



Protocol for a Systematic Review: Employment Interventions for Return to Work in Working Aged Adults Following Traumatic Brain Injury

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BACKGROUND

Incidence and Causes of Traumatic Brain Injury

Traumatic brain injury (TBI) occurs when there has been an alteration to brain function (e.g., loss of consciousness, memory loss, neurologic defects) due to an external force, such as the impact of an object to the head, blast waves from an explosion, swift acceleration or deceleration, or the penetration of a foreign object into the brain (Maas, Stocchetti, & Bullock, 2008; Menon, Schwab, Wright, & Maas, 2010). TBI is a major concern worldwide and affects 10 million people annually (Hyder, Wunderlich, Puvanachandra, Gururaj, & Kobsingye, 2007). While, traditionally, road traffic injuries are the most common cause of TBI (Hyder et al., 2007; Tagliaferri, Compagnone, Korsic, Servadei, & Kraus, 2006), an increasing number of military personnel and civilians are acquiring TBI as a result of blast injuries (Fear et al., 2009; Hyder et al., 2007; Warden, 2006). This is due to recent combat operations and unrest in the Middle East. Other causes of TBI include falls, violence, and other unintentional injuries (Hyder et al., 2007). With increasing numbers of people with TBI globally, and the substantial impact on individuals with the injury, TBI is a concern for all layers of society.

Severity and Sequelae

Levels of injury range from mild to severe, determined by measures such as duration of coma or post-traumatic amnesia (PTA), Glasgow Coma Scale (GCS) scores and similar measures, and the nature and extent of functional impairments following the injury. Individuals with TBI experience various combinations of physical, cognitive, sensory, and emotional symptoms, which are largely determined by the severity of the impact, the location of the impact, and whether the TBI is a closed or open injury (National Institute of Neurological Disorders and Stroke, 2002). Table 1 illustrates sequelae commonly associated with TBI.

Typically, increased severity of injury is related to degree and extent of impairment post-injury. However, even individuals experiencing mild injuries can experience difficulties in one or more areas. In addition, most individuals who experience a TBI have a period of recovery following the injury with a return of lost functioning. However, in most cases (particularly those with moderate or severe injuries), the individual's recovery will "plateau" below his or her pre-injury functioning level.

Return to Work Following TBI

Individuals with TBI often experience difficulties in becoming competitively employed or maintaining employment after sustaining TBI as a result of the post-injury difficulties they exhibit (Andelic, Stevens, Sigurdardottir, Arango-Lasprilla, & Roe, 2012; Dikmen, Temkin, Machamer, Holubkov, Fraser, & Winn, 1994; Ezrachi, Ben-Yishay, Diller, & Rattock, 1991; Ruttan, Martin, Liu, Colella, & Green, 2008). Reported unemployment rates of people with

Table 1. Common Sequelae of TBI

Physical impairments	<ul style="list-style-type: none">• Hemiplegia• Affected gait• Reduced fine motor skills• Fatigue• Headaches and other health problems
Cognitive impairments	<ul style="list-style-type: none">• Amnesia• Short-term memory loss• Diminished executive function• Reduced attention span
Sensory impairments	<ul style="list-style-type: none">• Visual impairment• Hearing impairment• Loss of sense of touch, smell, taste• Hypersensitivity to noise, heat, etc.
Emotional impairments	<ul style="list-style-type: none">• Affective disorders• Reduced impulse control• Loss of social and interpersonal skills• Reduced self-awareness• Aggression

TBI have ranged from 45% to 78% (Doctor, Castro, Temkin, Fraser, Machamer, & Dikmen, 2005; Kendall, Muenchberger, & Gee, 2006; Yasuda, Wehman, Targett, Cifu, & West, 2001). Variation in return to work (RTW) rates can be associated with differences in sample characteristics, methodologies, and measures of employment. Additionally, being employed has been associated with better quality of life (QOL) among those with TBI (O’Neill et al., 1998; Steadman-Pare, Colantonio, Ratcliff, Chase, & Vernich, 2001).

The injury and its effects can be overwhelming not just to individuals with TBI and their families (Cifu, Craig, & Rowland, 1996), but also for other layers of society. Individuals and families experience financial burden due to loss of jobs and wages as well as medical and rehabilitation expenses (Fadyl & McPherson, 2009), while communities and employers experience lost workdays and productivity (Andlin-Sobocki, Jonsson, Wittchen, & Olesen, 2005). TBI can also impose substantial burden to low-, middle-, and high-income countries through publicly funded healthcare and rehabilitation services, and financial support of injured persons (Hyder et al., 2007). The U.S. Center for Disease Control and Prevention (CDC) reported that medical and indirect costs of TBI (e.g., lost productivity) in 2000 were estimated at \$76.5 billion in the United States (Finkelstein, Corso, & Miller, 2006), while the total annual cost in Europe for individuals with TBI was estimated at 386 billion euros (Andlin-Sobocki et al., 2005). Thus, the cost of TBI to the individual and society is staggering. However, there is evidence that rehabilitation is effective at easing this burden, namely by returning individuals with TBI to work (Doctor et al., 2005; Kendall et al., 2006; Yasuda et al., 2001).

Shames and colleagues (2007) conducted a comprehensive review of the literature regarding factors associated with successful return to work (RTW) following TBI and current rehabilitation strategies. They note that prediction of RTW is a complex interaction of variables, including pre-morbid factors (i.e., age, education, and prior employment history), injury-related factors (type, severity, and location), post-injury impairments, and personal and environment factors (e.g., marital status, alternative income sources, social support). Because of this complexity and the unique characteristics of each TBI patient, prediction of RTW for an individual is not feasible. They note that the literature includes numerous examples of high-risk patients who did achieve successful RTW if given sufficient rehabilitation and support.

Research cited by Shames et al. (2007) has generally found that the weight of evidence indicates these factors are frequently found to contribute to poor employment outcomes:

- More severe injury (Kreutzer et al., 2003; Trexler, Trexler, Malec, Klyce, & Parrott, 2010; Wagner, Hammond, Sasser, & Wiercisiewski, 2002), as measured by GCS, PTA duration of rehabilitation, or other means;
- Higher age at injury (Keyser-Marcus et al., 2002; Kreutzer et al., 2003);
- Male (Cifu et al., 1999; Kreutzer et al., 2003);
- Lower levels of pre-injury educational and/or occupational status (Hart, Whyte, Polansky, Kersey-Matusiak, & Fidler-Sheppard, 2005; Keyser-Marcus et al., 2002; Walker, Marwitz, Kreutzer, Hart, & Novack, 2006);
- Less social support from friends, family, neighbors, church, etc. (Yasuda et al., 2001);
- Significant physical, psychosocial, or cognitive impairments (Keyser-Marcus et al., 2002; McCrimmon & Oddy, 2006; Wagner et al., 2002; Walker et al., 2006);
- Member of a minority group (Arango-Lasprilla et al., 2008; Hart et al., 2005; Kreutzer et al., 2003); and
- A history of substance abuse (Bogner, Corrigan, Mysiw, Clinchot, & Fugate, 2001; Corrigan, 1995; Wagner et al., 2002).

This list is far from exhaustive; many other factors have been studied, such as financial status and receipt of a settlement or public benefits following the injury. However, the list illustrates the complex nature of RTW and the difficulty in applying a prediction model to individual cases. In addition, the research literature is international, which brings into consideration differences across economies, cultures, health care and rehabilitation systems, and national “landscapes” of public and social disability policies.

Post-Acute RTW Interventions

Following acute care and rehabilitation, post-acute rehabilitation services focus on assisting the individual to adjust to on-going impairments and re-enter their communities, workplaces, schools, etc. Shames et al. (2007) broadly classify post-acute interventions into these groups:

- Residential community reintegration programs that provide intensive behavioural interventions;
- Comprehensive day treatment programs that emphasize training in self-awareness, social skills, daily living skills, and coping mechanisms; and
- Community re-entry programs that focus on vocational and social reintegration.

RTW interventions may be funded and delivered through multiple avenues, but in the U.S., the primary sources of RTW interventions are employer disability management programs and state Vocational Rehabilitation (VR) agencies. Many other countries have equivalent organizations. Brief descriptions of employer disability management and VR are presented in this section.

Employee Disability Management Programs, typically provided directly by employers or through their insurance programs, are a combination of many services (e.g., work injury prevention programs, early intervention, transitional work programs, and case management) to better address the physical and psychological needs of the worker (Ongori, 2012; Shrey, 1996). Job accommodations, support services, and determining the use of adaptive devices are all potential components of disability management (Ongori, 2012; Shrey, 1996). For example, gradual RTW would fall into this category.

As a disability management component, some companies may offer on-site training, which is similar to *transitional programs*, where the client receives physical, cognitive, and behavioural training while developing job skills in a practice work environment. This allows employers to see how and if they need to make accommodations, and helps the employee develop the skills they need to perform their job (Ben-Yishay et al., 1985; Jacobs, 1997; Klonoff et al., 2007; Prigatano et al., 1994).

State VR Services are provided to individuals with various types of disabilities to increase independence and employment. Services include physical restoration (prosthetic devices), vocational training, counselling, and job development assistance. An increasingly utilized VR service option for clients with TBI is *supported employment*, where a client obtains paid work that is integrated with people without disabilities with ongoing support from the employer and a vocational specialist (Wehman et al., 2003). These supports may include one-on-one skills training, counselling, and advocacy services by the vocational professional (Wehman et al., 1993). Long-term support services are available to the individual throughout

the individual's employment (Wehman et al., 2003). An individual placement supported employment model consists of a vocational specialist or job coach assisting in finding the individual a job, and then this vocational professional coordinates pre-employment and/or on-the-job supports (Wehman et al., 2003).

Although employer disability management programs serve employees who become disabled or are at risk of disability, and VR agencies serve those who are unemployed, there are similarities in the two systems' approaches to RTW. One is the use of *job accommodations*. Accommodations are negotiated between the employee and the employer. These are alterations made for the employee that do not conflict with the responsibilities of their job, such as flexible scheduling to accommodate episodic disabilities such as epilepsy or psychosocial disorders. Employers may also reassign non-essential duties that the employee cannot perform due to his or her disability. Improved physical accessibility is also a component, such as building ramps for wheelchair access, adding/fixing elevators, relocating an employee's office, widening aisles, and providing wheelchair accessible restrooms and/or grab bars. Also, with the advent of modern technology, high-speed Internet, and webcams, some businesses permit telework from home, allowing an employee to accomplish their daily tasks without having to leave their domicile (West & Anderson, 2005).

Another common strategy is to provide *adaptive devices and assistive technology* interventions. This can include memory aids, changing from regular to touch-screen based computers, installing adjustable mounts at desks, or utilizing specially-made styli to allow a person with limited fine motor skills to use a computer. With the advent of smartphones and tablet computers, people can use the pre-installed programs to create schedules and set alarms to adhere to them. There are even downloadable applications (apps) created for a number of tasks from detecting anaemia to speech therapy to determining whether people qualify for Medicare benefits (Inge & Targett, 2007).

Finally, both service systems can offer *ancillary therapeutic services* which, though not directly employment-focused, support the RTW process. These include treatments like physical therapy, occupational therapy, speech/language therapy, cognitive therapy, and peer or professional counselling. Utilizing these programs as a cohesive rehabilitation strategy emphasizes a *holistic approach*, based on the work of Ben-Yishay (1985).

Purpose of the Review

The most critical outcome from rehabilitating people with TBI is return to work and other productive activities (Fraiser & Clemens, 2000). It is imperative to increase RTW for people with TBI through effective interventions that lead to competitive employment due to its positive impact on the individual, his or her family, and society. *Thus, the purpose of this review is to identify and assess the evidence related to interventions for individuals with TBI that are directly focused on RTW.* For the purposes of this review, employment interventions will be broadly defined as any strategy, activity, or device that is intended to increase the capacity or the likelihood for an individual with TBI to (a) return to their pre-

injury competitive employment position, (b) obtain a new competitive employment position, or (c) retain an existing competitive employment position. Because of the broad array of employment interventions that will be reviewed, each will be assessed separately as to the provider and duration of the intervention.

All intervention studies that will be included will have used competitive employment as the RTW outcome. Our definition of competitive employment will be adapted from that of the U.S. Department of Education's Rehabilitation Services Administration (RSA). The RSA definition includes a criterion that the person be paid the prevailing minimum wage or greater. We will not include this criterion because we will be conducting an international search, and some nations may not have an established minimum wage. Our definition of competitive employment will therefore be based on three criteria:

1. Work is performed by the individual with TBI in an integrated setting, (i.e., not a disability organization, co-workers predominantly non-disabled);
2. The employee is paid by the business or organization where the work is performed, not by a disability organization (such as in enclaves); and
3. The employee is paid commensurate with non-disabled co-workers having similar qualifications, performing similar duties.

Although individuals with TBI and other disabilities may access other employment options (i.e., sheltered employment, volunteer positions), competitive employment was singled out as the optimal RTW outcome. The value of non-competitive employment services such as sheltered workshops and day vocational programs has been a hotly debated issue for many years (Cimera, Wehman, West, & Burgess, 2012; Migliore, Mank, Grossi, & Rogan, 2007). Without adding to this debate, it is self-evident that getting and keeping a competitive position and a non-competitive position are different processes and differ greatly in their demands on service providers, families, and persons with disabilities themselves. As one example, successful entry into a sheltered work program would typically hinge upon an available service slot and a funding source, whereas in the labor market persons with disabilities must compete for positions against non-disabled applicants and would need to show that they add value to the business. The disparity between competitive and non-competitive environments is supported by a recent study by Cimera, Wehman, West, and Burgess (2012), which found that sheltered work experience had no effect on competitive employment outcomes for state VR clients with autism. Similarly, work performance and value of individuals in volunteer positions are not evaluated as critically as that of paid employees, and therefore it is more likely that a low-performing volunteer will be retained than a low-performing employee. To summarize, competitive employment is the outcome of interest because non-competitive employment options do not reflect the true demands of entering and remaining in the workforce and are therefore of less interest in assessing RTW interventions.

How the Intervention Might Work

Employment barriers and interventions may be broadly classified as either supply-side or demand-side (Chan, Strauser, Maher, Lee, Jones, & Johnson, 2010). Supply-side barriers are those related to the individual with disabilities, such as deficits in skills, interfering behaviors, functional limitations related to the disability, and accommodation needs. Thus, supply-side interventions address those issues via skill or behavioral training, accommodations, and provision of other needed support to the individual with disabilities and his or her family members. Supply-side interventions may be delivered by therapists, educators, employment specialists, and VR Counselors, with durations from days to years depending on the nature of the intervention. For example, an individual in a supported employment program may theoretically receive ongoing support throughout his or her working history.

Alternatively, demand-side barriers are those that are related to the employer and the place of business. Examples of these barriers might include limited experience with employees with disabilities, high turnover or absentee rates, high production demands, and high costs related to injured workers. Thus, demand-side interventions may include disability management practices such as gradual return to full duty following injury, employer training and technical assistance related to disability and accommodation, co-worker and supervisor support and assistance, and employer-provided internships, skills training, or support programs. Demand-side interventions are typically delivered by either Vocational Rehabilitation agencies or employers/businesses themselves.

The Logic Model shows the connections between supply- and demand-side interventions, recipients of those interventions, and anticipated outcomes. For this review, we will include both types of interventions for individuals with TBI.

Why it is Important to do the Review

Previous systematic reviews have examined the effectiveness of specific interventions on persons with TBI regarding their community integration (Kim & Colantonio, 2010); cognitive rehabilitation (Cicerone et al., 2011; Rohling, Faust, Beverly, & Demakis, 2009); quality of life; functional independence; physical, psychological, and social functioning; and community participation (Cattelani, Zettin, & Zoccolotti, 2010; Evans & Brewis, 2008). Van Velzen, Van Bennekom, Edelarr, Sluiter, and Frings-Dresen (2009) examined the number of people with acquired brain injury who returned to work for a 16-year period but did not look at vocational rehabilitation interventions. Similarly, Nightingale, Soo, and Tate (2007) conducted a systematic review that examined the prognostic factors related to people with TBI RTW. Two of their outcome variables were productivity and competitive employment; however, Nightingale et al. (2007) did not examine interventions. There have also been systematic reviews that have examined the effectiveness of interventions on vocational outcomes of those with acquired brain injury (ABI) (Turner-Stokes, Nair, Sedki, Disler, &

Figure 1. Logic Model: Employment interventions for return to work in working aged adults following traumatic brain injury (TBI)

Situation	Outputs		Outcomes	
	Activities	Participants	Short-Term	Long-Term
<ul style="list-style-type: none"> ○ Traumatic brain injury (TBI) often results in changes to cognitive abilities, physical functioning, somatic functioning, and psychological/behavioral functioning ○ These can in turn lead to poor outcomes, particularly return to work or school ○ Young adults are at risk for TBI ○ Employment rates following TBI are low, especially for those with more serious injuries ○ Inability to return to work (RTW) following TBI can lead to other family, social, and psychological problems 	Supply-side interventions <ul style="list-style-type: none"> • Skills training • Therapies • Service and support strategies • Prosthetics/orthotics • Workplace accommodations • Other adaptive or assistive technology devices 	<ul style="list-style-type: none"> • Job-seekers or employees with TBI • Family members of individuals with TBI 	<ul style="list-style-type: none"> ✓ Increased skills, knowledge, and abilities of individuals with TBI ✓ Increased functional abilities ✓ Increased prospects for employment, re-employment, or return to work 	<ul style="list-style-type: none"> ✓ Increase employment of individuals with TBI and other types of disabilities ✓ Decreased dependence on public assistance, support from friends and family members
	Demand-side interventions <ul style="list-style-type: none"> • Employer training regarding disability • Employer/supervisor training and support • Coworker support • Assistance with job accommodations • Disability management practices • Modifications to policies and procedures that discriminate against job-seekers or employees with disabilities 	<ul style="list-style-type: none"> • Business owners • Human Resources staff • Supervisors of employees with disabilities • Coworkers of employees with TBI 	<ul style="list-style-type: none"> ✓ Increased willingness and capacity to recruit, hire, train, and retain individuals with TBI ✓ Increased skills and knowledge regarding accommodating employees with TBI ✓ Socialization and relationships between employees with and without disabilities 	<ul style="list-style-type: none"> ✓ Lower costs to employers related to disability and injured workers ✓ Lower costs to taxpayers related to disabled and injured workers ✓ More workplace diversity and disability-friendly businesses

Wade, 2005). A recent Campbell Collaboration title registration by Braathen et al. (2011) proposes to examine the effectiveness of comprehensive occupational rehabilitation programs for RTW among people on long-term sickness absence. Their review will include people with mental disorders and/or musculoskeletal disorders.

Further, Fadyl and McPherson (2009) reviewed and evaluated the evidence for effectiveness, strengths, and weaknesses of vocational interventions for persons with TBI. Unlike the longer time period (1973 to 2011) and broad information retrieval (more databases and grey papers) of this proposed review, Fadyl and McPherson's (2009) electronic database-limited search focused on articles available in English from January 1990 to July 2007 in Ovid Journals database, which includes MEDLINE, PsychInfo, CINAHL, AMED, Health and Psychosocial Instruments, Evidence -Based Medicine databases, and Web of Science. Geurtsen, Van Heugten, Martina, and Geurts (2010) conducted a systematic review of effectiveness of comprehensive rehabilitation program interventions on a number of outcome variables including employment. Only PubMed, PsychINFO, and PsychLit databases and articles published from 1990 to 2008 were used. Similarly, a recent systematic review protocol that addresses the effectiveness of multidisciplinary post-acute rehabilitation for adults with moderate to severe TBI (Agency for Healthcare Research Quality, 2011) limits its electronic database search to MEDLINE, the Cochrane Central Register of Controlled Trials, PEDro, and PsychINFO.

This proposed study will search a wider range of databases, search and include grey literature, search a broader length of time (1973 to 2011), and focus on competitive employment outcomes among persons with TBI regardless of injury severity. By including all competitive employment, supply- and demand-side, evidence-based research interventions for persons with TBI, this systematic review will provide clarity on the effectiveness of these employment intervention programs that will guide practitioners and vocational rehabilitation policy makers. Further, this analysis will provide information concerning the direction for future research.

OBJECTIVES

This systematic review will examine the effectiveness of interventions on RTW outcomes of adults with TBI. The goal of this project is to provide information that will benefit people with TBI, employers, and vocational professionals by informing these audiences of the effectiveness of employment interventions. The information we obtain from this analysis may indicate research gaps that provide direction for future research.

Methodology

The methodology found in this protocol is guided by the Campbell Collaboration Guidelines on Systematic Review Methods http://www.campbellcollaboration.org/artman2/uploads/1/C2_Protocols_guidelines_v1.pdf (retrieved September 27, 2012).

Criteria for Including Studies in the Review

Study Inclusion Criteria

Types of study designs. Studies that use randomized controlled trials (RCTs) and quasi-experimental designs will be included. Comparison group conditions will involve treatment as usual, other appropriate interventions, or no intervention.

Types of participants. Studies will be included that have participants who are of working age (18 to 65 years of age), have a closed TBI (injury which did not penetrate the brain) diagnosis regardless of severity, are engaged in full- or part-time competitive employment at the time of injury, injured either on the job or off the job, are unemployed, or are on medically related leave through the employer at the time of intervention receipt. Studies can include all times since injury. Participants can be injured either on or off the job, and subgroup analysis will be conducted for those injured on the job as opposed to those that were not. Studies that have samples with mixed disability groups will be included if and only if the researchers provide data for the TBI participants separately from the non-TBI participants. In situations in which non-competitively employed students and participants who are engaged in competitive employment are mixed in a study, we will use data if and only if data for the TBI participants who are competitively employed are presented separately from the non-competitively employed students in the study results.

Types of interventions. Studies will be included that use interventions that assist working age adults with TBI in returning to competitive employment, including self-employment (with competitive employment as the outcome). The intensity of the intervention can vary widely. Interventions implemented in any country will be eligible for inclusion so long as the study is written in English or Spanish. On the Coding Form (Appendix 3), we will code for type of intervention (e.g., transitional, supported, holistic) used and whether the intervention was demand- or supply-side. We will also note on the coding form whether a business, state vocational agency, psychologist, etc. carried out the intervention.

Outcome measures. The RTW outcome is continuous competitive employment, also referred to as open or independent employment, in which individuals with TBI have been full-time or part-time employed for 45 days or more. The premise of using competitive employment as the one outcome variable is that competitive employment represents optimal real world functioning. Our definition of competitive employment will be based on three criteria:

1. Employed individuals with TBI perform employment related tasks in an integrated setting (i.e., not a disability organization) and must interact with co-workers who are predominantly non-disabled.
2. Employed individuals with TBI are paid by the business or organization where the work is performed, not by a disability organization (such as in enclaves). In this way,

competitively employed individuals with TBI have the same risks of losing their position as non-disabled individuals.

3. Employed individuals with TBI are also paid commensurate with non-disabled co-workers having similar qualifications and performing similar duties. When an individual with TBI is competitively employed, the individual vied for a position against individuals *without* disabilities, which is more difficult than sheltered employment or volunteer work, and in most cases, more difficult than entering an educational program. In contrast, good consistent performance is not required for volunteer positions and sheltered workshops. Opportunities to re-do their performance through retaking exams or courses are not typically available in competitive work environments.

The primary outcome variable will be a dichotomous variable—employment status—in which we will use the proportion of participants in each study who are employed and those unemployed. There may be other secondary continuous outcomes such as length of time employed and mean hours worked.

Study Exclusion Criteria

The following will be excluded from the review:

1. Studies that do not examine the effectiveness of interventions for individuals with TBI disabilities that support RTW and/or retention of competitive employment.
2. Studies where participants' are only students.
3. Single-subject designs and other studies that are not RCTs or quasi-experimental designs.
4. Studies that do not use interventions.
5. Studies that do not report competitive employment as an outcome.

Search Strategy

Database Search

All relevant studies that meet the inclusion criteria will be identified and retrieved. A number of strategies will be used to obtain both published and unpublished studies that (a) identify interventions that assist persons with TBI to return to competitive work and (b) assess the strength of the evidence of the empirical evidence for them. We will restrict the search to articles and grey-literature papers to those written in either English or Spanish that were published between 1973 and 2011. To include reports in all languages would be untenable and fiscally burdensome to include in this report.

Computerized database searches relevant to rehabilitation health care, social sciences, and business will be conducted. A comprehensive database search will include the following databases:

1. Academic Search Complete
2. Article First
3. Australia Education Index
4. British Educational Index
5. Business Source Complete
6. CINAHL Plus with full text
7. CIRRIE (Center for International Rehabilitation Research Information and Exchange Database)
8. Cochrane Central Registry of Controlled Trials
9. ClinicalTrials.gov
10. Controlled-Trials.com
11. COS Conference Papers Index
12. COS Scholar Universe
13. Directory of Published Proceedings
14. Dissertations and Theses Full Text (Proquest)
15. ebrary: Academic Complete Collection
16. EBSCOhost Research Database
17. Education Research Complete
18. ERIC
19. FirstSearch Databases
20. FRANCIS
21. HealthSource: Nursing/Academic Edition
22. Google Scholar
23. Lexis-Nexus Academic
24. MEDLINE/PubMed
25. NARIC REHABDATA
26. PapersFirst
27. ProQuest
28. PsycExtra
29. PsychINFO
30. Psychology and Behavioral Sciences Collection
31. Science Direct
32. Sociological Abstracts
33. Web of Science
34. World Cat

The search will be conducted for studies published between 1973 and 2011. Based on Humphrey and Oddy's 1980 review of RTW in TBI populations from 1954 to 1978, it is very unlikely that we will retrieve any studies of vocational intervention in the form of

experimental, quasi-experimental, and single-subject experimental designs published before 1980. Most of the studies addressed prognosis of RTW. However, in order to ensure that we are able to retrieve all appropriate studies for our systematic review, we have used as our starting point the year 1973, when the Rehabilitation Act was passed, which prohibited discrimination due to disability by federal agencies and entities receiving federal financial assistance. All searches will be recorded per the Literature Search Protocol (Appendix 1) in Excel file, Search Record (Appendix 2).

Hand Searches

We will examine reference sections of included studies, as well as other relevant studies and documents, to determine whether there are relevant cited reports that were found through the electronic database searches.

Grey Literature

In addition to the computerized database searches, grey literature will be located and retrieved by searching websites maintained by state, federal, and international organizations that have conducted research related to the topic. These include government agencies, research organizations, foundations, clearinghouses, and archives. Conference Proceedings Citation Index, Directory of Published Proceedings, and PapersFirst will also be searched for leads to potential studies. A list of websites is listed in Appendix 1 and includes the following examples:

- <http://www.opengrey.eu/>
- <http://www.vra-uk.org/>
- <http://www.crsaaustralia.gov.au/>
- <http://www.rehab.state.al.us/>
- <http://www2.ed.gov/about/pubs/intro/index.html?src=ln/>

Bibliographies

Reference lists of included studies and related systematic reviews on the topic will be examined to locate unpublished studies. Grey literature will undergo the same inclusion criteria as other studies identified through the electronic database searches.

Search Terms

Where available, database thesauri will be consulted to ensure that appropriate synonyms have been included in the intervention, population, and outcome search categories. Search strings (keywords and Boolean operators) will be created so that the search strategy is transparent and replicable. The search strategy will be tailored for each database, as each database will require a slightly different strategy, and not all terms will be used in each search. We will begin each search in databases using search strings found in Appendix 1 (Literature Search Protocol) and then expand search strings based on the database. We will

search TBI by TBI, head injury, brain injury, and acquired brain injury. Since other injuries besides TBI are found in the brain, head, and acquired brain injury literature, note that TBI participants will be included if and only if researchers provide data for the TBI participants separately from other types of brain/head or acquired brain injuries.

Description of Methods Used in Primary Research

Studies in the systematic review will consist of randomized controlled trials (RCTs) and quasi-experimental designs. For those few studies that are RCTs, we will use post-test proportion of participants employed from the intervention and comparison group. We anticipate that most studies will be quasi-experimental and also not have comparison groups. We plan to examine the pre-post effect size of all interventions that report the same type of outcomes. Thus, all studies using the primary outcome variable—proportion of participants employed—and having pre- and post-test scores will be analysed together. Later in this section, we discuss how we will address those studies that have multiple outcome time points (post-intervention and follow-up).

Comparison group conditions will involve treatment as usual, other appropriate interventions, or no intervention. We will analyse studies together that have the same type of comparison groups. Studies in which there are intervention groups and control groups that do not receive an intervention or service will be analysed together. All comparison groups in multi-comparison studies will be reported on The Coding Form for Primary Research Characteristics and in the Table of Characteristics of Primary Research. The Coding Form for Primary Research Characteristics (Appendix 3) will capture primary research characteristics of each study.

We have included an example of a coded study that will be included in the systematic review in Appendix 4. The report is by Ellerd and Moore (1992) on a supported employment intervention, which used one group post-test only with follow-up design and data collection occurring at 12 and 30 months. Dichotomous and continuous variables were used as outcome variables in this study. The dichotomous variables consisted of number of participants employed at 12 and 30 months. The continuous variables consisted of length of time employed, mean hours worked, and mean wages at 12 and 30 months. The primary outcome for this systematic review is the proportion of participants who are employed.

Criteria for Determination of Independent Findings

Multiple studies that use the same sample or data will be treated as a single study, and information from these studies will be combined so that any data that is relevant will be used in this project. Original authors will be contacted in an attempt to clarify any conflicting information amongst the studies. Only one score will represent these studies.

Multiple Outcome Studies

Any secondary outcome variables that are analysed in a study will be represented by one score. When there are multiple time points for secondary outcome variables, the mean for the variable will be used. For instance, in the Ellerd and Moore (1992) study, the mean of the length of time employed of the 12 and 30 months length of time will be used.

Multiple Outcome Time Points

When there are multiple outcome time points in the study, we will take the mean proportion across outcome scores (post-intervention and follow-ups) to determine the overall effect size for that study. For instance, in the Ellerd and Moore (1992) study, the mean of the number of 12 month employed participants and 30 month employed participants will be used.

Multiple Comparison Groups Studies

It is unlikely that there will be multiple comparison groups. However there is a case in which the overall study was reported through multiple articles, and there two distinct intervention programs that were used with separate intervention samples (Braverman et al., 1999; Salazar et al., 2000; Warden, Salazar, Marin, Schwab, Coyle, & Walter, 2000). We will analyse data separately for each intervention.

Details of Study Coding Categories

Selection of Studies

Determination of inclusion and exclusion of studies will be conducted in two stages. In Stage One, the title and the abstract of all the references of the studies that have been identified will be obtained and screened by two reviewers to determine whether they meet the inclusion and exclusion criteria of this review. If both reviewers agree that the study meets the inclusion criteria, the full-text of the study will be obtained. If the reviewers are unsure, the citation will proceed to the full-text eligibility screening stage for a final inclusion decision.

In Stage Two, the full-text eligibility screening stage, two reviewers will independently code the full-texts of each study that proceeded to the full-text stage, using the coding form developed for this review (see below and Appendix 3 for coding form), to determine whether the study will be included or excluded from the review.

The coding form (Appendix 3) will track publication source, research design, subject characteristics, sample source, employment setting, intervention characteristics (e.g., number of participants employed at post-test, type and duration of services provided), and outcome measurements (e.g., proportion employed at post-test and duration of continued employment). Eligible studies will be coded for methodological qualities, such as allocation concealment, blinding, sequence generation, incomplete outcome data, and selective

outcome reporting. While blinding is challenging and not always feasible in rehabilitation and behavioral studies (Friedberg, Lipsitz, & Natarajan, 2010), it will be coded if blinding occurred.

If either reviewer was involved in any of the studies, a third reviewer will code that study to minimize bias. Inter-rater reliability will be established between the two reviewers prior to beginning coding activities. Reasons for the decision will be noted for each study. Notes for each study of both coders will be compared. If both coders agree on the eligibility decision for a study, the study will be included in the review. The reviewers will independently record all excluded studies along with the reasons for exclusion. If there is a disagreement in coding, reviewers will strive for consensus. If consensus is not reached, then a third reviewer will be asked to decide the coding conflict.

Quality Assessment

Two project reviewers (one with methodological expertise and one with content expertise) will code studies for methodological quality. These coders will pilot test the coding protocol to establish inter-rater agreement before coding studies for this project.

We will use the Cochrane's risk of bias tool and assess five factors this device addresses: sequence generation; allocation concealment; blinding of participants, personnel, and data collectors; incomplete data; and selective outcome reporting (Higgins & Altman, 2008). We will code these factors as low risk, high risk, and unclear/unknown. For these factors, we will provide a Risk of Bias Table and Risk of Bias Summary. Other data will be extracted design, review process (i.e., peer reviewed, not peer reviewed, unknown), type of publication (e.g., journal article, book chapter, dissertation, paper presentation), and presence of control group (Higgins & Altman, 2008; Wortman, 1994). Percentages and frequencies will be provided for all factors. Furthermore, all factors will be analyzed as sub-group analyses to assess their potential explanatory impact on the effect of the intervention.

Statistical Procedures and Conventions

We anticipate that a small number of studies will be included in this systematic review. However, we expect that the number of studies will be adequate to conduct a meta-analysis. Comprehensive Meta-Analysis 2 (CMA2; Biostat, 2005) will be used to conduct the meta-analysis. We will conduct an overall meta-analysis combining the experimental and quasi-experimental designs first. This will be followed by subgroup analyses including examining experimental studies separately from quasi-experimental. Next, we will determine how type of comparison group influences the effect size. We will use random effects models to conduct the meta-analysis, with inverse variance weighting of studies. Forest plots will be used to display effect size, 95% confidence intervals, and weighting.

Characteristics of Primary Literature

We will develop a descriptive table—Table of Characteristics of Primary Research—of all the included studies in the analysis. This table will include participants, sample size, description of the intervention, outcome variables, and observed effect size.

Effect Size for Binary Variables

The primary outcome variable is binary competitive employment outcomes (e.g., presence or absence of gaining competitive employment). Most employment intervention studies report whether or not participants in the intervention and control group obtained employment. We will report odds ratios for binary outcomes including the primary outcome. In the analyses, we will compute log odds ratio and standard error of the log odds ratio for binary outcome variables and then convert back to odds ratios. We do not anticipate having to convert odds ratios to Cohen's *d*.

Effect Size for Continuous Variables

There are two expected secondary outcome variables that are continuous: mean hours worked and mean length of time employed. The effect sizes will be computed for this meta-analysis using the commonly understood standardized mean difference (Cohen's *d*). To correct for small sample bias, Cohen's *d* will be converted into Hedges *g*.

Missing Data

Situations in which outcome data is incomplete, we will attempt to contact the designated contact author and/or the first author to request the missing data.

Publication Bias

We will be conducting a grey literature search. However, to determine whether there are missing studies, a funnel plot will be used to determine any evidence of publication bias. If there is bias, the trim and fill procedure will be used to adjust for publication bias.

Heterogeneity

Heterogeneity of included studies will be assessed by using (1) a chi-squared test to determine whether *Q* is significant and (2) the *I*² to determine the proportion of variance that is due to heterogeneity (Borenstein, Hedges, Higgins, & Rothstein, 2009). A significant *Q* ($p < 0.05$) and a moderate *I*² of 0.50 will be the criteria for determining heterogeneity (Borenstein et al., 2009).

Subgroup Analysis

We will conduct subgroup analyses when there is adequate number of studies. Actual moderators that will be used if there is sufficient number of studies will be determined by

consensus upon review. Potential moderators include (1) level of education pre-injury, (2) severity of TBI, (3) type of intervention, (4) provider (demand- or supply-side), (5) duration of intervention using 6 months increments (6 mos. or less, 6.1 mos. to 12 mos., etc.), (6) subject population (civilian or military), (7) where injury occurred (fall, motor vehicle/traffic, colliding with an object, assault, combat/terror), and (8) type of comparison group (no intervention, treatment as usual, other intervention).

Sensitivity Analysis

Sensitivity analysis will be conducted to determine the robustness of findings of the pooled effect sizes examining the impact of: (1) each study on the overall summary effect, (2) separately analysing randomized control trials from quasi-experimental studies, and (3) chronological order of studies.

Treatment of Qualitative Research

No qualitative research will be included in this meta-analysis. However, we will review relevant qualitative research that concerns the results of the meta-analysis. The qualitative research will be used if it enhances the discussion of the quantitative meta-analysis. This review will be entirely separate from the meta-analysis. This discussion will be presented in a separate section within the discussion.

REFERENCES

- Agency for Healthcare Research and Quality. (2011). *Comparative effectiveness of multidisciplinary postacute rehabilitation for moderate to severe traumatic brain injury in adults (Research Protocol)*. U. S. Department of Health and Human Services. Retrieved from <http://www.effectivehealthcare.ahrq.gov/index.cfm/search-for-guides-reviews-and-reports/?productid=726&pageaction=displayproduct>
- Andelic, N., Stevens, L. F., Sigurdardottir, S., Arango-Lasprilla, J. C., & Roe, C. (2012). Associations between disability and employment 1 year after traumatic brain injury in a working age population. *Brain Injury*, *26*, 261-269. doi: 10.3109/02699052.2012.654589
- Andlin-Sobocki, P., Jonsson, B., Wittchen, H. U., & Olesen, J. (2005). Costs of disorders of the brain in Europe. *European Journal of Neurology*, *12*(Supplement 1), 1-27.
- Arango-Lasprilla, J. C., Ketchum, J. M., Williams, K., Kreutzer, J. S., Marquez de la Plata, C. D., O'Neil-Pirozzi, T. M., & Wehman, P. (2008). Racial differences in employment outcomes after traumatic brain injury. *Archives of Physical Medicine and Rehabilitation*, *89*, 988-995.
- Ben-Yishay, Y., Rattok, J., Lakin, P., Piasetsky, E. B., Ross, B., Silver, S., Zide, E., & Ezarchi, O. (1985). Neuropsychological rehabilitation: Quest for a holistic approach. *Seminars in Neurology* *5*, 252-259.
- Biostat (2005). *Comprehensive meta-analysis version 2*. www.Meta-Analysis.com
- Bogner, J. A., Corrigan, J. D., Mysiw, W. J., Clinchot, D., & Fugate, L. (2001). A comparison of substance abuse and violence in the prediction of long-term rehabilitation outcomes after traumatic brain injury. *Archives of Physical Medicine and Rehabilitation*, *82*, 571-577.
- Borenstein, M., Hedges, L. V., Higgins, J. P. T., & Rothstein, H. R. (2009). *Introduction to meta-analysis*. West Sussex: UK: John Wiley & Sons, Ltd.
- Braathen, T. N., Eftedal, M., Tellnes, G., Midtgarden, I. J., Øyeflaten, I., Haugli, L., Brage, S., Hammerstrøm, K. T., & Labriola, M. (2011). Comprehensive occupational rehabilitation programs for return to work among people on long-term sickness absence. *Campbell Systematic Reviews*. Retrieved from <http://campbellcollaboration.org/lib/project/215/>
- Braverman, S. E., Spector, J., Warden, D. L., Wilson, B. C., Ellis, T. E., Bamdad, M. J., & Salazar, A. M. (1999). A multidisciplinary TBI inpatient rehabilitation programme for active duty service members as part of a randomized clinical trial. *Brain Injury*, *13*(6), 405-415. doi: 10.1080/026990599121467

- Cattelani, R., Zettin, M., & Zoccolotti, P. (2010). Rehabilitation treatments for adults with behavioral and psychosocial disorders following acquired brain injury: A systematic review. *Neuropsychology Review*, 20, 52-85.
- Chan, F., Strauser, D., Maher, P., Lee, E. J., Jones, R., & Johnson, E. T. (2010). Demand-side factors related to employment of people with disabilities: A survey of employers in the Midwest region of the United States. *Journal of Occupational Rehabilitation*, 20, 412-419. doi: 10.1007/s10926-010-9252-6
- Cicerone, K. D., Langenbahn, D. M., Braden, C., Malec, J. F., Kalmar, K., Fraas, M., ... & Ashman, T. (2011). Evidence-based cognitive rehabilitation: Updated review of the literature from 2003 through 2008. *Archives of Physical Medicine & Rehabilitation*, 92(4), 519-530. doi:10.1016/j.apmr.2010.11.015
- Cifu, D. X., Kreutzer, J. S., Marwitz, J. H., Miller, M., Hsu, G. M., Seel, R. T., Englander, J., High, W. M., Jr, & Zafonte, R. (1999). Etiology and incidence of rehospitalization after traumatic brain injury: A multicenter analysis. *Archives of Physical Medicine and Rehabilitation*, 80, 85-90.
- Cifu, D. X., Craig, E. J., & Rowland, T., (1996). Neuromedical considerations affecting return to work in the brain injured adult. *Journal of Vocational Rehabilitation*, 7, 257-265.
- Cimera, R. E., Wehman, P., West, M., & Burgess, S. (2012). Do sheltered workshops enhance employment outcomes for adults with autism spectrum disorder? *Autism*, 16, 87-94.
- Corrigan, J. D. (1995). Substance abuse as a mediating factor in outcome from traumatic brain injury. *Archives of Physical Medicine and Rehabilitation*, 76, 302-309.
- Dikmen, S. S., Temkin, N. R., Machamer, J. E., Holubkov, A. L., Fraser, R. T., & Winn, H. R. (1994). Employment following traumatic head injuries. *Archives of Neurology*, 51, 177-186.
- Doctor, J. N., Castro, J., Temkin, N. R., Fraser, R. T., Machamer, J. E., & Dikmen, S. S. (2005). Workers' risk of unemployment after traumatic brain injury: A normed comparison. *Journal of the International Neuropsychological Society*, 11, 747-752.
- Ellerd, D. A., & Moore, S. C. (1992). Follow-up at twelve and thirty months of persons with traumatic brain injury engaged in supported employment placements. *Journal of Applied Rehabilitation Counseling*, 23, 48-50.
- Evans, L., & Brewis, C. (2008). The efficacy of community-based rehabilitation programmes for adults with TBI. *International Journal of Therapy & Rehabilitation*, 15, 446-458.

- Ezrachi, O., Ben-Yishay, Y., Diller, K. T., & Rattock, J. (1991). Predicting employment in traumatic brain injury following neuropsychological rehabilitation. *Journal of Head Trauma Rehabilitation*, 6, 71-84.
- Fadyl, J. K., & McPherson, K. M. (2009). Approaches to vocational rehabilitation after traumatic brain injury: A review of the evidence. *Journal of Head Trauma and Rehabilitation*, 24, 195-212. doi:10.1097/HTR.0b013e3181a0d458
- Fear, N. T., Jones, E., Groom, M., Greenberg, N., Hull, L., Hodgetts, T. J., & Wessely, S. (2009). Symptoms of post-concussional syndrome are non-specifically related to mild traumatic brain injury in UK Armed Forces personnel on return from deployment in Iraq: An analysis of self-reported data. *Psychological Medicine*, 39, 1379-1387.
- Finkelstein, E. A., Corso, P. S., & Miller, T. R. (2006). *Incidence and economic burden of injuries in the United States*. New York: Oxford University Press.
- Fraiser, R. T., & Clemmons, D. C. (2000). *Traumatic brain injury rehabilitation: Practical vocational neuropsychological, and psychotherapy interventions*. Boca Raton, FL: CRC Press.
- Friedberg, J. P., Lipsitz, S. R., & Natarajan, S. (2010). Challenges and recommendations for blinding in behavioral interventions illustrated using a case study of a behavioral intervention to lower blood pressure. *Patient Education and Counseling*, 78, 5-11. doi:10.1016/j.pec.2009.04.009
- Geurtsen, G. J., Van Heugten, C. M., Martina, J. D., & Geurts, A. C. (2010). Comprehensive rehabilitation programmes in the chronic phase after severe brain injury: A systematic review. *Journal of Rehabilitation Medicine*, 42, 97-110.
- Hart, T., Whyte, J., Polansky, M., Kersey-Matusiak, G., & Fidler-Sheppard, R. (2005). Community outcomes following traumatic brain injury: Impact of race and preinjury status. *Journal of Head Trauma Rehabilitation*, 20, 158-172.
- Higgins, J. P. T., & Altman, D. G. (2008). Assessing risk of bias in included studies. In J. P. T. Higgins & S. Green (Eds.) *Cochrane handbook for systematic reviews of interventions* (pp. 187-241). West Sussex, UK: John Wiley & Sons, Ltd.
- Humphrey, M., & Oddy, M. (1980). Return to work after head injury: A review of post-war studies. *Injury*, 12, 107-114.
- Hyder, A. A., Wunderlich, C. A., Puvanachandra, P., Gururaj, G., & Kobsingye, O. C. (2007). The impact of traumatic brain injuries: A global perspective. *NeuroRehabilitation*, 22, 341-353.

- Inge, K., & Targett, P. S. (2007). Assistive technology in the classroom. In Wehman, P. (Ed.), *Real work for real pay: Inclusive employment for people with disabilities*. (pp. 171-198). Baltimore, MD: Paul H. Brookes Publishing.
- Jacobs, H. E. (1997). The Clubhouse: Addressing work-related behavioral challenges through a supportive social community. *Journal of Head Trauma Rehabilitation*, *12*, 14-27.
- Kendall, E., Muenchberger, H., & Gee, T. (2006). Vocational rehabilitation following traumatic brain injury: A quantitative synthesis of outcome studies. *Journal of Vocational Rehabilitation*, *25*, 149-160.
- Keyser-Marcus, L. A., Bricout, J. C., Wehman, P., Campbell, L. R., Cifu, D. X., Englander, J., High, W., & Zafonte, R. D. (2002). Acute predictors of return to employment after traumatic brain injury: A longitudinal follow-up. *Archives of Physical Medicine and Rehabilitation*, *83*, 635-641.
- Kim, H., & Colantonio, A. (2010). Effectiveness of rehabilitation in enhancing community integration after acute traumatic brain injury: A systematic review. *American Journal of Occupational Therapy*, *64*, 709-719.
- Klonoff, P. S., Talley, M. C., Dawson, L. K., Myles, S. M., Watt, L. M., Gehrels, J. A., & Henderson, S. W. (2007). The relationship of cognitive retraining to neurological patients' work and school status. *Brain Injury*, *21*, 1097-1107.
- Kreutzer, J. S., Marwitz, J. H., Walker, W., Sander, A., Sherer, M., Bogner, J., Fraser, R., & Bushnik, T. (2003). Moderating factors in return to work and job stability after traumatic brain injury. *The Journal of Head Trauma Rehabilitation*, *18*, 128-138.
- Maas, A. I. R., Stocchetti, N., & Bullock, R. (2008). Moderate and severe traumatic brain injury in adults. *The Lancet Neurology*, *7*, 728-741.
- McCrimmon, S., & Oddy, M. (2006). Return to work following moderate-to-severe traumatic brain injury. *Brain Injury*, *20*, 1037-1046.
- Menon, D. K., Schwab, K., Wright, D. W., & Maas, A. I. (2010). Position statement: Definition of traumatic brain injury. *Archives of Physical Medicine and Rehabilitation*, *91*, 1637-1640. doi: 10.1016/j.apmr.2010.05.017
- Migliore, A., Mank, D., Grossi, T., & Rogan, P. (2007). Integrated employment or sheltered workshops: Preferences of adults with intellectual disabilities, their families, and staff. *Journal of Vocational Rehabilitation*, *26*, 5-19.
- National Institute of Neurological Disorders and Stroke. *Traumatic brain injury: Hope through research*. Bethesda (MD): National Institutes of Health; 2002 Feb. NIH Publication No.: 02-158.

- Nightingale, E. J., Soo, C. A., & Tate, R. L. (2007). A systematic review of early prognostic factors for return to work after traumatic brain injury. *Brain Impairment*, 8, 101-142.
- O'Neill, J., Hibbard, M. R., Brown, M., Jaffe, M., Sliwinski, M., Vandergoot, D., & Weiss, M. J. (1998). The effect of employment on quality of life and community integration after traumatic brain injury. *The Journal of Head Trauma Rehabilitation*, 13, 68-79.
- Ongori, H., & Agoll, J. E. (2012). Rhetoric and reality of disabilities management in organisations: A strategy to manage employee turnover. *International Journal of Learning and Development*, 2, 509-519.
- Prigatano, G. P., Klonoff, P. S., O'Brien, K. P., Altman, I. M., Amin, K., Chiapello, D., ... Maria, M. (1994). Productivity after neuropsychologically oriented milieu rehabilitation. *The Journal of Head Trauma Rehabilitation*, 9, 91-102. doi: 10.1097/00001199-199403000-00011
- Rohling, M. L., Faust, M. E., Beverly, B., & Demakis, G. (2009). Effectiveness of cognitive rehabilitation following acquired brain injury: A meta-analytic re-examination of Cicrone et al.'s (2000, 2005) systematic review. *Neuropsychology*, 23, 20-39.
- Ruttan, L., Martin, K., Liu, A., Colella, B., & Green, R. E. (2008). Long-term cognitive outcome in moderate to severe traumatic brain injury: A meta-analysis examining timed and untimed tests at 1 and 4.5 or more years after injury. *Archives of Physical Medicine and Rehabilitation*, 89, S69-S76. doi: 10.1016/j.apmr.2008.07.007
- Salazar, A. M., Warden, D. L., Schwab, K., Spector, J., Braverman, S., Walter, J., ... Ellenbogen, R. G. (2000). Cognitive rehabilitation for traumatic brain injury: A randomized trial. *Journal of American Medical Association*, 283(23), 3075-3081. doi:10.1001/jama.283.23.3075
- Shames, J., Treger, I., Ring, H., & Giaquinto, S. (2007). Return to work following traumatic brain injury: Trends and challenges. *Disability and Rehabilitation*, 29, 1387-1395.
- Shrey, D. E. (1996). Disability management in industry: The new paradigm in injured worker rehabilitation. *Disability and Rehabilitation*, 18, 408-414.
- Steadman-Pare, D., Colantonio, A., Ratcliff, G., Chase, S., & Vernich, L. (2001). Factors associated with perceived quality of life many years after traumatic brain injury. *The Journal of Head Trauma Rehabilitation*, 16, 330-342. doi: 10.1097/00001199-200108000-00004
- Tagliaferri, F., Compagnone, C., Korsic, M., Servadei, F., & Kraus, J. (2006). A systematic review of brain injury epidemiology in Europe. *Acta Neurochirurgica*, 148, 255-268.

- Trexler, L. E., Trexler, L. C., Malec, J. F., Klyce, D., & Parrott, D. (2010). Prospective randomized controlled trial of resource facilitation on community participation and vocational outcome following brain injury. *The Journal Head Trauma Rehabilitation*, *25*, 440-446. doi: 10.1097/HTR.0b013e3181d41139.
- Turner-Stokes, L., Disler, P. B., Nair, A. & Wade, D. T. (2005). Multi-disciplinary rehabilitation for acquired brain injury in adults of working age. *Cochrane Database of Systematic Reviews, Issue 3*. Art. No.: CD004170. doi: 10.1002/14651858.CD004170.pub2
- Van Velzen, J. M., van Bennekom, C. A., Edelaar, M. J., Sluiter, J. K., & Frijngs-Dresen, M. H. (2009). How many people return to work after acquired brain injury?: A systematic review. *Brain Injury*, *23*, 473-488.
- Wagner, A. K., Hammond, F. M., Sasser, H. C., & Wiercisiewski, D. (2002). Return to productive activity after traumatic brain injury: Relationship with measures of disability, handicap, and community integration. *Archives of Physical Medicine and Rehabilitation*, *83*, 107-114.
- Walker, W. C., Marwitz, J. H., Kreutzer, J. S., Hart, T., & Novack, T. A. (2006). Occupational categories and return to work after traumatic brain injury: A multicenter study. *Archives of Physical Medicine and Rehabilitation*, *87*, 1576-1582.
- Warden, D. (2006). Military TBI during the Iraq and Afghanistan wars. *The Journal of Head Trauma Rehabilitation*, *21*, 398-402.
- Warden, D. L., Salazar, A. M., Marin, E. M., Schwab, K. A., Coyle, M., & Walter, J. (2000). A home program of rehabilitation for moderately severe traumatic brain injury patients. *The Journal of Head Trauma Rehabilitation*, *15*(5), 1092-1102.
- Wehman, P., Kregel, J., Keyser-Marcus, L., Sherron-Targett, P., Campbell, L., West, M., & Cifu, D. (2003). Supported employment for persons with traumatic brain injury: A preliminary investigation of long-term follow-up costs and program efficiency. *Archives of Physical Medicine and Rehabilitation*, *84*, 192-196. doi:10.1053/apmr.2003.50027
- Wehman, P., Kregel, J., Sherron, P., Nguyen, S., Kreutzer, J., Fry, R., & Zasler, N. (1993). Critical factors associated with the successful supported employment placement of patients with severe traumatic brain injury. *Brain Injury*, *7*, 31-44.
- West, M. D., & Anderson, J. (2005). Telework and employees with disabilities: Accommodations and funding options. *Journal of Vocational Rehabilitation*, *23*(2), 115-122.
- Wortman, P. M. (1994). Judging research quality. In H. Cooper & L. V. Hedges (Eds.). *The handbook of research synthesis* (pp. 97-109). New York: Russell Sage Foundation.

Yasuda, S., Wehman, P., Targett, P., Cifu, D., & West, M. (2001). Return to work for persons with traumatic brain injury. *American Journal of Physical Medicine & Rehabilitation*, 80, 852-864.

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ROLES AND RESPONSIBILITIES

- Content: Michael West has expertise in the field of vocational rehabilitation, including RTW of individuals with TBI.

- Systematic review methods: Carolyn Graham has conducted, presented, and published meta-analyses. We will also seek guidance from Dr. John Westbrook from SEDL as necessary.
- Statistical analysis: Carolyn Graham is a research methodologist involved in designing studies, conducting power analyses, and collection and analyzing data for rehabilitation/disability studies across a number of disciplines such as medicine, education, rehabilitation counseling, psychology, and bio-engineering. Her skills in conducting quantitative research include conducting meta-analyses. She has over 16 years of experience in teaching research methods, statistics, and qualitative research.
- Information retrieval: We will seek guidance as necessary from a SEDL librarian in locating publications catalogued in US databases. For international literature retrieval, the team will seek assistance from the ECG.

SOURCES OF SUPPORT

This study was funded by Center on Knowledge Translation for Employment Research through grant #H133A100026 to SEDL from the National Institute on Disability and Rehabilitation Research (NIDRR) in the U.S. Department of Education's Office of Special Education and Rehabilitative Services.

REQUEST SUPPORT

The reviewers may seek guidance and assistance in systematic searches of international databases. Only those studies written in English will be included.

DECLARATIONS OF INTEREST

There are no conflicts of interest.

PRELIMINARY TIMEFRAME

Once the protocol is approved, authors expect to submit the first completed draft of the review within six months.

PLANS FOR UPDATING THE REVIEW

Authors will assess updating the review every three years.

AUTHORS' RESPONSIBILITIES

By completing this form, you accept responsibility for preparing, maintaining and updating the review in accordance with Campbell Collaboration policy. The Campbell Collaboration will provide as much support as possible to assist with the preparation of the review.

A draft review must be submitted to the relevant Coordinating Group within two years of protocol publication. If drafts are not submitted before the agreed deadlines, or if we are unable to contact you for an extended period, the relevant Coordinating Group has the right to de-register the title or transfer the title to alternative authors. The Coordinating Group also has the right to de-register or transfer the title if it does not meet the standards of the Coordinating Group and/or the Campbell Collaboration.

You accept responsibility for maintaining the review in light of new evidence, comments and criticisms, and other developments, and updating the review at least once every three years, or, if requested, transferring responsibility for maintaining the review to others as agreed with the Coordinating Group.

PUBLICATION IN THE CAMPBELL LIBRARY

The support of the Campbell Collaboration and the relevant Coordinating Group in preparing your review is conditional upon your agreement to publish the protocol, finished review and subsequent updates in the Campbell Library. Concurrent publication in other journals is encouraged. However, a Campbell systematic review should be published either before, or at the same time as, its publication in other journals. Authors should not publish Campbell reviews in journals before they are ready for publication in the Campbell Library. Authors should remember to include the statement: "This is a version of a Campbell review, which is available in The Campbell Library" when publishing in journals or other venues.

I understand the commitment required to undertake a Campbell review, and agree to publish in the Campbell Library. Signed on behalf of the authors:

Form completed by: Carolyn W. Graham, PhD

Date: 31 October 2013

APPENDIX

Appendix 1. Literature Search Protocol for *Employment Interventions for Return to Work in Working Aged Adults Following Traumatic Brain Injury (TBI)* Systematic Review Databases (initial/date once complete):

_____ 1. Article First (via FirstSearch)	_____ 9. MEDLINE/PubMed
_____ 2. Australia Education Index / Australian Council for Educational Research	_____ 10. NARIC REHABDATA
_____ 3. CIRRIE – Center for International Rehabilitation Research Information and Exchange Database	_____ 11. ProQuest
_____ 4. www.ClinicalTrials.gov	_____ 12. PsycExtra
_____ 5. Cochrane Central Registry of Controlled Trials	_____ 13. PsychINFO
_____ 6. ebrary: Academic Complete Collection	_____ 14. Science Direct
_____ 7. EBSCOhost Research Database	_____ 15. Web of Science
_____ 8. Google Scholar	

*****Some search engines include multiple sub- engines in their queue. Here is a list of those search engines:***

ProQuest:

<p>ABI/INFORM Complete Abstracts in New Technology & Engineering AGRICOLA AIDS and Cancer Research Abstracts Applied Social Sciences Index and Abstracts (ASSIA) Aqualine ARTbibliographies Modern (ABM) ASFA: Aquatic Sciences and Fisheries Abstracts Avery Index to Architectural Periodicals Biological Sciences BioOne Abstracts & Indexes Computer and Information Systems Abstracts COS Papers Invited Design and Applied Arts Index (DAAI) Dissertations & Theses @ VCU EconLit Electronics & Communications Abstracts Engineering Research Database Environmental Impact Statements Environmental Sciences and Pollution Management ERIC</p>	<p>Ethnic NewsWatch GenderWatch GeoRef (1693 - current) International Bibliography of Art (IBA) International Index to Performing Arts Linguistics and Language Behavior Abstracts (LLBA) Materials Research Database MEDLINE® National Criminal Justice Reference Service (NCJRS) Abstracts Database PAIS International Physical Education Index PILOTS: Published International Literature On Traumatic Stress ProQuest Dissertations & Theses (PQDT) ProQuest Historical Newspapers: Chicago Defender ProQuest Historical Newspapers: The New York Times (1851-2009) with Index Social Services Abstracts Sociological Abstracts The Vogue Archive</p>
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EBSCOhost:

<p>Academic Search Complete AgeLine Alt HealthWatch Alternative Press Index Alternative Press Index Archive AMED America: History & Life Applied Science & Technology Index Art Full Text Art Index Retrospective Associates Programs Source ATLA Religion Database Biological & Agricultural Index Plus Book Review Digest Plus Business Source Complete CINAHL CINAHL Plus with Full Text Communication & mass Media Complete Computers & Applied Sciences Complete Criminal Justice Abstracts Dentistry & Oral Sciences Source eBook Collection Economia y Negocios Education Research Complete Environment Complete Essay and General Literature Index European Views of the Americas: 1493 to 1750 Federal Research in Progress Fuente Academica General Science Full Text GreenFILE Health and Psychosocial Instruments Health Source – Consumer Edition</p>	<p>Health Source: Nursing/Academic Edition Historical Abstracts Hospitality & Tourism Complete Humanities Abstracts Humanities International Complete Index Islamicus International Pharmaceutical Abstracts Left Index Legal Collection LGBT Life with Full Text Library Literature & Information Science Index Library, Information Science, & Technology Abstracts MasterFILE Premier MedicLatina Mental Measurements Yearbook with Tests in Print Military & Government Collection Music Index Newspaper Source Plus Philosopher’s Index Play Index Psychology and Behavioral Sciences Collection Regional Business News RILM Abstracts of Music Literature Short Story Index Social Sciences Abstracts Social Work Abstracts SPORTDiscus Teacher Reference Center Urban Studies Abstracts Vente et Gestion Woman’s Studies International AP NewsMonitor Collection Web News</p>
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Web of Science:

Arts & Humanities Citation Index

Conference Proceedings Citation Index – Science

Conference Proceedings Citation Index – Social Science & Humanities

Science Citation Index Expanded

Social Sciences Citation Index

List of Search Strings for Journal Articles:

employment + brain damage employment + intervention + brain damage return to work + brain damage rehabilitation + brain damage	employment + head injury employment + intervention + head injury return to work + head injury physical therapy + return to work + head injury cognitive rehabilitation + return to work + head injury rehabilitation + return to work + head injury
employment + acquired brain injury employment + intervention + acquired brain injury occupation + acquired brain injury occupation + intervention + acquired brain injury return to work + acquired brain injury rehabilitation + acquired brain injury	

Grey Papers & Terms:

<p>_____ 1. Department of Labor http://www.dol.gov/</p> <p>_____ 2. NIDRR http://www2.ed.gov/about/offices/list/osers/nidrr/index.html?src=mr</p> <p>_____ 3. Rehabilitation Services Administration (RSA) https://www2.ed.gov/about/offices/list/osers/rsa/index.html http://rsa.ed.gov/</p> <p>_____ 4. Vocational and Rehabilitation Services for all 50 states (VDRS or VADRS) http://wdcrobcolpo1.ed.gov/Programs/EROD/org_list.cfm?category_cd=SVR</p> <p>Alabama http://www.rehab.state.al.us/ Alaska http://labor.alaska.gov/dvr/ Arizona https://www.azdes.gov/rsa/VR/ Arkansas http://ace.arkansas.gov/arRehabServices/Pages/default.aspx http://humanservices.arkansas.gov/Pages/default.aspx California http://www.dor.ca.gov/ Colorado http://www.colorado.gov/cs/Satellite/CDHS-SelfSuff/CBON/1251580884712 Connecticut http://www.ct.gov/brs/site/default.asp Delaware http://dvr.delawareworks.com/ District of Columbia http://dc.gov/DC/DDS/Rehabilitation+Services+Administration/About+RSA/Programs+Offered/Vocational+Rehabilitation Florida http://www.rehabworks.org/ Georgia http://www.vocrehabga.org/ Hawaii http://hawaiiivr.org/main/ Idaho http://www.vr.idaho.gov/index.shtml Illinois http://www.dhs.state.il.us/page.aspx? Indiana http://www.in.gov/fssa/2328.htm Iowa http://www.ivrs.iowa.gov/ Kansas http://www.dcf.ks.gov/Pages/Default.aspx Kentucky http://www.ovr.ky.gov/ Louisiana http://www.laworks.net/WorkforceDev/LRS/LRS_Main.asp Maine http://www.maine.gov/rehab/dvr/index.shtml Maryland http://www.dors.state.md.us/dors Massachusetts http://www.mass.gov/eohhs/consumer/disability-services/vocational-rehab/ Michigan http://www.michigan.gov/dhs/0,4562,7-124-5453_25392-272058--,00.html Minnesota http://www.positivelyminnesota.com/JobSeekers/People_with_Disabilities/ Mississippi http://www.mdrs.state.ms.us/client/ovr.asp Missouri http://dese.mo.gov/vr/vocrehab.htm</p>	<p>TBI + employment + intervention</p> <p>acquired brain injury + employment + intervention</p>
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Montana <http://www.dphhs.mt.gov/dsd/>
Nebraska <http://www.ncbvi.ne.gov/>
<http://www.vr.ne.gov/index.html>
Nevada <http://detr.state.nv.us/Rehab%20Pages/rehab.htm>
New Hampshire <http://education.nh.gov/career/vocational/>
New Jersey <http://lwd.dol.state.nj.us/labor/dvrs/DVRIndex.html>
New Mexico <http://www.dvrgetsjobs.com/Pages/Index.aspx>
New York <http://www.acces.nysed.gov/vr/>
North Carolina <http://www.ncdhhs.gov/dvrs/>
North Dakota <http://www.nd.gov/dhs/dvr/index.html>
Ohio <http://www.rsc.state.oh.us/default.aspx>
Oklahoma <http://www.okdrs.gov/>
Oregon <http://www.oregon.gov/DHS/vr/Pages/index.aspx>
Pennsylvania http://www.dli.state.pa.us/portal/server.pt/community/l_i_home/5278
Rhode Island <http://www.ors.ri.gov/>
South Carolina <http://scvrd.net/common/index.php>
South Dakota <http://dhs.sd.gov/drs/>
Tennessee <http://tennessee.gov/humanserv/rehab/vrs.html>
Texas <http://www.dars.state.tx.us/drs/index.shtml>
Utah <http://www.usor.utah.gov/division-of-rehabilitation-services>
Vermont <http://vocrehab.vermont.gov/>
Virginia <http://www.vadrs.org/>
Washington <http://www.dshs.wa.gov/dvr/>
West Virginia <http://www.wvdrs.org/>
Wisconsin <http://dwd.wisconsin.gov/dvr/>
Wyoming <http://www.wyomingworkforce.org/job-seekers-and-workers/vocational-rehabilitation/Pages/default.aspx>

_____5. Vocational and Rehabilitation Services for International countries

Great Britain <http://www.vra-uk.org/>
European Union <http://www.epr.eu/>
Australia <http://www.crsaaustralia.gov.au/>

_____6. Department of Labor for International countries

Great Britain <https://www.gov.uk/financial-help-disabled/overview>
<http://www.delni.gov.uk/>
European Union <http://ec.europa.eu/social/main.jsp?catId=157&langId=en>
Australia <http://deewr.gov.au>

_____7. **European Union Grey Papers.** www.opengrey.eu

Record Everything!

1. Find each above database through VCU library or through the website provided.
2. For each database, do a search with each of the above search strings.
 - a. For each new search string, view as many hits on one page as possible.
 - b. For each hit page, right click and select “Convert to Adobe PDF.”
 - c. Save the PDF on your computer in a “Search Results” –esque folder. Make sure that the file name saves as something logical by default – otherwise change it to a methods such as “Database name_Search_keyword 1 AND keyword 2.”
 - i. Even if there are no hit results, convert that webpage to PDF and save it.
3. For each search string, find articles related to the topic at hand (employment intervention/working-aged adults/TBI). Base your judgment on the title and abstract only; if you are unsure then include it in your search results anyway.
 - a. When you find a good article, fill out the “Peer-Reviewed Articles” or “Gray Papers” spreadsheets on the G-Drive. Note that each new database has a tab at the bottom of the spreadsheet.
 - b. Save the article on your computer in a “Search Results” –esque folder. Make sure that you save the file as something logical such as “Author1_Journal_Abbrev Title.”
4. When you are done for the day, do the following:
 - a. Print off the result list PDFs – try to put multiple pages on one, and/or print double-sided to save paper b/c these can get long.
 - b. Print off **two** copies of the **first page** of each article PDF (in order to get the abstracts).
 - c. For each database, you will have two manila folders: one for the result list and one for the abstracts.
 - d. Upload all of the PDFs for that day into the appropriate SEDL sub-folder on G-Drive (e.g., result list in “Peer-Reviewed Search Results,” articles in “Peer-Reviewed PDFs”).
5. Gray Papers: Search the websites of state, federal, and international organizations; government agencies, research organizations, foundations, clearinghouses, and archives.
 - a. Similar to above...record result lists and files on the computer, record in G-Drive spreadsheet, upload to G-Drive sub-folders, and print out documents to save in manila folders.
 - b. Sometimes you will come across gray papers when searching for peer-reviewed articles; simply save these gray papers as you normally would and mark where you found them.
 - i. Databases (which are included in above list) that are specific to gray papers: Conference Proceedings Citation Index, Directory of Published Proceedings, PapersFirst.
6. Maintain file folders:
 - a. Two folders per database (one for results, one for abstracts), and one-two for all gray papers

Appendix 2. Search record example for *Employment Interventions for Return to Work in Working Aged Adults Following Traumatic Brain Injury (TBI)* Systematic Review

Name	Date Found	Database	Search String	Year	First Author	Journal/Source	Title	DOI
Jessica	9/24/2012	Academic Search Complete	employment + intervention + TBI	2012	Andelic, N.	Brain Injury	Associations between disability and employment 1 year after traumatic brain injury in a working age population	10.3109/02699052.2012.654589
Jessica	9/24/2012	Academic Search Complete	employment + intervention + TBI	2010	Hart, T.	Journal of Vocational Rehabilitation	Vocational interventions and supports following job placement for persons with traumatic brain injury	10.3233/JVR-2010-0505
Jessica	9/24/2012	Academic Search Complete	employment + intervention + TBI	2006	Kendall, E.	Journal of Vocational Rehabilitation	Vocational rehabilitation following traumatic brain injury: A quantitative synthesis of outcome studies	

**Appendix 3. Coding Form for Primary Research Characteristics for
Employment Interventions for Return to Work in Working Aged Adults
Following Traumatic Brain Injury (TBI) Systematic Review**

Author(s):

Title:

Date of Pub:

Source: ___ 1. Journal

___ 2. Book or Book Chapter

___ 3. Master Thesis/Doctoral Dissertation

___ 4. Presentation

___ 5. Government Agency Report

___ 6. Organization Report

Intervention:

Employment Intervention: 1. Yes 2. No (will be excluded from study)

Participants Had TBI: 1. Yes 2. No (will be excluded from study)

Comments: _____

Type of Intervention: _____

Provider: ___ Demand Side ___ Supply Side

Duration of Intervention: _____

Design:

Randomized Controlled Trials (RCTs) _____

Quasi-Experimental _____

Other (will be excluded from study) _____

Sampling:

___ Random, specify type _____

___ Other, explain _____

Allocation Concealment ___ Yes (Low Risk) ___ No (High Risk)

___ Unclear/Unknown

Low Risk Descriptions:

___ Central allocation (telephone, web-based)

___ Sequentially numbered, opaque and sealed envelopes

High Risk Descriptions:

___ Using an open random allocation schedule (list of random numbers)

___ Assignment envelope were not opaque and/or sealed

___ Alternation or Rotation

- Date of Birth
- Case Record Number
- Random Numbers Table
- Other explicitly unconcealed assignment procedure, specify _____
- None

Unclear/Unknown Description

- Inadequate information to make a judgement.

Blinding: Yes (Low Risk) No (High Risk) Unclear/Unknown

Low Risk Descriptions:

- No blinding, but reviewers determine there is little chance that that outcome and outcome measurements are influenced by lack of blinding.
- Participants and key study personnel blinding occurred and little chance blinding was broken.
- Some blinding occurred, but either participants or key personnel were not blinded and non-blinding had little chance of introducing bias.

High Risk Descriptions:

- There is a lack of or incomplete blinding and there is a chance that outcome or outcome measurement will be influenced.
- There was an attempt to blind participant and key researchers but there is a good chance that blinding was broken.
- There was partial blinding and there is a good chance that this introduced bias.
- None

Unclear/Unknown Description

- Inadequate information to make a judgement.
- Study did not address outcome of interest.

If blinded, check those who were blinded:

- Researcher Other (explain) _____
- Participant
- Intervener
- Assessor
- Employer

Sequence Generation:

Yes (Low Risk) No (High Risk) Unclear/Unknown

Low Risk Descriptions:

- Random Numbers Table
- Random Number Generated
- Coin Flip
- Other, specify _____

High Risk Descriptions:

- Sequence generated by odd/even birthdate
- Sequence generated by date of enrolment
- Sequence generated by CRN or other rule based method. Specify _____
- Assignment by participant preference
- Assignment by clinical judgement
- Assignment by pre-assessment tool
- Assignment by availability of the intervention
- None

Unclear/Unknown Description

- Inadequate information to make a judgement.

Recruitment Pool:

- Referral
- Existing Group
- Other, Explain _____
- Criterion
- Volunteer
- Waiting List
- Not Reported

Comments:

Number of Intervention Sites: _____

If random sampling use, was the same sampling procedure used at all sites?

Yes No

Source of Sample

1. Public Agency
2. Private Agency
3. Not Reported
4. Other (explain) _____

Type of Comparison Group Yes No

If yes, check appropriate type

- Treatment as usual
- No intervention
- Alternate Service, Explain _____

Incomplete Outcome Data:

Yes (Low Risk) No (High Risk) Unclear/Unknown

Low Risk Descriptions

- ___ No missing outcome data
- ___ Equal amount of missing data across groups and all groups have similar justifications for missing data.
- ___ Dichotomous outcome data – ratio of proportion missing to observed is not relevant enough to bias the effect estimate.
- ___ Continuous outcome data - not relevant enough to bias effect size estimate.
- ___ Missing data have been appropriately imputed.

High Risk Descriptions

- ___ Unequal amount of missing data across groups and there is a good chance that this missing data is related to outcome across groups.
- ___ Dichotomous data – the ratio of the proportion missing to observed is substantial enough to introduce bias.
- ___ Continuous data – the amount of missing outcome data is large enough to introduce bias.
- ___ Conducting an “As-treated” analysis with substantial discrepancy from random assignment.
- ___ Inappropriate use of simple imputation.

Unclear/Unknown Descriptions

- ___ Information not reported.
- ___ Incomplete reporting of attrition and exclusions such as no justification of outcome data.

SUBJECT CHARACTERISITICS

Gender	Group 1	Group 2
Female	%	%
Male	%	%

Race/Ethnicity	Group 1	Group 2
_____	%	%
_____	%	%
_____	%	%
_____	%	%
_____	%	%
_____	%	%
_____	%	%

Comments:

Education

_____ Some High School

Comments:

_____ High School Graduate/GED

_____ Some College

_____ Graduated College

Table 1: Group Characteristics:

	Grp Type	Mean Age	Age Range	Males % (n)	Pre-test n	Post-test n	Attrition	Follow-Up n	F-UP Attrition n	Total Attrition
Group										
Group										
Group										
Group										

Location of Treatment

_____ Urban

_____ Rural

_____ Suburban

_____ Other (explain) _____

Comments:

Where Injury Occurred:

_____ Motor Vehicle/Traffic

_____ Fall

_____ Combat/Terror

_____ Assault

_____ Colliding with moving or stationary object

_____ Not Reported

Time since Injury:

Mean Age at Injury:

Mean Time in Coma:

Severity of Injury

- Mild
- Mild to Moderate
- Moderate
- Moderate to Severe
- Severe
- Not Reported
- Other (explain) _____

Comments:

Subject Population:

- Civilian
- Military/Veteran

Pre-Injury Employment _____

Intervention Characteristics:

- Average length of intervention program _____
- Length of time of participation activity _____
- Number of Sessions _____
- Intervention Activities included

Type of Professional conducting intervention _____

Sample Status Assessed

- Only those that obtained full-time employed
- Mixed – those that obtained full-time or part-time employed

Primary Type of Employment

- Retail Trade
- Transportation & Warehousing
- Information
- Finance
- Professional
- Education & health
- Leisure & Hospitality
- Construction
- Manufacturing
- Local government
- State government

- Federal government
- Other Service:
- Not Reported

Comments:

Employment Outcome Measure(s):

Employment outcome:

1. Employed - dichotomous –
 - a. Number employed _____
 - b. Number unemployed, still _____
2. Length of Time to Place in Employment: _____
3. Length of Time Employed: _____
4. Hours worked per week: _____
5. Dropped Out Before Placement Occurred: _____

Comments:

Selective Outcome Reporting

Yes (Low Risk) No (High Risk) Unclear/Unknown

Low Risk Description

- Study protocol is available and all pre-specified outcomes that are of interest are reported in the pre-specified way.
- Study protocol is not available but all expected outcomes along with pre-specified outcomes are reported clearly.

High Risk Description

- Reporting of pre-specified outcomes is not complete.
- Not all of pre-specified outcomes have been reported. Those that have been reported used a subset of data, used measured not pre-specified, or analysis that was not pre-specified.
- At least one primary outcome was not pre-specified.
- At least one outcome was not completely reported so that information can not be entered into meta-analysis.
- Study does not report findings for a key outcome that one would expect to

have been reported for that particular type of study.

Unclear/Unknown Description

___ Inadequate information to make a judgement.

Comments:

Fidelity of Implementation

Intervention implemented as described

___ No

___ Yes

___ Unclear

___ Not Reported

Comments:

Outcome Measures

Outcomes	Measurement	Type of Variable
Employment Status (ES)	Employed (E)/ Unemployed (UE)	Dichotomous

Mean hourly wage:

Total days employed

Dichotomous Outcome Data Study:

Outcome	Assessment Points	Valid Ns	Intervention	Comparison Group n	Statistics	Page No. & Notes
ES	Baseline		n	n	<i>p value</i>	
	Follow-Up		n	n	Chi-Square	
		% of N in Intervention n	df		95% CI	
Other						

Continuous Outcome Data Study:

Outcome	Valid N	Intervention	Comparison	Statistics	Page No. & Notes
		n	n	<i>p value</i>	
		n	n	t	
		Means	Means	F	
		SDs	SDs	df	
Outcome	Valid N	Intervention	Comparison	Statistics	Page No. & Notes
		n	n	<i>p value</i>	
		n	n	t	
		Means	Means	F	
		SDs	SDs	df	

Appendix 4. Coded Ellerd & Moor (1992) Coding Form

Author(s): **Ellerd & Moore**

Title: Follow-up at twelve and thirty months of persons with traumatic brain injury engaged in supported employment placements

Date of Pub: 1992

Source: **1. Journal:** *Journal of Applied Rehabilitation counseling*

2. Book or Book Chapter

3. Master Thesis/Doctoral Dissertation

4. Presentation

5. Government Agency Report

6. Organization Report

Intervention:

Employment Intervention: **1. Yes** 2. No (will be excluded from study)

Participants Had TBI: **1. Yes** 2. No (will be excluded from study)

Comments: _____

Type of Intervention: Supported Employment

Provider: Demand Side **Supply Side**

Duration of Intervention: _____

Design:

Randomized Controlled Trials (RCTs)

Quasi-Experimental **one group pre-post follow-up**

Other (will be excluded from study) _____

Sampling:

Random, specify type _____

No, explain: one group only

Allocation Concealment Yes (Low Risk) **No (High Risk)**

Unclear/Unknown

Low Risk Descriptions:

Central allocation (telephone, web-based)

Sequentially numbered, opaque and sealed envelopes

High Risk Descriptions:

Using an open random allocation schedule (list of random numbers)

Assignment envelope were not opaque and/or sealed

Alternation or Rotation

Date of Birth

Case Record Number
 Random Numbers Table
 Other explicitly unconcealed assignment procedure,
specify none _____

Unclear/Unknown Description

Inadequate information to make a judgement.

Blinding: Yes (Low Risk) **No (High Risk)** Unclear/Unknown

Low Risk Descriptions:

- No blinding, but reviewers determine there is little chance that that outcome and outcome measurements are influenced by lack of blinding.
- Participants and key study personnel blinding occurred and little chance that blinding was broken.
- Some blinding occurred, but either participants or key personnel were not blinded and non-blinding had little chance of introducing bias.

High Risk Descriptions:

- There is a lack of or incomplete blinding and there is a chance that outcome or outcome measurement will be influenced.
- There was an attempt to blind participant and key researchers but there is a good chance that blinding was broken.
- There was partial blinding and there is a good chance that this introduced bias.

X None.

Unclear/Unknown Description

- Inadequate information to make a judgement.
- Study did not address outcome of interest.

If blinded, check those who were blinded:

- Researcher
- Participant
- Intervener
- Assessor
- Employer
- Other (explain) _____

Sequence Generation:

Yes (Low Risk) **No (High Risk)** Unclear/Unknown

Low Risk Descriptions:

- Random Numbers Table
- Random Number Generated
- Coin Flip
- Other, specify _____

High Risk Descriptions:

- Sequence generated by odd/even birthdate
- Sequence generated by date of enrolment
- Sequence generated by CRN or other rule based method. Specify _____
- Assignment by participant preference
- Assignment by clinical judgement
- Assignment by pre-assessment tool
- Assignment by availability of the intervention

X None

Unclear/Unknown Description

- Inadequate information to make a judgement.

Recruitment Pool:

- | | | |
|---|------------------------------------|---------------------------------------|
| <input checked="" type="checkbox"/> Referral | <input type="checkbox"/> Criterion | <input type="checkbox"/> Waiting List |
| <input type="checkbox"/> Existing Group | <input type="checkbox"/> Volunteer | <input type="checkbox"/> Not Reported |
| <input type="checkbox"/> Other, Explain _____ | | |

Comments:

Number of Intervention Sites: **not specifically reported but job coaches spent 55% of time at various job sites** _____

If random sampling use, was the same sampling procedure used at all sites? Yes **x**
No

Source of Sample

5. **Public Agency - State VR**
6. Private Agency
7. Not Reported
8. Other (explain) _____

Type of Comparison Group Yes **x No**

If yes, check appropriate type

- Treatment as usual Alternate Service, Explain
- No intervention

Incomplete Outcome Data:

Yes (Low Risk) No (High Risk) Unclear/Unknown

Low Risk Descriptions

- No missing outcome data
- Equal amount of missing data across groups and all groups have similar justifications for missing data.**
- Dichotomous outcome data – ratio of proportion missing to observed is not relevant enough to bias the effect estimate.
- Continuous outcome data - not relevant enough to bias effect size estimate.
- Missing data have been appropriately imputed.

High Risk Descriptions

- Unequal amount of missing data across groups and there is a good chance this missing data is related to outcome across groups.
- Dichotomous data – the ratio of the proportion missing to observed is substantial enough to introduce bias.
- Continuous data – the amount of missing outcome data is large enough to introduce bias.
- Conducting an “As-treated” analysis with substantial discrepancy from random assignment.
- Inappropriate use of simple imputation.

Unclear/Unknown Descriptions

- Information not reported.
- Incomplete reporting of attrition and exclusions such as no justification of missing outcome data.

SUBJECT CHARACTERISITICS

Gender	Group 1	Group 2
Female	29.17 %	%
Male	70.83 %	%

Race/Ethnicity not reported	Group 1	Group 2
_____	_____ %	_____ %
_____	_____ %	_____ %
_____	_____ %	_____ %
_____	_____ %	_____ %
_____	_____ %	_____ %
_____	_____ %	_____ %
_____	_____ %	_____ %

Comments:

Education

- 21% Some High School
- 42% High School Graduate/GED
- 25% Some College
- 12% Graduated College

Comments:

Table 1: Group Characteristics:

	Grp Type	Mean Age	Age Range	Males % (n)	Pre-test	Post-test	Attrition	Follow-Up	F-UP Attrition	Total Attrition
Group	tx	31.0	NR	70.83 (17)	24	20	4	16	4	8
Group										
Group										
Group										

Location of Treatment

- Urban
- Rural
- Suburban
- Other (explain)**
- Not Reported**

Comments:

Where Injury Occurred:

- Motor Vehicle/Traffic
- Fall
- Combat/Terror
- Assault
- Colliding with moving or stationary object

X Not Reported

Mean Time since Injury: 6.3 years

Mean Age at Injury: 25 years

Mean Time in Coma: 40.4 days

Severity of Injury

- Mild
- Mild to Moderate
- Moderate
- Moderate to Severe
- Severe**
- Not Reported

Comments:

Subject Population:

- Civilian**
- Military/Veteran

Pre-Injury Employment: 100% pre-injury employed: 59% unskilled, 29% skilled, and 12% technical

Intervention Characteristics:

Average length of intervention program: NR but supported employment is indefinite

Length of time of participation activity: NR – since it is Supported employment, it would be 30 months

Number of Sessions: did report the minimum number of required contacts – supported employment varies by the needs of each participant

Intervention Activities included: 55% of job coaches spent time at worksite training of 24 participants which include 20% of this time was spent time on advocacy services. Therefore 35% of job coaches time was spent providing direct service; job coaches also monitored participant progress

Type of Professional conducting intervention: Job coaches provided intervention. Report did not indicate the educational level of job coaches or training.

Sample Status Assessed

- Only those that obtained full-time employed**
- Mixed – those that obtained full-time or part-time employed

Primary Type of Employment

- Retail Trade
- Transportation & Warehousing

- Information
- Finance
- Professional
- Education & health
- Leisure & Hospitality
- Construction
- Manufacturing
- Local government
- State government
- Federal government
- Not Reported
- Other Service: mechanic's helper, office clerk, stable keeper, kitchen helper, administrative assistant, childcare worker**

Comments:

Employment Outcome Measure(s):

Employment outcome:

6. Employed - dichotomous –

a. **Number employed** ___@12 mos. – 17; @ 30 mos - 9

b. **Number unemployed, still - 9**

7. **Length of Time to Place in Employment:** not reported

8. **Length of Time Employed:** @ 12 mos. - 86.9 days; @ 30 mos. –

9. **Hours worked per week:** Mean hours – @12 mos. - 33 hours a week; @ 30 mos. – 30 hours

10. **Dropped Out Before Placement Occurred:** @ 12 months, 4 dropped out: 2 to SUD, 1 to SSA benefits, 1 inappropriate behavior. @ 30 months – 3 to SUD, 1 SSA benefits, and 1 laid off, 1 to school

Comments:

Selective Outcome Reporting

___ Yes (Low Risk) ___ No (High Risk) ___ Unclear/Unknown

Low Risk Description

Study protocol is available and all pre-specified outcomes that are of interest are reported in the pre-specified way.

Study protocol is not available but all expected outcomes along with pre-specified outcomes are reported clearly.

High Risk Description

Reporting of pre-specified outcomes is not complete.

Not all of pre-specified outcomes have been reported. Those that have been reported used a subset of data, used measured not pre-specified, or analysis that was not pre-specified.

At least one primary outcome was not pre-specified.

At least one outcome was not completely reported so that information can not be entered into meta-analysis.

Study does not report findings for a key outcome that one would expect to have been reported for that particular type of study.

Unclear/Unknown Description

Inadequate information to make a judgement.

Comments:

Fidelity of Implementation

Intervention implemented as described

No

Yes

Unclear -

Not Reported

Comments: Study used the individual placement model of supportive employment and the use of this was indicated in the diversity of reported positions. Furthermore, all job coaches engaged in direct guidance at job sites and advocacy services, and nearly half of the job coaches monitored of participant progress.

Outcome Measures

Outcomes	Measurement	Type of Variable
Employment Status (ES)	Employed (E)/ unemployed (UE)	Dichotomous
Days Employed (DE)	Number of days	Continuous
Hours Worked (HW)	Number of hours worked	Continuous

Dichotomous Outcome Data Study:

Outcome	Assessment Points	Valid Ns	Intervention n	Comparison Group n	Statistics	Page No. & Notes
ES	@12 mos.	20	N= 20 n =17 E n = 3 UE - searching	N = 0	Only descriptive statistics reported – no chi-sq	49
ES	Follow-Up @30 mos	16	N = 16 n = 9 E n = 7 UE - searching	N = 0		
		% of N in Interventio n 100%	Df NR		95% CI NR	
Other						

Continuous Outcome Data Study:

Outcome	Valid N	Intervention @ 12 mos.	Comparison @ 30 mos.	Statistics	Page No. & Notes
HW	17	n = 17	n = 9	<i>p value</i> --	
		n	n	T --	
		Means 33	Means 30	F --	Only descriptive statistics reported
		SDs NR	SDs NR	Df - -	
Outcome	Valid N	Intervention	Comparison	Statistics	Page No. & Notes
DW	17	n = 17	n = 9	<i>p value</i> --	
		n	n	t --	
		Means 86.9	Means 226.0	F --	Only descriptive statistics reported
		SDs NR	SDs NR	Df --	