

**ORIGINAL ARTICLE**

# Employment Trajectories After Spinal Cord Injury: Results From a 5-Year Prospective Cohort Study



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## Abstract

**Objectives:** To identify different employment trajectories in individuals with spinal cord injury (SCI) after discharge from initial rehabilitation and to determine predictors of different trajectories from demographic, injury, functional, and psychological characteristics.

**Design:** Prospective cohort study with baseline measurement at the start of active rehabilitation, a measurement at discharge, and follow-up measurements at 1, 2, and 5 years after discharge.

**Setting:** Eight rehabilitation centers with SCI units in The Netherlands.

**Participants:** People with acute SCI (N=176), aged between 18 and 60 years at baseline, who completed at least 2 follow-up measurements.

**Interventions:** Not applicable.

**Main Outcome Measure:** Employment was defined as having paid work for  $\geq 12$ h/wk.

**Results:** Using latent class growth mixture modeling, 3 distinct employment trajectories were identified: (1) no employment group (22.2%), that is, participants without employment pre-SCI and during 5-year follow-up; (2) low employment group (56.3%), that is, participants with pre-SCI employment and a low, slightly increasing probability of employment during 5-year follow-up; and (3) steady employment group (21.6%), that is, participants with continuous employment pre-SCI and within 5-year follow-up. Predictors of steady employment versus low employment were having secondary education (odds ratio, 4.32; 95% confidence interval, 1.69–11.02) and a higher FIM motor score (odds ratio, 1.04; 95% confidence interval, 1.01–1.06) at discharge.

**Conclusions:** Distinct employment trajectories after SCI were identified. More than half of the individuals with SCI had a low employment trajectory, and only one-fifth of the individuals with SCI had a steady employment trajectory. Secondary education and higher functional independence level predicted steady employment.

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Substantial information exists on the level of employment and its determinants in people with spinal cord injury (SCI).<sup>1-3</sup> Employment rates vary from 21% to 67%,<sup>1</sup> yet on average, 35% to 40% of individuals with SCI have some kind of employment.<sup>2,4</sup> The

average time to obtain the first postinjury job ranges from 3.8 to 4.9 years after SCI,<sup>5-7</sup> but it differs by several factors including educational level and preinjury employment.<sup>6</sup>

Even in the case of successful (re)integration into the labor market, stability of employment is by no means guaranteed. People with disability or chronic conditions often experience symptom recurrences, comorbidity, and psychological disorders,<sup>8,9</sup> which can lead to multiple episodes of sickness absence and hospitalization.<sup>9,10</sup> Many individuals with SCI have to endure long-term functional limitations and frequent secondary health

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conditions such as pressure sores, pain, and bladder or bowel disorders,<sup>11,12</sup> and therefore job retention can be more challenging.<sup>12</sup> Work can also be delayed for those being in school at the time of injury, or discontinued by reeducation or vocational rehabilitation (VR).<sup>6,13</sup> Thus, it can be expected that people experience different employment trajectories until a more or less stable employment situation is achieved.

Most knowledge on employment and return to work (RTW) in individuals with SCI originates from cross-sectional studies, which measured employment at a single time point and did not capture the overtime change in postinjury employment.<sup>1-3,14</sup> Earlier cohort studies followed individuals with SCI over a relatively short time,<sup>15-17</sup> during which the employment potential was not fully regained, or the course of employment was reported for the whole sample,<sup>15,18,19</sup> assuming that individuals with SCI would have a similar course of employment.

To our knowledge, no study investigating distinct employment trajectories in individuals with SCI exist. For the planning of effective VR interventions, it is important to identify groups that show unfavorable trajectories, that is, those with delayed entry to employment or unsustainable employment, and to determine factors associated with these trajectories. We also examined whether demographic, injury, functional, and psychological characteristics predict employment trajectories after SCI.

## Methods

### Study design and participants

The study was conducted within the sampling frame of a prospective cohort study Restoration of Mobility in the Rehabilitation of Persons with a Spinal Cord Injury, with 5-year follow-up after discharge from initial SCI rehabilitation.<sup>20</sup> Participants with the following criteria were recruited from 8 SCI rehabilitation centers in The Netherlands between August 2000 and July 2003: diagnosis of acute SCI, age 18 to 65 years at the onset of injury, wheelchair-dependent, and able to understand Dutch. For our study, we included participants with age of onset between only 18 and 60 years, because the retirement age in The Netherlands is 65 years.

All eligible participants who were admitted into these 8 centers during the study recruitment period were asked to participate by their attending physician. Individuals with SCI due to a malignant tumor or progressive disease and psychiatric diseases were excluded from the study. The study protocol was approved by the medical ethics committee of the Stichting Revalidatie Limburg/Institute for Rehabilitation Research in Hoensbroek. All participants gave written informed consent after being informed about the study.

### Procedure

Demographic information was collected at baseline (at the start of active inpatient rehabilitation, ie, when the patient was able to sit for 3–4h). Injury-related, functional, and psychological measurements were performed at discharge from inpatient

rehabilitation. Follow-up measurements were performed at 1, 2, and 5 years after discharge. Data were collected by medical examination, physical measurements, oral interview by trained research assistants, and a self-administered questionnaire.

### Main outcome measures

Employment status was measured as part of the oral interview at baseline (for preinjury work) and at 1, 2, and 5 years after discharge using a single item “How many hours per week do you spend working in a job for which you get paid?” from the Utrecht Activities List.<sup>21</sup> Participants of the present study were classified as employed if they had paid work for  $\geq 12$ h/wk, in line with the Dutch standard definition of employment.<sup>22</sup>

### Variables

Demographic characteristics included age, sex, and secondary education. Neurological level and completeness of injury were measured according to the International Standards for Neurological Classification of Spinal Cord Injury at discharge.<sup>23</sup> A lesion below T1 was categorized as paraplegia, and a lesion at T1 or above was categorized as tetraplegia. Completeness of injury was classified using the American Spinal Cord Injury classification and categorized into motor complete (American Spinal Cord Injury grades A and B) and motor incomplete (American Spinal Cord Injury grades C and D).<sup>23</sup> Functional limitations were assessed at discharge using the motor score of the FIM.<sup>24</sup>

Self-efficacy was conceptualized as the belief in one's ability to cope with a broad range of challenging tasks and assessed by using the Sherer's General Self-Efficacy Scale, which contains 16 items rated on a 5-point Likert scale.<sup>25</sup> Assessment of self-efficacy was performed at discharge.

Preinjury work characteristics included occupational level, physical intensity of preinjury occupation, and number of hours worked. Type of occupation was asked with an open question and categorized using the Dutch Standard Classification of Occupations.<sup>26</sup> Occupational level was classified into basic/low and middle/high on the basis of the most adequate educational/training qualification needed to perform the work tasks.<sup>26</sup> Physical intensity of preinjury occupation was classified into low and moderate/high using adapted definitions from Tomassen et al.<sup>27</sup> Low physical intensity involved mainly sedentary work, carrying light weight, and little movements. Moderate/high physical intensity involved moving, carrying weight/heavy objects, and climbing stairs. Hours worked before injury were dichotomized into  $\geq 35$  and  $< 35$ h/wk, which is in line with the definition of full-time work in The Netherlands.<sup>28</sup>

### Statistical analysis

Statistical analysis was conducted in 3 steps: (1) identifying latent trajectory groups, (2) comparing different trajectory groups with respect to baseline characteristics, and (3) predicting the membership of different trajectory groups using demographic, injury, functional, and psychological characteristics.

Four time points (baseline, 1-, 2-, and 5-y follow-up) were included in the trajectory analysis. All participants who completed at least 2 follow-up measurements with data on employment status were included in the trajectory analysis. Distinct trajectories were identified using latent class growth mixture modeling (LCGMM) with Mplus 7.1 software.<sup>29-31,a</sup> LCGMM is based on structural equation modeling techniques and assumes that there are subgroups in the study sample that have unique growth parameters

#### List of abbreviations:

<b>BIC</b>	<b>Bayesian information criterion</b>
<b>LCGMM</b>	<b>latent class growth mixture modeling</b>
<b>RTW</b>	<b>return to work</b>
<b>SCI</b>	<b>spinal cord injury</b>
<b>VR</b>	<b>vocational rehabilitation</b>

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