set of materials and a follow-up phone call. A third mailing was used for participants who were reached by phone and requested additional materials. Participants were offered \$25 compensation for their participation.

### Statement of ethics

We certify that all applicable institutional and governmental regulations concerning the ethical use of human volunteers were followed during the course of this research.

### Measures

The Life Situation Questionnaire<sup>10,11</sup> was used to assess outcome variables including years to first post-injury employment and first post-injury full-time employment. Employment history included ever work before injury, occupation, and return to the same employer. Pre-injury occupations were collapsed into management/professional, non-management professional, and unemployed before injury. Predictor variables included age at injury, gender, race, and injury severity. Race was dichotomized into Caucasian (reference) and non-Caucasian. Injury severity was classified as ambulatory (reference), C1–C4/non-ambulatory, C5–C8/non-ambulatory, and non-cervical/non-ambulatory. Educational levels were less than a high school certificate (reference), high school—associate's degree, and bachelor's—higher degree. No information was available on workers compensation.

### Analyses

We used a Weibull survival model<sup>12</sup> to estimate the differences in mean time to first job exclusively attributable to each of the covariates.<sup>13</sup> Unlike the typical survival model where the outcome ultimately occurs with all individuals (for example mortality), not everyone works after SCI. Therefore, in addition to those who will eventually become employed after SCI, the censored cases include individuals who will never become employed. The former conform to the assumptions underlying survival models, the latter do not. As we cannot distinguish between the two types of censored observations, we must assume that those with shorter durations post-injury are more likely to eventually find work. As a compromise strategy, we excluded those

censored observations when unemployment exceeded a specified length.

The magnitudes of the differences in years to work and years to full-time work attributable to each predictor are described as 'attributable differences.' Other studies have identified attributable differences using quantitative outcomes such as earnings.<sup>1,2</sup> We assessed goodness-of-fit with a likelihood ratio test of the null model in which all of the regression coefficients were constrained to be zero, against the unrestricted model.

## Results

### Participant characteristics

Mean age at injury was 30.8 years (s.d. = 11.3) and mean years since injury was 14.8 (s.d. = 10.2). In terms of injury severity, 24.4% were ambulatory. The rest were non-ambulatory and were broken down according to injury level as follows C1–C4 (10.1%), C5–C8 (29.3%), and non-cervical (36.2%). Just <22% had not obtained a high school certificate, 64.6% reported completing at least high school or some education up to an associate's degree, and 13.8% had at least a bachelor's degree (Table 1). Almost all persons (90.7%) had worked before their injury.

### Summary of employment characteristics

Nearly 52% of the participants had worked at some time since SCI onset. The average time until first job for the full sample was 3.9 years (s.d. = 3.6). Seventy-seven percent of the participants who eventually returned to work had done so by 5 years post-injury, and 93% had done so by 10 years post-injury (Figure 1).

Just fewer than 38% of the participants had worked full time. The average time until first full-time job for the full sample was 4.3 years (s.d. = 3.8). Of these, 71% were working full time by 5 years post-injury and 91% by 10 years post-injury (no separate graph for full time since the distribution is similar to that of Figure 1).

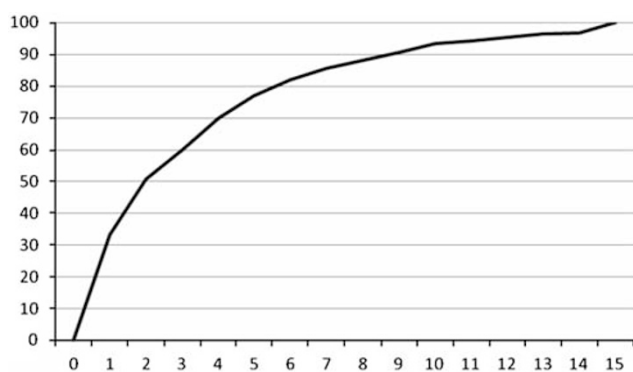
### Years until first job

When censoring at 10 years post-injury, the projected average number of years until first job was 6.1 years and the actual average among those who had returned within the first 10 years was 4.1 years.

Several factors were significantly associated with time until first job (Table 2). Pre-injury education was associated with initiation of employment. In terms of attributable differences, compared with those who had not completed high school, persons with at least a high school certificate or associate's degree averaged 1.5 years less to first job and those with a bachelor's degree (or higher) averaged 3.0 less years to first job. Compared with those who were ambulatory, all other injury severity groups took longer to return to their first job, ranging from a low of 1.7 years for those with non-cervical injuries to a high of 3.8 years for those with C5–C8 injuries. Return to pre-injury employer was associated with 5.0 years shorter interval to time to work compared with those who returned to a different company or who did not work pre-injury. Having worked in management pre-injury

**Table 1** Characteristics of participants

	N	%
<b>Gender</b>		
Male	850	75.0
Female	284	25.0
<b>Race</b>		
Caucasian	898	79.2
Non-Caucasian	236	20.8
<b>Injury severity</b>		
Ambulatory	277	24.4
C1–C4, non-ambulatory	115	10.1
C5–C8, non-ambulatory	332	29.3
Non-cervical, non-ambulatory	410	36.2
<b>Education</b>		
Bachelor's—graduate	156	13.8
High school—associates	733	64.6
<High school	245	21.6
<b>Pre-injury employment</b>		
Yes	1029	90.7
No	105	9.3
<b>Return to work</b>		
Return to same company	193	17.0
Return to work, different company	837	73.8
<b>Employment type</b>		
Management	213	18.8
Other	822	72.5
	Mean	s.d.
Age at injury	30.8	11.3
Years since injury	14.8	10.2
Years to employment	3.9	3.6
Years to full-time employment	4.3	3.8

**Figure 1** Cumulative percentage of employed participants as a function of years post-injury among those employed post-SCI.

just missed significance ( $P=0.06$ ). Non-Caucasian participants took an average of 1.3 years longer to begin working. The goodness of fit was statistically significant,  $\chi^2$  (d.f. = 13) = 456.5,  $P<0.001$ .

#### Years until first full-time job

When censoring at 10 years post-injury, the projected average number of years till first job was 7.5 years and the

actual average among those who had returned within the first 10 years was 4.4 years.

All variables that were significantly related to time to first job of any type (education, injury severity, return to the same company) were also significantly related to time until first full-time job (Table 3), except for those with only a high school certificate or associate's degree (goodness of fit:  $\chi^2$  (d.f. = 13) = 275.0,  $P<0.001$ ). In addition, race and gender were also significant, as non-Caucasians took an average of 3.1 years longer than Caucasians to first full-time post-injury job, and men took an average of 2.6 years less than women. Those with non-cervical injuries were not significantly different than those who had cervical injuries (goodness of fit:  $\chi^2$  (d.f. = 13) = 335.1,  $P<0.001$ ).

## Discussion

Our results are relatively similar to those of the two earlier studies,<sup>8,9</sup> but also have some important differences. Whereas one suggested two general paths or tracks to employment, including a fast track for those who were highly educated, worked as a professional pre-injury, or returned to their pre-injury position,<sup>9</sup> we did not find that working in management pre-injury was related to time to first job (having worked in management was close to significant regarding first full-time job). Returning to the pre-injury employer did lead to a substantially shorter delay to work, as did having more education.

Our results underscore the importance of working with pre-injury employers to return the individual to work. If this is not possible, the interval of time to work after SCI may be considerably longer. Having completed a bachelor's degree facilitated a quicker return, although recent research<sup>14</sup> suggests that pre-injury education is much less predictive of post-injury employment than is education obtained after injury. Therefore, further education may still be required for many individuals to work after SCI. Although post-injury education is important, it is possible that it is not necessarily the degree but that persons who obtain post-injury education are more motivated to become employed.

#### Race, gender, injury severity

One particularly interesting finding was that neither race-ethnicity nor gender were significantly related to time to first job but both were significantly related to time to first full-time job. Women and non-Caucasians took longer to obtain full-time work.

Caucasians have consistently reported a greater likelihood of post-injury employment than non-Caucasians.<sup>15,16</sup> Two studies have suggested that, among those who do work after SCI onset, there are differences in earnings.<sup>1,2</sup> Therefore, non-Caucasians are less likely to work and make lower earnings than Caucasians when they do work. This study further suggests that non-Caucasians are disadvantaged in terms of having a longer interval to obtaining full-time work. In short, non-Caucasians experience a number of disadvantages in the labor force participation that extend well beyond the probability of work.

**Table 2** Average derivative for age at injury variable and attributable differences for binary variables for time to first job of any type

Variable	10-year censoring		
	Attr-dif	t-stat	P-value
<i>Biographic characteristics</i>			
Age at injury	0.14	0.02	0.98
Non-Caucasian (vs Caucasian)	1.26	2.38	0.02
Male (vs female)	-0.23	-0.61	0.54
<i>Education (vs &lt; high school)</i>			
High school—associates	-1.50	-3.13	0.00
Bachelor's—graduate	-2.98	-7.53	0.00
<i>Injury severity (vs ambulatory)</i>			
C1–C4, non-ambulatory	3.72	2.93	0.00
C5–C8, non-ambulatory	3.78	6.00	0.00
Non-cervical, non-ambulatory	1.70	4.00	0.00
<i>Employment characteristics</i>			
Return to same company (vs different company, no pre-injury employment)	-4.95	-14.84	0.00
Pre-injury employment in management (vs not employed pre-injury)	-1.60	-1.86	0.06
Pre-injury employment in other (vs not employed pre-injury)	-1.05	-1.05	0.29

**Table 3** Average derivative for age at injury variable and attributable differences for binary variables for time to first full-time job

Variable	10-year censoring		
	Attr-dif	t-stat	P-value
<i>Biographic characteristics</i>			
Age at injury	0.11	0.01	0.99
Non-Caucasian (vs Caucasian)	3.12	4.22	0.00
Male (vs female)	-2.57	-3.69	0.00
<i>Education (vs &lt; high school)</i>			
High school—associates	-0.84	-1.06	0.29
Bachelor's—graduate	-2.82	-3.78	0.00
<i>Injury severity (vs ambulatory)</i>			
C1–C4, non-ambulatory	5.13	2.49	0.01
C5–C8, non-ambulatory	3.48	4.28	0.00
Non-cervical, non-ambulatory	1.08	1.91	0.06
<i>Employment characteristics</i>			
Return to same company (vs different company, no pre-injury employment)	-5.62	-10.47	0.00
Pre-injury employment in management (vs not employed pre-injury)	-1.24	-0.95	0.34
Pre-injury employment in other (vs not employed pre-injury)	-0.42	-0.29	0.77

The findings for women are similar in that we observed a significant delay to full-time work. Women also reported differential earnings compared with the earlier studies.<sup>2</sup> However, unlike the case with race, women do not always report a lower overall employment rate after SCI onset,<sup>16,17</sup> particularly considering that they appear to have a somewhat lower rate of pre-injury employment<sup>15</sup> which could contribute to a lower post-injury employment rate.

The finding that it took longer for those with more severe SCI to find work is not surprising, as injury severity is highly correlated with post-injury employment rates.<sup>17,18</sup> However, it is important to note that under appropriate circumstances such as completion of a master's degree or higher, some of the disadvantages are negated.<sup>17</sup> Similarly, differences in the probability of post-injury employment have not necessarily led to differential earnings among those who become employed.<sup>2</sup>

### Limitations

There are several limitations of the study. First, data are self-report and, although we do not expect substantial differences between objective records and self-report, some deviations in retrospective recall are expected.

Second, in terms of generalizability of results, although there were a substantial number of African-American participants, the representation among other groups was limited. We chose to group non-Caucasian participants into a single category, rather than eliminating those with only a handful of cases from all analyses.

Third, the average interval between injury onset and initiation of any employment (3.9) and initiation of full-time work (4.3) should not be interpreted literally, as it is reasonable to assume that some participants who had not yet returned to work will do so in the future (particularly those who require prolonged education or retraining). We capped

the number of years at 15 when collecting the data (a category of 15 or more years), so this also leads to an artificially low interval of time until work. In contrast, returning to the pre-injury employer may artificially magnify the attributable differences in delay to first job and to full-time job.

Finally, because the data are cross-sectional, rather than longitudinal, there may be some systematic biases due to attrition. Specifically, those who drop out of the study may have characteristics different than those who are retained, including survival status. The ideal design would be to start with a longitudinal cohort at the time of injury, but this type of data are not available to us and would be difficult to collect. Therefore, we have unknown biases in terms of the selective attrition.

### Implications

Our results suggest that career counseling will benefit from exploration of means of using pre-injury skills (including education) as a means of facilitating post-injury employment. Returning to the pre-injury employer should be a priority, as this is a time-limited opportunity. Therefore, rather than asking, 'How soon after SCI is too soon to discuss initiating employment?' it may be better to ask, 'How long is the window open for returning to the pre-injury employer or utilizing the pre-injury skills?' Allowing an individual time to adjust to his/her SCI may inadvertently contribute to closing the window of opportunity for a relatively speedy time to work. Interventions to promote employment should include the pre-injury employer, as the employer may provide accommodations needed after SCI.

### Future research

It is time to shift the traditional focus from current employment (the near sole focus of existing research) to account for multiple post-injury employment parameters. Two individuals may work similar lengths of time after SCI with very different patterns of employment. Additional research is needed that not only focuses on return to work, job retention, and the length of time to return to work, but also work lapses and early retirement. Addressing these factors will give a much clearer picture of how SCI affects post-injury employment.

Research will be required to identify the association of SCI with quality indicators, including intensity of employment (that is hours per week at work), job satisfaction, and earnings. It is only through continued investigation of more diverse outcomes that we will more fully understand the full scope of how SCI affects employment, factors that predict employment, and how we can maximize participation by using research to facilitate better outcomes.

### Conflict of interest

The authors declare no conflict of interest.

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