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Tbi And Long-Term Competitive Employment As A Function Of Services Provided By Vocational Rehabilitation

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TBI AND LONG-TERM COMPETITIVE EMPLOYMENT AS A FUNCTION OF
SERVICES PROVIDED BY VOCATIONAL REHABILITATION

by

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A Dissertation

Submitted to the Graduate Faculty

of the

University of North Dakota

In partial fulfillment of the requirements

for the degree of

Doctor of Philosophy

Grand Forks, North Dakota

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2013

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This dissertation, submitted by Natasha Adamson in partial fulfillment of the requirements for the Degree of Doctor of Philosophy from the University of North Dakota, has been read by the Faculty Advisory Committee under whom the work has been done, and is hereby approved.

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Natasha Adamson
August 2013

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ABSTRACT

Objective: Research has demonstrated the importance of vocational rehabilitation (VR) for individuals with traumatic brain injury (TBI) who seek competitive long-term employment. Unfortunately, there has been minimal research on the provision of services provided by VR as a moderating factor, and almost non-existent research for individuals in rural regions. Research in this area is crucial given that the services are provided as a way to increase the individual's likelihood of overcoming barriers to gaining employment. Therefore, this study focused on individual's diagnosed with TBI who are clients of North Dakota's Division of Vocational Rehabilitation (DVR) and the connection between services provided by DVR and long-term competitive employment. Method: 327 consumers of VR services who had sustained a TBI were tracked between 2007 and 2011 Federal Fiscal Year (FFY). Results: Cross tabulations revealed significant relationships between obtaining/maintaining long-term employment and consumers who participated in diagnosis and treatment services ($p = .01$), provision of job readiness services ($p = .01$), on-the-job support services ($p = .02$), and job placement services ($p = .001$). Contrary to previous research, no significant differences were found between individuals who received supportive employment and their counterparts. Conclusions: The results of this research have important implications for practitioners and patients. In general, some services may be more effective for individual's diagnosed with TBI in state VR

agency settings than others. Overall, these findings provide evidence to help assist practitioners in treatment planning.

CHAPTER I

INTRODUCTION

Traumatic brain injury (TBI) is a complicated disability involving a wide range of cognitive, physical, emotional, and sensory deficits (Chesnut, Carney, Maynard, Mann, Peterson, & Helfand, 1999). While TBI represents a global health issue, those with TBI in the state of North Dakota have their own specific needs and issues for vocational rehabilitation. Each state's Vocational Rehabilitation program functions differently, again adding to the complexity of the issues, and causing a need for information specific to each state (Elliot & Leung, 2005). All the factors involved make post-injury employment difficult to predict.

For individuals seeking meaningful and sustaining employment, TBI has considerable long-term physical, emotional, and vocational implications. Unemployment rates for individuals with TBI are extremely high, with estimates as high as 78% (Kreutzer et al., 2003). There are a variety of factors that play into the complication of unemployment including: functional limitations of the individual, emotional issues, environmental factors and difficulty reintegrating into the workforce.

There are often considerable costs associated with the acquisition of a TBI. Costs may incur from a number of factors including (but not limited to): medical care, rehabilitation services, assistive devices, disability payments, and decreased earning capacity. One study estimated that the average cost of acute care and rehabilitation of a

severe TBI was \$164,238 (Harrison-Felix, Newton, Hall & Hreutzer, 1996). Another study looked at the cost associated with permanent disability after TBI and estimated the loss of national income in the first year to be \$642,961,200, and approximately \$96,443,900 loss of income revenues (Johnstone, Mount, & Schopp, 2003). The increasing rates are likely connected to ongoing medical advances leading to an increase in survival rate. Thus there is an increase in the number of working-age adults who are living with long-lasting vocational and financial difficulty (Johnstone et al., 2003).

Individuals who acquire a TBI are frequently altered both physically and psychologically. Changes in both domains can have an impact on an individual's ability to cope and process the acquisition of a disability. TBI is also often associated with awareness deficits and adds complexity to the problem (Bach & David, 2006). Awareness has been shown to have a negative effect on motivation and self-monitoring (Dixon & Layton, 1999). Lezak (1995), which can have substantial consequences for a number of areas in the patient's life such as: interpersonal relationships, rehabilitation, and the ability to obtain competitive employment.

The opportunity to obtain competitive employment is important for a number of reasons. Competitive employment provides the opportunity to earn wages and benefits, which could lead to a greater independence for the individual. The ability to be productive on a daily basis has been shown to be meaningful and vitally important to one's self-esteem and dignity (Turner & Turner, 2004). Also the establishment of relationships and networks of social support in the employment community is usually facilitated by having a job within a career path. Incidences of poor employment outlook

following TBI are a global problem, resulting in personal and societal consequences (Noone, 2011).

Vocational rehabilitation (VR) services frequently play a vital role in positive employment outcomes. One way individual's with TBI can be assisted by VR is through the provision of services that are referred, located, established and/or provided. Provided services can do many things for the individual including: improve an individual's ability to perform activities of daily living, help the individual understand current functional abilities/disabilities, and decrease the need for outside assistance. Thus such services can greatly contribute to an individual's ability to obtain and/or maintain employment (Flavo, 2005).

State vocational rehabilitation is a commonly utilized program of individuals who acquire a TBI. Unfortunately there are a small number of studies on state vocational rehabilitation clients diagnosed with TBI. Due to the important role the agency plays in an individual with TBI's ability to obtain and/or maintain employment research in this area is imperative. Further understanding in the area can help improve the fund of knowledge regarding the process of these clients and the services connected to successful employment.

Purpose of the Study and Research Questions

The purpose of this study is to identify fundamental factors associated with the successful employment (gaining and/or maintaining competitive employment for 90 days) outcomes of clients of North Dakota's Department of Vocational Rehabilitation diagnosed with Traumatic Brain Injury. Specifically, data contained in the RSA-911 case reports for the state of North Dakota between 2007 and 2011 Federal Fiscal Year

(FFY) were used. The demographic variables of the individuals and regional offices were explored. This study specifically aims to address the following questions regarding clients with TBI, receiving Vocational Rehabilitation services in the state of North Dakota:

1. How does the provision of assessment services relate to employment outcome?
2. What is the relationship between diagnosis services and employment outcome?
3. Is employment outcome affected by the provision of job readiness services?
4. What is the relationship between on the job support services and employment outcome?
5. How is employment outcome related to the utilization of supportive employment?
6. What is the relationship between the provision of job placement services and employment outcome.

CHAPTER II

LITERATURE REVIEW

This chapter reviews the current literature related to traumatic brain injury (TBI) and state vocational rehabilitation. The following includes factors that influence long term employment, such as type of physiology, severity, and cognitive changes associated with TBI. Then I will discuss issues related to vocational rehabilitation including important legislation, process and services provided. Following I will explore the literature on successful long-term employment of vocational rehabilitation clients who have TBI. I will end with a review of the purpose and rationale for the study leading to my hypotheses.

Traumatic Brain Injury

Each year in the United States approximately 3 million people sustain a traumatic brain injury (TBI) (TBI; Silver, McAllister & Yudofsky, 2005). Of those individuals approximately 80-90,000 people have a long term disability according to the Center for Disease Control (MMWR; 2006). In the United States the rate of TBI leading to death is approximately 50,000 individuals a year (Zasler, Katz, & Zafonte, 2007). Though the global incidence of TBI is unknown, the Global Burden of Disease Study estimates approximately 9,500,000 cases of TBI were severe enough to warrant medical care or result in death (Thurman, 1996). This number is most likely an underestimate as it does not include individuals who did not need, or seek, medical care

unless the end result was death (Roebuck-Spencer & Shere, 2008). The high number of new TBI injuries each year, the toll on the individual and their support circle, and the still vast amount of unknown information establishes TBI as a disorder still in need of much research.

Work is a part of the everyday life for all individuals. Whether a person holds a full-time job, part-time employment, spends their days as a homemaker, or is unemployed, they are affected by the world of work in one way or another. Work affects our livelihoods, social wellbeing, self-identity, as well as many other aspects of our lives. Individuals with TBI have unique needs and issues related to employment. High medical bills and assistive needs establish income as an important factor in the lives of individuals with TBI, as well as the lives of their families (Rubin & Roessler, 2000). This coupled with the importance that work holds for most people, and the distinctive needs and limitations someone with TBI usually has, makes this an imperative area for consideration.

Physiology

Traumatic Brain Injury (TBI) is defined as an injury occurring to the brain from an external force, which may or may not result from actual impact to the skull. A TBI is not generally considered a degenerative impediment, the result of a disease, or of a congenital origin. A multitude of effects including physical, cognitive, emotional, and behavioral can occur as a result (Falvo, 2005). The most common causes are traffic accidents (highest percentage), domestic/industrial accidents, sports/recreational injuries and assaults (Silver, 2011). Over the past few decades the incidence of TBI has increased dramatically. The increase has been strongly linked to advances in medical

care and technology, as well as improvement of emergency services (Zasler, 2007). More people are surviving from injuries that would have in previous years resulted in death. An increase in survival rate has led to an increase in the number of people suffering residual after-effects, and consequentially a greater need for attention from the rehabilitation community. Further, increased understanding of TBI has contributed increased reporting (Powell, 1994).

TBI can be classified as either an open (penetrating) head injury or a closed head injury. Open head injuries are the product of an outside object fracturing or penetrating the skull. This classification of TBI is likely to be more localized, affecting more specific regions of the brain (Flavo, 2005). In contrast closed head injuries can occur from such incidences as a blow to the head or a violent shaking of the skull, when no penetration or fracture occurs. In these occurrences the brain is damaged because the skull is impacted with enough force to result in jarring of the brain (Silver, 2011). The outcome of force within the skull is shearing of the blood vessels or nerve fibers (Flavo, 2005).

Diffuse axonal injury (DAI) results in cases where an injury is caused to the brain both from the external force as well as from movement of the brain within the skull. The initial impact is called the coup, and the impact of the brain on the opposite side of the skull is called the contre coup. This type of injury results in axonal stretching, disruption and potential separation of the nerves (Xu, Rasmussen, Lagopoulos, & Haberg, 2007; scheid, Walther, Guthke, Preul, Von Cramon, 2006). DAI is said to be the predominant mechanism of injury in approximately 40-50% of all TBIs in the United States requiring hospitalization (Meythaler, Peduzzi, Eleftherlou, &

Novack, 2001). Unfortunately this type of injury can be difficult to identify, as only 10% are revealed in CT findings (Blumbergs et al., 1995). Thus a large percentage of patients cannot be identified through this typical method. A definitive diagnosis of DAI can only be made after an autopsy (Diaz-Marchan, 1996). Combined with other commonly experienced deficits, individuals with DAI may be impaired severely in day-to-day functioning. Researchers link this to the possible global deficits associated with DAI (Meythaler et al., 2001). However the exact functional limitations resulting from DAI depend on where and how much shearing occurs (Falvo, 2005).

Following the initial damage, there is a chance of further injury should there be a development of an edema or hematoma. An edema, or swelling, results in excessive pressure in the brain called Intracranial Pressure (ICP). ICP results in a compression of blood vessels, which reduces blood flow and limits oxygenation (Donkin & Vink, 2010). A hematoma occurs when one or more sacs fill with blood within the confinement of skull. The bleeding that takes place is known as intracranial hemorrhage. Because the brain is restricted within the skull, a hard structure not meant to expand, there is no space available should swelling or bleeding occur (Silver, 2011). It is the expansion within the confined structure that may result in negative consequences, if not immediately treated. With limited space both forms of expansion compress the brain and continue to cause injury until the pressure is relieved (Falvo, 2005).

Epidural hematoma is characterized by bleeding that occurs in the space between the outer membrane of the brain and the skull, known as the duramater. In most cases the bleeding takes place quickly, and may not be initially discovered. The

swelling or bleeding causes compression of the brain and interferes with functioning. Because they are usually not immediately detected, and thus are not quickly treated, there is a high mortality rate (Le & Gean, 2009). The more time it takes to treat the problem the more likely they will cause additional permanent brain damage, or even death (Flavo, 2005).

A hemorrhage occurring in the space beneath the duramatter is known as a subdural hematoma (le & Gean, 2009). Symptoms usually appear gradually, and become evident days or even weeks after the initial injury; however in a small number of cases they appear rapidly. As with epidural hematoma action needs to take place immediately, as it is essential to stop the bleeding and relieve pressure before any permanent damage to the brain, or even death, becomes the end result (Falvo, 2005).

Literature is increasingly studying *delirium* and the resulting long-term effects. Delirium has been defined by the DSM-IV-TR as a clinical condition with the following characteristics: (a) disturbance of consciousness with inattention, (b) acute change in cognition, (c) the disturbance develops over a short period of time with fluctuations (d) without etiology resulting from physical consequences of a general medical condition (*DSM-IV-TR*; APA, 2000). Many head injuries result in significant trauma that requires hospitalization. Studies have shown that the prevalence of delirium in patients treated in the ICU range between 20% and 80%, and often depend on the severity of injury/illness, as well as the instrument used to assess for delirium. These individuals often suffer long-term sequelae in the form of cognitive impairment (Jackson, Mitchell & Hopkins, 2009).

Individuals suffering long-term cognitive impairment as the result of delirium typically have problems with, memory, executive functioning, and attention. These problems alone, without the complication of a TBI, can result in: caregiver burden, and increased medical costs, difficulty returning to work, reduced life satisfaction, and psychological problems (e.g., depression and anxiety) (Jackson, Gordon, Hart, Hopkins, Ely, 2004). A review of 10 cohort studies suggested that 25% to 78% of individuals have long-term cognitive impairment. Further studies have evaluated patients at 1 year (46%), and 6 (25%) years after delirium and revealed for many cognitive impairment persists. Higher rates were found among some populations (e.g., those with acute respiratory distress syndrome and those who underwent long-term mechanical ventilation) (Hopkins & Jackson, 2006).

Severity. The severity of the injury is determined by the amount of acute disruption to the brain physiology or to the structure. Assessment of severity is taken from clinical evaluations and is usually conducted early in the course of the individual's medical care. Severity is divided into three broad categories mild (or minor), moderate, and severe. Severity levels are assessed and diagnosed by medical professionals. There are several common scales used to assess TBI severity including: the Glasgow Coma Scale (GCS), the Abbreviated Injury Severity Scale (AIS) and the Rancho Los Amigos Cognitive Scale. Research suggests that severity can be a good predictor of the course of events, as well as provide insight into possible outcomes (Thurman, Coronado, & Selassie, 1996).

The term *mild* TBI commonly leads to misunderstandings about the consequences of the injury. Individuals diagnosed with a mild TBI may still experience

dramatic changes. Clinical studies have demonstrated these individuals often retain significant repercussions (Thurman, 2007). This level of TBI makes up about 70% of all documented cases (Falvo, 2005). Mild TBI is characterized by one or more of the following: (a) any period of confusion, disorientation, or impaired consciousness; (b) any dysfunction in memory around the time of injury; (c) loss of consciousness lasting less than 30 minutes; (d) the onset of observed signs or symptoms of neurological or neuropsychological dysfunction (Falvo, 2005).

Individuals with mild TBI may experience understated but troublesome symptoms that persist months or even years after the initial injury occurred. These symptoms are known as *postconcussion syndrome*. Common symptoms are: headache, vertigo (dizziness), tinnitus (ringing in the ears), sleep disturbance, depression, irritability, reduced attention span, or memory impairment (Kraus et. al, 2005). One of the many difficulties for individuals with mild TBI can be limited objective indications of a brain injury. Lack of objective data may result in the individuals medical complaints being challenged (Falvo, 2005). Nonetheless, the cognitive deficits associated with mild TBI habitually leads to considerable anguish, negatively impacting the individual's occupational and social performance.

Individuals diagnosed with moderate TBI have experienced loss of consciousness for 30 minutes to one week. Posttraumatic amnesia in these cases can last anywhere from 24 hours to 1 week. Physical, cognitive, and psychosocial deficits may last for a few weeks, several months, or even remain permanent (Arlinghaus, Shoaib & Price, 2005). Automobile accidents, falls, assaults, and sports-related injuries are all common causes of moderate TBI. The symptoms are usually not as obvious as

those in severe brain injury. Common symptoms in these cases include: headache, memory difficulty, dizziness, nausea, fatigue, problems with concentration, as well as mood and personality changes (Falvo, 2005).

Loss of consciousness for individuals with severe TBI lasts for a minimum of one week, as does post traumatic amnesia (Arlinghaus et al., 2005). Individuals may remain in a coma, characterized by a prolonged unconscious state where there is little or no meaningful responses and an inability to be wakened for days or even months. The severity of permanent consequences will vary and depend on the severity of the injury itself. Other factors determining the severity are the area of brain damaged, type of damage, and factors existing prior to the injury (Falvo, 2005).

Location of damage. The side of brain damage is highly correlated with observed outward signs and symptoms. Lesions in the left hemisphere typically result in the following deficits: language functions (i.e., speech reading, writing, arithmetic), language-related sounds, and identification of letters and words) (Kolb & Whishaw, 2009; Woods, Dodrill, Ojemann, 1988). The most visible sign of individuals with left-sided damage is problems with right-side motor activity, as well as right-side sensory paralysis. The individual is also likely to experience difficulty with verbal and/or written communication. Aphasia is a possible consequence of this type of injury. Individuals with left-sided injury are also often described as slow, hesitant, anxious and disorganized when presented with new or unfamiliar situations (Flavo, 2005; Fontaine, Azoui, Remy, Bussel, & Samson, 1999; Woods, Dodrill, Ojemann, 1988). While an individual may have difficulty with speech and language, it should not be assumed that they have difficulty with learning, as this is a common misconception (Flavo, 2005).

The most visible sign of right-sided brain damage is left-sided motor and sensory paralysis. Injuries to this side of the brain are usually accompanied by problems with: visual perception of geometric patterns, perception of nonlanguage environmental sounds, tactile recognition of complex system patterns, nonverbal memory, mental rotation of shapes and movements in spatial patterns (Kolb & Whishaw, 2009). Trouble with spatial-perception may include loss of depth perception, lack of stimuli on the left side of the body and difficulty with navigation. Because memory may be impaired an individual may experience problems recognizing familiar people or places (Flavo, 2005). It is common for an individual to be unaware of deficits and overestimate their own abilities to perform tasks. Individuals may be described as impulsive, and insensitive. They also may be seen as setting unrealistic goals (Silver,2011).

Damage to the frontal lobes, as well as their projections, can result in difficulty with higher-order capabilities, known as executive functioning. The following deficits may stem from the lesions in the frontal lobe: planning, divided attention, organization of behavior, poor response inhibition and poor self-regulation (Shallice, 1988; Jones-Gotman and Milner, 1977; Milner, 1964; Petrides, 1977, Miller, 1985, Levine et al., 1998; Freedman and Oscar Berman, 1986; Blumer and Benson, 1975;and Petrides, 2000). The deficits with control systems implementing different behavioral strategies responding to internal and external cues are often referred as *executive functioning* (Kolb & Whishaw, 2009). (McCullagh and Feinstein (2005) assert that deficits in the area of executive functioning are a critical determinant of functional outcome for individuals with TBI.

Moderating Factors in Return to Work

Statistics have demonstrated unemployment is a real problem for individuals with TBI (Ashley, Leal & Mehta, 2004). As severity of injury increases so does the possibility of unemployment. While reports of unemployment rates vary widely, researchers all agree it is a serious issue (Silver, 2011). One study looking at seven years post head injury found unemployment rates rose from 14% pre-injury to 78% post-injury (Brooks, Mckinlay, Symington, Beattie, & Campsie, 1987). Kreutzer et al. (2003) notes similar studies have found unemployment rates ranging from 55% to 78%. They did concede that not all studies fall within this limit and that there are a few researchers documenting lower rates ranging between 10% and 34%. With rates ranging from 10% to 78%, there is clearly a large discrepancy between studies.

The discrepancies between the reported rates of unemployment have been explored. Kreutzer and colleagues (2003) explained these variances as a product of diverse definitions of employment across studies. Some investigators include sheltered workshops, employment paying below minimum wage and unpaid work (e.g. volunteer work, student status, and homemaker status). Other studies are more selective and only include jobs paying minimum wage or better. Further definitions vary by hours required of the workers. While some studies define full time employment as 32 plus hours, others include 20 plus hours of employment in their definitions. Furthermore some studies do not set a lower limit to the number of hours required to be considered employed. Without a consistent definition of unemployment it is extremely difficult to compare studies and make accurate statements about unemployment rates.

Age

A number of studies have identified age as a significant predictor of return to work. Skeel, Bounds, Johnstone, Loyd and Harms (2003) note this is a necessary area to review given that TBI is most common between the ages of 15 and 24, then peaks again by the age of 65. Individuals who sustain a TBI at age 60 or higher are significantly less likely to return to work than individuals of other ages. There are various theories of the impact of age. Some literature suggests the finding is a product of higher mortality rates among older individuals after TBI. Other studies note that older adults tend to have more severe injuries and complications than do their younger counterparts (Rothweiler, Temkin, & Dikmen, 1998).

One study looked at differences in excess unemployment among age groups including: below 25 (31%), 25 to 39 (35.2%), 40 to 49 (18.1%), and 50 plus (42.1%). While the risk for accruing a TBI for the age 25 to 39 group (6.15) was highest, excess unemployment percentage was highest among individuals ages 50 plus. Of the age groups those younger than 25 had the lowest risk of unemployment. The authors of this study propose that TBI puts a person at substantial risk for unemployment even when these demographic factors are controlled, which included prior year employment status. However, while the researchers included important factors such as age, gender and education level, they failed to include other important factors like race, ethnicity and post injury psychological or physical deficits. The inclusion of such factors would provide a more detailed description of observed unemployment rates (Doctor et al., 2005).

West et al. (2005) explored age as a function of return to work. Results suggested that those who sustain an injury between the years of 40 and 60 were negatively affected returning to work. The researchers speculated that retraining is more difficult for individuals within this age group. Another study explored return to productivity (work or school) after TBI and found age to be a significant predictor. Specifically, those 40 or older were less likely to return to productivity following TBI (Keyser-Marcus et al., 2002). A number of other studies have found similar results, indicating that individuals younger than 40-45 were significantly more likely to return to work following TBI than their counterparts (Crisp, 2005).

Education

A number of studies have demonstrated that increased educational attainment prior to injury is positively related to successfully obtaining or maintaining employment post injury (Gordon et al., 2006; Ownsworth & Mckenna, 2004; Yasuda et al., 2001). Keyser-Marcus et al., (2002) found education was a good predictor of return to work one year after injury in a multiple regression model. In a similar study Sherer et al., (2002) extended the findings to include successful return to “productivity”, which also included education.

Doctor, Castro, Temkin, Fraser, Machamer, and Dikmen (2005) conducted a research study of 418 individuals who had suffered a TBI. All individuals were working at the time of injury, and enrolled between 1980 and 1994. There were 334 males and 84 females, ranging in age (under 25 to over 50), and educational attainment (less than HS to College). Race, ethnicity and pre-morbid mental health were not noted in demographics. All subjects had a period of loss of consciousness, posttraumatic

amnesia of at least one hour, brain injury serious enough to require hospitalization, and survival for at least one month. Employment status of the subjects was taken at 1 month and 1 year, in the form of an interview. Researchers factored in general population risk of unemployment, then found unemployment rates, and calculated the difference to find the *excess unemployment rates*. Doctor et al., (2005) found that those with less education have higher excess unemployment after TBI than college graduates, and the burden was often lowest due to previous medical benefits and socioeconomic status.

One longitudinal study evaluated 99 individuals for factors predicting positive employment outcomes following TBI. Researchers found that those individual's with a higher level of education had a greater likelihood of employment post-injury. Only 12% of individuals with less than a high school level of education returned to work (Gollaher et al., 1998). Several other studies have evaluated pre-injury education level's impact on employment outcomes. A number of studies have demonstrated that individuals who had less than a high school education were less likely to return to work than their counterparts (Kreutzer, Marwitz, Walker, Sander, Sherer, Bogner, Fraser & Bushnik, 2003; Devitt et al, 2006).

Pre-injury Occupational Status

Owensworth and McKenna (2004) noted pre-injury occupational status and functional status at discharge as important factors for predicting return to work. They further found general intellectual or global cognitive functioning, visuo-spatial ability, executive functioning, rehabilitation and vocational support services, as well as emotional status, to impact return to work. In this study older adults were found to experience less favorable outcomes than younger adults in regards to employment.

A number of studies of VR client's employment outcomes have evaluated employment status pre-injury. One study found that individuals employed at the time of application were significantly more likely to have a successful competitive employment outcome at the time of closure (Hayward & Schmidt-David, 2003). Willemsel-Van Son et al., (2007) reported that there was strong evidence pre-injury employment was a predictor of productivity post-injury.

Other studies looking at pre-injury occupational factors found less success in regaining employment for individuals in an occupation that is either semi-skilled or an unskilled manual job. Also, individuals who worked in structural occupations like construction were more likely to return to their former occupation than those in professional, managerial, clerical or service employment. Their reports suggest educational finding that imply those with higher education are more likely to return to work (West et al., 2005).

Income

Bellini, Neath, and Bolton (1995) explored the relationship between family income and VR employment outcome. The researchers utilized income at the time of referral, and their Scale of Social Disadvantage. The sample included 4,603 VR clients. Results demonstrated family income to be moderately related to employment outcome.

A few studies have explored pre-injury weekly earnings in comparison to weekly earnings at the time of VR closure. One study found that individuals who were competitively employed at the time of closure were significantly more likely to have higher hourly wages at the time of application than individuals who were not competitively employed. Wadsworth, Estrada-Hernandez, Kampfe, & Smith (2008)

reported that income at the time of VR enrollment was positively correlated with income at the time of closure for older adults.

Severity and Additional Diagnosis

Johnstone et al., (2003) examined the impact of concurrent disabilities on vocational outcome. The study was exploratory in nature and divided the groups into broad general categories. Subjects included 139 clients of state vocational rehabilitation (Missouri). The authors report no significant difference among groups in severity of TBI. Results indicated that clients diagnosed with TBI had employment rates of approximately 23 to 32%. Unemployment rates were higher among clients with additional diagnosis of a psychological disorder (16.7%), physical condition (7.9-11.5%), or learning disability (24%). It was suggested that the difference in unemployment rates between clients with additional physical conditions and clients with other conditions (i.e., psychological disorder & learning disability) was that those with physical conditions (or medical disorders) were more easily accommodated. The authors conclude that clients with an additional diagnosis consistently have lower employment rates than those with a single diagnosis of TBI.

Machamer et al., (2005) examined the level of brain injury severity as it related to long-term employment of individuals with TBI. They examined group of 165 subjects at one, six, and twelve months post-injury. They then followed up with the subjects at three, and five years; however only 44% of the subjects were available for review on the fifth year. Researchers established that the time spent working correlated significantly with severity of TBI. Results showed a negative relationship between

severity of injury and amount of time worked. There was also a significant positive correlation between severity of injury and unlikelihood of returning to work post injury.

A large number of other studies have attempted to establish a relationship between brain injury severity and employment outcome; however, findings vary widely and appear to differ according to the measure used (McMordie, Barker & Palo, 1990). Several studies have found negative correlations between duration of coma and return to work (Brooks, McKinlay, Symington, Beattie & Campsie, 1993; Rao, Rosenthal, Cronin-Stubbs, 1990). Others have noted that the individuals who had obtained more positive scores on the Glasgow Coma Scale had better work outcomes (West, Targett, Yasuda & Wehman, 2005). In relation to VR outcome, one study surveyed VR clients and outcomes suggested that regardless of severity, individuals with TBI can benefit from services (Jonstone, Reid-Arnd, Franklin and Harper, 2006).

Cognitive Changes

Cognitive impairment is the most commonly cited problem by patients and caregivers years after injury, and is said to contribute more to persisting disability than physical impairments. The severity of cognitive changes are a result of a number of different factors: (a) severity of diffuse axonal injury, indicated by the length of posttraumatic amnesia, and the extent of generalized atrophy; (b) location, depth, and volume of focal cerebral lesions; (c) age of the individual; (d) preexisting morbidities, and; (e) occurrence of significant extra cranial or systemic injury (McCullath, & Feinstein, 2005). Gentry, Godersky, & Thompson (1988) contend that despite a wide range of possible deficits post-TBI, there is some consistency as to the nature and the

frequency of the observed difficulties. They believe this is because of the concentration of the damage that occurs in the anterior regions of the brain.

A study of return to work rates among individuals with TBI, Fraser, Machamer, Temkin, Dikmen and Doctor (2006) aimed to address the issues of job competency or ability for handling complexity of employment. They specifically hoped to account for: the demographic and brain injury characteristics of “workers” experiencing a TBI at three to five years post-injury; the changes pre-and post-injury in employment complexity; underemployment of those who work post-injury; and the subject’s self-perceptions of overall TBI impact on vocational competency. The study by Fraser et al. (2006) involved 140 subjects who were working half-time or more prior to their injury, who were recruited from the Valporate Prophylaxis of Post-traumatic Seizures Study. Those involved were injured between 1991 and 1994. Their pre-existing conditions, obtained through structural interview, included: alcohol problems, illegal drug use issues and arrest record. The participants were separated into three vocational outcome groups: three to five years post injury and at or above half-time, three to five years post-injury who had returned to work but could not sustain employment, and individuals who had never returned to work. In order to examine the relationships between vocational outcome, pre and post-injury job complexity, and individual characteristics groups were formed. Researchers looked at income earned during the year prior to injury and divided it into five categories. They also included injury severity using the Glasgow Coma Scale, which was obtained in the emergency room.

Fraser et al., (2006) found groups with higher numbers of females, those without substance abuse involvement and those with less severe injuries were more

likely to return to work. The participants who were working at 3 to 5 years post injury had better cognitive functioning on the Wechsler Adult Intelligence Scale Digit-Symbol subtest, a 90 second coding measure of general cognitive efficiency. The participants who were not able to maintain employment lacked complexity in their last position. The researchers believe job complexity is a salient variable in relation to being able to keep one's former job. The study demonstrated that individuals who never returned to work had a more severe brain injury and were impaired on the neuropsychological measures assessing memory and cognitive efficiency.

Problems with attentional processes are extremely common among those with TBI, at all levels. As a result the individual may complain of difficulty focusing attention, concentrating, and following a train of thought. Even mild problems can restrict other processes, such as the ability to learn new information, as attention underpins all aspects of cognition. Mental slowing, trouble following conversations, confusion of thought process, and difficulty with multitasking are all common subjective complaints (McCullagh & Feinstein, 2005).

Memory loss is another frequently associated cognitive consequence of TBI. McCullagh and Feinstein (2005) note it is the most apparent of initial symptoms. It is also the most common subjective complaint among individuals with TBI. Falvo (2005) describes a variety of memory problems that may be experienced following brain damage. Individuals may be able to remember facts, though they are unable to remember how to do specific tasks. Other individuals may only be able to remember things that occurred prior to acquiring the TBI, a condition known as *retrograde amnesia*. Those who have forgotten their own personal history have a disorder known

as *remote memory impairments*. These individuals may not recognize friends, or even remember their field of employment prior to acquiring a TBI.

Other common cognitive consequences include: difficulty acquiring new information, trouble obtaining new memories, remembering past events, perseveration (getting stuck on one theme or repetitive behaviors) (Flavo, 2005). Confabulation is the term used to describe how some individuals compensate for acquired deficits, by making up answers to questions. This tendency is not necessarily a result of faulty memory or intentional deception, but a problem of juxtaposition of unrelated information and memories (McCullagh & Feinstein, 2005).

A study conducted by Tomberg, Toomela, Ennok, and Tikk (2007) explored rates of returning to work as a function of different levels of education. Researchers found that individuals with higher levels of education prior to injury were more likely to return to work. One explanation the authors proposed is that the task of retrieving information well-learned pre-injury is easier than the task of acquiring new information post-injury. Therefore, clients are more likely to retain their long-term memory, and struggle with working memory.

While it is less likely, some individuals experience difficulty with long-term memory following acquiring a TBI. Skills the individual once found well-known may become foreign. The individual may be unable to remember skills that were once very familiar, or part of their everyday tasks. For example, an individual who previously used a computer on a daily basis may have significant trouble performing even the simplest of operations (e.g. turning on the computer or opening programs) (McCullagh & Feinstein, 2005). Such a loss is not only problematic for the individual who has

suffered the TBI, but for individuals who once relied on their knowledge (e.g., support system, work colleagues).

Flavo (2005) reports memory problems may be the most limiting of all the potential cognitive consequences of TBI. The loss of memory is significant because an individual's ability to learn, store, and retrieve information is also affected. Thus the individual may make the same mistakes time and again, since they are unable to profit from their experiences. Generalization from one situation to the next is also diminished. So what one may be able to learn in one setting, may not be transferable to another setting. For example at work an individual could have difficulty performing the same task in different offices.

Executive Functioning

Executive functioning is a collection of higher-order abilities, and associated with the frontal lobe. Tasks of executive functioning include: goals and planning, commencing and processing goal-directed behavior, inhibition, conceptual reasoning, decision making, self-monitoring and self-regulation (Stuss & Levine, 2002). A review of TBI literature found executive functioning to be a common loss among individuals who sustain a TBI (Bivona, 2008). Regrettably executive functioning is also a necessary ability for employment and independent living (Krapan, Levine, Stuss, & Dawson, 2007). Thus deficits in this area typically effect all realms of the individual's life, which includes ability to obtain and maintain employment.

Communication

Communication difficulty of all forms can occur as a result of TBI. The ability to speak, comprehend, or even convey language through means other than speaking

(e.g. American sign language) all have the potential of being affected. Also there may be deficits in the ability to use specific muscles which allow individuals to form words and project speech (Silver, 2011). Prigatano, Roueche, and Fordyce (1986) describe the ability to communicate, or transmit and exchange information, as a fundamental determinant of an individual's overall psychosocial well-being.

Dysarthria, or problems with concentration and accuracy of movement of the muscles (i.e., lips, tongue, and other associated muscles), is a possible speech-related consequence of attaining a TBI (Flavo, 2005). This may also result in trouble with voice quality as paralysis or weakening of the vocal cords is a potential consequence. Articulation disorders are the result of other motor problems. With articulation disorders there is no significant weakness or lack of coordination of one's reflexive action; instead the individual has difficulty with positioning and sequencing of associated muscle movements. Tasks that may be affected include such things as eating and pronunciation (Satyajit, & Joshi, 2010).

The inability to use or comprehend language is known as aphasia, and is another communication problem commonly associated with TBI. Problems with aphasia may be seen in difficulty with either written or verbal communication. Aphasia results from dysfunction of the language centers in the brain, rather than problems with muscle impairment. There are a number of categories of aphasia (e.g., Broca's aphasia, Wernicke's aphasia); however the most common are non-fluent and fluent. Non-fluent aphasia is related to expressive or motor impairment, where effluent is receptive or sensory impairment. Such problems can cause problems at work, such as understanding

directions, communicating thoughts or following a set of instructions (McCullagh & Feinstein, 2005).

Behavioral and Psychiatric Problems

The first noted observance of behavioral changes as a result of TBI can be traced back to 1848, and the case of Phineas Gage. After a 3-foot-13 pound iron rod passed through his skull, Gage survived, and remarkably was able to maintain much of his previous functioning. The most notable was the change in his personality. After the accident he was described as irresponsible, capricious, and irritable (Kihlstrom, 2010). This case was a landmark in the study of TBI, as it demonstrated the possibility of change in personality as a possible acquired deficit (Kolb & Whishaw, 2009).

As demonstrated by the case of Phineas Gage, after an individual has acquired a TBI a number of neuropsychiatric problems may occur, including changes in behavior and mood. The individual may exhibit well defined syndromes, or a constellation of unconnected symptoms. There is also wide range in the severity of observed symptoms. Problems may manifest as slight changes or lead to psychiatric hospitalization (Vaishnavi, Roa, Fann, & 2009).

It is the behavior changes that friends, family, and work colleagues often describe as the most problematic and troubling consequence of TBI (Schwartz et al., 2003; Winkler et al., 2006). The most common behavioral problems are associated with mood or emotional state, and have significant effects on the individual's return to work outcome (Yasuda, Wehman, Targett, Cifu, & West, 2001). Deb et al. (1999) cites the most frequently endorsed symptom as irritability. Other cited problematic behavior

changes are aggression, lack of motivation, and reduced inhibition (Winkler et al., 2006).

Many studies have focused on the incidence of depression among individuals with TBI. Ruff et al. (1993) found that individuals demonstrating an increased level of depressive symptoms at six months after injury were less likely to become employed. A similar study by Felmingham, Baguley, and Crooks (2001) looked at psychological distress and employment, evaluating individuals at six months and two years. They noted that six months to 12 months post-injury is consistent with the amount of time it typically takes individuals to develop insight into their post-injury difficulties and experience an associated increase in emotional distress. Felmingham et al (2001) found individuals with increased psychological distress levels at six months after hospital discharge were significantly more likely to be unemployed at two years post-discharge. Overall, behavioral and emotional difficulty has been regularly documented as a significant factor impacting an individuals' ability to obtain and maintain employment.

Impaired awareness can have significant consequences, such as the individual not receiving proper rehabilitation and resources needed after their attained head injury. For example, individuals with functional deficits and awareness deficits may lack an appreciation for the importance of rehabilitation (e.g., speech therapy, occupational therapy, physical therapy) and may consistently overestimate vocational and social functioning abilities. Thus the individual may fail to perform recommended rehabilitation tasks or even attend rehabilitation at all. Unfortunately in these cases the individual is unsuccessful in obtaining optimal post-injury functioning (Abreu, Seale, Scheibel, Huddleston, Zhang, & Ottenbacher, 2001; Bach & David 2006).

A number of research studies have identified the development of self-insight as a crucial factor in employment outcome (Yasuda, Wehman, Target, Cifu & West, 2001; Sherer et al., 2003). Unfortunately research has also recognized loss of this crucial ability as a common problem in individuals with TBI (Bivona et al., 2008).

Ramachandran (2011) explains the ability to see the “self” as a complex concept, made up of multiple facets. He specifically lists seven important aspects: unity, continuity, embodiment, social embedding, free will, and self-awareness. TBI may affect any number, or combination, of these facets. Thus the effect TBI has on self-insight may look very different depending on type and number of facets involved.

Various studies have linked pre-injury substance use to employment outcome, demonstrating a negative correlation of pre-injury substance use to the ability to obtain and maintain employment. Sherer, Bergloff, High and Nick (1999) found that subjects without history of substance use prior to injury were more than eight times as likely to have a positive employment outcome as those with histories of drug or alcohol abuse. The authors hypothesize that pre-morbid substance use may make individuals more susceptible to greater impairment when they suffer a TBI. Alternatively they suggest that perhaps patients with pre-morbid substance history may be at greater risk to return to substance use post-injury, which could interfere with the process of obtaining and maintaining employment.

Social and Environmental Factors

An area recently gaining more attention is social and environmental factors related to return to work outcomes among individuals with TBI. Environmental factors may include: products, technology, services, system, and policies. Social factors

include all interpersonal relationships and supports. Social and environmental factors have been found to be a fundamental component in the rehabilitation process of individuals with TBI (Ownsworth & McKenna, 2004).

Social support. The individual's social support system has been positively associated with successful employment outcomes (Ownsworth & McKenna, 2004). Conversely low levels of social support have been found to negatively affect the individual's ability to return to work. A review of the literature suggested that this is likely due to the needs of the individual that are unable to be met by vocational rehabilitation. For example, tasks of daily living are not covered by vocational rehabilitation. Further, lack of social support can lead to prolonged feelings of loneliness, lack of opportunities for establishing new social contacts, decrease in leisure activities, and high levels of anxiety and depression. (Yasuda, Wehman, Targett, Cifu, West, 2001).

Marital status has been looked at as a possible factor in employment outcome. Ownsworth and McKenna (2004) believe there to be conflicting findings. Ip, Dornan, Schentag (1996) research results concluded that individuals who at the time of injury were married were less likely to return to work than those who were single at the time of injury. One study, in contrast, found that individuals who were married at the time of injury were significantly more likely to return to work (Kreutzer et al., 2003). Further a number of studies have demonstrated no significance in marital status at the time of injury (Ownsworth & McKenna, 2004). Overall, no clear consensus seems to have been established regarding marital status' impact on return to work following TBI.

Environment. There are a vast array of environmental factors that may inhibit an individual with TBI from returning to, or entering, the work force. Such factors may include: transportation, number and type of employment opportunities, and availability of support services. Whiteneck, Gerhart, & Cusick (2004) found the most common environmental barriers observed by individuals with TBI a year after injury was: availability of transportation, natural environment, aspects of the environment such as noise and crowds, governmental policies and societal attitudes. One additional interesting finding was that those with the most impact from environmental barriers also reported lower levels of life satisfaction and participation. The research suggests it is extremely important to identify the areas where interventions are required to reduce the negative impact of the environment.

Rural versus urban environment. It is estimated that approximately 10.8 million individuals with disabilities in America live in rural communities (Bureau of the Census, 2005). Some studies have indicated a poorer outcome for individuals with disabilities who live in rural communities. The outcome differences have been linked to a number of factors including, difficulty obtaining necessary health services from appropriately trained professionals and limited access to necessary resources (Johnstone et. al, 2003).

There have been a small number of studies that have examined individuals with TBI from rural communities. Of the studies completed, all indicate a difference in individuals with TBI living in rural communities versus individuals with TBI living in urban communities. One study found that individuals living in rural communities were twice as likely to be in poor health and dependent on others (Schoutman & Fuotes,

1999). Other studies suggest that individuals with TBI in rural communities have significantly more trouble with finances, accessing service providers, accessing health care, transportation, obtaining information and referral, and coordination of services (Sample & Darragh, 1998).

Johnstone et al., (2006) reviewed six studies on the efficacy of state vocational rehabilitation programs for individuals in rural communities diagnosed with TBI. Their goal was to identify the demographic characteristics of clients, the nature and severity of injury, and the neuropsychological deficits. Further they were interested in variables predicting vocational outcomes. Of the studies reviewed the provision of vocational rehabilitation services was the most important determinant in obtaining employment.

Jostone et al., (2003) noted that it is imperative rehabilitation professionals and vocational counselors attend to environmental factors that may be limiting the individuals in rural areas. They state that individuals in rural communities have much greater difficulties finding employment because of environmental factors including: lack of jobs, lack of vocational training programs, limited transportation, and lack of resources. They also suggest VR counselors work to be creative in regards to finding transportation opportunities, vocational training, finding access to resources, and job opportunities.

Vocational Rehabilitation

The term vocational rehabilitation customarily refers to a service aimed at enhancing the employability of an individual with a functional limitation. Beginning in 1920 the federal and state governments put effort toward the employment of individuals with disabilities through the state vocational rehabilitation program. The program is

still run as a federal and state partnership. The federal government's role consists of leadership and provision of funding, while the state is responsible for the administration of the program in their state (McCue et. al., 1994).

State vocational rehabilitation assists eligible individuals with disabilities with maintaining or obtaining employment. The principles of the Americans with Disabilities Act of 1990 are embedded in the program. Eligible clients include those who: (a) have a mental or physical impairment diagnosed by a medical professional, (b) impairment causes an impediment to employment, (c) can benefit from services, (d) requires services to prepare for, enter, engage in, or retain employment. Once eligibility is determined emphasis is placed on the client's involvement in the vocational rehabilitation process (Rosenthal, Dalton & Gervey, 2007).

Professionals employed by federal and state vocational rehabilitation agencies work toward the coordination of services provided by a number of fields (e.g., medicine, education, counseling), while preparing the client for employment. The process of rehabilitation may include a number of disciplines, representing a variety of fields. Typically rehabilitation counseling is connected with the process of rehabilitation, due to the association with state and federal legislation (Elliott, 2004).

Contemporary Legislation

Amidst the physical toll World War II was inflicting on its soldiers, the United States Congress enacted the Vocational Rehabilitation Act. The act was signed in 1943 for the purpose of providing services to returning World War II veterans who had acquired disabilities. Of particular note was the money the act provided to train rehabilitation professionals. These professionals were to be instructed in the

rehabilitation and employment of soldiers with disabilities. They would then serve the role of providing counseling and guidance services (Bryan, 2002). Today they are called *vocational rehabilitation counselors*.

In 1965 the act continued to progress with the passing of the Vocational Rehabilitation Act Amendments. The amendments provided: money for reconstruction aimed at restructuring the provision of client services, a more extensive array of services to clients, and the inclusion of clients with social deficits. It also eliminated monetary need as an eligibility requirement. One of the most recognized improvements the act made was the inclusion of a greater number of individuals with disabilities, made possible through the exclusion of the requirement of economic hardship (Pfeiffer, 1993).

The next revolutionary legislation was the Rehabilitation Act of 1973, which denoted a new outlook of rehabilitation. Through the act individuals with disabilities were identified as having minority status. Sections 501 and 504 have been noted as the provisions providing the most significant changes. Overall the sections afforded the Interagency Committee on Handicapped Employees, the Architectural and Transportation Barriers Compliance Board, affirmative action for hiring among employers doing business with the federal government, and nondiscrimination legislation in the employment practices of institutions receiving federal financial assistance (e.g., universities and colleges accepting federal student aid) (Bryan, 2010).

The Rehabilitation Act of 1973 provided a foundation for future legislation in the area of discrimination of individuals with disabilities. Today the field of rehabilitation is still supported by many pieces of this innovative piece of legislation.

Under title I of the Rehabilitation Act of 1973, all 50 US states, US territories (e.g., Guam), and tribal nations receive federal funds for vocational rehabilitation. The service funding is used to promote the employment of qualified state residents with disabilities (Johnstone, Reid-Arndt, Franklin, & Harper, 2006).

The American's with Disabilities Act was put into effect in 1990 after the signing of President George H.W. Bush. The act was a monumental step for the advancement of rights among individuals with disabilities. With its passing civil rights protection was extended to individuals with disabilities in both the private and public sectors (Bryan, 2010). The goals of the act included: providing a clear mandate for elimination of discrimination; addressing the day-to-day discrimination faced by individuals with disabilities; and providing strong, consistent standards for addressing acts of discrimination. It also ensured the federal government has a central role in the enforcement of the act (Essex-Sorlie, 1994).

While legislation supported consumer choice it was not mandated until 1992. The passing of the Rehabilitation Act Amendment required the client be active in the generation of their Individual Employment Plan (IEP). Thus the client was to be involved in identifying and selecting their vocational goal to be supported by vocational rehabilitation, as well as the services to be provided (Beveridge & Fabian, 2007). Consumer choice continues to be an important part of the rehabilitation process for state vocational rehabilitation (Elliot & Leung, 2005).

The Workforce Investment Act (WIA, 1998) incorporated provisions of the Rehabilitation Act into a mainstream and labor-oriented legislation. It aspired to support the individual's choice in the rehabilitation process, assist in the reemployment

of the individual, and reorganize links between public VR and the jobs generated by past legislation. Clients were to be served in an integral and inclusive way (Growick, 2000). The legislation further required that the IEP be developed in a way that supports the attainment of the employment goals of the individual (Beveridge & Fabian, 2007).

Vocational Rehabilitation Process

The vocational rehabilitation process involves a sequential set of activities initiated and coordinated by the rehabilitation professional (See Appendix B). Once the client is initially referred they are interviewed, screened, and evaluated for eligibility and appropriateness (Rosenthal et al., 2004). During the evaluation phase the individual is evaluated for services needed and possible coverage of those services. A number of factors can influence service and coverage including: functional limitations, severity of the disability, the prior psychosocial and legal history, economic status, environmental factors and the availability of state VR funds for the remainder of the fiscal year (See Appendix A). A sliding-fee type scale is used for evaluation of factors related to service coverage (Elliott, 2004).

Once the client is determined eligible they are assigned a VR counselor. The counselor is then entrusted with the responsibility of organizing the assessment of job skills, interests, and abilities. The counselor's additional responsibilities include: developing the Individual Plan of Employment (IPE), provision of services, assisting the client with obtaining and maintaining employment (Rubin & Rossler, 2008). The client's assistance is emphasized, as the involvement the client throughout the process is a high priority of VR. Other professionals may also be involved throughout the VR process. For example, assessments may be conducted by the VR counselor or other

professionals hired by the counselor (e.g., psychologist, physician, occupational therapist) (Devinney, McReynolds, Currier, Mirch, & Chan, 1999).

Services

Through the rehabilitation process a number of services may be provided to the client (See Appendix C). The services can be provided by VR or outsourced to other providers (Rubin & Roessler, 2008). The goal of service delivery is to maximize the probability of a positive employment outcome for the client (Brabham., Mandeville, & Koch, 1998). The service phase consists of three processes: referral, diagnostic evaluation and planning, and service provision (Devinney, McReynolds, Currier, Mirch, & Chan, 1999). The services provided (e.g. training, assessment, travel) are based on a survey of means and are used to assist the client with needs necessary to return to work, to enter a new line of work, or to enter the work force for the first time (Johnstone et al., 2006).

Since the beginning of VR programs, the range of services available to clients has expanded (Patterson, Bruyère, Szymanski, & Jenkins, 2005). To date there are over twenty comprehensive service categories in the VR system. The services available include: assessment, diagnosis and treatment, counseling and guidance, training, job search assistance, job placement assistance, on-the-job supports, transportation services, maintenance, rehabilitation technology, rehabilitation engineering services, assistive technology devices and services, reader services, interpreter services, personal attendant services, technical assistance services and information and referral (Rehabilitation Services Administration, 2006). As previously mentioned, selection of

services is dependent on several factors like the needs of the individual, vocational goals, funding, and availability of services (Rubin & Roessler, 2008).

Hayward & Schmidt-Davis, (2003) explored 15,868 clients of VR and found 2% were identified as having at TBI looked at the most frequently utilized services among individuals with TBI. The most frequently utilized service was assessment (31.9%). The other utilized services included: counseling (30%), transportation (24.6%), medical (18.2%), assistive technology (17.4%), business/vocational training (15.2%), job placement (13.4%), supportive employment (12.8%), educational status evaluation (12.6%), psychological/psychiatric treatment (12.3%), and job development (10.6%). They also noted that individuals diagnosed with TBI, mental illness, or learning disability were provided more diverse services than individuals with other diagnosis.

Supported employment. Supported Employment is one of a handful of specialized programs that are part of the Rehabilitation Act, and it has the unique ability to make and impact of the hundreds of thousands of individuals who have a disability and are unemployed. It first received funding in 1986 through the Rehabilitation Act Amendments. It was specifically designed to assist individuals with the most significant disabilities to achieve competitive employment and to provide an alternative to sheltered workshop settings. It had become apparent that a large number of individuals with significant disabilities needed additional support to have the opportunity to obtain and maintain competitive employment (Revell, Kregel, Wehman & Bond, 2000).

Wehman (1986) stated that the development of the supported employment program was partly due to the realization that only a small minority group of individuals with mental retardation placed in sheltered workshops were ever able to move on to competitive employment positions. The development of the supportive employment program was an attempt toward a solution to this problem. The underlying philosophy of supported employment is that individuals with disabilities, even the most severe of disabilities, deserve to live and work in the least restrictive environments (Rubin & Roessler, 2008).

Supportive employment utilizes specialists, mentors, coworkers and employers to aid in reduction of the impediments faced by the individual (Revell et al., 2000). Through assistance in areas where the individual struggles, an emphasis is placed on the workers strengths. The individuals' supportive employment is individually structured, and may occur in an individual or a group model. The individual model is the most common model used. Examples of other individuals who may be involved includes, on-site direct service providers, and an employment facilitator (i.e. coworker, employer) who arranges natural supports (Revella, Kregela, Wehmana & Bond, 2000).

Under Title VI of the Rehabilitation Act Amendments of 1986 supportive employment services are offered for up to 18 months by the state VR programs. Following the transitional period of supportive employment funding must be acquired from external sources to finance extended supportive employment for clients who require ongoing support to maintain their employment. Potential sources of funding may include such sources as Medicaid Home and Community Based Services (HSB), collaboration with SSA Program to Achieve Self-Sufficiency (PASS), Impairment

Related Work Expenses (IRWE), Ticket to Work, and Temporary Assistance to Needy Families (TANF) (Revell, Kregel, Wehman & Bond, 2000).

The supportive employment program has been carefully documented and has demonstrated positive employment outcomes for individuals with disabilities in a number of areas including: job placement rates, wages and benefits, client satisfaction, employer perceptions, and effective support strategies (Rubin & Roessler, 2008). Revell et al., (2000) argued that these and other articles provide evidence as to why supportive employment has shown itself to be an exemplary program with high potential for expansion.

A case meta-analysis reviewed the impact of supported employment outcomes for individuals with TBI who are clients of VR. Overall the evidence suggested supported employment improves the level of competitive employment outcomes. Those who were older, had more education, had no prior work experience, or suffered more severe injuries were found to have the most improvement with the use of the supported employment program (Teasell et al., 2010).

On-the-job supports. On-the-job supports describe services provided to a client who has been placed in employment for the purpose of stabilizing the placement and enhancing job retention. Services may include (but are not limited to) job coaching, follow-up and follow-along support, and job retention. One study found the provision of the services increased the successful employment rates of clients to 62% from the 42% among individuals not provided the service. Researchers described the finding as significant because it brought to light the importance of the service for individuals with TBI (Catlano et al., 2006). DaSilva et al., (2007) found that on-the-job supports not

only improved the likelihood of a successful closure, but actually doubled the odds of obtaining competitive employment.

Job readiness training. Job readiness training refers to services aimed at preparing the individual for the world of work. This may include such things as: appropriate work behaviors, time management, acceptable dress and grooming, and productivity. Hart et al., (2010) noted that further research is still needed to determine the significance of job readiness training and employment outcomes.

Job placement services. Job placement describes referral to a specific job opening that results in an interview, whether or not a job is obtained. Previous research has determined this service to be extremely important in the vocational rehabilitation process of individuals with TBI. One study found clients who had received job placement services were significantly more likely to obtain long-term employment (68%) than those who were not provided the same services (41%) (Catlano et al., 2006).

Bolton et al. (2002) described job placement assistance as the most important predictor of long-term employment for individuals receiving VR services in the US. Additionally, one study found that the provision of job placement services doubled the likelihood of obtaining competitive employment (Da Silva Cardoso et al., 2007). Gamble and Moore (2003) explored clients in a southeastern state and found that individuals provided with job placement services were 20.77 times more likely to obtain competitive employment at closure than their counterparts. They noted that job placement services was the most predictive factor of all services provided in predicting a successful closure status.

Assessment. Assessment services are provided to aid clients in taking part in their career planning. The amendments to the Rehab Act, emphasizing consumer involvement, describes assessment as an important part of the process (West, Targett, Yasuda, & Wehman, 2007). Assessment can help the individual better understand, their interests as they related to the job market, their abilities in relation to job skills and tasks, as well as possible job or education accommodations (Rubin & Roessler, 2008).

Johnstone et al., (2006) found assessment services to be the most frequently offered service by DVR counselors as it helps with: determining eligibility, identifying relative strengths and weaknesses, and aids in direction of rehabilitation services. The information collected aids the process of determining an appropriate Individual Plan for Employment (IEP), establishing services to be provided, and ascertain accommodations that may be required. Abilities and disabilities are not consistent between clients with TBI. The uniqueness of the individual combined with the variance in work environment denotes a strong need for assessment. The assessment data often accumulates across a series of evaluations, and may be provided by a number of professionals (Rubin & Rossler, 2008).

In a study by Gamble & Moore (2003) VR services were assessed for their impact on weekly earnings. Among the study cohort, assessment was found to be a significant factor influencing the amount of weekly earnings. They also reported that when assessment was followed by college services the individual's weekly earnings were significantly higher than when assessment was provided alone. Further there was a three way interaction with job placement services. Individuals receiving all three

services earned significantly more than their counter parts who received one or a combination of only two services.

Interest testing. The interest testing portion of the process aids the client and counselor in identifying potential careers that are likely to lead to increased job satisfaction. Information obtained from interest testing will help determine the client's interests in relationship to the extrinsic and intrinsic rewards of the job. Though it should be noted that while it is a necessary part of the process is not sufficient. The information collected from physical and cognitive evaluation assists the client and counselor in determining if the client is capable of performing the tasks of the job (Rubin & Rossler, 2008).

Situational assessment. Traditionally functional assessments have taken place in a controlled environment. Over the years the popularity of on-the-job assessments has grown. This type of approach focuses on the client's strengths rather than weaknesses (West, Targett, Yasuda, & Wehman, 2007). This type of assessment can provide important information about the client including: response to supervision, work interpersonal relationships, task focus, productivity, and frustration tolerance. Situational assessments have a number of advantages, particularly their ability to help provide insight into real world work behaviors (Rubin & Roessler, 2008). In a study by Schonebrun, Kampfe and Sales (2007) researchers found that individuals who received assessment services were more likely to be competitively employed than those who did not receive the same services.

Psychological assessment. Personality assessment following TBI is an important part of clinical care and rehabilitation. It is particularly important due to the

likelihood of personality changes resulting from injury (Till, Christensen, & Green, 2009). Psychological assessments are aimed at the assessment of an individual's emotional, interpersonal, motivational and attitudinal characteristics (Anastasi & Urbina, 1997). Within the realm of vocational rehabilitation personality assessments help the client and counselor identify the personality strengths or deficits affecting the individual's ability to adjust to work demands and environments (Power, 2006). Client and counselor can then work to capitalize on strengths and accommodate for deficits.

Neuropsychological assessment. Neuropsychological assessment specifically focuses on the evaluation of the relationship between brain functioning and behavior (Cohen, Swerdlik, & Phillips, 1996). The goal of this type of assessment is to help answer questions such as: the capacity for self-care, reliability in following a therapeutic regimen, ability to perform tasks, ability for employment (Lezak, Howieson, & Loring, 2004). A survey of neuropsychologist identified 11 common goals of neuropsychological assessment: documentation of emotional, cognitive, and behavioral status; information regarding the client's strength and weaknesses; treatment implications; feedback to the client's support system; recommendations for supervision needs; recommendation for return to work or school; evaluation of long term functioning; competence evaluation; driving recommendations; evaluation of late complications and evaluation of effectiveness of drugs (Sherer, Madison, & Hannay, 2000).

A meta-analysis by Sherer et al., (2002) reviewed 23 articles concerning the use of neuropsychological assessment and employment outcome. Researchers found a strong relationship between the use of neuropsychological assessments and

employment outcome among individuals with TBI. The complexity of factors involved in predicting long-term employment was identified as the reason for the importance of neuropsychological assessment. The authors suggest neuropsychological assessment should be a routine practice in the rehabilitation process of individuals with TBI.

Functional capacity assessment. A functional capacity assessment (FCE) is used to evaluate an individual's physical ability to return or enter work. The clinician seeks to determine the individual's maximum physical abilities for employment related tasks. Information gathered from the assessment assists in the determination of safe, endurable levels of functioning. Specific tasks evaluated may include: lifting, trunk flexion/rotation, carrying, coordination, dexterity, and mobility (Gross & Battie, 2002). It should be noted that work instability is a likely consequence of a disparity between physical demands of the job and ability level (Chamberlain et al., 2009). Such assessments have been found to be a useful tool in the evaluation of individuals with TBI (Buffington & Malec, 1997). An FCE is said to be most useful in the elimination of potential environmental barriers at work (Chappell, Higham & McLean, 2003). This type of assessment can thus be an important part of the assessment phase should there be a concern about variance between ability and requirements.

Diagnosis and treatment of impairments. Diagnosis and treatment of impairment covers a wide range of services, such as corrected surgery or therapeutic treatment, diagnosis and treatment of emotional and mental disorders, diagnosis and treatment of acute or chronic medical complications and other medical or medically relevant services. Some services (i.e., evaluations) may be similar to those covered by assessment. The RSA-911 Case Services Report (2008) provides a detailed description

of both and defines how the services should be labeled. The label of these services is dependent on context and timing of delivery (e.g., for establishment of eligibility vs establishment of treatment plan).

Shoneburn et al., (2007) found that diagnosis and treatment services were positively related to successful employment outcomes of vocational rehabilitation clients with traumatic brain injury. Further those individuals who received the service were found to have higher weekly wages at time of closure than did clients not receiving the same services.

Disincentives

While there are a variety of motivational factors for return to work, public support programs have been identified as a source of disincentives. Clients of vocational rehabilitation are commonly also receiving disability compensation programs. Similar goals are held by the two programs; however some aspects of the client's recovery conflict. The clients are supported with financial benefits through the disability compensation programs (Drew, 2001). A number of studies have revealed financial benefits often foster motivation for withdrawal from the workforce (Cook, 2006).

A number of studies have demonstrated that for some individuals disability compensation programs motivate choosing not to work, even when they are physically able to do so. The socioeconomic factors seem to create a strong influence (Baldwin & Johnson, 1998). Cook (2006) explained that federal regulations mandate a review of the individual's status as disabled upon employment, and that once employed the individual's benefits are sharply reduced as their earnings increase. Further the

individual incurs an *implicit tax* once employed, possibly causing them to lose such benefits as health insurance, housing assistance, utility assistance, transportation stipends, and food stamps.

Traumatic Brain Injury and Vocational Rehabilitation

TBI has unique and wide ranging effects (e.g., physical, cognitive, behavioral) on individuals. Loss of function in multiple areas is common. The functional losses experienced by the individual can have a considerable impact on their ability to acquire and/or maintain long-term competitive employment. Common reported problems also include: environmental barriers, outdated or limited vocational assistance, attitudinal barriers, and social separation. Due to the multiple intertwining problems facing individuals with TBI successful employment outcomes are low and difficult to achieve. It has been reported that a small number of individuals with TBI re-enter the world of work for similar compensation, at an equivalent level and for the same weekly hours as pre-injury (Uomoto, 2000, p.1).

For many individuals who sustain a TBI, returning to work is the most important long-term rehabilitation goal (Katz, Zasler, Zafonte & 2007). State Vocational Rehabilitation (VR) can be an essential part of attaining the individual's goal. Malec, Buffington, Moessner, and Degiorgio (2000) assessed the effects of involvement in VR for individuals with TBI. Their study found those who had attained independent employment were more likely to have received vocational interventions. Regrettably, there has been very little research examining federal state VR services as a moderator of employment outcome for individuals with TBI. This fact seems highly

problematic considering the significant number of individuals applying for services and the associated financial cost (Johnstone et al., 2006).

Gamble and Moore (2003) first explored the relationship between VR services and employment outcomes of individuals with TBI. The study sought to explore the relationship of six specific VR services to the client's vocational outcome. The services of interest in this study included: assessment, college, counseling/guidance, job placement, restoration, and work adjustment services. Their sample was made up of 1,073 VR clients, who were closed in competitive employment (51.4%) and non-rehabilitated statuses (48.6%), between 1992 and 2000, in a southeastern state. Most clients were categorized as having a severe disability (88.8%). Interestingly an overwhelming majority of the subjects (91.3%) did not have previous work experience, while only a small percentage reported any prior employment experience (Gamble & Moore, 2003).

Clients receiving Job Placement services were 20.77 times more likely to obtaining competitive employment than those not receiving the same services. Results of a logistic regression determined this to be a positive predictor of a successful closure status ($p < .001$, 95% CI=13.89-31.07). Other services determined to be positive predictors of successful closures included: college services ($p < .001$, OR=5.21, 95% CI=2.95-9.19), and counseling/guidance ($p < .001$, OR=3.03, 95% CI=1.74-5.28) (Gamble, 2003). It should be noted that only a small percentage of the sample had received college services and future research should explore the significance among a more balanced sample.

Fadyl & McPherson (2009) explored the various case models used by vocational rehabilitation with clients who have TBI. Through a meta-analysis approach the authors identified three case model categories used by vocational rehabilitation: program based, supported employment and case coordination. Overall the researchers reviewed 35 research articles, 10 case studies, and six reviews. Their goals included: identification of main approaches to vocational rehabilitation after TBI, assessing the evidence and effectiveness of the described approaches, and determining the strengths and weaknesses of each approach.

The program-based approach aims at maximizing vocational outcome (Fadyl & McPherson, 2009). The model contains three sequential components: (1) Pre-employment training in vocationally related skills and interventions within a structured program environment, (2) guided work trials, and (3) assisted placement with transitional job support. In some programs there is followed-up at various increments after discharge. After a review of the literature the authors found weak evidence supporting specialist brain injury programs and weak evidence for increased wages. There was strong evidence showing that these types of programs offer skills training and help build confidence, as well as provide the opportunity for independence at work. It should be noted that these specific results are based on the information from only four reviewed articles. Further research should aim to solidify the results in this area.

For this study the supported employment model was characterized as a sequential model that included: (a) limited pre-employment training, (b) placement, (c) transitional job coaching and on-the-job training, (d) continued involvement, with less time on work site as the individual becomes more competent. Authors note some key

aspects of this model include, quick job placement, minimal pre-employment training, and ongoing job coaching. The supported employment model provides the highest level of support for the client. They state this approach has been helpful for individuals with a degree of severity that would preclude employment without intensive support (Fadyl & McPherson 2009). However, in this employment model the goal is employment with continued support, so for those individuals who became employed in the study there was ongoing job coaching.

Fadyl & McPherson (2009) found weak evidence was reported for employment of individuals who were unemployed pre-injury. There was also weak evidence for gaining competitive employment that last a minimum of 90 days. Authors did note that this approach proved useful for individuals with the most severe disabilities. The strengths of the supported employment model include no limitation on the level or length of support, and that support can be highly individualized.

The last model they reviewed was case coordination. This approach is said to be holistic, in that vocational rehabilitation is part of an overall program aimed to meet specific individual needs. Like the other models, case coordination is a sequential model including: (1a) vocational rehabilitation services meant to meet individual needs, (1b) medical and other non-vocational rehabilitation, (2) placement, (3) system-based ongoing support, where the client can re-request services as necessary. This approach involves referral for various aspects of vocational rehabilitation used in other models. Some important characteristics of this model are the monitoring of progress by a case coordinator and the integration of vocational rehabilitation into other areas such as medical rehabilitation, making a more holistic approach (Fadyl & McPherson 2009).

Early intervention, continuity of care and coordination of vocational rehabilitation with other post-acute rehabilitation services set this model apart from the others. There is moderate evidence that this model produces higher employment and productivity outcomes (Fadyl & McPherson 2009). Weak evidence suggests those who receive interventions within the first year after their injury are placed in a job more quickly than their counterparts. Fadyl et al. (2009) noted there is some evidence to suggest that those in this model, who are also referred to supported employment, are more likely to have competitive employment and less likely to need supports later on.

Gamble and Moore (2003) believe that due to the low employment retention rates of people with severe TBI, supported employment has become a popular model of intervention. However, despite its popularity, the authors do note that there is limited research examining the differences in vocational rehabilitation outcomes and the actual costs associated with supported employment. In fact, while there are many positive implications of supported employment, there are also a number of criticisms. For example, Rubin and Roessler (2008) note that some have criticized supportive employment because it is usually limited to those with the most severe disabilities. Further, workers with severe disabilities receiving supportive employment services typically work fewer hours and making lower wages than those with less severe disabilities. However, there has also been research demonstrating those with severe disabilities receiving supported employment are making more than their counterparts who are working in sheltered workshops (Moore & Gamble 2003).

Hypotheses

Hypothesis I: Individuals receiving assessment services will be more likely to have long-term employment than those not receiving assessment services.

Hypothesis II: Diagnosis services will be significantly correlated with long-term employment.

Hypothesis III: The provision of job readiness services will be significantly correlated with long-term employment.

Hypothesis IV: Long-term employment will be significantly correlated with the utilization of supportive employment.

Hypotheses V: Individuals receiving job placement services will be more likely to obtain long-term employment than their counterparts.

CHAPTER III

METHODS AND RESULTS

The purpose of the current study was to contribute to the body of knowledge regarding VR services contribution to employment outcomes of individuals with TBI. Data analysis for demographic information is presented, followed by the results of this study's five research questions, and ends with a summary of the research findings.

Participants are described in terms of age, sex, racial identity, education, personal income, and region. Information was then provided about services received by individuals while they were clients of North Dakota's VR. Finally, statistical analyses and the results of the five research questions will be presented.

Procedures

The research design selected for this study was an archival research design. This research design did not involve random assignment to groups, nor was there any manipulation of an independent variable. This researcher had the assistance of employees from the state office of North Dakota's Department of VR. Information was collected and entered by employees of VR while the case was active, and upon closure. The procedure for data entry and collection was standardized by VR and RSA. Orientation to the program and data entry is provided to the staff by VR. The employees obtained all relevant vocational rehabilitation data from their database (VIRS) and excluded all identifying information. The data was obtained from VIRS

database via a Microsoft Office Access Database and was then exported into SPSS 19 format.

Analysis

The data for this study was extracted from the VIRS program, an RAS-911 database utilized by North Dakota's Division of Vocational and Rehabilitation Services.

The program contains closure data in various forms for RSA and dates back to 1921. It started in 1988 as part of an ongoing effort to collect client information and is examined every two to three years. The factors are fixed allowing for comparisons over time. Typically vocational rehabilitation counselors enter the information following the closure of a case.

Descriptive statistics such as means, percentiles, frequencies and percentages were used to summarize individual background variables, vocational rehabilitation regional variables, and employment outcome information. Nonparametric 95% confidence intervals were calculated to test for significant changes in patient and surrogate total AQ scores and differences between AQ

The relationship between services of interest and employment outcome was evaluated with a two-way contingency table analysis using crosstabs. Follow-up tests were conducted for significant relationships to evaluate pairwise differences. The Holm's sequential Bonferroni method was used to control for Type I error at the .05 level across all three comparisons.

Participants

Age

Individuals diagnosed with TBI who were clients of North Dakota's Department of Vocational Rehabilitation and had their case closed (i.e., Unsuccessful, Successful, or unable to locate) between Federal Fiscal Years of 2007 and 2011 were included in this study. The complete sample included 327 individuals, ranging in age from 16 to 64 years old (Median=35.65; SD=12.5). The majority of participants were between the ages of 18-59 years old (n=322; 98.5%) (See Table 2).

Sex

The study sample identified as predominantly Male (n=217; 66.4%). The remaining distribution of the sample identified themselves as Female (n=110; 33.6%). (See Table 2).

Racial Identity

The study sample was predominantly White (n=263; 80.4%). The remaining racial distribution of the sample included: American Indian or Alaskan Native (n=46; 14.1%), Biracial (n=11; 3.4%), Black or African American (n=5; 1.5%), Asian (n=1, .3%), Native Hawaiian or other Pacific Islander (n=8; 6.3%) (See Table 2).

Education

A large portion of the sample population identified as high school graduates (n=247; 75.5). The majority of individuals reported their highest level of education at the time of application to be high school graduate (n= 118; 36.1%). The remaining educational distribution of the sample included: post-secondary education no degree (n= 68; 20.8%), secondary education (n=66; 20.2%), associate degree or

vocational/technical certificate (n=38; 11.6%), bachelor's degree (n=20; 6.1%), special education (n=9; 2.8%), elementary education (n=5; 1.5), and master's degree or higher (n=3; .9%) (See Table 3).

Personal Income

At the time of application the minimum weekly salary of the sample was 0 dollars and the maximum was 725 dollars (Mean=36.07.65; SD=101.2). The mode was 0 dollars (n=269; 82.3%). The majority of participants earned between 0 and 300 dollars weekly (n=317; 97%) (See Table 2).

North Dakota's Department of Vocational Rehabilitation Region

North Dakota's Department of Vocational Rehabilitation is divided into 8 regions: Williston (Northwest Region), Minot (North Central Region), Devils Lake (Lake Region), Grand Forks (Northeast Region), Fargo (Southeast Region), Jamestown (South Central Region), Bismarck (West Central Region), and Dickinson (Badlands Region). The majority of participants were working with the Fargo (n=82; 25.1%) or Bismarck (n=89; 27.2%) office. The remaining distribution of the sample included: Grand Forks (n= 54; 16.5%), Minot (n=30; 9.2%), Dickinson (n=21; 6.4%), Jamestown (n=19; 5.8%), Williston (n=17; 5.2%), and Devils Lake (n=15; 4.6) (Table 1).

Table 1

North Dakota VR Region

Region	Frequency	Percent
Bismarck	89	27.2
Fargo	82	25.1
Grand Forks	54	16.5
Minot	30	9.2
Dickinson	21	6.4
Jamestown	19	5.8
Williston	17	5.2
Devils Lake	15	4.6
Total	327	100

A Brief Summary of the Information in the Demographic Section is Presented Below.

In Table 2, information related to all individual’s age, sex, racial identity, and education level is presented. Demographic information is broken down by closure statuses (i.e., successful, unsuccessful, and unable to locate) in Table 3. Descriptions of North Dakota’s VR regions by closure status is provided in Table 4.

Table 2

Participant Demographics

Factor	Description	Frequency	Percent
Age	Under 18	21	6.4
	18-29	95	29.1
	30-39	79	24.2
	40-49	86	26.3
	50-59	41	12.5
	60-69	5	1.5

Table 2 (continued)

Factor	Description	Frequency	Percent
Sex	Male	217	66.4
	Female	110	33.6
Racial Identity	Asian	1	.3
	American Indian/Alaskan Native	46	14.1
	Biracial	11	3.4
	Black or African American	5	1.5
	Native Hawaiian/Pacific Islander	1	.3
	White	263	80.4
Highest Education Completed At Time of Application	Elementary Education	5	1.5
	Secondary Education	66	20.2
	Special Education	9	2.8
	High School Graduate	118	36.1
	Post-Secondary Education No Degree	68	20.8
	Associate Degree/Vocational/Tech Cert	38	11.6
	Bachelor's Degree	20	6.1
	Master's Degree or Higher	3	.9
Personal Weekly Income	\$0	269	82.3
	\$1-100	14	4.3
	\$101-200	23	7
	\$201-300	11	3.4
	\$301-400	2	.6
	\$401-500	4	1.2
	\$501-600	2	.6
	\$601 and above	2	.6

Demographic Information Regarding Successful and Unsuccessful Employment

Demographic information of both the Successful employment and Unsuccessful employment groups were explored. The majority of individuals from the Unsuccessful (n=107; 78%), unable to locate (n=55; 80%) and Successful (n=98; 77%) groups were between 18 and 49 years of age. Of the women in the sample, the majority were split between the Unsuccessful (n=44; 40%) and Successful (n=47; 42%), while only a small

portion fell into the unable to locate group (n=19; 17%). Similar results were found among the male sample of the group with the majority falling in either the Unsuccessful (n=93; 43%) or Successful groups (n=81; 37%). As with the female group, only a small portion of the males fell into the unable to locate group (n=43; 20%) (Table 2).

There was a similar distribution of education level attained at closure between both the Successful and Unsuccessful groups. The majority of individuals had a minimum of a high school education (Unsuccessful: n=117; 85.4%) (Successful: n=101; 80%). The majority of individuals in the Unable To Locate group's education level was a high school diploma or less (n=40; 64.5%) (Table 2).

Table 3

Description of Successful, Unsuccessful and Unable to Locate Cases

		Successful (n; group)	Unsuccessful (n; % group)	Unable to Locate (n; % group)
Sex	Male	81; 63.3%	93; 67.9%	43; 69.4%
	Female	47; 36.7%	44; 32.1%	19; 30.6%
Age	Under 18	9; .07%	10; .07%	2; .03%
	18-29	40; 31.3%	36; 26.3 %	19; 30.6%
	30-39	24; 18.8%	37; 27%	18; 29%
	40-49	34; 26.6%	34; 24.8%	18; 29%
	50-59	17; 13.3%	19; 13.9%	5; .08%
	60-69	4; .03%	1; .01%	0; 0%

Table 3 (continued)

Education at Closure	Successful (n; group)	Unsuccessful (n; % group)	Unable to Locate (n; % group)
Elementary	2; 1.6%	2; 1.5%	1; 1.6%
Secondary Education, no HS Degree	10; 7.8%	15; 10.9%	14; 22.6%
Special Education	5; 3.9%	3; 2.2%	2; 3.2%
High School	35; 27.3%	50; 36.5%	23; 37.1%
Post-Secondary Education	27; 21.1%	36; 26.3%	14; 22.6
Associate Degree or Vocational/Technical Certificate	30; 23.4%	22; 16.1%	2; 3.2%
Bachelor's Degree	9; 6.6%	18; 14.1%	4; 6.5%
Master's Degree or Above	1; .8%	0; 0%	2; 3.2%

Regions were examined in terms of the percentage of cases that fell into each of the three groups. The regions with the highest percentages of clients who obtained successful employment were Williston (n=8 ;47.1%), Devils Lake (n=7 ; 46.6%) and Fargo (n=39; 47.6). Dickinson (n=13 ; 61.9%) and Minot (n=16 ;53.3%), had the highest percentage of unsuccessful cases. The region with the highest percentage of cases closed because the clients could not be located was Williston (n=6; 35.3%), while the region with the lowest percentage was Dickenson (n=0 ; 0%) (Table 4).

Table 4

Description of North Dakota Vocational Rehabilitation Regions

	Unsuccessful	Successful	Unable to Locate	Total
Williston	17.6	47.1	35.3	17
Minot	53.3	33.3	13.3	30
Devils Lake	33.3	46.6	.2	15
Grand Forks	38.9	37.0	24.1	54
Fargo	36.6	47.6	.01	82
Jamestown	47.4	42.1	.1	19
Bismarck	44.9	31.5	23.6	89
Dickinson	61.9	38.1	0	21

Research Question I

One of the primary tasks of this study was to examine the relationship between services obtained while individuals were clients of North Dakota’s department of VR and their employment outcome. The study was specifically interested in the following services: assessment, diagnosis and treatment, supportive employment, job readiness, and on the job support. Additionally, the study aimed to explore the possible relationship between supportive employment and employment outcome. Research Question I examined the relationship between assessment and employment outcome.

Table 5

Crosstabulation between Assessment Services and Employment Outcome

			Assessment Not Provided	Assessment Provided	Total
Successful	Unsuccessful	Count	34	103	137
		Expected Count	34.5	102.2	137
	Successful	Count	26	102	128
		Expected Count	32.5	95.5	128
	Unable to Locate	Count	23	39	62
		Expected Count	15.7	46.3	62
Total		Count	83	244	327
		Expected Count	83	244	327

Table 6

Assessment Services Chi-Square Tests

	Value	Df	Asymp. Sig (2-sided)
Pearson Chi-Square	6.25 ^a	2	.044
Likelihood Ratio	5.982	2	.050
N of Valid Cases	327		

Table 7

Assessment Services Symmetric Measures

		Value	Approx. Sig
Nominal by	Phi	.138	.044
Nominal	Cramer's V	.138	.044
N of Valid Cases		327	

Table 5 represents pairwise comparison between the whether assessment was provided and employment outcome.

A two-way contingency table analysis was conducted to evaluate whether the provision of assessment services were related to successful employment, unsuccessful employment or unable to locate closure statuses. The two variables were provision of assessment service with two levels (provided and not provided) and closure status of individuals with three levels (successful employment, unsuccessful employment and unable to locate). Provision of assessment services and closure status was found to be significantly related, Pearson χ^2 (2, N=327)= 6.25, $p=.04$, Cramér's $V=.138$. The proportion of closure statuses of individuals provided assessment were, .42, .42, and .16, respectively.

Follow-up pairwise comparisons were conducted to evaluate the difference among these proportions. Table 8 shows the results of these analyses. The Holom's sequential Bonferroni method was used to control for Type I error at the .05 level across all three comparisons. The only pairwise difference that was significant was between individuals who had unsuccessful employment and those who could not be located.

Table 8

Follow-Up Crosstabulation between Assessment Services and Employment Outcome

Comparison	Pearson chi-square	p value	Cramér's V
Successful vs. unsuccessful	.767	.381	.054
Successful vs. unable to locate	3.149	.076	.126
Unsuccessful vs. unable to locate	6.15*	.013	.180

Research Question II

The second purpose of this study was to explore the relationship between the provision of diagnosis and treatment services and employment outcome. Further, how the provision of both assessment and diagnosis and treatment affects the individual's probability of a successful closure.

Table 9

Crosstabulation between Diagnosis Services and Employment Outcome

			Diagnosis Not Provided	Diagnosis Provided	Total
Successful	Unsuccessful	Count	108	29	137
		Expected Count	97.2	39.8	137
	Successful	Count	69	59	128
		Expected Count	90.8	37.2	128
	Unable to Locate	Count	55	7	62
		Expected Count	44	18	62
Total	Count		232	95	327
	Expected Count		232	95	327

Table 10

Diagnosis Services Chi-Square Tests

	Value	Df	Asymp. Sig. (2-sided)
Pearson Chi-Square	31.656 ^a	2	.000
Likelihood Ratio	32.301	2	.000
N of Valid Cases	327		

Table 11

Diagnosis Services Symmetric Measures

		Value	Approx. Sig
Nominal by	Phi	.311	.000
Nominal	Cramer's V	.311	.000
N of Valid Cases		327	

Table 9 represents pairwise comparison between the whether diagnosis and treatment services were part of the IPE and employment outcome.

A two-way contingency table analysis was conducted to evaluate whether the provision of diagnosis and treatment services were related to successful employment, unsuccessful employment or unable to locate closure statuses. The two variables were provision of diagnosis and treatment service with two levels (provided and not provided) and closure status of individuals with three levels (successful employment, unsuccessful employment and unable to locate). Provision of diagnosis and treatment services and closure status was found to be significantly related, Pearson χ^2 (2, N=327)= 31.656, $p<.01$, Cramér's $V=.311$. The proportion of closure statuses

(unsuccessful, successful, and unable to locate) of individuals provided diagnosis and treatment were, .31, .62, and .07, respectively.

Follow-up pairwise comparisons were conducted to evaluate the difference among these proportions. Table 12 shows the results of these analyses. The Holom's sequential Bonferroni method was used to control for Type I error at the .05 level across all three comparisons. Pairwise differences were found between individuals who had successful employment and unsuccessful employment, as well as successful employment and those who were unable to locate. The probability of a an individual being closed successfully was about 3.19 times more likely when they were provided assessment services as opposed to being closed unsuccessfully. Further, the probability of a an individual being closed successfully was about 6.72 times more likely when they were provided assessment services as opposed to being closed as unable to locate.

Table 12

Follow-Up Crosstabulation between Diagnosis Services and Employment Outcome

Comparison	Pearson chi-square	<i>p</i> value	Cramér's <i>V</i>
Successful vs. unsuccessful	18.536*	.000	.264
Successful vs. unable to locate	22.317*	.000	.343
Unsuccessful vs. unable to locate	2.810	.094	.119

In order to explore the relationship between the provision of assessment and diagnosis and treatment with employment outcome, a two-way contingency table analysis was conducted. The two variables were provision of both assessment and diagnosis and treatment service with two levels (provided and not provided) and

closure status of individuals with three levels (successful employment, unsuccessful employment and unable to locate). Provision of both assessment and diagnosis and treatment services and closure status was found to be significantly related, Pearson χ^2 (2, N=130)= 30.106, $p < .01$, Cramér's $V = .481$. The proportion of closure statuses (unsuccessful, successful, and unable to locate) of individuals provided both assessment and diagnosis and treatment were, .32, .62, and .06, respectively.

Follow-up pairwise comparisons were conducted to evaluate the difference among these proportions. Table 13 shows the results of these analyses. The Holom's sequential Bonferroni method was used to control for Type I error at the .05 level across all three comparisons. Pairwise differences were found between individuals who had successful employment and unsuccessful employment, successful employment and those who were unable to be locate, as well as unsuccessful employment and those who were unable to be located. The probability of an individual being closed successfully was about 4.87 times more likely when they were provided both assessment and diagnosis and treatment services as opposed to being closed unsuccessfully.

Table 13

Crosstabulation between Assessment and Diagnosis Services with Employment Outcome

Comparison	Pearson chi-square	<i>p</i> value	Cramér's <i>V</i>
Successful vs. unsuccessful	13.86*	.000	.362
Successful vs. unable to locate	28.11*	.000	.597
Unsuccessful vs. unable to locate	5.726*	.017	.276

Research Question III

The third purpose of the study was to explore the relationship between job readiness services and employment outcome.

Table 14

Crosstabulation between Job Readiness Services and Employment Outcome

			Job Readiness Not Provided	Job Readiness Provided	Total
Successful	Unsuccessful	Count	113	24	137
		Expected Count	127.7	24.3	137
	Successful	Count	96	32	128
		Expected Count	105.3	22.7	128
	Unable to Locate	Count	60	2	62
		Expected Count	51	11	62
Total		Count	83	58	327
		Expected Count	269	58	327

Table 15

Job Readiness Chi-Square Tests

	Value	Df	Asymp. Sig (2-sided)
Pearson Chi-Square	13.580 ^a	2	.001
Likelihood Ratio	16.901	2	.000
N of Valid Cases	327		

Table 16

Job Readiness Symmetric Measures

		Value	Approx. Sig
Nominal by	Phi	.204	.001
Nominal	Cramer's V	.204	.001
N of Valid Cases		327	

Table 14 represents pairwise comparison between the job readiness services provision and employment outcome.

A two-way contingency table analysis was conducted to evaluate whether the provision of job readiness services were related to successful employment, unsuccessful employment or unable to locate closure statuses. The two variables were provision of service with two levels (provided and not provided) and closure status of individuals with three levels (successful employment, unsuccessful employment and unable to locate). Provision of job readiness services and closure status was found to be significantly related, Pearson χ^2 (2, N=265)= 13.58, $p < .01$, Cramér's $V = .204$. The proportion of closure statuses of individuals provided job readiness were, .41, .55, and .03, respectively.

Follow-up pairwise comparisons were conducted to evaluate the difference among these proportions. Table 17 shows the results of these analyses. The Holom's sequential Bonferroni method was used to control for Type I error at the .05 level across all three comparisons. Significant pairwise differences were found between individuals who had successful employment and those who were unable to locate, as

well as individuals who had unsuccessful employment and those who were unable to locate.

Table 17

Follow-Up Crosstabulation between Job Readiness Services and Employment Outcome

Comparison	Pearson chi-square	<i>p</i> value	Cramér's <i>V</i>
Successful vs. unsuccessful	2.23	.136	.092
Successful vs. unable to locate	13.48*	.000	.266
Unsuccessful vs. unable to locate	7.68*	.006	.196

Research Question IV

The fourth purpose of the study was to explore the relationship between on-the-job support and employment outcome.

Table 18

Crosstabulation between On-The-Job Support and Employment Outcome

			On-the-job support Not Provided	On-the-job support Provided	Total
Successful	Unsuccessful	Count	127	10	137
		Expected Count	123	13.4	137
	Successful	Count	107	21	128
		Expected Count	115.5	12.5	128
	Unable to Locate	Count	61	1	62
		Expected Count	55.9	6.1	62
Total		Count	295	32	327
		Expected Count	295	32	327

Table 19

On-the-Job Support and Chi-Square Tests

	Value	df	Asymp. Sig (2-sided)
Pearson Chi-Square	12.005 ^a	2	.002
Likelihood Ratio	13.409	2	.001
N of Valid Cases	327		

Table 20

On-the Job Symmetric Measures

		Value	Approx. Sig
Nominal by	Phi	.192	.002
Nominal	Cramer's V	.192	.002
N of Valid Cases		327	

Table 18 represents pairwise comparison between the weather on-the-job support services were provided and employment outcome.

A two-way contingency table analysis was conducted to evaluate whether the provision of on-the-job support services were related to successful employment, unsuccessful employment or unable to locate closure statuses. The two variables were provision of service with two levels (provided and not provided) and closure status of individuals with three levels (successful employment, unsuccessful employment and unable to locate). Provision of on-the-job-support services and closure status was found to be significantly related, Pearson χ^2 (2, N=327)= 5.313, $p= <.02$, Cramér's $V=.142$.

The proportion of closure statuses of individuals on the job support services, .31, .66, and .03, respectively.

Follow-up pairwise comparisons were conducted to evaluate the difference among these proportions. Table 21 shows the results of these analyses. The Holom's sequential Bonferroni method was used to control for Type I error at the .05 level across all three comparisons. Significant pairwise differences were found between individuals who had successful employment and those who were unable to locate, as well as individuals who had successful employment and unsuccessful employment. The probability of an individual being closed successful was about 2.45 times more likely when they were provided on the job support services as opposed to unsuccessful.

Table 21

Follow-Up Crosstabulation between On-The-Job Support and Employment Outcome

Comparison	Pearson chi-square	<i>p</i> value	Cramér's <i>V</i>
Successful vs. unsuccessful	5.313*	.021	.142
Successful vs. unable to locate	8.928*	.003	.217
Unsuccessful vs. unable to locate	2.643	.104	.115

Research Question V

The fifth purpose of the study was to explore the relationship between supportive employment and employment outcome.

Table 22

Crosstabulation between Supportive Employment and Employment Outcome

			Supportive Employment Not Provided	Supportive Employment Provided	Total
Successful	Unsuccessful	Count	51	10	61
		Expected Count	51.7	9.3	61
	Successful	Count	107	21	128
		Expected Count	108.5	19.5	128
	Unable to Locate	Count	20	1	21
		Expected Count	17.8	3.2	21
Total		Count	178	32	210
		Expected Count	178	32	210

Table 23

Supportive Employment Chi-Square Tests

	Value	df	Asymp. Sig (2-sided)
Pearson Chi-Square	1.983 ^a	2	.371
Likelihood Ratio	2.529	2	.282
N of Valid Cases	210		

Table 24

Supportive Employment Symmetric Measures

		Value	Approx. Sig
Nominal by	Phi	.097	.371
Nominal	Cramer's V	.2097	.371
N of Valid Cases		210	

Table 22 represents pairwise comparison between the whether the individual utilized supportive employment and employment outcome.

A two-way contingency table analysis was conducted to evaluate whether the provision of supportive employment services were related to successful employment, unsuccessful employment or unable to locate closure statuses. The two variables were supportive employment with two levels (provided and not provided) and closure status of individuals with three levels (successful employment, unsuccessful employment and unable to locate). Provision of supportive employment services and closure status was found to be significantly related, Pearson χ^2 (2, N=210)= 1.98, p = <.371, Cramér's V =.097. The proportion of closure statuses of individuals provided job readiness were, .31, .66, and .03, respectively.

Research Question VI

The sixth purpose of the study was to explore the relationship between job placement and employment outcome.

Table 25

Crosstabulation between Job Placement Services and Employment Outcome

			Job Placement Not Provided	Job Placement Provided	Total
Successful	Unsuccessful	Count	108	29	137
		Expected Count	103.1	33.9	137
	Successful	Count	79	49	128
		Expected Count	96.3	31.7	128
	Unable to Locate	Count	59	3	62
		Expected Count	46.6	15.4	62
Total		Count	246	81	327
		Expected Count	246	81	327

Table 26

Job Placement Services and Chi-Square Tests

	Value	df	Asymp. Sig (2-sided)
Pearson Chi-Square	26.710 ^a	2	.000
Likelihood Ratio	30.307	2	.000
N of Valid Cases	327		

Table 27

Job Placement Services and Symmetric Measures

		Value	Approx. Sig
Nominal by	Phi	.286	.000
Nominal	Cramer's V	.286	.000
N of Valid Cases		327	

Table 25 represents pairwise comparison between the whether job placement services were provided and employment outcome.

A two-way contingency table analysis was conducted to evaluate whether the provision of job placement services were related to successful employment, unsuccessful employment or unable to locate closure statuses. The two variables were provision of service with two levels (provided and not provided) and closure status of individuals with three levels (successful employment, unsuccessful employment and unable to locate). Provision of on the job placement services and closure status was found to be significantly related, Pearson χ^2 (2, N=327)= 26.7, p = <.001, Cramér's V =.286. The proportion of closure statuses of individuals on the job support services, .21, .38, and .05, respectively.

Follow-up pairwise comparisons were conducted to evaluate the difference among these proportions. Table 28 shows the results of these analyses. The Holom's sequential Bonferroni method was used to control for Type I error at the .05 level across all three comparisons. Significant pairwise differences were found between individuals who had successful employment and those who were unable to locate, as well as individuals who had successful employment and unsuccessful employment. The

probability of an individual being closed successful was about 2.31 times more likely when they were provided on the job support services as opposed to unsuccessful.

Table 28

Follow-Up Crosstabulation between Job Placement Services and Employment Outcome

Comparison	Pearson chi-square	p value	Cramér's V
Successful vs. unsuccessful	9.331*	.003	.188
Successful vs. unable to locate	23.500*	.000	.352
Unsuccessful vs. unable to locate	8.434*	.004	.206

Summary

A small significant relationship between the provision of assessment services and employment outcome (i.e., successful employment vs. unable to locate) was found in Research Question I. In Research Question II a small significant relationship was found between individuals who had successful employment and unsuccessful employment, and a medium significant relationship was found between individuals with successful employment and those who were closed as unable to locate. Follow-up tests explored the provision of both assessment and diagnosis and treatment services and found the following significant relationships: a small significant relationship between unsuccessful and unable to locate, a medium significant relationship between successful and unsuccessful, and a large significant relationship between successful and unable to locate.

A small significant relationship between provision of job readiness services and employment outcome (i.e., successful employment vs. unable to locate, and

unsuccessful employment vs. unable to locate) was found in research question III. A small significant relationship was found between provision of on the job support services and employment outcome (i.e., successful employment vs. unable to locate, and successful vs. unsuccessful) in Research Question VI. No significant relationship was found between supportive employment and employment outcome in Research Question V. A small significant relationship was found between provision of job placement services and employment outcome (i.e., successful employment vs. unable to locate, and unsuccessful employment vs. unable to locate) was found in research question VI.

CHAPTER IV

DISCUSSION

The purpose of this research was to examine the relationship between vocational rehabilitation employment services and long-term employment outcomes. The research study examined various quantitative aspects of 327 clients of North Dakota's Department of Vocational Rehabilitation who were diagnosed with TBI. Data was extracted from the department's database VIRS and analyzed in SPSS. Findings indicated that some services had a significant relationship with long-term employment outcomes. The beginning of this chapter is organized around the research questions and hypotheses investigated for this study.

This section will summarize and discuss key findings for each of the research questions and its attendant hypothesis. It places the results in the context of the literature, and discusses the consistency with past research. It will explore major limitations specific to a given result and suggests how further research could clarify or extend findings. The following sections of the chapter will review the general limitations of the study, discusses implications and suggest ideas for future research.

Summary and Interpretation of Results

Research Question I

The first research question asked whether assessment services were related to long-term employment for persons diagnosed with TBI. Specifically, Hypothesis 1

predicted a positive relationship between the provision of assessment services and long-term employment.

The data analysis in this first crosstabs (Chi-Square) nonparametric test did not find support for the hypothesis. The independent variable of assessment services was not significant between successful employment and other closures (unsuccessful=.38, unable to locate=.076). However, there was a significant relationship between unsuccessful and unable to locate at .013. While there was no significance found for obtaining and maintaining long term employment, it seems the client was more likely to stay with VR than be closed as unable to locate.

The results are not consistent with some previous outcome studies, such as Gamble and Moore (2003); however, Schonburn et al., (2007) did find similar results in a southern state. In the later study it was suggested that the results were possibly linked to the wide variation of services under this label. The failure to reject the null hypotheses may be attributed to the wide definition of assessment services. As in the previous study assessments were varied in type (e.g., neuropsychological, medical, psychological, situational, functional assessments) and depth (e.g., full batteries, screens). It is unfortunately impossible to determine the specific method and depth of assessment for each individual with the collected data.

Research Question II

The second research question aimed to explore whether obtaining a vocational rehabilitation employment outcome was related to the provision of diagnosis and treatment services. Hypothesis 2 predicted a positive relationship between employment outcome and the utilization of diagnosis services. The data analysis supported this

hypothesis and indicated the null hypothesis should be rejected. There was a significant relationship at $p < .001$ level and Cramer's V of .311.

Individuals who were provided diagnosis services were 3.19 times more likely to obtain long-term employment than to be closed unsuccessful. They were also more likely to stay with VR than to be closed as unable to locate. The significance of this service is consistent with previous research results. As in previous studies, it was not possible to know from the data exactly what was diagnosed or treated; however it indicates that it is a positive indicator of a successful employment outcome when specific medical/psychological services were addressed (Schonburn et al., 2007).

Follow up analysis explored the relationship between the provision of both diagnosis services and assessment services and employment outcome. Results indicated a positive relationship between the provision of both services and closure status at $p < .001$ level and Cramer's V of .48. Individuals provided both services were 4.87 times more likely to be closed successful than unsuccessful and were more likely to stay with VR than to be closed as unable to locate. No previous studies have explored the relationship between the provision of both services and employment outcome.

Research Question III

The third research question sought to determine whether obtaining job readiness services was related to employment outcome. Hypothesis 3 posited a positive relationship between the provision of services and employment outcome. Specifically, obtaining job readiness services increases the likelihood of a successful employment outcome. A significant relationship was found at $p = .001$ level and Cramer's V of .204. Follow up analysis found significant differences between the following groups:

individuals who had successful employment and those who were unable to locate, individuals who had unsuccessful employment and those who were unable to locate. There were no significant differences found between the successful and unsuccessful groups. The results found in this study were not similar to the results found by Catalano et al., (2006). Additionally, it appears that the provision of these services was related to an individual maintaining contact with vocational rehabilitation.

Research Question IV

The fourth research question sought to determine whether obtaining on the job support services was related to employment outcome. Hypothesis 4 predicted a positive relationship between the provision of on-the-job support service and long-term employment. Specifically, obtaining on-the-job support services would increase the likelihood that a given individual would obtain long-term employment. Results indicated that the null hypothesis should be rejected. There was a significant relationship at the .02 level and Cramer's V of .142.

Individuals who were provided on-the-job support services were 2.45 times more likely to obtain long-term employment than to be closed unsuccessful. There was a significant relationship at the .02 level and Cramer's V of .142. Results were consistent with those found by most previous studies (Catalano et al., 2006); however, odds were lower than those found in one similar study. Premuda-Conti (2008) reported the odds of finding competitive employment for VR clients receiving on-the-job supports was 4.4 times higher than those who did not receive the service.

When an individual was provided on the job support services was more likely to obtain long-term employment services than to be closed as unable to locate. There was

a significant relationship at $<.01$ and Cramer's V of $.217$. There were no prior studies examining the effect of on the job support services on an individual being closed unable to locate. Though these results do suggest there is a relationship between the two variables.

Research Question V

The fifth question investigated whether utilization of supportive employment services was related to long-term employment. Hypothesis 5 predicted a positive relationship between supportive employment and a successful closure. The data provided no support for this hypothesis ($p=.09$).

Most of the prior research on the relationship between vocational rehabilitation outcomes and supportive employment has shown a positive relationship (Gamble & More, 2003; Groswasser, Melamed, Agranov, & Keren, 1999; Preston, Ulicny, & Evans, 1992; Target, Wehman, Gorton, & Petersen, 1998; Wehman et al., 1990; Wehman et al., 1989). It is quite possible that this finding is related to the large number of cases being coded as "unknown". In fact 131 individual's cases were labeled as *supportive employment unknown at the time of closure*, and had to be excluded from the analysis.

Research Question VI

The sixth question investigated whether the provision of job placement services was related to long-term employment. Hypothesis 6 predicted a positive relationship between job placement services and a successful closure. A significant relationship was found at $p=.001$ level and Cramer's V of $.286$. Results were consistent with prior

research that determined the provision of job placement services were significantly related to employment outcome (Catlano et al., 2006).

Follow-up analysis found significant differences between the following groups: individuals who had successful employment and those who had unsuccessful employment, individuals who had successful employment and those who were unable to locate, individuals who had unsuccessful employment and those who were unable to locate. Individuals who were provided job placement services were 2.31 times more likely than unsuccessful. There were also significant relationships between the provision of job placement services and successful employment, as well as the provision of job placement services and unsuccessful employment.

The results were similar to other studies in regard to job placement being significantly related to outcome, though the odds ratio of this study was somewhat higher than those found in previous studies. One study reported an odds ratio of 1.95; however, their study was conducted with a national sample rather than state-level, controlled for a large set of demographic variables (i.e., age, gender, race/ethnicity, education, severity of disability, psychiatric disability, substance abuse, work disincentives, and employment status at application), and included all VR services. Premuda-Conti (2008) controlled for a smaller set of demographic variables and found an odds ratio of 7.5. Two other studies that did not control for demographic factors (Gamble & Moore, 2003; Schonbrun et al., 2007) also found job placement to be a strong predictor of successful employment outcome. Additionally, the provision of service appears to be significantly related to an individual maintaining contact with VR.

Limitations

The study had a number of methodological limitations that make it necessary to interpret the results with caution. Major limitations were related to sample and study design.

Sample concerns. The first limitation is related to the research sample's external validity. This sample only included participants from one state vocational rehabilitation agency and is only applicable to the public vocational rehabilitation population. Thus the results likely do not extend to similar populations with disabilities (e.g., The Veterans Administrations Department of Vocational Rehabilitation, workers compensation clients).

The sample was also limited to participants from a rural Midwest state situated along the Canadian border. Previous research has noted that vocational rehabilitation clients from rural areas of the country seem to have different service needs than clients from other regions. The results likely cannot be generalized to clients from other locations (e.g., Pacific Northwest, New England, south).

In this study the Department of Vocational Rehabilitation Services' definition for long-term employment was utilized. In terms of the reviewed research 90 days is a relatively short period of time. Future research should evaluate individual's statuses at more extended periods of time for the individual's ability to maintain competitive long-term employment.

Data was extracted from VIRS, an RSA-911 database utilized by North Dakota's Division of Vocational Rehabilitation Services. In most cases VR counselors enter information included in the database upon closure. Previous research has noted

that counselors may rely exclusively on memory for this information. Further, there is potential for error when with the variety counselors of individual's entering information into the database. Though previous studies have noted that it is assumed that these unknown errors are indiscriminate and do not result in methodological data bias (Wheaton et al., 1996).

Finally, with regard to sample concerns the population was limited in cultural diversity. Individuals predominantly identified as White (80.4 %), with the second largest group being American Indian or Alaskan Native (14%). Most were male (66.4%). In regard to socioeconomic status the mode weekly income of participants at the time of eligibility was 0 dollars.

Design. The research design selected for this study was archival. In addition, the ex post facto design did not allow manipulation of the independent variables, additional data collection, or contact with study participants. The design could be improved through longitudinal methods. It would be beneficial to contact participants a year after closure to obtain additional information about successful employment (e.g., current employment status). Also it would be useful to obtain information regarding severity of TBI (i.e., mild, moderate, severe) as previous research has suggested services required may be different for individuals with dissimilar diagnosis.

The factor *unable to locate* describes clients who did not maintain contact with VR; however it not provide information about what happened to the individual. Clients falling into this category may have had a number of outcomes (e.g., moved, obtained employment, decided not to utilize VR services), and it is impossible to know why they

fell into this category. The only conclusion that can be drawn is that they decided not to maintain contact with VR.

All data in this study was obtained from the RSA-911 dataset, which is generated from various stages in the process. One concern addressed by previous researchers utilizing the same type of dataset (Catalano et al., 2006) is the fixed set of variables and options for coding available to the counselors who enter the information. Counselors may have entered some of the information that they determined “best fit”.

Implications of Findings

The results of this research have a number of implications for vocational rehabilitation counselors and consumers. Such implications include practice, and direction of future research.

Applied Implications. The findings have practical implications for service providers. The study demonstrated the usefulness of diagnosis and treatment services, as well as the combination of assessment services and diagnosis and treatment services. Counselors should consider these services with clients diagnosed with TBI. The study supports previous research which has described the services as useful in identifying appropriate IPE goals and successful long-term employment (Catalano et al., 2006). Results also suggest that the provision of assessment services and both assessment services and diagnosis and treatment services were related to cases being closure statuses other than unable to locate.

The results showed long-term employment positive correlation between on the job support services and placement services. Both services were found to be significant predictors of successful employment. Catalano et al. (2006) also found these services to

be significant predictors and failed to find significance of supportive employment. The researchers noted that these services are pieces of supportive employment, and perhaps it is the specific ingredients of supportive employment that lead to long-term employment as opposed to the traditionally defined model. Further they postulate that the specific services may be more effective for individuals diagnosed with TBI in state VR agency settings.

Supportive employment was not a significant factor, which conflicted with previous research. Review of the data revealed the information was not entered, or unknown, for a large number of cases. It is impossible to know if the lack of data impacted the outcome, or if a complete dataset would have revealed a different relationship. It would be useful for North Dakota's VR to explore the reason for lack of information, so that data can be obtained in the future.

Direction of Future Research. The results of this study suggest a variety of directions for future research. This study evaluated service provision and employment outcome of a vastly homogeneous subgroup of VR clients. The best practices movement described by Chronister, Cardoso, Lee, Chan, and Leahy (2005) focused rehabilitation research toward helping professionals identify “what processes/techniques make specific rehabilitation intervention work”, “For whom is the intervention most effective” and “when”. To continue working toward this goal future research should continue exploring services that are most effective for clients from underrepresented groups (e.g., racial identity, gender, age).

Numerous research articles on TBI discuss need and functional limitation differences among individuals with different severity levels of TBI (i.e., mild,

moderate, severe) (Silver, 2011). These articles use medical diagnosis given to the individual while in the hospital; information that is not incorporated into the RSA-911 data set. The data does include information on severity of disability as determined by VR. The severity level in RSA-911 is based on different factors than those used by physicians and review of North Dakota's data set revealed the majority of individuals fell into the *most severe* range, which did not allow for comparison. It would be useful for future research to evaluate the needs of individuals of with differing levels of severity. Given past research it is likely individuals with different severity levels will have different types and levels of needs.

Although demographic variables were associated with employment outcomes in this study, psychological factors were not investigated. Given previous research it is likely that other psychological factors (e.g., PTSD, drug and alcohol abuse or dependence) may have contributed to the vocational rehabilitation outcomes. Future research should look at service provision specific to the addition of such diagnosis.

This study included *unable to locate* as an outcome variable. The addition of this variable was unique in respect to previous research. The novelty of the factor and significance of the results suggests more information is needed. Maintaining contact with clients is important for case management, provision of services, and client care. It would be helpful for future research to explore this variable and its implications for clinical practice.

The archival data analysis of this study allowed for detailed information and insight about demographic variables, service patterns, and long-term employment. The data did not contain information about the specific type of service provided (e.g.,

whether assessment services were provided, but not the type of assessment). Detailed information regarding the type of service provided may allow for even better case management and counseling (e.g., neuropsychological assessment versus functional capacity assessment). Greater insight into service specifics would allow for increased understanding of client needs and improved service provision.

Finally, the majority of previous literature has identified supported employment as a significant predictor of employment. This study and one previously identified study (Catleno et al., 2006) had contrary findings. It was previously noted that while supportive employment was not found to be significant, some elements of supportive employment (i.e., job search assistance, job placement assistance, and on-the-job support) were found to be significant predictors of successful employment. This study again found similar results. This may suggest that particular elements of supportive employment are more important. It would be beneficial for future research to explore this possibility.

APPENDICES

APPENDIX A

VOCATIONAL REHABILITATION REQUIREMENTS

Individual must meet the following criteria	Description
1. Impairment	He/She must have a mental or physical impairment.
2. Employment	Impairment must result in a substantial impediment to employment.
3. Benefits	The individual can benefit in terms of an employment outcome from vocational rehabilitation services.
4. Requires	The individual requires vocational rehabilitation services to prepare for, engage in, or retain gainful employment
*Automatic Eligibility	The individual receiving SSI or SSDI benefits who wants to work are presumed eligible for VR services.

APPENDIX B

VOCATIONAL REHABILITATION PROCESS

Steps	Description
1. Intake	The individual completes an intake and application for services
2. Eligibility	The individual is assigned a counselor and VR determines eligibility.
3. Assessment	The individual can benefit in terms of an employment outcome from vocational rehabilitation services.
4. Individual Plan for Employment (IPE)	The individual and counselor will: complete interest assessments, conduct labor market research, have further assessments to help determine an appropriate employment goal.
5. Services	Services that have been agreed upon in the IPE are provided.
6. Job Placement & Successful Employment	The individual is placed and has 90 days before they are considered to be successfully employed. After 90 days the individual's file is closed.
7. Post-Employment Services	Services that are provided after a case is closed to help the individual maintain a job, if deemed appropriate by the client and VR.

APPENDIX C

VOCATIONAL REHABILITATION SERVICES DESCRIPTION

SERVICE	DESCRIPTION
Assessment	Services provided and activities performed to determine an individual's eligibility for VR services, to assign an individual to a priority category of a state VR agency that operates under an order of selection, and/or to determine the nature and scope of VR services to be included in the individual plan for employment (IPE); included in this category are trial work experiences and extended evaluation
Diagnosis and treatment of impairments	Surgery, prosthetics and orthotics, nursing services, dentistry, occupational therapy, physical therapy, speech therapy, and drugs and supplies; this category includes diagnosis and treatment of mental and emotional disorders
Vocational rehabilitation counseling and guidance counseling	Discrete therapeutic counseling and guidance services necessary for an individual to achieve an employment outcome, including personal adjustment counseling; counseling that addresses medical, family, or social issues; vocational counseling; and any other form of counseling and guidance necessary for an individual with a disability to achieve an employment outcome; this service is distinct from the general counseling and guidance relationship that exists between the counselor and the individual during the entire rehabilitation process
College or university training	Full-time or part-time academic training above the high school level that leads to a degree (associate, baccalaureate, graduate, or professional), a certificate, or other recognized educational credential; such training may be provided by a four-year college or university, community college, junior college, or technical college
Occupational or vocational training	Occupational, vocational, or job skill training provided by a community college and/or a business, vocational/trade, or technical school to prepare students for gainful employment in a recognized occupation; this training does not lead to an academic degree or certification

On-the-job training	Training to prepare an individual for the world of work (e.g., appropriate work behaviors, methods for getting to work on time, appropriate dress and grooming, methods for increasing productivity)
Miscellaneous training	Any training not recorded in one of the other categories listed, including GED or high school training leading to a diploma
Job placement	A referral to a specific job resulting in an interview, whether or not the individual obtained the job
Job readiness training	Training to prepare an individual for the world of work (e.g., appropriate work behaviors, methods for getting to work on time, appropriate dress and grooming, methods for increasing productivity)
augmentative skills training	Service includes, but is not limited to, orientation and mobility, rehabilitation teaching, training in the use of low vision aids, Braille, speech reading, sign language, and cognitive training/retraining
On-the-job supports	Support services provided to an individual who has been placed in employment in order to stabilize the placement and enhance job retention; such services include job coaching, follow-up and follow-along, and job retention services
Transportation services	Travel and related expenses necessary to enable an applicant or eligible individual to participate in a VR service; includes adequate training in the use of public transportation vehicles and systems
Maintenance	Monetary support provided for expenses such as food, shelter, and clothing that are in excess of the normal expenses of the individual and that are necessitated by the individual's participation in an assessment for determining eligibility and VR needs or that are incurred while an individual receives services under an IPE
Interpreter services	Sign language or oral interpretation services performed by specially trained persons for individuals who are deaf or hard of hearing, and tactile interpretation services for individuals who are deaf-blind; includes real-time captioning services; does not include language interpretation
Personal attendant services	Those personal services that an attendant performs for an individual with a disability such as bathing, feeding, dressing, providing mobility and transportation, and so on
Technical assistance services	Technical assistance and other consultation services provided to conduct market analyses, to develop business plans, and to provide resources to individuals in the pursuit of self-employment, telecommuting, and small business operation outcomes
Provider (Career)	Specific providers contracted to provide services such as: job

Options, Pride, or Hit)	placement, job coaching, vocational development, supported employment, and job readiness training.
Information and referral services	Services provided to individuals who need assistance from other agencies (through cooperative agreements) not available through the VR program

APPENDIX D

VOCATIONAL REHABILITATION CLOSURES DESCRIPTION

Closure Type	Description	Study label
Achieved employment outcome	Represents an individual who obtained and maintained employment for a minimum of 90 days.	Successful
Extended employment	Individual placed in non-integrated setting	Successful
Unable to locate or contact	Unable to contact client and no forwarding address is available. Code may also be used for a person who left the state with no intentions of continuing in a VR program.	Unable to locate
Failure to cooperate	Represents an individual who's actions make it impossible to continue VR services. Also includes individuals who fail to keep appointments.	Unsuccessful
Transportation not feasible or available	Represents an individual who could not accept or maintain employment due to problems with transportation.	Unsuccessful
Extended services not available	Represents an individual who could have benefited from supported employment services but for whom no source of extended services was available.	Unsuccessful
All other reasons	All reasons not covered by: unable to locate, extended services not available, or extended employment.	Unsuccessful
No disabling condition	Represents an applicant who is not eligible for services because no physical or mental disability exists.	Excluded
No impediment to employment	Represents an individual who has a mental or physical disability that does not conflict with their ability to obtain or maintain employment.	Excluded
Does not require VR services	Represents an individual who does not require VR services to obtain or maintain employment.	Excluded

Individual in Institution	Represents a client who entered an institution and is unabalible to participate in the VR program for an indefinite or significant period of time.	Excluded
Death	Expired during their time as a client	Excluded
Disability too significant to benefit from VR services	Represents an individual who's disability is so significant that they are determined to be unable to benefit from VR services for employment purposes.	Excluded

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