

REVIEW

Interventions for improving employment outcomes among individuals with spinal cord injury: A systematic review

LM Trenaman^{1,2}, WC Miller^{2,3,4}, R Escorpizo^{5,6,7} and the SCIRE Research Team**Study Design:** Systematic literature review.**Objective:** The primary aim of this study was to evaluate interventions aimed at improving employment outcomes for individuals with spinal cord injuries (SCI).**Methods:** An electronic search of Medline/PubMed, EMBASE, Cochrane database, CINAHL, PsycINFO, Social Science Abstracts and Social Work Abstract databases was performed on 31 December 2013. To be included in the review, studies needed to investigate interventions among individuals with SCI where employment was an outcome. Exclusion criteria include (i) reviews, (ii) studies not published in English and (iii) non-peer reviewed publications.**Results:** Fourteen studies met the inclusion criteria, two were randomized controlled trials. The strongest evidence finds that supported employment can improve employment outcomes among individuals with SCI. The use of service dogs has also been shown to improve employment outcomes. The remaining 12 studies are observational and predominantly focus on vocational rehabilitation programs.**Conclusion:** There is a dearth of high-quality intervention research that targets employment outcomes in individuals with SCI. Consequently, conclusions are mostly based on evidence from observational studies. Vocational rehabilitation programs are the primary focus of this evidence, but conclusions may be confounded, as individuals may be self-selecting for these programs. Additional randomized trials on employment interventions are needed to overcome these limitations. Studies should aim to identify which components of these programs have the greatest influence on employment outcomes.*Spinal Cord* (2014) 52, 788–794; doi:10.1038/sc.2014.149; published online 2 September 2014

BACKGROUND

The International Classification of Functioning, Disability and Health (ICF) of the World Health Organization defines employment as ‘engaging in all aspects of work, as an occupation, trade, profession or other form of employment, for payment or where payment is not provided, as an employee, full or part time, or self-employed.’¹ Gainful employment helps individuals achieve economic self-sufficiency, and is considered a source of personal growth,² adjustment to disability,³ social integration, life satisfaction, and is associated with improved health and well-being.^{4,5} As a result, employment is one of the most important psychosocial topics for individuals with spinal cord injuries (SCI).⁶

Research indicates high variability in employment rates after SCI as a result of differences in study design, sample characteristics such as the age, duration of injury, work experience prior to injury and differences in the definition of the concept of ‘employment’ itself.⁷ Nevertheless, systematic reviews indicate that approximately 35% of individuals with SCI are employed post injury.^{8,9} Though it is not surprising that a catastrophic event such as a SCI would present an

employment challenge, a considerable number of unemployed individuals have a desire to work, and judge themselves as able to do so.¹⁰

An individual’s employment status is the result of a complex interaction between personal, environmental and injury-related factors. A recent systematic review identified 32 factors associated with employment outcomes in individuals with SCI (Trenaman *et al.*, submitted). The authors of that review categorized factors based on the World Health Organization’s International Classification of Functioning and Disability (ICF)¹ which includes the domains of activity and participation, personal, environmental, body structures and function, and health condition. In addition, factors were subcategorized based on their modifiability, which is important because it ultimately determines how this information is used to improve employment outcomes in this population. Non-modifiable factors such as age, sex, race/ethnicity and severity of injury can help identify and focus resources on individuals who will face the greatest challenge in gaining employment. On the other hand, modifiable factors serve as the foundation for interventions, and can provide guidance for individuals developing programs where the primary

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(or secondary) goals are to improve employment outcomes for individuals with SCI.

The objectives of this review are to systematically evaluate the interventions that have been associated with employment outcomes in individuals with SCI, to contrast the findings against known modifiable and non-modifiable factors from the literature, and to identify factors that have been understudied to date as a means of informing future research in this area.

METHODS

Eligibility criteria

To be included in the review, studies needed to (i) investigate interventions among individuals with SCI where employment was a primary or secondary outcome and (ii) have a sample comprised of individuals at least 18 years of age with a SCI, or have provided results specific to individuals with a SCI if a heterogeneous sample was used. Exclusion criteria include (i) reviews, (ii) studies not published in English and (ii) non-peer reviewed publications.

Information sources

Medline/PubMed, EMBASE, CINAHL, PsycINFO, Cochrane Database, Social Science Abstracts and Social Work Abstract databases were searched. No limits were applied on publication date.

Search strategy

The electronic search was undertaken on 31 December 2013. The following search terms were used:

(employment OR supported employment OR unemployment OR employment status OR employability OR employment disabled OR gainful employment OR self-employment OR part time employment OR temporary employment OR employee assistance OR employee assistance program OR vocation OR vocation assistance OR vocational rehabilitation OR vocational education OR work resumption OR workplace OR return to work OR work force OR labor force OR career assistance OR career OR job) AND (spinal cord injury OR paraplegia OR tetraplegia OR quadriplegia)

All publications were then entered into an electronic reference manager (RefWorks) where duplicates were removed. Additional papers were identified through hand-searching the reference list of included papers.

Study selection process

Review at the title level was undertaken independently by two reviewers, with relevant studies reviewed at the abstract and full-text level (LT, WCM). The authors identified papers for inclusion with full agreement (i.e., no discrepancies needed to be resolved through discussion).

Data collection process

Dataset was extracted by one reviewer (LT).

Data Items

For each study, the author(s), year of publication, country, study design, sample size, population, intervention and employment outcome were compiled.

RESULTS

Study selection

Fourteen studies met the inclusion criteria (see Figure 1). Studies were published between 1982 and 2012, with the majority from the United States ($n=9$). The remaining studies were from Taiwan ($n=2$), Australia ($n=1$), Canada ($n=1$) and India ($n=1$). There were two randomized trials and 12 observational studies. Table 1 summarizes the included studies. Most studies focused on vocational rehabilitation, with others on targeted social support, community integration,

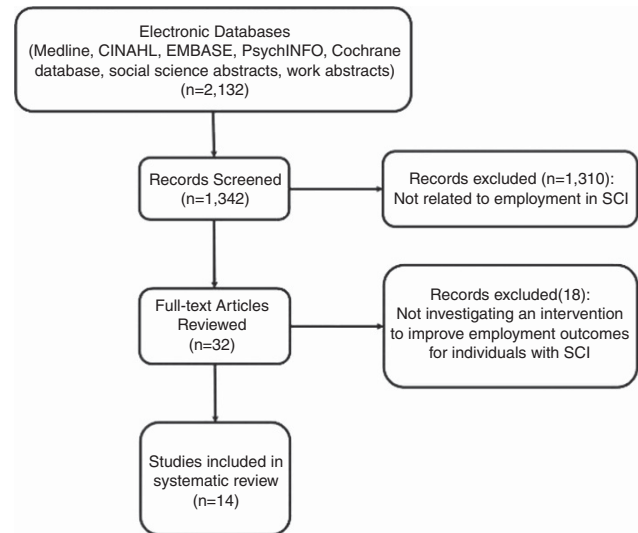


Figure 1 PRISMA diagram of systematic review process.

assistive technology, functional independence and psychological functioning (see Table 1).

One randomized controlled trial evaluated the use of trained service dogs for individuals with severe ambulatory disabilities, with employment as one of the main outcome measures.¹¹ There were 48 participants, of whom 22 had SCI, randomized to the experimental group (service dog at 1 month) or to the control group (service dog at 13 months). At 12 months, 14 of 24 individuals in the experimental group were employed part-time, compared with 0 of 24 in the control group. At 24 months, where the experimental group had a service dog for the entire period and the control group for just 12 months, 23 of 24 individuals in the experimental group, and 17 of 24 in the control group were employed part-time. Notably, traditional vocational rehabilitation services were not part of the intervention.

The second randomized controlled trial evaluated a supported employment (SE) intervention in veterans with SCI.¹² This trial included an intervention site with a group that received SE, a control group which received treatment as usual along with a control group at another site. It was found that individuals receiving SE were 2.5 times more likely to obtain competitive employment than individuals who received treatment as usual at the same site, and 11.4 times more likely than those in the control group at the other site. Intention to treat analysis revealed that individuals in the SE group earned significantly more per week than the treatment as usual-observational site group, but not the treatment as usual-intervention site group.

Observational analyses of vocational rehabilitation interventions have found that education, on-the-job training, job search assistance, job placement assistance, on-the-job support, maintenance services, assistive technology and 'other services' were correlated with gaining employment.¹³ Marini *et al.*¹⁴ evaluated components of vocational rehabilitation services in over 10 000 individuals and found that job placement assistance, on-the-job training, assistive technology and job finding services were significantly associated with a competitive employment. Jellineck and Harvey¹⁵ compared state vocational rehabilitation services to on-site professional counselors for vocational rehabilitation, and found that 4 individuals with SCI who used state vocational services were employed 3 years post discharge, compared with 15 in the group who had access to on-site counselors. Inge *et al.*¹⁶ followed three individuals and tailored vocational rehabilitation their needs; intervention intensity

Table 1 Summary of studies evaluating interventions targeted at employment outcomes in individuals with SCI

Author, year, country, study design	Study population	Modifiable factors treatment	Employment outcome(s)	Influence on employment
Allen and Blasovich 1996; ¹¹ USA RCT <i>n</i> = 48	All individuals were classified as having severe ambulatory disabilities. Experimental: <i>n</i> = 24 (SCI: <i>n</i> = 11, 7 men) Control <i>n</i> = 24 (SCI = 11, 7 men)	Social Support, Community Integration Experimental group members received trained service dogs 1 month after the study began. Wait-list control group received dogs in month 13. Participation was limited to individuals who had expressed interest in a service dog and who required substantial personal assistance. Data were collected for 2 years	Part-time employment	At month 12, 14 out of 24 individuals in the experimental group were working part-time (compared with 0 in control). At 24 months, 23 out of 24 individuals in the experimental group and 17 in the control group were working part-time.
Ottomanelli <i>et al.</i> 2012; ¹² USA RCT <i>n</i> = 157	Veterans with SCI between the ages of 18 and 65 who received medical and/or rehabilitation care at one of six participating centers. Experimental: <i>n</i> = 81 (mean age 48.7) Control: <i>n</i> = 76 at intervention site (mean age 49.8); <i>n</i> = 44 at observational site (mean age 45.1)	Vocational rehabilitation (supported employment) Experimental group members received a SE intervention based on an IPS model. The model focuses on integrating vocational rehabilitation with medical rehabilitation, rapid engagement in job finding and ongoing support while incorporating patient preferences. There were two control groups: one at the intervention sites through which individuals were randomly assigned to the control group—TAU-IS and one at sites where the SE intervention was not available. All individuals at these observational sites received treatment as usual—TAU (TAU-IS). Data were collected for 12 months.	Competitive employment in the community earning at least minimum wage; earnings as a result of employment	Individuals in the SE group were 2.5 times more likely than individuals receiving TAU-IS and 11.4 times more likely than individuals receiving TAU-IS to obtain competitive employment. Intent to treat analysis found that subjects in the SE group earned significantly more per week than the TAU-IS group (<i>P</i> < 0.001) but not the TAU-IS group (<i>P</i> < 0.387). Subjects in the SE group worked significantly more hours per week than subjects in both the TAU-IS and TAU-IS groups (<i>P</i> < 0.001).
Arango-Lasprilla <i>et al.</i> 2011; ¹³ USA Observational <i>N</i> = 3514	Individuals with SCI who received state vocational rehabilitation interventions in the United States. There were a total of 3119 individuals classified as European American (mean age = 37.38 ± 11.56), and 395 classified as Hispanic (mean age = 33.68 + 11.61).	Vocational rehabilitation Components of vocational rehabilitation (job search assistance, job placement assistance, on-the-job support, etc.) were investigated to determine which were significantly correlated with current paid employment.	Paid employment	Education, on-the-job training (OR = 2.97, 95% CI (1.55–5.69)), job search assistance (OR = 1.35, 95% CI (1.10–1.67)), job placement assistance (OR = 1.81, 95% CI (1.48–2.20)), on-the-job support (OR = 1.65, 95% CI (1.25–2.17)), maintenance services (OR = 1.60, 95% CI, (1.32–1.94)), assistive technology (OR = 2.08, 95% CI (1.74–2.48)), and 'other services' (OR = 1.51, 95% CI (1.29–1.78)) were correlated with gaining employment. 54% of the entire sample was successfully employed. The most significant predictor of successful employment was use of job placement services; clients who received job placement services had a significantly higher employment rate of 75%, compared with those who did not use a job placement service. On-the-job training, job finding services and assistive technology were also significant predictors of competitive employment.
Marini <i>et al.</i> 2008; ¹⁴ USA Observational <i>N</i> = 10 901	<i>N</i> = 10 901 65% (7086) men Mean age = 41.6 ± 9.9 years. No other demographics given.	Vocational rehabilitation All participants received some type of vocational rehabilitation service. Study examined variables associated with successful return to work.	Employment in integrated competitive employment settings	

Table 1 (Continued)

<i>Author, year, country, study design</i>	<i>Study population</i>	<i>Modifiable factors treatment</i>	<i>Employment outcome(s)</i>	<i>Influence on employment</i>
Jellinek and Harvey 1982; ¹⁵ USA Observational N = 41	N = 86 (41 with SCI, 45 with brain injury) 41 subjects with SCI (22 subjects with tetraplegia, 19 subjects with paraplegia) at an inpatient medical rehabilitation centre; mean age = 29.7 (age range 17–56 years); 35 males, 6 females; 21 (SCI) in group 1; 20 (SCI) in group 2 3 subjects (all with cervical SCI); age range: 38–83; 2 male, 1 female	Vocational rehabilitation Group 1, access to state vocational rehabilitation agency only. Group 2, access to on-site professional counselors for vocational/educational rehabilitation	Employment status (or in-school) post discharge.	4 SCI subjects in group 1 were employed or in school 3 years post discharge. 15 SCI subjects in group 2 were employed or in school 3 years post discharge.
Inge <i>et al.</i> 1998; ¹⁶ USA Observational N = 3	174 participants with SCI up to 12 months post-discharge from inpatient rehabilitation. No other demographics given.	Vocational rehabilitation, Assistive technology Program of person-centered planning tools to assist in identifying support needs that would be required in the workplace to include assistive technology and to develop plans to direct the job search. Informal observation/interview sessions with employment specialists to discuss future plans. Community integration An enhanced case management program (Marcus Community Bridge Program) assisting people to return to the community and to return to work or educational training. The program provides consistent support over time, with a focus on education.	Employment status, workplace support. Rate of return to work or educational training at 1 year post-discharge.	All 3 subjects gained employment. Workplace support ranged from minor to intensive. 1 year after discharge the rate of return to work was 1.7% (i.e., identical to the rate reported by the U.S. Model Systems) and the rate of return to educational training was 31.6% (compared with 15.3% reported by U.S. Model Systems)
King <i>et al.</i> 2004; ¹⁷ USA Observational N = 174	36 subjects (13 subjects with tetraplegia, 23 with paraplegia) from the ACSCI; 29 male; age range: 18–49; 11 complete, 25 incomplete 55 subjects (21 with tetraplegia, 34 with paraplegia) from the SCIAROC. 47 male, 8 female; age range 18–>60; 16 complete, 39 incomplete.	Functional independence, psychological functioning ACSCI group: training program with 6 months of training including: psychosocial consulting, functional, strengthening exercises, endurance, and vocational training; SCIAROC: no specific training program. Vocational rehabilitation Report on access to vocational training (which included computer-related courses, jewellery design, handicrafts, engraving, broadcasting and marketing). Vocational rehabilitation Mailed questionnaire inquiring about factors influencing employment, including access to vocational counseling and job retraining.	Employment status (student/employed/unemployed), self-reported Employment status (full-time/part-time/student/homemaker), vocational training Employment status (employed/unemployed)	SCIAROC group: All subjects with tetraplegia were unemployed; 1 subject with paraplegia was a student, 11 were employed, and 22 were unemployed. ACSCI group: all 36 subjects were unemployed because they were just completing the ACSCL program. 88% were gainfully employed at time of injury; 47% were employed post injury 53% were unemployed. 50% of those employed received vocational training compared with 28% of unemployed. Most important factor in getting a job was educational upgrading, followed by job retraining, assistance seeking employment, and vocational counselling.
Jang <i>et al.</i> 2005; ¹⁹ Taiwan Observational N = 169	169 subjects (32 subjects with incomplete paraplegia, 86 with complete paraplegia, 24 with incomplete tetraplegia, 27 with complete tetraplegia); mean age = 39; 147 male.	Vocational rehabilitation Report on access to vocational training (which included computer-related courses, jewellery design, handicrafts, engraving, broadcasting and marketing). Vocational rehabilitation Mailed questionnaire inquiring about factors influencing employment, including access to vocational counseling and job retraining.	Employment status (employed/unemployed)	23 individuals returned to work; 18 subjects were employed in a job similar to their pre-injury job; 5 were employed in a different occupation than what they were doing pre-injury. Of the 23 individuals that returned to work, 4 used a wheelchair, and 5 used crutches.
Jongbloed <i>et al.</i> 2007; ²⁵ Canada Observational N = 357	357 subjects (92 with complete tetraplegia, 142 with complete paraplegia; 108 with incomplete SCI, 15 unknown); mean age = 46; 243 (68%) male.	Vocational rehabilitation Mailed questionnaire inquiring about factors influencing employment, including access to vocational counseling and job retraining.	Employment status	23 individuals returned to work; 18 subjects were employed in a job similar to their pre-injury job; 5 were employed in a different occupation than what they were doing pre-injury. Of the 23 individuals that returned to work, 4 used a wheelchair, and 5 used crutches.
Hansen 2007; ²⁰ India Observational N = 46	40 males with SCI, 6 females with SCI. No other demographics given.	Vocational rehabilitation, functional independence Participation in the work rehabilitation program with the Center for Rehabilitation of the Paralyzed. Program includes physical conditional, vocational training and work placements.	Employment status	23 individuals returned to work; 18 subjects were employed in a job similar to their pre-injury job; 5 were employed in a different occupation than what they were doing pre-injury. Of the 23 individuals that returned to work, 4 used a wheelchair, and 5 used crutches.

Table 1 (Continued)

<i>Author, year, country, study design</i>	<i>Study population</i>	<i>Modifiable factors treatment</i>	<i>Employment outcome(s)</i>	<i>Influence on employment</i>
Rowell and Connelly 2010; ²⁶ Australia Observational N = 181	181 respondents (109 with SCI) 73.5% male, mean age: 44 years, 61% unmarried, mean time since injury: 18 years, 39% in labor force and 26% employed	Functional independence No intervention per se but examines the impact of a publicly funded set of services to enable return to work, i.e., ALSP, which aims to support activities of daily living	Labor market outcomes, exposure to the ALSP, clinical and demographic covariates	No statistically significant effect of either the ALSP or support packages from private insurance sources (i.e., PPSP) on labor market participation was found. The marginal effects for the ALSP are statistically insignificant. Thus, the hypothesis that the ALSP has a zero effect on labor market participation cannot be rejected.
Phillips, Hunsaker and Florence 2012; ²¹ United States Observational N = 111	111 newly injured individuals at an Atlanta rehabilitation. Mean age 35 years (s.d. = 11.8); 78% male; 76% white	Secondary health conditions, Functional independence, assistive technology Video-based telerehabilitation intervention (9 weeks); telephone-based telerehabilitation intervention (9 weeks); standard follow-up care.	Time to productive activities (attending school, VR, working as a homemaker, volunteering) from injury. Time to employment from injury date among individuals employed prior to injury.	Being in one of the intervention groups (either phone- or video-based telerehabilitation) did not significantly impact return to productive activities. Being in one of the intervention groups did not have a significant impact on the time to return to employment for individuals who were employed prior to injury ($P = 0.610$)
Shem <i>et al.</i> 2011; ²² USA Prospective study N = 39	39 individuals with SCI (28 male, 11 female, age 16–26 years) were enrolled. Average age of mentees was 19.8 years (s.d. = 3.0). 17 employed with mentors and began the program; 10 participants (34%) completed the program	Social support Each mentee with SCI was matched with a community-based mentor, with or without a disability. The mentoring relationship was planned for 2 years. Participants were evaluated with standardized questionnaires at intake, 3 months after entry, every 3 months thereafter, at the time of post-secondary education or employment entry and 4 months post entry.	Return to school, return to work	7 out of 29 (24%) participants returned to school; 2 (6.9%) participants returned to work; 1 (3.4%) participant returned to school part-time

Abbreviations: ACS/CI, Asylum Center Spinal Cord Injury; ALSP, Adult Lifestyle Support Packages; CI, confidence interval; IPS, individual placement and support; OR, odds ratio; RCT, randomized controlled trial; SE, supported employment; SCI, spinal cord injury; SCIAROC, Spinal Cord Injury Association of the Republic of China; TAU-IS, treatment as usual-intervention site; TAU-OS, treatment as usual-observational sites.

ranged from minor to intensive, and all three were able to gain employment.

King *et al.*¹⁷ evaluated an enhanced case management intervention, which included support while individuals returned to the community. After 1 year, 17% of individuals had returned to work (approximately equal to the rate from the National Spinal Cord Injury Statistical Center) while 32% had begun educational training (compared with 15%). Wang *et al.*¹⁸ evaluated a multi-faceted program, which aimed to improve psychosocial and physical functioning, while also including vocational training. The analysis was completed just as the 6-month intervention was finishing; no one in the intervention group was employed or attending school, whereas 20% (11 out of 55) in the control group were employed and one was attending school. Jang *et al.*¹⁹ performed an observational analysis of individuals who received vocational rehabilitation services compared with those who did not. They found that 50% of employed individuals had received vocational rehabilitation compared with 28% of unemployed individuals.

Hansen *et al.*²⁰ investigated a program in India that focused on physical conditioning, vocational training and work placements, and found that 50% (23 out of 46) individuals had gained employment. A pilot study in Australia evaluated a program, which featured lifestyle support packages that aim to improve activities of daily living. No statistically significant difference in labor market participation was observed between individuals who had received support compared with those who had not. Phillips *et al.*²¹ evaluated a telerehabilitation intervention that focused on skin care, nutrition, bowel and bladder routines, psychosocial issues and equipment needs, and was delivered via video in one intervention group, audio in another, while the control group received usual care. Being in one of the two intervention groups trended toward a longer time until return to productive activities such as school, work or home-making though it was not significant ($P=0.083$). Lastly, Shem *et al.*²² evaluated a peer mentorship intervention and found that among those in the study, 7 (24%) participants returned to school, 2 (6.9%) participants returned to work and 1 (3.4%) participant returned to school part-time.

DISCUSSION

In this systematic review, we have synthesized intervention studies from the SCI literature that have evaluated employment as an outcome. We found a profound lack of high-quality studies evaluating the influence of interventions on employment outcomes following SCI, despite the known importance of employment among individuals with SCI. Two randomized controlled trials have been completed, one involving social support with a guide dog and the other offering an enhanced supportive employment program, and both improved employment outcomes. The observational studies we reviewed provide additional evidence that supports targeting vocational rehabilitation and social support.

The majority of studies included in this review focused on vocational rehabilitation, which has the primary objective of improving employment outcomes. As identified in a review of factors associated with employment outcomes, vocational rehabilitation interventions have been identified as key in enabling return to work following SCI (Trenaman *et al.*, submitted).⁸ If improving employment outcomes is the primary goal, vocational rehabilitation is the logical intervention to facilitate return to work.

The strongest evidence comes from a randomized trial of a SE intervention compared with conventional vocational rehabilitation. SE integrates members of the vocational rehabilitation team into the care continuum, allowing them to access and discuss care with other

team members.²³ It also promotes a more personalized experience, with support built around the preferences of the individual. Individuals receiving SE were 2.5 times more likely to gain employment than those receiving usual care at the site offering the intervention, and 11.4 times more likely than those receiving usual care at a site that did not.¹² Study authors noted that at the site offering the SE intervention, there was an elevated awareness and attention to vocational issues, and that this translated into increased use of conventional vocational rehabilitation services among the control group. This highlights the positive impact that established vocational rehabilitation programs can have if they are adequately promoted and utilized, in addition to added benefit from greater integration and personalization of services.

The only other randomized trial found improved employment outcomes following the use of service dogs. Though this study adds evidence to how employment outcomes can be modified, the considerable cost and time associated with training and maintenance might preclude program planners from implementing a service dog program.

A previous systematic review identified education as the modifiable factor that was associated with the greatest increase in odds of employment (Trenaman *et al.*, submitted). Four of the included studies focused on education as an outcome (in addition to employment).^{15,17,21,22} Phillips *et al.*²¹ used a broader outcome definition called 'productive activities' that included both employment and education, whereas others investigated education on its own. Given that education may be an intermediate step to obtaining employment, it is a justifiable end point of studies investigating employment outcomes and may provide a better overall view of the employment prospects for those with SCI.

Many of the studies in our review either did not include a control group or failed to adequately specify the employment rate for comparison with those in the intervention group. In these cases, it is difficult, if not impossible, to determine the proportion of individuals returning to work that is directly attributable to the intervention. One study attempted to overcome this by comparing the rate of employment (and return to education) with figures from the National Spinal Cord Injury Statistical Center.¹⁷ Future studies should make a concerted effort to ensure that employment outcomes are adequately reported so evidence-based conclusions on effective return-to-work strategies can be drawn. Timing is also an important consideration when evaluating interventions. One study performed the analysis immediately after the individuals completed a vocation rehabilitation program; this meant that no information can be obtained whether or not those in the intervention group were employed or pursued education.¹⁸ Performing the evaluation at 6 months, 1 year (or even longer) post intervention would have allowed for a better understanding of how the intervention influenced employment outcomes from a temporal or change in status perspective.

Interventions that are targeted toward several modifiable factors may ensure a higher likelihood of returning to employment. Our review provides evidence that interventions have often targeted a number of factors. Whereas vocational rehabilitation is often cited as a single 'factor' (Trenaman *et al.*, submitted), it actually represents a host of activities and processes, including on-the-job training, job search and placement assistance, and on-the-job support.¹³ For instance, Inge *et al.*¹⁶ targeted vocational rehabilitation in addition to assistive technology and Wang *et al.*¹⁸ targeted both psychological functioning and functional independence.

Policy differences in social benefits, such as financing, food, lodging or transportation, have been shown to be important predictors of

employment outcomes for individuals with SCI.⁷ These benefits may act as disincentives to return to work if they are withheld when the individual earns above a certain threshold. Thus, the policy context is critical to understanding and developing interventions in this area. Guaranteed benefits regardless of employment income may overcome this barrier to employment; studies comparing regions with different public policies could help determine how policies can best meet the needs of individuals with SCI and society more broadly.

Limitations

Our search terms did not capture non-English publications, or those not indexed in the databases that we searched, but we are convinced that our search strategy was reasonably comprehensive. We were also unable to perform an assessment of quality of publications given the heterogeneity in the methodology and factors investigated.

CONCLUSIONS

Despite their disability, many individuals with SCI possess the potential and desire to remain or become productive members of society while deriving the positive psychosocial benefits of employment at the same time. People with SCI may benefit from employment interventions; however, there is a dearth of high-quality research related to interventions that specifically target employment outcomes in individuals with SCI. Consequently, conclusions are mostly based on evidence from observational studies making it difficult to determine causality. For instance, did vocational rehabilitation improve employment outcomes, or did individuals more interested in gaining employment participate in vocational rehabilitation? There is a critical need for high-level evidence studies that address employment in SCI. The best evidence of 'actionable' interventions in SCI is from SE. Though only one randomized trial of SE has been completed in SCI, SE has been successful for individuals with other health conditions.²⁴ Future research should focus on identifying innovative interventions, and, given the multifaceted nature of employment programs, the components of the interventions that have the greatest effect on employment outcomes must also be investigated.

DATA ARCHIVING

There were no data to deposit.

CONFLICT OF INTEREST

Logan Trenaman has previously worked for a company that received funding from the Rick Hansen Institute. Dr William C Miller and Reuben Escorpizo declare no conflict of interest.

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