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# Employment Outcomes Following Traumatic Brain Injury: A Literature Review on the Effectiveness of Vocational Intervention

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EMPLOYMENT OUTCOMES FOLLOWING TRAUMATIC BRAIN INJURY: A  
LITERATURE REVIEW ON THE EFFECTIVENESS OF VOCATIONAL INTERVENTION

by

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A Research Paper

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Approved by:

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## **CHAPTER 1**

### **INTRODUCTION**

The field of rehabilitation counseling is distinguished in its focus on confronting the convergence of disability and dysfunction in people's lives. This sector of human services strives to address the wide array of barriers that surface from disabilities such as traumatic brain injury (TBI) with the intention of improving the individual's overall quality of life. Prevalence rates for TBI in the United States are estimated to be as high as 5.3 million persons (1.6% of the population) at any given time (Alverson et al., 2015, p. 2). Even more pertinent are large-scale national data trends on incidence from the National Center for Injury Prevention and Control showing the occurrence of at least 1.7 million TBIs across all age groups each year (Faul, Xu, Wald, & Coronado, 2010, p. 7). Being such a widespread issue, the purpose of this research is to review the literature that addresses the employment barriers experienced by individuals with TBI. More specifically, to conduct an in-depth literature review to analyze the primary obstacles for persons with TBI in obtaining and maintaining satisfactory employment in association with vocational rehabilitation methods aiding this population in overcoming those barriers. A thorough exploration of this topic is important as research findings guide the development of vocational strategies utilized for individuals with TBI and produces a framework for educating rehabilitation counselors in training.

To better understand the population on which this research focuses, Chapter 1 provides a definition of TBI, its etiology, measures of severity, and symptomology. Since TBI presents itself in many ways, it is important to understand the variation in symptoms that affect individual functional outcomes for this population. That information paves the way to a better understanding of the significance of this disability and its impact on employment rates. The

subsequent literature review and methodology portion in Chapter 2 describes current approaches to vocational intervention through the implementation of supported employment both before and during job attainment. Chapter 3 presents results through the analysis of these rehabilitative methods to portray the effectiveness of the various forms of vocational intervention. The following chapter portrays the importance of this research through a discussion that describes implications surrounding individuals with TBI and the field of rehabilitation. The paper will conclude by tying together all preceding components to both reiterate significance and point out relevant recommendations.

## **DEFINITIONS**

The Brain Injury Association of American (BIAA) defines acquired brain injury as “not hereditary, congenital, degenerative, or induced by birth trauma” with resulting effects on an individual’s physical or functional abilities (BIAA, 2019, Brain injury overview section). This paper will focus on the psychosocial outcomes of acquired brain injury due to head trauma, as opposed to those cause by congenital defects, disease, or toxin exposure.

We define head trauma as including as including injuries from falls, gunshot wounds, or explosive blasts. This type of head trauma results in brain injury that is medically defined by altered brain functioning precipitated from an external force that either penetrates the brain (open) or does not (closed) (BIAA, 2019).

According to criterion for brain injury delineated by the *Diagnostic and Statistical Manual of Mental Disorders* (5<sup>th</sup> edition), an individual with this diagnosis experiences altered levels of consciousness; memory deficits; confusion from orientation issues; neurological changes to neuroimaging; seizure disorder; visual deficits; weakness/paralysis, etc. (“Pediatric traumatic brain injury,” 2019).



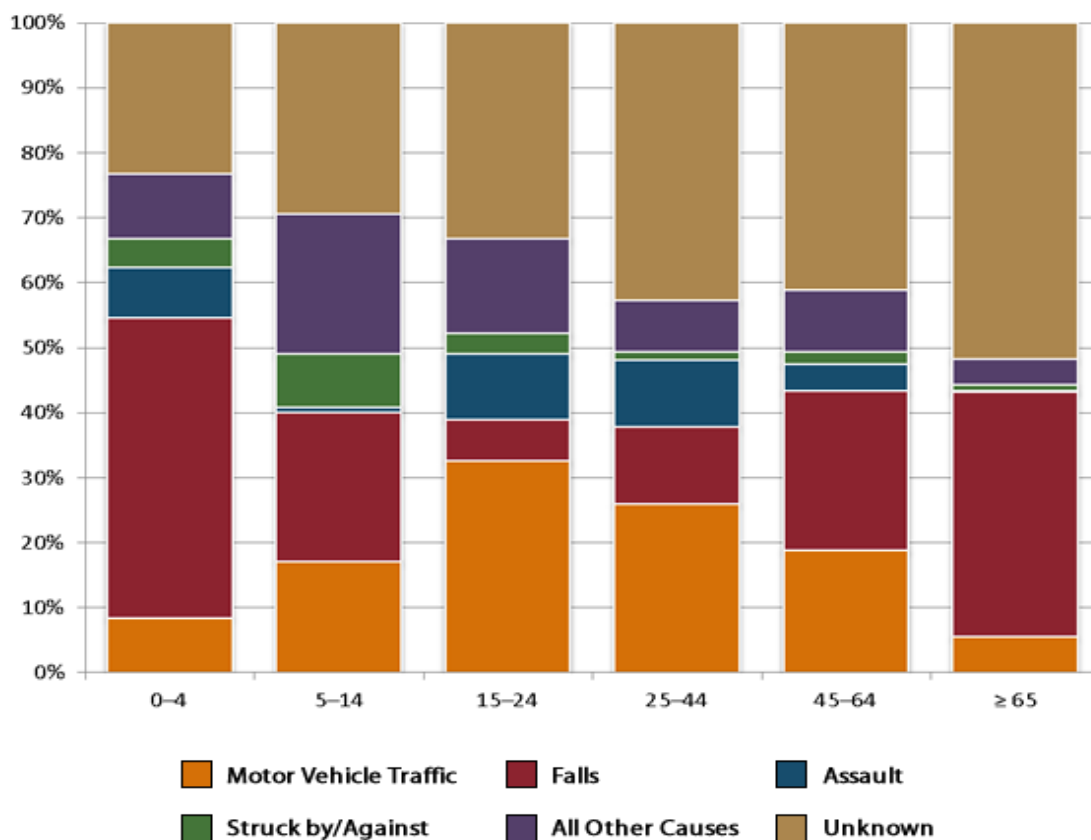
Traumatic brain injury may be acquired at birth or during the latter portion of a person's life. Data from the American Speech-Language Hearing Association (ASHA) shows that the highest annual estimates of emergency room visits related to TBI (1,256 per 100,000) pertain to children ages 0–4 years (“Pediatric traumatic brain injury,” 2019). While biopsychosocial struggles of children and their parents is an important topic, for the purpose of this literature review, we will focus on the needs of working age individuals including adolescents and adults.

## **ETIOLOGY**

Among the most challenging characteristics of traumatic brain injury is acquiring data that most accurately reflects persons with TBI as a group. Persons with TBI are not a heterogenous group. Second, TBI symptomology mimics other disorders and misdiagnosis is not uncommon. Therefore, an individual may be living with a TBI that remains undiagnosed (Coleman, Long, & Koyfman, 2018). This makes it difficult to obtain holistic etiological estimates of TBI. The National Data and Statistical Center (2018) presents data showing demographic characteristics of this population. The majority of cases occur to men (73.5%) as well as individuals that are white (66%) (“National database: 2018 profile of people within the traumatic brain injury model systems,” 2018). Employment status displays another important characteristic in that 31% are employed at time of injury and 49% are retired. Data shows that 60% of cases happen to individuals with high school education or less (“The traumatic brain injury model systems,” 2017).

A full representation of injury mechanisms of TBI's categorized by age is provided in *Figure 1. Percent Distributions of TBI-related Hospitalizations by Age Group and Injury Mechanism - United States, 2006-2010*. It presents data showing that majority of injury mechanisms of TBI occur to individuals ages 4 and below as well as 65 years and older. The

frequency of TBI hospitalizations result from vehicular crashes that increase through 44 years of age. It is evident that young adults ages 15 to 24 years are hospitalized most frequently from TBI as a result of vehicular accidents (Centers for Disease Control and Prevention). Given the multiplicity of causes and their potential influence on recovery, it can be assumed that affected individuals encounter an incredibly complex variety of symptoms, severity levels, and course of treatment based on the individual and nature of the injury itself.



*Figure 1.* Percent Distributions of TBI-related Hospitalizations by Age Group and Injury Mechanism - United States, 2006-2010. Reprinted from “Traumatic brain injury & concussion.” Copyright 2017 by the Centers for Disease Control and Prevention. Reprinted with permission.

Military members of Operation Enduring Freedom and Operation Iraqi Freedom (OEF/OIF) are especially susceptible to traumatic brain injury based on their likelihood to be

exposed to improvised explosive devices, training incidents, gunshot/shrapnel wounds, and vehicular accidents, and so forth (Turgoose & Murphy, 2018). Members of military branches in the United States have traumatic brain injury prevalence rates as high as 15.2-22.8% for OEF/OIF alone (Turgoose & Murphy, 2018). That means individuals in the military are nearly 15-20x more likely to experience TBI than civilians. Thus, veterans make up an overwhelming portion of the TBI population with a dire need for employment at an alarming unemployment rate of 45% (Pogoda et al., 2016).

## **SEVERITY**

The field of rehabilitation and medicine has developed methods of assessing severity. Severity of traumatic brain injury ranges from mild with brief alterations to mental state or consciousness to severe with longer periods of losing memory or consciousness post-injury (CDC, 2017). The organization further goes on to describe the technique of evaluating severity through the use of an instrument called the Glasgow Coma Scale. Its creators constructed it as a measurement tool that analyzes characteristics of comatose or impaired consciousness through a scoring system. Classification of severe TBI is represented by scores of 3 to 8, moderate scores of 9 to 12, and mild scores of 13 to 15 (CDC, 2017, TBI Classification Systems section, para. 1).

The Glasgow Coma Scale may be the most widely known severity assessment tool. Measurement takes place at the location of the incident and in intervals during hospital care to assess the depth of coma through eye opening, verbal response, and movement (Novack & Bushnik, 2019). These comatose characteristics are used to estimate the extent to which the injury has damaged brain tissue (Novack & Bushnik, 2019). However, healthcare providers must often use a more holistic approach to quantify the degree to which a traumatic injury has impacted someone.

Severity assessment is an essential part of the rehabilitation process because it provides a guide for vocational rehabilitation professionals for anticipating the levels of intervention that may be required for that person to resume function areas that contribute to their quality of life, including employment. Assessments provide a classification framework for recovery prognosis, anticipated limitations, and treatment plan development. However, individuals' response to the injury and rehabilitation efforts are distinct, so classification suggests potential vulnerability and not a pre-determined outcome. Severity assessments do provide a baseline for measuring the individuals' future progress, and they are very useful for program planning and case management. The following table illustrates the several criteria used to come to the final scoring determination.

*Table 1. Criteria used to classify TBI severity*

<b>Criteria</b>	<b>Mild</b>	<b>Moderate</b>	<b>Severe</b>
Structural Imaging	Normal	Normal/abnormal	Normal/abnormal
Loss of Consciousness	< 30 mins	30 mins - 24 hrs	>24 hrs
Consciousness/Mental State Alteration	A moment to 24 hrs	>24 hrs	>24 hrs
Post-traumatic Amnesia	0-1 day	>1 and <7 days	>7 days

<b>Criteria</b>	<b>Mild</b>	<b>Moderate</b>	<b>Severe</b>
Glasgow Coma Scale (Best score in 24 hours)	13–15	9–12	3–8
Abbreviated Injury Severity Scale	1–2	3	4–6

Reprinted from “Multidisciplinary post-acute rehabilitation for moderate to severe traumatic brain injury in adults,” by Brasure et al. Copyright 2012 by the Agency for Healthcare Research and Quality. Reprinted with permission.

## **SYMPTOMS**

Symptoms of traumatic brain injury, often referred to as sequelae, are unique to each individual and frequently appear relative to the individual’s severity assessment. A heterogeneous cluster of short- or long-term physical, cognitive, emotional, behavioral, or social impairments are commonly reported following moderate to severe TBI, which can create developmental issues among children, and affect socialization, and progression toward independence at any age group (Faul & Coronado, 2011). People with TBI have been studied empirically from medical neuropsychological and behavioral viewpoints (Ylvisaker, Jacobs, & Feeney, 2003). Results have been neither consistent nor conclusive. Some individuals have little or no neurological abnormality and display an apparently “normal” social appearance yet they have subtle neurobehavioral difficulties that interfere with performance in everyday activities (Wood & Rutterford, 2004). For others, gains are seen in psychosocial function with no improvement in cognitive functioning (Kendall, 1996). These differences are largely based on the vast differences that exist within the population of individuals with TBI.

Symptomology may present itself through cognitive, somatic, or emotional manifestations (Theadom et al., 2018). Cognitive symptoms involve impairments to concentration, thought processing, or memory. There is also a heightened potential for somatic symptoms such as fatigue, headaches, or dizziness. Emotional symptoms may include irritability, frustration, or restlessness (Theadom et al., 2018). No two experiences are identical between individuals with TBI based on the intricate, complicated nature of the human brain. Further, any of the aforementioned symptoms may dissipate early in the recovery process or may emerge over time (Nichols & Kosciulek, 2014).

### **SIGNIFICANCE OF THE PROBLEM**

This population faces significant barriers in their rehabilitation process in many aspects of living, particularly in regard to employment. Individuals with TBI face obstacles associated with memory, visual disturbances, fatigue from sleep deprivation, uncontrollable emotions, and mood swings (Wyse et al., 2018). Issues experienced in the workplace surface through job task fluidity, lower-self-esteem, communication, social interaction, memory, or learning new skills/technology (Materne, Lundqvist, & Strandberg, 2017). Barriers to service accessibility emerge as individuals require individualized cognitive supports in the workplace that aid in organization, time-management, memory, and attention (Minton et al., 2017). It is particularly challenging for this population to adhere to the structure/pace of a work environment, concentrate, control their emotions, and manage inappropriate behaviors (Rumrill et al., 2017). Other barriers stem from productivity, competitive environments, disability stereotypes, disability intolerance, transportation, and an overall lack of workplace accommodations.

Research shows that people who have experienced TBI are less likely to regain employment. More specifically, roughly 40.7% of persons with TBI return to work one year

post-injury and 40.8% after two years (Van Velzen et al., 2009, para. 3). Data further shows that 35% of patients with TBI at inpatient rehabilitation facilities are employed part-time at two years post-injury (Cuthbert et al., 2015). 5-year outcomes show that 57% of those that survive their injury are either moderately or severely disabled and 55% do not have a job despite being employed pre-injury (“The traumatic brain injury model systems,” 2017). 33% of individuals that have sustained TBI rely on external assistance for activities of daily living and 29% report being unsatisfied with their lives (“The traumatic brain injury model systems,” 2017).

In summary, from one-third to one-half of people that have sustained TBI lose their ability to support themselves financially. This data stretches across ages, severity levels, and even rehabilitative methods. It is crucial to understand that these statistics quantify exactly how a subpopulation’s obstacles outweigh employment success stories. The focus here is that employment is a means of independence and financial stability. Thus, effective intervention methods are the most powerful influence in the pursuit of fulfilling, feasible employment.

## **CHAPTER 2**

### **METHODS**

Rehabilitative strategies have been introduced and tested as methods of making individuals with traumatic brain injury more employable. The aforementioned barriers emphasize that vocational rehabilitation represents its own important area of focus as part of the rehabilitation process in full. Vocational rehabilitation interventions to these challenges are implemented through several studies that address cognitive characteristics of TBI as they relate to the provision of supported employment.

The working definition of cognition involves any activity where one is situationally aware and capable of fulfilling needs, goals, and required actions as a means of effectively optimizing quality of life (Borson, 2011). Since cognitive ability is directly affected by the nature and severity of the injury to the brain, it becomes a vital focus of many approaches to TBI rehabilitation. The cognitive training implemented in this field relies on compensatory strategies applying across tasks that require multiple skills or ones that pertain to specific singular tasks (Hart et al., 2010). It addresses skills in quality control such as the utilization of feedback as well as the review of skills or rules relative to the job (Hart et al., 2010). This commonly includes repetitive-type tasks (e.g. remembering or rapidly responding to information); solving challenging or frustrating tasks; attention improvement (e.g. talking aloud through tasks); or breaking up material into manageable chunks (McGurk & Wykes, 2008). Although programs may have differences in training delivery, most cognitive interventions address more than one domain at least two hours per week over the course of roughly three to six months (Twamley, Jeste, & Bellack, 2003).

Grauwmeijer et al. (2012) provided a prospective employment outcome study including



data from a cognitive perspective in the vocational rehabilitation process. Authors analyzed the correlation between employment rates and cognitive impairment in individuals with TBI. Participants included 113 patients between the ages of 18 to 65 years with severity levels from moderate (26%) to severe (74%). These individuals were discharged from neurosurgical departments within trauma centers. Authors utilized data from the Glasgow Coma Scale as a means of functional assessment for baseline data. Participant would then receive a 1- to 3-year follow up regarding employment status as well as correlated predictors to acquiring employment.

Another study addressing cognitive components of TBI by O'Connor et al. (2016) presents additional data on employment outcomes. It emphasized the need for data that analyzes the influence of methodological cognitive intervention rather than simply observing employment outcomes related to one's cognitive dysfunction. Authors provided cognitive training to participants over a 12-week period. The control group received client-centered therapy without any focus on cognition. Thus, authors could isolate cognitive characteristics of the vocational rehabilitation process as its independent variable as means of preventing skewed results. Participants were randomly assigned to groups to further strengthen validity.

Centralizing cognition is crucial to the implementation of supported employment (SE) as an approach to vocational rehabilitation both before and during the length of time an individual holds employment. This method predominantly utilizes the expertise of a specially trained professional as a source of direct support. Supported employment utilizes skill training in a client's ability to identify sources of support (i.e. compensatory memory strategies, assistive technology) that assist in learning how to perform the job and more importantly how to meet the employer's standards of performance (Wehman et al., 2003). Another influential characteristic of SE is the implementation of long-term follow-up services as long as the individual needs. This

includes onsite assistance as well as offsite assistance to resolve issues that could impede upon job performance (Wehman et al., 2003).

A study by Gamble & Moore (2003) evaluated the connection between job placement in competitive positions and the implementation of a supported employment strategy for individuals with traumatic brain injury. Researchers involved 1,073 participants which were clients at vocational rehabilitation facilities. 953 (88.8%) of participants received severe diagnoses while 120 (11.2%) were mild-moderate severity with ages ranging from 16 to 71 years. The control group received vocational rehabilitation but did not receive supported employment services.

O'Reilly, Lancioni, & O'Kane (2000) presented a qualitative study on outcomes resulting from supported employment with individuals with TBI prior to and during employment. The study effectuated a treatment plan where participants are taught problem solving skills common to the workplace. Skills training included initiating social contact; making decisions; responding to criticism; resolving differences; and appropriate nonverbals (eye contact, personal space, demeanor). Authors conducted a task analysis on these skills at baseline, during the intervention, and during a 6-week follow-up.

## CHAPTER 3

### RESULTS

Results from the Grauwmeijer et al. (2012) study on employment outcome predictors associated with cognitive training intervention showed the employment rate dropping from 80% preinjury to 15% at 3 months postinjury. It significantly increased to 55% from 3 months to 1 year but revealed no significant change from 1 to 3 years postinjury. Other potential determinants to acquiring employment correspond to the participants' age, length of hospital stay, discharge location, and psychiatric symptomology in this sample. Nevertheless, these percentages support the notion that consequential impaired cognitive ability from TBI is associated with the greatest risk of long-term unemployment.

The study presented by O'Connor et al. (2016) found that after the 12 weeks of treatment, 50% of participants in the group receiving cognitive training attained competitive employment while only 12.5% of the control group attained any competitive employment outcomes. Qualitative results from participants that received cognitive intervention were reportedly highly satisfied with regard to improvements in goal setting, organization, attention, situational reinterpretation, and deadline timeliness. There were no significant quantitative differences related to competitive versus noncompetitive job attainment between the two groups.

The Gamble & Moore (2003) study provided results showing that 53 (67.9%) of the participants given supported employment services were placed and maintained in competitive employment. 468 (47%) of participants that did not receive supported employment services were competitively employed. Authors further deduced that out of the competitively employed participants, there were significant differences in earnings, hours work per week, and treatment costs.

Results from the qualitative study by O'Reilly, Lancioni, & O'Kane (2000) show effectiveness of supported employment as it influences employment outcomes. Participants reportedly displayed inadequate or inappropriate behavior during baseline assessment in terms of initiating social contact; making decisions; responding to criticism; resolving differences; and appropriate nonverbals (eye contact, personal space, demeanor). However, results show improvements in the participants' ability to demonstrate these skills during intervention and follow-up. Through the use of observation, interviewing, and self-report surveys it was determined that the implementation of supported employment is not only effective in skills relevant to the workplace but also satisfactory from the perspective of the participants.

## **CHAPTER 4**

### **DISCUSSION**

Despite the statistics showing the need for employment for individuals with TBI, challenges continue to persist as more citizens sustain injuries. Among the various approaches to rehabilitation, some of the most crucial are vocational methods that focus on aspects of cognition as they relate to supported employment. This literature review presented several studies whose results were able to provide quantifiable efficacy outcomes of strategy implementation to this population. Realistic examples of these interventions being put to use. This literature assessed the effectiveness of vocational rehabilitation for TBI as a part of a holistic approach with the ultimate goal of improvement to quality of life. The results provide quantifiable and descriptive evidence of these interventions having a positive influence on employment outcomes.

In this context, it is much more effective to incorporate data that directly analyzes correlations between rehabilitation interventions and employment outcomes rather than solely employment rates for the entire TBI population. Broad employment rates do not account for the influence of particular vocational rehabilitation strategies. Even further, employment statistics are substantially associated with the severity of the injury. Much of the concepts put forth in this literature applies to individuals with moderate-severe injuries. This stems from the fact that mild injuries do not often lead to the presence of intrusive symptoms that considerably interfere with attaining or maintaining employment. Obstacles surface alongside any severity level and are unique to every injury as well as each individual. For that reason, these types of conceptual findings are able to be expanded to the entire traumatic brain injury population. It is more effective to produce solution-focused literature that may improve anyone's quality of life and employability rather than exclude individuals with milder severity assessments.

## **CHAPTER 5**

### **SUMMARY, CONCLUSION, RECOMMENDATION**

#### **SUMMARY**

The acquisition of a traumatic brain injury is highly prevalent in the United States. This leaves a substantial portion of society with a need for services that assist in the attainment of competitive employment as well as support in its maintenance. This literature explains barriers to employment to emphasize the influence that cognition has on persons with TBI. These cognitive barriers are particularly pervasive within the scope of attaining long-term satisfactory employment. Thus, it is important to address cognitive characteristics through the implementation of supported employment. Vocational rehabilitation focuses on aspects of employment that require individuals with TBI to use facets of thought that are relevant to work expectations like memory, reasoning, attention, and so forth. Supported employment focuses less on the preparatory training of brain functions and more on the continuous, lifelong experiences in the workplace itself.

#### **CONCLUSION**

The importance of this literature review lies within its confrontation of barriers to a considerable portion of society needing rehabilitation services pivotal to regaining adequate employment. Addressing these challenges enables individuals with TBI to regain the independence they had before their injury. Financial stability is a major component of leading the autonomous life in which every person has the fundamental right to acquire. Having the ability to make your own decisions is the most important necessity when it comes to having a fulfilling quality of life. Even further, simply gaining employment does not exclusively lead to positive outcomes if it is neither competitive, desirable, nor stable over one's lifetime. This

literature review confronts the complexities of cognitive deficits rather than shy away from a population with considerable barriers to employment.

There are several implications surrounding individuals with traumatic brain injury, all persons with disabilities, and the field of vocational rehabilitation. Individuals with disabilities must confront the financial burden of unemployment often made worse by crippling medical debt. Even if someone can overcome the obstacles presented to their activities of daily living, they would require resources and support to manage their financial stability. A source of income allows independence in housing, hobbies, personal resources, transportation, social/community experiences, and so forth. Stable income through well-paid, fulfilling employment has become its own sector of rehabilitation. Rehabilitation professionals approach treatment holistically but have learned the importance of focusing on vocation in order to emphasize autonomy as one of the most crucial ethical rights of a human being.

## **RECOMMENDATION**

There remains a need for data on this topic that is more accurate when it comes to incidence and prevalence rates for traumatic brain injury. This would enable research to include persons treated outside of hospitals and even those receiving no medical care at all. Even further, information on this population would be better representative if rates were determined by each state. Legislators would be better equipped with knowledge on incidence and prevalence in their own state to construct more effective funding allocation for vocational rehabilitation. Most statistics appear outdated and largely developed through non-systematically inflated estimations associated with hospital numbers.

The lack of data in this topic extends into the issue of inadequate national estimates of employment for those with TBI. These numbers are both difficult to find and lacking any recent

information that separates traumatic brain injury aside from disability as a whole. Thus, it is especially challenging to analyze country-wide outcomes related to vocational rehabilitation methods. This literature leans on the findings of small-scale studies to represent this diverse population. United States employment estimates that do exist tend to reference the entire TBI population and neglect to address whether or not individuals are receiving interventions that influence these numbers.

A major downside of this research comes from the financial perspective in the field of rehabilitation. Average case expenditures for competitively employed individuals receiving treatment like supported employment were twice as high as expenditures for counterparts not provided services (Gamble & Moore, 2003). This leads into an issue faced in the field regardless of the nature of one's disability. State and federal legislation is more heavily geared toward ensuring that individuals with disabilities are receiving services that enhance quality of life. Substantial progress must be made in the provision of laws and regulations that enable agencies to have access to sufficient resources and money to provide services correlated with successful outcomes in research.

Other recommendations revolve around the interventions themselves. These would be open to improvement through the introduction of special methods designed for subpopulations by age, gender, non-English speaking citizens, race/ethnicity, and other demographics. Characteristics of being a competitive job candidate differ in relation to the make-up of the individual. It goes back to the notion that individualized treatment faces much greater likelihood to be effective. Current strategies could implement a guiding foundation that leaves space for customization based on the unique multicultural needs of the individual.



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