VOCATIONAL REHABILITATION OUTCOME IN CLIENTS WITH TRAUMATIC BRAIN INJURY

by

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ABSTRACT

This research provides an analysis of the relationship between demographic information and between specific vocational rehabilitation services and employment outcome in RSA consumers with traumatic brain injury (TBI). The findings suggest that there is a relationship between a consumers’ race (i.e., White, Black, Hispanic, and Hawaiian), level of education, and presence of substance abuse. No relationship was identified between a consumers’ gender, age, or race of Asian or American Indian consumers. When specific services of assessment, job placement, job search, and diagnosis/treatment were provided consumers were more likely to obtain employment. The specific services of job placement, job search and diagnosis/treatment also predicted consumers’ employment outcome. Only three of these services, job placement, job search, and diagnosis/treatment were significantly related to consumers’ weekly earnings at case closure. Diagnosis/Treatment was positively related, while job placement and job search were negatively associated.
CHAPTER ONE
INTRODUCTION

It is estimated that 1.5 million Americans sustain a traumatic brain injury (TBI),
annually, and that an estimated 5.3 million individuals live with permanent difficulties as
a result of their injuries (CDC, 2004). TBI occurs most frequently in three populations:
young children, young adults, and older adults (CDC, 2004). Given this age spectrum, the
majority of individuals with TBI that vocational rehabilitation counselors see are in their
early adulthood, less than 30 years of age (Ashley, Persel, Clark, & Krych, 1997). Return
to work following TBI is critical because individuals typically have the majority of their
work life remaining. The inability to gain and maintain employment not only affects the
individual’s self-esteem and self-identity, but also has larger social and economic
consequences. Failure to return to work can result in poverty and long-term dependence
on public assistance (Abrams, Barker, Haffrey, & Nelson, 1993; Dikman, Temkin,
Machamer, Holubkov, Fraser, & Winn, 1994). Disability sequelae following TBI often
involve physical, behavioral, and cognitive problems that either alone, or in combination,
cause a substantial impediment to employment (CDC, 2004; Golden, Smith, & Golden,
1993; Van Baalen et al., 2003).

Employment rates within this population vary by study; however, the majority of
researchers indicate high rates of unemployment that become even higher over time
(Cattelani, Tanzi, Lombardi, & Mazzucchi, 2002; Isaki & Turkstra, 2000; Kosciulek,
1994; Kruetzer et al., 2003). Those who do return to work rarely do so at the same level
and pay scale that they had pre-injury (Gollaher, et al., 1998; Uomoto, 2000). In a recent
analysis, Johnstone, Mount, and Schopp (2003) found that 31% of their participants with TBI were employed at one-year post injury with a 51% reduction in earnings and an estimated 275% increase in the amount of public assistance received.

The State-Federal Vocational Rehabilitation (VR) program is the primary provider of vocational rehabilitation services, spending over $2 billion annually for consumers with disabilities (Goodall, Lawyer, & Wehman, 1994). Given the high cost of vocational rehabilitation and the low rate of employment outcome for consumers with TBI, it is necessary to identify services that are effective in helping consumers return to work. By understanding the service characteristics of participants with successful employment outcomes, rehabilitation professionals can increase the likelihood of success in other consumers (Bolton, Bellini, & Brookings, 2000). Using a Rehabilitation Services Administration (RSA) database for a southeastern state, Gamble and Moore (2003) evaluated six services received by consumers with TBI (i.e., assessment, college, counseling/guidance, job placement, restoration, and work adjustment). They found that college, counseling/guidance, and job placement were significantly related to achieving employment. Of these, job placement services most significantly predicted employment at case closure of clients with TBI. This is consistent with previous literature that has shown that, regardless of disability type, job placement services are frequently a significant predictor of employment outcome (Bolton et al., 2000). Gamble and Moore (2003) indicated that they did not find any similar studies that examined the relationship between State-Federal VR services and employment outcome in consumers with TBI.
They recommended that future research replicate their efforts to determine the consistency of their findings throughout the State-Federal VR program.

Statement of the Problem

The problem addressed in this study is that there is no known research addressing the relationship between State-Federal Rehabilitation Services and employment outcome of consumers with TBI on a national basis. An understanding of this relationship is important because consumers with TBI in the VR system typically are high cost cases of long duration, and frequently they do not achieve successful employment outcome at case closure. Identifying what services are most related to employment outcome may help VR counselors decrease case costs and improve consumer service delivery. The goal of this study was to address the need for national data of the relationship between State-Federal VR services and employment outcome in consumers with TBI. This was done by replicating the procedures and variables analyzed by Gamble and Moore (2003), using a national RSA database.

Research Questions

The purpose of this research was to evaluate the relationship between vocational rehabilitation services and employment outcome of clients with TBI using national data available through the RSA database for fiscal year 2002. The research questions were: (1) What demographic variables are related to competitive employment outcome in consumers with TBI?; (2) What specific services are related to competitive employment outcome in consumers with TBI?; and 3) What is the relationship between the provision of specific services and consumers’ earnings at case closure?
Methodology

The methodology used in this study involved a correlational study that analyzed data of consumers with TBI from the RSA 911 database. The sample that was used consisted of those consumers with a primary disability of TBI whose RSA cases were closed during the year 2002. The analysis was conducted using SPSS to answer both research questions. To answer the research question, in replicating Gamble and Moore’s 2003 research, univariate and logistic regression analyses were used to evaluate the relationship between VR services and employment outcome. Chi-Square analysis was employed to evaluate the significance of these relationships.

Limitations of the Study

There is potential for error in using archival databases such as the RSA national database. The database was designed to provide national information on clients, services and outcomes. Therefore, this information may not be applicable to individual consumers.

Significance of the Problem

Gamble and Moore’s 2003 research is the first known study that has examined the relationship between State-Federal VR services and employment outcome specific to consumers with TBI. Prior to their study, this relationship had not been extensively studied. Replicating and expanding this study is the first known research to address the relationship between VR services and employment outcome on a national basis in this population.
Similarly, the 2003 articles (Bounds, Schopp, Johnstone, Unger, & Goldman, 2003; Johnstone, et al., 2003; Johnstone, Mount, & Schopp, 2003; Skeel, Bounds, Johnstone, Lloyd, & Harris, 2003) on consumer demographics and employment outcome in VR consumers by Johnstone and colleagues are limited to one state and not generalizable. Replication of these studies is particularly significant to vocational rehabilitation professionals because such information can be used to evaluate the relationship between types of VR services and employment outcome specific to a TBI population that has applied for VR services.

This study has significance for rehabilitation practice and education. Employment outcome has generally been difficult for consumers with TBI. This study has provided further information regarding the relationship between VR services and consumer employment outcome following services.

To address practice implications, in an era of increased accountability and decreased funding, identifying relationships between types of services and successful outcome may help VR counselors provide more effective services than those employed at present. This may include providing services related to successful employment outcome to clients, while reducing services that do not share a relationship between successful employment outcomes.

This study has also addressed the need for further education and training to both student and professional rehabilitation counselors in those service areas that are related to employment outcome. For example, continuing education or in-service training may be directed toward the assessment or job development process and the importance of
providing effective services in these areas. Identification of the relationship between consumer demographic variables and employment is necessary to identify consumers who may have more difficulties with employment and may require a higher level of support and services in the VR program.

Definition of Terms

**Traumatic Brain Injury (TBI)**- A traumatic brain injury is an insult to the brain caused by external physical forces that may result in impairment of cognitive abilities, physical abilities, and behavioral functioning (BIAA, 2004).

**Rehabilitation Services Administration (RSA)**- The State-Federal VR System that provides vocational services to clients with disabilities.

**Acute Measures of TBI**- Measures that are designed to assess the patient’s ability at hospital admission or stabilization period.

**Post-Acute Measures of TBI**- Measures that are designed to assess the patient’s abilities after acute hospitalization and following posttraumatic amnesia

**Competitive Employment**- Employment occurring in an integrated workplace without vocational rehabilitation supports.

**Primary Disability**- Identifies the primary physical or mental impairment that causes or results in a substantial impediment to employment (US Dept. of Education, 2000)
CHAPTER TWO

LITERATURE REVIEW

This chapter describes the current literature related to consumers with TBI. It will establish a working definition of TBI, an overview of functional limitations associated with TBI, and incidence data. The vocational implications of TBI and existing literature on employment data on consumers with TBI will be further discussed, as well as the services available to consumers with TBI in the RSA VR program.

TBI Disorder

Definition

A traumatic brain injury is caused by external forces that result in difficulties with functioning in one or more areas (i.e., physical, motor, social, or behavior). A more specific definition is an alteration in brain function that manifests as confusion, altered level of consciousness, seizure, coma, or motor neurological deficit resulting from blunt or penetrating force to the head (Bruns & Hauser, 2003). According to the Brain Injury Association of America (2004), a TBI “is an insult to the brain, not of degenerative or congenital nature, which is caused by a physical force that may produce a diminished or altered state of consciousness, which results in an impairment of cognitive abilities or physical functioning. It also can result in the disturbance of behavioral or emotional functioning.”

Range of Functional Limitations

As previously stated, TBI frequently results in sequelae that affect an individual’s functioning in one or more areas. An individual’s functional outcome subsequent to TBI
may cover a wide range of disabilities and impairments from very minor to very severe (Van Baalen et al., 2003). Examples of abilities that may be affected by TBI in the physical domain include strength, endurance, gait, coordination, vision, hearing, and speech, among others. In the cognitive domain, abilities such as attention, concentration, memory, reasoning, follow through, problem solving, organization, and multi-tasking may be impaired. In the behavioral and emotional domains, functions such as self-monitoring, impulsivity, emotional lability, social skills, and social behaviors may be impaired (Golden et al., 1993). Impairments from TBI may permanently affect the individual’s vocational abilities as well as family and social relationships (CDC, 2004). In more severe cases, an individual may be dependant on families or professionals as caregivers.

National Incidence

The Center for Disease Control and Prevention (CDC, 2004) estimates that approximately 1.5 million Americans sustain a TBI, annually. Of these, approximately 50,000 individuals die, 230,000 are hospitalized, and 80,000 to 90,000 will experience the onset of long-term disability. Bruns and Hauser (2003) estimate the incidence of TBI in developed countries, including the United States, to be approximately 200 per 100,000 people; however, this figure is limited only to those admitted to hospitals. As a cumulative total, the CDC estimates that 5.3 Americans live with a permanent TBI-related disability. Individuals who are most likely to sustain a TBI are adolescents, young adults, and older adults. Bruns and Hauser (2003) note the nearly universal trend for TBI incidence rates to decline in middle to older adults. They opined that this trend is the
result of a decline in impulsivity in the younger years and precedes the mobility problems in older adults, which result in an increased number of TBIs secondary to falls. Additionally, males are more than twice as likely to sustain a TBI than females (Bruns & Hauser, 2003).

The major causes of TBI are motor vehicle accidents, violence, and falls. Specific to morbidity rates, causes of injury vary by both gender and race. In adolescents and young adults, men are most likely to sustain a TBI-related death from firearms or motor vehicle accidents; whereas women are more likely to sustain a TBI-related death from motor vehicle accidents. With regard to race, Whites and African-Americans are most likely to sustain a TBI-related death from firearms. In all other racial groups, motor vehicle accidents are the leading cause of TBI-related death (CDC, 2004).

TBI- Vocational Implications

General Issues

It is likely that vocational rehabilitation counselors will increasingly see clients with TBI (Golden et al., 2001). One reason for this trend is the increasing number of people who survive severe head injury due to medical advances (CDC, 2004; Demoratz, 2003). Of the 1.5 million individuals who sustain a TBI annually, the vast majority will survive with some level of impairment and/or disability (CDC, 2004).

Financial costs associated with TBI are staggering, estimated to be approximately $9-10 billion, annually, for acute care and rehabilitation (NIH, 1999). Estimates of lifetime care for individuals with severe TBI range from $600,000 to $1,875,000 per person. Johnstone, Mount, and Schopp (2003) estimated a global loss in earning capacity
of over $642 million following TBI. Additionally, the annual cost for public assistance payments due to TBI-related disability is approximately $354 million (Johnstone et al., 2003). Financial cost, however, represents only one portion of the loss for individuals who sustain a TBI. Other losses include the individual’s family relationships and roles, self-identify, physical and cognitive functioning, and employability.

Vocational Limitations

TBI has been referred to as an “invisible epidemic” (CDC, 2004) because survivors’ difficulties are not always readily apparent to the public. Disability from TBI frequently causes impairments in multiple areas (i.e., cognitive, emotional, social, motor, and behavior) that affect all aspects on an individual’s vocational, social, and familial life (CDC, 2004, Demoratz, 2003; Taylor, Forbes, & Goodwin, 1998; Van Baalen et al., 2003).

Typically, motor impairments tend to show improvement first in the acute and post-acute recovery phase, whereas cognitive and behavioral impairments show a slower improvement. These impairments pose significant barriers to gaining and maintaining employment in consumers with TBI (Groswasser, Melamed, Agranov, & Keren, 1999). The lack of ability to maintain employment is one of the most significant barriers in consumers with TBI. Parente, Stapelton, and Wheatley (1991) describe a “return loop syndrome” where consumers with TBI continuously re-enter the VR system each time they lose a job. They describe three common scenarios where a previously successfully employed consumer with TBI will lose employment: a) when they are promoted and lack the cognitive and adaptive skills to learn or adjust to the new position; b) when a job
changes either through restructuring, personnel changes, or managerial changes; and c) when the loss of support systems occurs (i.e., loss of vocational rehabilitation services and supports, loss of job coach, etc.).

To re-enter the workforce, consumers with TBI frequently need cognitive remediation and training at the work site (Hurt, 1991), assistance in adjustment to limitations (Trudel, Tryon, & Purdum, 1998), assistance in regulating emotions in a work site, and intensive follow-up services (Hurt, 1991). Given these difficulties, it is necessary for vocational professionals to provide flexible and creative team services, including vocational troubleshooting and crisis resolution in intensive follow-up services with consumers who are returning to work (Parente et al., 1991).

Additionally, individuals with TBI may face even greater difficulties in seeking employment than other consumers with disabilities due to employers’ perceptions of this disability. Bricount and Bently (2000) found that human resource managers judged applicants with a known TBI to be significantly below an identical applicant without a disability, and slightly below an applicant with a known history of mental illness.

Assessment of TBI

Individuals with TBI are typically classified as having a mild, moderate, or severe injury. These definitions can be both neurological and practical in nature (Hurt, 1991). Mild brain injury may result from a fall, blow to the head, or whiplash style injury that may or may not involve brief hospitalization. Deficits associated with mild head injury include reduced speed of information processing; difficulties with attention and
concentration; and impaired abstract thinking, planning, and organizational skills (Hurt, 1991).

Acute severity of TBI is frequently measured by the presence and duration of posttraumatic amnesia (PTA) and the Glasgow Coma Scale (GCS) (Van Baalen et al., 2003). The GCS is a standardized measure that evaluates a patient’s level of consciousness based on three response scores (i.e., eye opening, motor score, and verbal score). A higher score generally indicates a higher level of consciousness and lower severity classification. Conversely, a lower score indicates a lower level of consciousness and higher severity classification. For example, individuals with admission GCS scores of less than 8 are classified as having a severe TBI; those with a GCS score of 9-13 are classified as having a moderate TBI; and those with GCS scores of 14-15 are classified as having a mild TBI (Van Baalen et al., 2003). However, there is not always a direct relationship between the severity level of an injury and the effects the TBI may have on an individual’s symptomatology and ability to function (Hartlage, 1990).

Post-acute functional outcome in clients with TBI is frequently measured by four scales: the Glasgow Coma Scale (GCS), the Disability Rating Scale (DRS), the Rancho Los Amigos Levels of Cognitive Functioning, and the Functional Independence Measure (FIM) (Van Baalen et al., 2003). The DRS measures four categories of functioning a) arousability, awareness, and responsiveness, b) cognitive ability for self-care, c) dependence on others, and d) psychosocial adaptability. The Rancho Los Amigos Scale is generally associated with severe TBI and measures an individual’s cognitive responses from no response at stage I to a purposeful and appropriate response at stage VIII.
(Arlinghaus, Shoaib, & Price, 2005). The FIM measures an individual’s self-reported level of functioning on 18 items covering both motor and cognitive domains (Greenspan, Wrigley, Kresnow, Branche-Dorsey, & Fine, 1996).

Neuropsychological Assessment

It is commonly accepted in both rehabilitation practice and literature that neuropsychological impairments affect consumers’ abilities to work (Johnstone, Schopp, Harper, & Koscuilek, 1999). Neuropsychological evaluations are conducted for several reasons; including assistance with patient care, management, and vocational planning (Lezak, 1983). Neuropsychological assessment is important in identifying both how the TBI affects the individual and how to assist with short-term and long-term planning (Hartlage, 1990). Short-term planning may involve strategies for dealing with everyday problems (i.e., memory, concentration or interpersonal skills), whereas long-term planning may be directed toward vocational or educational planning.

Neuropsychological evaluation is frequently used to evaluate the skills and deficit areas of post-acute TBI consumers. Evaluation involves numerous test batteries that measure specific areas of a consumer’s functioning and is frequently used to evaluate return to work potential. However, individual test scores do not always predict vocational rehabilitation outcome for a particular consumer. For example, WAIS IQ scores are generally one part of a neuropsychological test battery. Schonbrun and Kampfe (2004) identified four studies that examined the relationship between Performance IQ and employment outcome. Three of these studies (i.e., Catellani, et al., 2002; Lam & Priddy, 1991; O’Connell, 2000) found there was a positive relationship between this variable and
employment outcome; however, a fourth study (i.e., Leahy & Lam, 1998) did not find a relationship. Sbordone (1999) found that because no single test could predict outcome, neuropsychologists may need to become more familiar with a consumer’s past and present occupation, work environment, job skills, predictability level, the necessary degree of interaction with public and co-workers, and cognitive and behavioral strengths. It is also important to find the availability of limited or part-time work to describe a particular consumer’s vocational limitations and/or employability.

Rehabilitation Services Administration Responses to Clients with TBI

Services Available

Consumers with TBI are found eligible for Rehabilitation Services Administration (RSA) under the same criteria as any other consumer with a disability according to the Rehabilitation Act of 1973. Title I of this Act awards federal grants to each state to operate a comprehensive VR program. A person is eligible for these services if he/she a) is a person who has a physical or mental impairment which constitutes or results in a substantial impediment to employment, b) can benefit from VR services to achieve an employment outcome, and c) requires VR services to prepare for, secure, retain, or regain employment (RSA, 2004). Because RSA is a federal program administered by the states, the mode of service delivery to consumers with TBI varies by state. Gamble and Moore (2003) found that the six most frequently provided VR services to consumers with TBI in one Southeastern state were counseling, assessment, restoration, job placement, work adjustment, and college.
In 1988, a Congressional task force identified numerous areas where the needs of consumers with TBI were not being met by existing care and rehabilitation systems. They recommended that RSA develop TBI Regional Comprehensive Care Centers. RSA was and continues to be responsible for these centers that are located in various US geographic areas (i.e., Southwest, Rocky Mountain, Midwest, and New York) (NAASHIA\(^1\), 2002). Under the mandate of close consultation with TBI survivors and their families, the Regional Traumatic Brain Injury Centers work to a) increase the number and effectiveness of TBI prevention programs, b) develop outreach programs to increase the professional knowledge base, and c) identify and eliminate barriers to effective service.

**Supported Employment**

Supported employment is paid employment in a variety of work settings for individuals who are unlikely to immediately participate in competitive employment (Golden et al., 1993). Supported employment has been successful in returning consumers with severe TBI to some level of vocational success (Gamble & Moore, 2003). Because RSA is a state administered program, some states include supported employment as one possible employment outcome for consumers with TBI, whereas other states do not. Consumers working in supported employment work significantly fewer hours and receive lower weekly earnings than those in competitive employment. Higher case expenditures on supported employment tend to result in higher rates of competitive employment,

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\(^1\) National Association of Administrators of State Head Injury Associations
indicating that the high cost of supported employment may ultimately result in a greater
likelihood for competitive employment outcome (Gamble & Moore, 2003).

Available Data Base

RSA oversees and funds the majority of vocational rehabilitation programs in the
country. Although there are several possible outcomes of case closure (i.e.,
independent living, self-employment, homemaker, and supported and competitive
employment), the emphasis has traditionally been on achieving a competitive
employment placement (Bolton, 1987). Current policy requires RSA to demonstrate
effectiveness of services in order to receive continued funding (Kosciulek, 2004). The
RSA 911 Database or Rehabilitation Services Administration Case Services Report
(RSA911) is an annual report prepared on all consumers who have exited the VR system
in a given fiscal year. Each state’s RSA submits an annual report for the prior year that
contains a record for each case closure, regardless of the type of closure status (US Dept.
of Education, 2000). The RSA 911 database is one of the longest-standing database
collections of employment needs and outcomes of consumers with disabilities in the
State-Federal VR system (Kiernan, Gilmore, & Butterworth, 1997). These data allow for
an analysis of rehabilitation services and employment outcome of consumers within the
State-Federal VR system (Gilmore, Schuster, Timmons, & Butterworth, 2000).

TBI Research

TBI and Vocational Research

Given the large population, high cost, and poor employment outcome associated
with consumers with TBI, numerous researchers have identified variables related to or
predicting employment outcomes. However, researchers have produced mixed findings on individual variables. One reason for this may be the differences in the TBI population and severity levels examined by researchers.

Several researchers have indicated the need for more accurate prediction studies to improve consumer services and employment outcome (Leahy & Lam, 1998; Ponsford, Olver, Curran, & Ng, 1995). This information is important because rehabilitation counselors have had limited resources available to predict employment outcome or work capabilities in consumers with TBI (Simpson & Schmitter-Edgecomb, 2002).

Schonbrun and Kampfe (2004) summarized current literature (i.e., 1991-2003) regarding the relationship of a variety of potential predictor variables related to employment outcome in clients with TBI. The independent variables most frequently studied were education, injury severity, age, verbal aptitude, marital status, gender, performance IQ, race, length of time from injury, and specific tests.

Level of education was found to positively relate to employment outcome in six articles (Gollaher, et al., 1998; Greenspan, et al., 1996: Krueetzer et al., 2003; Sherer, Bergloff, High & Nick, 1999; Sherer et al., 2002; Simpson & Schmitter-Edgecomb, 2002). However, level of education was found to be unrelated to employment outcome in eight others (Catellani et al., 2002; Ezrachi, Ben-Yashat, Kay, Diller & Rattok, 1991; Keyser-Marcus, Bricout, Wehman, Campbell, Cifu & Englander, 2002; Leahy & Lam, 1998; O’Connell, 2000; Ponsford et al., 1995; Ruffolo, Friedland, Dawson, Colantonia & Linsday, 1999).
Age (at the time of the study) was consistently found to be unrelated to employment outcome in individuals with TBI in 11 studies (Cattelani et al., 2002; Ezrachi et al., 2002; Gollaher et al., 1998; Greenspan et al., 1996; Isaki & Turkstra, 2000; Keyser-Marcus et al., 2002; Leahy & Lam, 1998; O’Connell, 2000; Ruffolo et al., 1999; Sherer et al., 2002; Simpson & Schmitter-Edgecomb, 2002). Only Ponsford et al., (1995) found that age, characterized as being under or over the age of 40, predicted an individual’s employment status where those over the age of 40 had more difficulties in employment than their younger counterparts.

Research regarding injury severity produced mixed findings; most likely, due to the various ways that injury severity was defined. On standardized measures of the Glasgow Coma Scale (GCS) and Abbreviated Injury Scale (AIS), three research groups found a significant negative relationship with employment (Cattelani et al., 2002; Cifu, Keyser-Marcus, Lopez, Wehman, Kruetzer, & Englander, 1997; Ponsford et al., 1995); whereas five research groups did not find a significant relationship between injury severity and employment outcome (Gollaher et al., 1998; Greenspan et al., 1996; Keyser-Marcus et al., 1997; Ruffalo et al., 1999; Sherer et al., 2002).

When length of time spent in coma was analyzed, all researchers reported a negative relationship to employment (Cattlani et al., 2002; Cifu et al., 1997; Ezrachi et al., 1991; Simpson & Schmitter-Edgecomb, 2002). That is, the longer the individual’s coma, the less likelihood of gaining employment.

Mixed findings have been reported regarding the relationship between verbal aptitudes and employment outcome. Four studies (Cattelani et al., 2002; Ezrachi et al.,
Isaki & Turkstra, 2000; O’Connell, 2000) found a positive relationship between this measure and employment; however, two other studies (Lam & Priddy, 1991; Leahy & Lam, 1998) did not find this relationship.

Marital status was examined by four studies (Greenspan et al., 1996; Keyser-Marcus et al., 2002; Kruetzer et al., 2003; Ruffolo et al., 1999). Two research groups reported a positive relationship between marital status and employment (Greenspan et al., 1996; Kruetzer et al., 2003). However, Keyser-Marcus et al. (2002) and Ruffalo et al. (1999) did not find such a relationship.

Gender was analyzed in six studies (Gollaher et al., 1998; Greenspan et al., 1996; Keyser-Marcus et al., 2002; Kruetzer et al., 2003; Ponsford et al., 1995; Ruffolo et al., 1999). All found this independent variable to be unrelated to employment outcome.

Performance IQ was found to relate to employment in three studies (Cattelani et al., 2002; Lam & Priddy, 1991; O’Connell, 2000). A fourth study (Leahy & Lam, 1998) did not find this relationship.

The study of the relationship between race and employment outcome produced mixed findings. One research group found a relationship between race and employment outcome (Kruetzer et al., 2003); whereas two others did not (Greenspan, et al., 1996; Keyser-Marcus, et al., 2002).

Kruetzer and colleagues indicated that length of time from injury to data collection was found to be positively related to employment outcome (Kruetzer et al., 2003). Simpson and Schmitter-Edgecomb (2002) also found that the greater the passage
of time from the TBI the higher the likelihood of employment. Consumers with more recent injury were less likely to be employed.

Several studies evaluated the relationship of specific tests to employment outcome. The most frequently examined was the Disability Rating Scale (DRS). All five research groups who examined this variable found a positive relationship between DRS scores and employment (Cifu et al., 1997; Gollaher et al., 1998; Keyser-Marcus et al., 2002; Kruetzer et al., 2003; Ponsford et al., 1995).

Based on their review of these studies, Schonbrun and Kampfe (2004) recommended future prediction models might include variables of education, DRS scores, coma duration, time since injury, Performance IQ, marital status, verbal measures, severity indices, and pre-injury productivity. Age and gender were less likely to be included in such a model because they appeared to be consistently identified as variables unrelated to employment outcome.

Substance abuse, both pre and post injury, has also been evaluated in relationship to employment outcome. In fact, research has shown that as much as 60% of brain injuries are substance related (Arenth, Bogner, Corrigan, & Schmidt, 2001). A history of pre-injury substance abuse is associated with a negative relationship to employment outcome (Sherer et al., 1999). Substance abuse rates tend to decline post–injury, yet as high as 50% of individuals with TBI reported using at pre-injury levels (Sparadeo & Gill, 1989). Continued substance usage in individuals with TBI is associated with a slower recovery and poor employment outcome (Sparadeo, Strauss, & Barth, 1990).
Johnstone and colleagues authored a series of articles that examined the relationship between demographic variables of RSA consumers with TBI and employment outcome based on data from the State of Missouri’s VR program. In one study, Bounds et al., (2003) found that a much higher percentage of men’s cases (i.e., 23%) were closed in competitive employment than were women’s cases (i.e., 4.4%). This was contradictory to the findings of the studies examined by Schonbrun and Kampfe (2004). Perhaps the Bounds et al. findings were due to the services provided to men. Although the difference was statistically non-significant, Bounds et al., found that men typically received more VR services than did the women in their study. For example, 10.9% of the men received job placement services compared to 0% of the women.

In another study, Johnstone et al., (2003) examined the relationship of the race of consumers with TBI to their employment status following RSA service. They found no significant differences in successful employment outcome (i.e., consumers closed in competitive employment) between African American VR consumers (i.e., 23%) and Caucasian VR consumers with TBI (i.e., 18%). Although not statistically significant, the trend was for African American consumers to receive a greater number of VR services than Caucasian consumers received, including job placement. The variable of race produced mixed findings in the literature review of Schonbrun and Kampfe (2004), however this is consistent with the majority of research groups (i.e., 2 out of 3 who studied this variable) that found race to be unrelated to employment outcome in consumers with TBI.
In a related study that examined the effects of age on employment outcome in consumers with TBI, Skeel et al., (2003) found that although the neuropsychological assessments of abilities in older consumers were lower than were the younger consumers, there was no significant relationship between age and employment outcome. This is consistent with literature indicating no relationship between age and employment outcome in consumers with TBI (Catellani et al., 2002; Ezrachi et al., 1991; Gollaher et al., 1998; Greenspan et al., 1996; Isaki & Turkstra, 2000; Keyser-Marcus et al., 2002; Leahy & Lam, 1998; O’Connell, 2000; Ruffolo et al., 1999; Sherer et al., 2002; Simpson & Schmitter-Edgecomb, 2002). Their findings also indicated that consumers across age groups received similar services, indicating that expenditures were equally beneficial to young and old.

Johnstone et al. (1999) also examined the relationship between neuropsychological impairment and vocational outcome. They found that those with the most significant neuropsychological impairment had the highest rate of employment, which indicated that all consumers with TBI had the potential to benefit from VR services regardless of injury severity.

Using RSA data for a Southeastern state, Gamble and Moore (2003) examined the relationship of six services received by consumers with TBI (i.e., assessment, college, counseling/guidance, job placement, restoration, and work adjustment) to employment outcome. Their findings indicated that college, counseling/guidance, and job placement were significantly related to a competitive employment outcome for consumers with TBI. Of these three services, job placement most significantly predicted successful
employment. This is consistent with previous literature, that regardless of disability type, job placement services are frequently a significant predictor of employment outcome (Bolton et al., 2000). Gamble and Moore (2003) indicated that they did not find any similar studies that examined the relationship specifically between State-Federal VR services and employment outcome in consumers with TBI. They recommended that future research replicate their efforts to determine the consistency of their findings throughout the State-Federal VR program.

The purpose of this research was to evaluate the relationship between vocational rehabilitation services and employment outcome of clients with TBI using national data that are available through the RSA 911 database for fiscal year 2002. Additionally, to address the second research question, this analysis will examine demographic variables of consumers with TBI (i.e., education, age, gender, and race) to evaluate their relevance and consistency to consumers with TBI in the State-Federal VR program. The variables of age, gender and race have been previously studied in TBI populations with some consistency of non-significant findings in relationship to employment. However age, gender and race in the population of TBI consumers in the VR program have only been analysed in one other study (Skeel et al., 2003; Bounds et al, 2003; Johnstone et al., 2003), respectively. Therefore, it is important to examine these variables in a national sample specific to TBI VR consumers. Although Schonbrun & Kampfe recommended further predicion models evaluate additional variables (i.e., DRS scores, coma duration, time since injury, Performance IQ, marital status, verbal measures, severity indices, and pre-injury productivity); these variables were not included in the RSA 911 database.
CHAPTER THREE
METHODOLOGY

This chapter describes the procedures that were used in the collection and analysis of data. It will include a description of the sample used and the population of consumers the sample was drawn from. The database, as an instrument, will be described in further detail. A description of the statistical tools used to analyze the data is also included in this section.

Selection Procedure

The data analyzed in this study are drawn from and represent a sample of consumers whose cases were closed and recorded in the RSA 911 database for fiscal year 2002. The National RSA 911 database sample of consumers with TBI listed as the primary disability consists of 14,311 consumers whose cases were closed. Similar to the general population of individuals with TBI, men comprised the majority of consumers (i.e., 64.9 %) and women, the minority (i.e., 35.1 %). The primary disability is defined as “the individual’s primary physical or mental impairment that causes or results in a substantial impediment to employment” (p. 10, US Dept. of Education, 2000).

RSA cases are closed for one of 14 reasons. The majority of consumers closed in employment status were competitively employed. For purposes of this analysis, the record position for competitive employment has two choice options (i.e., yes or no). That is, a consumer was closed in competitive employment or they were not closed in competitive employment. This category, competitive employment, resulted in 6460 cases. Of the 6460 cases, 69.6% (i.e., 4498) of consumers were closed successfully in
competitive employment and 30.4% remained unemployed. For purposes of this study, competitive employment is defined as full or part time employment that occurs in an integrated setting without ongoing vocational rehabilitation support services at or above Federal Minimum wages (US Dept. of Education, 2000). This analysis has referred to the two groups as the Employed Group and the Unemployed Group. The Employed Group consists of the RSA consumers with TBI who obtained a competitive job following services (i.e., status 26). The Unemployed Group consists of the RSA consumers with TBI who attempted to obtain a competitive job following services but were not successful and remained unemployed (i.e., a status 28).

Instrument

The instrument for this study was devised by RSA and is called the RSA 911 database. RSA requires each state to submit data annually for each case closure in each fiscal year. Data are collected in a specific format and each record entry must be unique. Those with duplicate records are systematically rejected. Each record represents an individual whose case was closed during that year, regardless of the reason for closure. Each record is 213 characters in length and each set of characters represents one of 43 values or elements (US Dept. of Education, 2000). Variables include RSA demographic information (i.e., state, consumer identification number, date of application and closure, and referral source; demographic information specific to the consumers (i.e., gender, race and ethnicity, and their primary and secondary disability); and information regarding the client’s status at time of application and closure (i.e., employment status, hourly and weekly earnings, type and amount of public support, type and reasons of closure). Data
are also collected on service information including services provided and cost of purchased services. Appendix A details the information contained in each record.

Data were previously collected by individual RSA state agencies and reported to RSA for fiscal year 2002. These data are collected, annually, in a specific format coded according to the Reporting Manual for the Case Service Report (US Dept. of Education, 2000). Data are collected for each of 43 elements and each element is assigned a specific numeric code. For example, the record position of Primary Disability occupies position 43-46 of the 213-character record. The first two digits (i.e., position 43 and 44) represent categories of sensory/communication impairments, physical impairments, or mental impairments. The last two digits (i.e., positions 45 and 46) represent the codes for cause and sources of the impairments (i.e., a code of 37 occupying space 45 and 46 of a given record indicates the individual’s primary impairment was caused by a traumatic brain injury). This information is further detailed in Appendix A.

Data Collection

The data used in this study are in CD–ROM format. Cases were closed in the VR system as status 26 (successfully employed) or status 28 (case closed without employment ) (Gamble & Moore, 2003). There were six specific categories of employment status at case closure. The majority of consumers were closed in competitive employment (i.e., 82.1%). A smaller percentage of closed cases fell into extended employment, self-employment, homemaker, or unpaid family worker (i.e., combined total of 6.0%). The remainder of consumers in employment at closure (i.e., 11.9%) were closed in employment with support in an integrated setting. For purposes
of this analysis, as in Gamble and Moore’s analysis, only a competitive employment closure status was used because the other categories represent only a small proportion of cases and were excluded from this study. As previously stated, this analysis has referred to the two groups in the competitive employment category as the employed group and the unemployed group. The employed group consists of the RSA consumers with TBI who obtained a competitive job following services (i.e., status 26). The unemployed group consists of the RSA consumers with TBI who attempted to obtain a competitive job following services, but were not successful and remained unemployed (i.e., a status 28).

Analysis

This research was an ex post facto correlational study, because the goal was to observe the size and direction of the relationship between the predictor variables and employment outcome (Shadish, Cook, & Campbell, 2002). The following statistical techniques were utilized to analyze the RSA database in addressing the hypotheses of this study. These were the same techniques used by Gamble and Moore (2003) and include descriptive, t-test, chi-square analysis, logistic regression and ANOVA. SPSS was used in the analysis. A value of p < .05 was selected as an accepted level of significance.

Hypothesis One: Consumers who are employed are not different from consumers who remain unemployed in their age, gender, race, education level and substance abuse.

\[ Ho: e = e \]

\[ Ha: e \neq e \]

Descriptive statistical techniques were used to identify frequencies and percentages of consumers’ demographic makeup (i.e., age, race, gender and substance
abuse, and educational levels). The two groups that represented the dependent variable (i.e., employed and unemployed consumers with TBI) were categorical data. The variables of race and gender were also categorical data. A chi-square test for independence was necessary to examine the relationship between two categorical variables (Pallant, 2001). The age of consumers in the two groups was continuous data. When there are two variables, one categorical (i.e., employed or unemployed) and the other continuous (i.e. age), a t-test for independent samples is used to find if there is a statistically significant difference in the mean scores of the two groups (Pallant, 2001). A chi-square test was also used to determine if there was a statistically significant difference in the level of education in the two groups, as this variable was categorical, rather than continuous as coded in the RSA database. The variable, substance abuse, as a secondary disability category, was analyzed in relationship to employment outcome using a large sample approximation for binomial data test. Because of the way the variable, secondary disability, was coded and entered into the RSA database, it would have been impractical to use a chi-square analysis in SPSS. Therefore, this calculation was used in the alternative.

Hypothesis Two: The provision of specific services will be equivalent in the employed and unemployed groups.

\[ Ho: e = e \]

\[ Ha: e > e \]

Each specific service constitutes a categorical variable (i.e., service received or not received), as does each of the two groups of consumers (i.e., employed or not
employed). The variables were examined using a chi-square test for independence. Logistic regression is frequently used in prediction studies when outcome measures (the dependent variable) are categorical (i.e., employed or unemployed) (Willis, Hendershot, & Fabian, 2005). The goal is to assess the relative association of each independent variable to the criterion variable (Greenspan et al., 1996). Appendix B details the categories of services that may be provided to a consumer. In replicating Gamble & Moore’s (2003) research, only the five most frequently provided services were analyzed.

Hypothesis Three: Consumers provided specific services will have weekly earnings equivalent to consumers not provided specific services.

\[H_0: e = e\]

\[H_a: e > e\]

To analyze the relationship between each service and consumers’ weekly earnings, a factorial ANOVA was used. A factorial ANOVA is used to evaluate the relationship between several independent variables and a continuous variable (Huck & Cormier, 1996). In replicating Gamble & Moore’s (2003) research, only the five most frequently provided services were analyzed.
CHAPTER FOUR
RESULTS

This section will describe the results of the analysis of the data described in chapter three. Results will be presented for each hypothesis.

Hypothesis One - Demographics

The first null hypothesis stated that “consumers who are competitively employed are not different from consumers who are not employed.” The alternative hypothesis was “that consumers who are competitively employed are different from consumers who are not employed.” The variables of gender, race, education, age, and substance abuse were analyzed in testing the null hypothesis. The analyses indicated mixed findings regarding differences in these variables between groups, therefore the null hypothesis was partially rejected and the alternative hypothesis partially accepted.

Gender

The first variable analyzed was gender. Men comprised 64.5% of those in the employed group and 65.0% of those in the unemployed group. Women made up 35.5% of the employed group and 35.0% of the unemployed group. Using a chi-square test, the variable of gender was not statistically significant (Pearson chi-square = .111, \( p = .739 \)) between the two groups of consumers with TBI (i.e., employed and unemployed).

Race

Within the data set, the variable of race was broken down into six categories (i.e., White, Black, Hispanic, American Indian, Asian, or Hawaiian).
The chi-square test for racial/ethnic categories produced mixed findings. The variable of race in consumers identified as White, Black, Hawaiian, or Hispanic was strongly related to employment outcome (i.e., $p \leq .001$, all). Race as a variable in White consumers was positively related to competitive employment outcome (Pearson chi-square = 25.076, $p = .001$). Within racial category, 70.9% of White consumers were employed whereas 29.1% of White consumers who were not employed. A positive relationship was also noted between Black consumers and employment (Pearson chi-square = 18.049, $p = .001$), where 63.1% of Black consumers were employed and 36.9% of Black consumers were unemployed. The variable of race in Hispanic consumers with TBI was also positively related to employment outcome (Pearson chi-square = 33.866, $p = .001$). Within race, 58.2% of Hispanic consumers were employed while 41.8% of Hispanic consumers were unemployed at the time of case closure. There was a negative relationship between the variable of race and employment outcome of Hawaiian consumers (Pearson chi-square = 22.79, $p = .001$). Hawaiian consumers were significantly more likely to be unemployed (i.e. 65% of Hawaiian consumers were unemployed compared to 35.0% of Hawaiian consumers who were employed). The variable of race in American Indian (Pearson chi-square = .132, $p = .818$) and Asian consumers (Pearson chi-square = .111, $p = .840$) was not statistically significant regarding employment outcome.

*Education*

Education was coded into one of nine categories (i.e., no formal education; elementary education (1-8); secondary education - no diploma (9-12); special education
certificate of completion; high school graduate or GED; post-secondary education (no degree); associates degree; bachelor’s degree; or masters degree or higher.

Table 1 breaks down the percentage of consumers employed or unemployed by educational category. For example, of those consumers who had no formal schooling, 54.5% were competitively employed and 45.5% were not employed.

Table 1 Competitive Employment Rates by Educational Category

<table>
<thead>
<tr>
<th>Level of Education</th>
<th>Employed</th>
<th>Not Employed</th>
</tr>
</thead>
<tbody>
<tr>
<td>No formal school</td>
<td>54.5%</td>
<td>45.5%</td>
</tr>
<tr>
<td>Grades 1-8</td>
<td>58.6%</td>
<td>41.4%</td>
</tr>
<tr>
<td>Grades 9-12</td>
<td>76.0%</td>
<td>24.0%</td>
</tr>
<tr>
<td>Special Ed Certificate</td>
<td>64.3%</td>
<td>35.7%</td>
</tr>
<tr>
<td>H.S. diploma/GED</td>
<td>66.1%</td>
<td>33.9%</td>
</tr>
<tr>
<td>Post-secondary ed</td>
<td>70.5%</td>
<td>29.5%</td>
</tr>
<tr>
<td>Associates Degree</td>
<td>79.7%</td>
<td>20.3%</td>
</tr>
<tr>
<td>Bachelor’s Degree</td>
<td>72.4%</td>
<td>27.6%</td>
</tr>
<tr>
<td>Masters Degree</td>
<td>72.1%</td>
<td>27.9%</td>
</tr>
</tbody>
</table>

A chi-square test showed that, education was significantly related to employment outcome (i.e., Pearson chi-square = 70.328, *p* = .001). Education was analyzed as a single variable, hence producing a single *p* value. The general trend was that consumers with higher levels of education had higher rates of employment, however this was only a trend. The lowest competitive employment rates were found in those with no schooling. Consumers with an associates or technical degree had the highest rates of employment within the categories of educational level; 79.7% of these consumers were competitively employed, whereas only 20.3% were not employed. This was followed by consumers with a 9-12 grade education (but no high school diploma); 76.0% percent of these consumers were employment. The next highest rates of employment were in consumers
who had a Bachelors or Master’s degree, followed by those with post-secondary education without a degree.  

Age  

A t-test for independent means was used to compare the mean age in the employed and unemployed groups of consumers with TBI. No statistically significant difference was found between the two groups ($p = .186$). The mean birth year of those in the employed group was 1965.48 (36.9 years old) compared to the mean birth year of 1965.04 (36.5 years old) in the unemployed group, a difference of .44 of a year or approximately 5.3 months.  

Substance Abuse  

The variable, substance abuse, as a secondary disability category was analyzed in relationship to employment outcome using a large sample approximation for binomial data test. The presence of substance abuse was significantly negatively related to employment outcome ($z = 5.4799$ converted to table value is $.0001$, $p = .001$). Data were coded at the time of the consumer’s application and therefore represent post-injury usage. It is not possible to know from the data whether substance abuse was an injury preceding condition or not. Alcohol abuse/dependence and drug abuse/dependence did not account for a significant number of TBI consumers in this sample who had identified secondary disabilities. Only 2.2% of consumers (i.e., 307 individuals) were identified as having a secondary disability due to alcohol abuse. Only 1.6% of consumers (i.e., 22 individuals) were identified as having a secondary disability due to drug abuse.
Hypothesis Two - Service Variables

The second null hypothesis stated that “the provision of specific services will be equivalent in the employed and unemployed groups.” The alternative hypothesis was that “the provision of specific services in the employed and unemployed groups will not be equivalent.” A significant difference in employment outcome was found in four out of the five most commonly provided service variables analyzed using chi-square tests. Therefore, the null hypothesis was rejected and the alternative hypothesis accepted.

Table 2 provides the frequencies of the five most frequently provided specific services in the employed and unemployed groups as well as the chi-square statistic and the $p$ value of the relationship between each service and employment outcome.

<table>
<thead>
<tr>
<th>Services</th>
<th>%Service Provided</th>
<th>Employed</th>
<th>Not Employed</th>
<th>Chi-square</th>
<th>$p$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assessment</td>
<td>60.0%</td>
<td>61.4%</td>
<td>56.7%</td>
<td>16.86</td>
<td>.001</td>
</tr>
<tr>
<td>Counseling/guidance</td>
<td>54.2%</td>
<td>54.3%</td>
<td>54.2%</td>
<td>4.26</td>
<td>.234</td>
</tr>
<tr>
<td>Job Placement</td>
<td>28.6%</td>
<td>37.3%</td>
<td>8.7%</td>
<td>633.35</td>
<td>.001</td>
</tr>
<tr>
<td>Job Search</td>
<td>27.4%</td>
<td>34.3%</td>
<td>11.5%</td>
<td>414.16</td>
<td>.001</td>
</tr>
<tr>
<td>Diag &amp; Treat</td>
<td>25.9%</td>
<td>27.4%</td>
<td>22.5%</td>
<td>33.74</td>
<td>.001</td>
</tr>
</tbody>
</table>

There was a significant relationship between four specific services (i.e., assessment, job placement, job search, and diagnosis and treatment) and employment outcome. However, there was no such relationship between the specific service of counseling/guidance and employment outcome. In less frequently provided VR services (i.e., where the service was provided to less than 10% of TBI consumers), a significant relationship was found between employment outcome and the specific services of vocational training ($\chi^2 = 97.446, p = .001$), college ($\chi^2 = 26.456, p = .001$), etc.
= 95.664, \( p = .001 \)), rehabilitation technology (Pearson chi-square = 28.704, \( p = .001 \)), and on-the-job-training (Pearson chi-square = 93.897, \( p = .001 \)). No significant relationship was identified between employment outcome and the VR services of augmentative skills (Pearson chi-square = 1.428, \( p = .699 \)) and remedial/literacy training (Pearson chi-square = 2.407, \( p = .492 \)).

The five most frequently provided VR services were further evaluated using logistic regression to identify the abilities of each service variable to predict employment outcome. The results are summarized in Table 3.

<table>
<thead>
<tr>
<th>Services</th>
<th>B</th>
<th>Odds Ratio</th>
<th>df</th>
<th>p</th>
<th>95% Confidence Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assessment</td>
<td>.235</td>
<td>1.265</td>
<td>1</td>
<td>.209</td>
<td>.877-1.827</td>
</tr>
<tr>
<td>Counseling/guidance</td>
<td>-.124</td>
<td>.883</td>
<td>1</td>
<td>.720</td>
<td>.448-1.743</td>
</tr>
<tr>
<td>Job Placement</td>
<td>-1.859</td>
<td>.156</td>
<td>1</td>
<td>.000</td>
<td>.067-.365</td>
</tr>
<tr>
<td>Job Search</td>
<td>-.763</td>
<td>.466</td>
<td>1</td>
<td>.033</td>
<td>.232-.938</td>
</tr>
<tr>
<td>Diag &amp; Treat</td>
<td>-.633</td>
<td>.531</td>
<td>1</td>
<td>.000</td>
<td>.396-.712</td>
</tr>
</tbody>
</table>

When the confidence interval includes the value of 1, then that variables not considered a useful predictor, therefore the variables of assessment and counseling/guidance do not predict employment outcome. The remaining services, job placement, job search, and diagnosis/treatment are considered a statistically significant as a predictor variable. The further away from one, the odds ration is indicated the stronger the relationship. Therefore the ability of these services to predict employment outcome is strongest between job placement and least strong between diagnosis/treatment.
Hypothesis Three - Weekly Earnings

The third hypothesis stated that “consumers provided specific services will have equivalent weekly earnings to consumers not provided specific services.” The alternative hypothesis stated that “consumers provided specific services would have greater than the earnings of consumers not provided specific services.” The null hypothesis was partially rejected because three out of the five most provided service variables were associated with a difference in weekly earnings. The alternative hypothesis, however, was not fully accepted because two out of these three service variables were negatively associated with weekly earnings as they resulted in lower weekly earnings when services were provided.

The relationship between specific service variables and weekly earnings of consumers with TBI at case closure were analyzed. Table 4 provides the results of the ANOVAs that analyzed the relationship between the service variables and consumers’ weekly earnings at case closure.

<table>
<thead>
<tr>
<th>Service Variable</th>
<th>Provided</th>
<th>Not Provided</th>
<th>F</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assessment</td>
<td>$271.65</td>
<td>$253.20</td>
<td>2.35</td>
<td>.070</td>
</tr>
<tr>
<td>Counseling/guidance</td>
<td>$263.17</td>
<td>$267.12</td>
<td>.79</td>
<td>.499</td>
</tr>
<tr>
<td>Job Placement</td>
<td>$247.40</td>
<td>$275.89</td>
<td>5.49</td>
<td>.001</td>
</tr>
<tr>
<td>Job Search</td>
<td>$267.03</td>
<td>$274.09</td>
<td>5.58</td>
<td>.001</td>
</tr>
<tr>
<td>Diagnosis &amp; Treatment</td>
<td>$289.30</td>
<td>$249.30</td>
<td>12.68</td>
<td>.001</td>
</tr>
</tbody>
</table>

To give a frame of reference, TBI consumers whose cases were closed in competitive employment had average weekly earnings of $314.35. Consumers whose cases were not closed in employment had average weekly earnings of $34.57. In this analysis, when assessment services were provided by VR funds, consumers’ weekly earnings at case
closure were $271.65 weekly, compared to consumers’ weekly earnings of $253.20 when this service was not provided \((p = .070)\). When diagnosis and treatment were provided by VR funds, weekly earnings averaged $289.30; whereas when this service was not provided, consumers’ mean weekly earnings were $249.30 \((p = .001)\). Consumers who were provided counseling/guidance service had weekly earnings of $263.17; whereas consumers who were not provided counseling/guidance had weekly earnings of $267.12 \((p = .499)\). In consumers who were provided job placement services, consumers’ weekly earnings averaged $247.40. When this service was not provided, weekly earnings averaged $275.89 \((p = .001)\). When job search services were not provided, consumers averaged slightly higher weekly earnings (i.e., $274.09) compared to weekly earnings of $267.03 when this service was provided \((p = .001)\).

Summary

In summary, the results of this analysis indicate mixed findings regarding differences between the employed and unemployed group across demographics, service variables, and weekly earnings. There were no significant relationships between employment outcome and gender, age, or some racial categories (i.e., Asian or American Indian). There were significant relationships between the employment outcome and education and some racial categories (i.e., White, Black, Hispanic, and Hawaiian). There was also a significant relationship between the specific services of assessment, job placement, job search, and diagnosis/treatment and employment outcome; however no such relationship between counseling/guidance and employment outcome. In evaluating the relationship between weekly earnings and specific services, consumers who were
provided diagnosis/treatment services had higher average weekly earnings than did consumers who did not receive this service. Conversely, consumers who were provided job placement and job search services had significantly lower earnings than did consumers not provided these services. There was no relationship between counseling/guidance services and consumers’ weekly earnings.
CHAPTER FIVE
SUMMARY, DISCUSSION AND RECOMMENDATIONS

This chapter includes a summary, discussion, and recommendations based on the findings in Chapter Four. It will also discuss limitations of this study and implications for future rehabilitation research.

Summary
The purpose of this analysis was to address the need for national data regarding specific RSA services and consumer demographics and employment outcome. Three research questions addressed this purpose. First, what demographic variables were related to competitive employment outcome in consumers with TBI? Second, what specific services were related to competitive employment outcome in consumers with TBI? Third, what is the relationship between the provision of specific services and consumers’ earnings at case closure? The research questions were analyzed using the RSA 911 database which represented national data for fiscal year 2002. Hypothesis One stated that consumers who were employed were not different from consumers who remained unemployed. The demographic variables of race, gender and education were evaluated using chi-square analysis. The variable of age was evaluated by a t-test. The variable of substance abuse was evaluated using a binomial distribution for large samples. There were no differences between the employed and unemployed consumers in gender, age and some racial backgrounds (i.e., Asian and Native American). There was a significant relationship between consumers’ education, presence of substance abuse and some racial background (i.e., White, Black, Hawaiian, and Hispanic). Hypothesis Two,
stated that the provision of specific services will be equivalent in the employed and unemployed groups. This was addressed through chi-square analyses and logistic regression. The services of assessment, counseling, job placement, job search and diagnosis/treatment were significantly related to employment outcome; however, the service of counseling/guidance did not have such a relationship. The services of job placement, job search, and diagnosis and treatment were predictive services in relationship to employment outcome. The third hypothesis was evaluated using ANOVA’s. There was a relationship between the services of job placement, job search, and diagnosis/treatment and employment outcome; but not between the services of assessment and counseling/guidance and employment outcome.

Discussion

Similarities between competitively employed and unemployed consumers

Regarding Hypothesis One, consumers in the employed and unemployed groups were not significantly different with regard to gender, age, and some racial backgrounds (i.e., American Indian and Asian consumers). A further description of these variables in relationship to other rehabilitation literature follows.

The finding regarding gender is consistent with previous literature indicating that no significant relationship exists between gender and employment outcome in individuals with TBI (Gollaher et al., 1998; Greenspan et al., 1996; Keyser-Marcus et al., 2002; Kruetzer et al., 2003; Ponsford et al., 1995; Ruffolo et al., 1999). In consumers with TBI in the VR program, Johnson et al. (2002) did find a difference between gender and
employment outcome in their analysis; however, they indicated that this might have been due to a very small sample of women in their analysis.

There was no significant difference in the age of consumers between the employed and unemployed groups (i.e., approximately age 37 for both groups). This finding is consistent with that of prior researchers that age is not related to employment outcome in individuals with TBI (Catellani et al., 2002; Ezrachi et al., 1999; Gollaher et al., 1998; Greenspan et al., 1996; Isaki & Turkstra, 2002; Keyser-Marcus et al., 2002; Leahy & Lam, 1998; O’Connell, 2002; Ruffolo et al., 1999; Sherer et al., 2002; Simpson & Schmitter-Edgecomb, 2002). Specific to consumers in the VR system, Skeel et al. (2003) found that age was not related to employment outcome following VR services.

No relationship was found between employment outcome and race in consumers who were American Indian and Asian. These findings are consistent with literature indicating race was not an indicator of employment outcome in individuals with TBI (Greenspan et al., 1996; Keyser-Marcus et al., 2002).

*Differences between competitively employed and unemployed consumers*

The two groups (employed and unemployed) were different regarding the variables of level of education, presence of substance abuse, and some racial backgrounds. Black, Hispanic and White racial background had a positive relationship with employment outcome; whereas, Hawaiian background had a negative relationship with employment outcome. Within the context of TBI consumers in the RSA program, Johnstone et al. (2002) found no statistically significant difference in the employment outcome between Black and White consumers with TBI. That research group did
indicate; however, a slight trend for higher employment rates in White consumers than
Black consumers. Although not statistically evaluated, that trend was also present in this
analysis.

The variable of education was significantly related to employment outcome; however, this finding was most significant at the associate degree or vocational degree level. This is somewhat consistent with literature that indicates that consumers with higher levels of education tend to have higher rates of employment (Gollaher et al., 1998; Greenspan et al., 1996; Kruetzer et al., 2003; Sherer et al., 1999; Sherer et al., 2002; Simpson & Schmitter-Edgecomb, 2002). However, the second highest employment rates were found in consumers with 9-12 grade education, followed by those with a Bachelors and Masters degree. This indicates that while the trend was for those with higher levels of education to have higher employment rates, it clearly was not a straightforward linear relationship.

The variable, substance abuse, was negatively related to employment outcome. This is consistent with literature indicating that consumers with TBI who have reported substance abuse tend to have a less successful outcome and are less likely to return to work than those consumers who did not use substances (Corrigan, 1995; Kruetzer, Doherty & Harris, 1990; Sparadeo, Strauss, & Barth, 1990).

Hypothesis Two addressed differences in specific services provision and employment outcome. The most frequently provided specific services to consumers with TBI were assessment, job placement, job search, diagnosis and treatment, and counseling/guidance. Assessment was statistically non-significant as a predictor of
employment outcome; however, assessment did have a positive relationship to
employment outcome at case closure. Job placement produced a significant finding in
predictive ability and a positive relationship to employment outcome at case closure. Job
search and diagnosis/treatment services were also positively related to employment
outcome as well as predicted employment outcome. There was no significant
relationship between counseling/guidance and employment, nor did the provision of
counseling/guidance predict employment outcome.

Hypothesis Three addressed differences in weekly earnings of consumers at case
closure when specific services were provided. There was no significant relationship
between assessment services or counseling/guidance services and weekly wages of
consumers at case closure. The service variables of job placement and job search were
significantly related to weekly income; however, this was a negative relationship.
Consumers had lower weekly earnings (i.e., -$28.49 and -$7.06 respectively) when these
services were provided than when they were not provided. There was a positive
relationship to consumers’ weekly earnings when diagnosis and treatment services were
provided (i.e., +$40).

This study represents a national replication and expansion of Gamble and
Moore’s research, which used a state RSA database for consumers with TBI. This
analysis produced both similar and different findings than Gamble and Moore’s (2003)
research regarding specific services provided, their ability to predict employment
outcome, and the specific services’ relationships to consumer weekly earnings at case
closure. In the current analysis of the national data set, the specific services provided to
consumers with TBI were different from the state data set analysis of Gamble and Moore regarding the types of most frequently provided VR services. Because of these differences, only three service variables (i.e., assessment, job placement, and counseling/guidance) were the same as those examined by Gamble and Moore. The findings regarding assessment were similar to that of Gamble and Moore in that both results indicated that the provision of assessment services was not a predictor of employment outcome. Both analyses found that job placement significantly predicted competitive employment at case closure. Contrasting with Gamble and Moore, counseling/guidance did not have a significant relationship to employment outcome or the ability to predict employment outcome, nor did this service variable have a significant relationship to weekly earnings of consumers with TBI.

Design Issues

There are three types of validity in experimental and quasi-experimental studies used in social science research (Shadish, Cook, & Campbell, 2002). This analysis has two threats to statistical conclusion validity (i.e., unreliability of treatment implementation and heterogeneity of units (Shadish, Cook, & Campbell, 2002). It is not possible to know from the data the specifics of intensity, duration, or quality of the specific services; only that the individual services were not provided, were provided by VR funds, or were provided though other funding. Therefore, statistical significance may be either under or over reported depending upon the services that a consumer may have actually received. For purposes of this analysis, VR services were classified and analyzed as a) not provided or b) provided by VR funds. It is likely that services were
not provided in a standardized manner to all clients and effects may be underestimated when less than full participation in services was provided to VR consumers.

This analysis also has two threats to internal validity. They are maturation and attrition. Maturation is a concern in that consumers may have returned to employment with or without VR services as a natural progression in their recovery. Attrition is an important factor and limits generalization of this analysis. Consumers’ cases may be closed for a number of reasons. In this population, a large number of consumers with TBI were not closed in a status which reflected a competitive employment outcome. As an example, although employment outcome was the largest reason for case closure, the next three largest reasons were a.) inability to locate or contact, b.) refusal of service, and c.) failure to cooperate. It is not unreasonable that these consumer behaviors may be related to emotional, behavioral or cognitive sequelae following TBI. It is possible that consumers closed in a competitive employment outcome represented a specific sample with greater abilities to benefit from VR services than the population of VR TBI consumers in its entirety.

It is important to note that TBI, by its nature, is heterogeneous in its results and sequelae. While these results may be applicable for group and practice implications, they may not be appropriate to a particular individual.

Implications

Hypothesis One

Gender was non-significant in relationship to employment outcome. This is consistent with most rehabilitation literature. However, this contrasts with the findings of
Johnstone et al. (2002) who found that men in their sample received a greater number of services and had higher employment rates than did the women. It is important for RSA counselors to provide comparable services regardless of gender and be assured that men and women have an equal chance of employment.

The mean age for both employed and unemployed groups was approximately 37 years of age. At present, individuals’ work life expectancy generally extends until the age of approximately 62-65 years. Given the relatively young age of consumers with TBI in the VR system, it is necessary for RSA services to teach consumers job skills, adaptations, and adjustments to limitations to assist them throughout their work life expectancy. It is unlikely consumers of this age would remain employed with one employer throughout their work life expectancies. Literature has documented a return loop phenomenon where consumers with TBI keep re-entering the VR program after employment ends (Parente et al., 1991). Focus on self-sufficiency and learning/teaching job skills may improve consumers’ knowledge base to enable them to seek employment more effectively following leave of an employment site. It is important for RSA counselors to be aware of the lack of relationship between employment and age of consumers with TBI, as a common misperception is that employment rates decline with age. RSA counselors need to provide services and opportunities without an age bias.

The small number of consumers identified with substance abuse as a secondary disability is different than literature suggesting high rates of post-injury substance abuse in consumers with TBI (Arenth et al., 2001; Kolakowsky-Hayner et al., 2002). One explanation for the low numbers of consumers identified with substance abuse issues may
be that post-injury substance abuse is lower in consumers who are able to actively seek RSA services than in the general population of individuals with TBI. An alternative explanation may be that the presence of substance abuse was underreported to and/or reported by RSA counselors. RSA counselors may benefit from continuing education regarding identification of the symptomatology and effects of substance abuse on consumers with TBI to assist in detection and referral to appropriate counseling in order to improve consumer outcome.

Although a positive relationship was identified between race and employment outcome in Black, Hispanic and White consumers, both the employed and unemployed groups were predominantly made up of White consumers (i.e. 83.9% of the employed group and 78.7% of the unemployed groups). Literature, however, suggests that the incidence rate for TBI is higher in minority groups (Bruns & Hause, 2003; CDC, 2004; Cooper, Tabaddor & Hauser, 1983; Jager, Weiss & Coben, 2000). Minority consumers may be unaware of RSA services or be reluctant to seek vocational assistance. It is important for RSA to continue to make minority community services and members aware of VR services for consumers with TBI given the positive relationship with employment outcome and some racial groups when VR services are provided.

Education was also significantly related to employment outcome. Schonbrun and Kampfe (2004) analyzed 14 studies that evaluated education in relationship to employment outcome. The findings were mixed. Six of the 14 researchers found that education did have a positive relationship to employment outcome; whereas, eight of the 14 researchers found no relationship. The current analysis found a positive relationship
with educational level and employment; however, this relationship was found most
notable at the associates degree and 9-12 grade levels. This finding may be one plausible
explanation for the previously described mixed findings in that there may be limitations
to the benefits of short term rather than long term post-secondary education.

Hypothesis Two

The specific service variable of counseling/guidance did not show a relationship
between service provision and employment outcome. One explanation may be that
consumers who needed counseling/guidance services may represent individuals with
greater level of impairment or need at the time the specific services were provided. It is
important to note that this variable refers to services, separate and apart, from the
counseling relationship that exists between the consumer and counselor throughout the
vocational rehabilitation process.

Vocational training was significant in its relationship to employment outcome,
this service was provided in less than 10% of consumer cases. The highly increased
employment rates at the vocational or two year degree level is significant in that
consumers’ employability may be maximized by a limited level of education rather than
more lengthy academic programs. This would not only decrease college service costs to
RSA, but assist consumers in re-entering the labor market in a more timely manner.

Hypothesis Three

The VR service variables of job placement and job search were positively
associated with employment outcome, however, negatively associated with consumers’
weekly earnings at case closure. One explanation may be that consumers with greater
impairment or lower levels of education may have benefited from these services. Job search activities “support and assist a consumer in searching for an appropriate job. May include help in resume preparation, identifying appropriate job opportunities, developing interviewing skills and making contacts” (US Dept of Education, 2001 p. 24). Job placement is defined as “a referral to a specific job resulting in an interview, whether or not the individual obtained the job.” It may then be assumed that consumers needing these services may represent more severely impaired or less educated consumers who would face difficulties in obtaining competitive employment without these services. Similarly, consumers who obtained competitive employment without these services, may have been higher functioning or educated, and obtained higher paying jobs on their own.

Recommendations for Future Research

Counseling Services

Further analysis is warranted into specifying different types of counseling services (i.e. marital/family counseling, adaptation to disability/personal counseling, substance abuse, or cognitive/behavioral counseling) and their relationship to employment outcome in order to benefit VR consumers and reduce RSA costs of service. Further research may address the effectiveness of these services in improving consumer outcome. In this analysis, counseling services were provided to over half of consumers in this category, but did not show a positive relationship to employment outcome in all analyses. Under the presumption (and heavy literature support) that counseling is a beneficial service, future research may address why this service did not show a relationship to consumers in the RSA program. Further research may also wish to explore
the relationship between counseling services and consumers in non-employment related areas (i.e., quality of life, medication dependence, etc). As previously stated, it is important to note that this variable refers only to purchased counseling services by VR funds and is not reflective or inclusive of the counselor-client relationship that exists in the RSA system.

*Vocational Training*

The variable of vocational training may warrant further exploration given the positive relationship between this variable and employment outcome and the strong relationship between consumers with an AA/vocational training and employment outcome. Future research may address the cost-to-benefit ratio of both short and long term training in this population.

*Employment Stability*

Given the relatively young age of TBI consumers in the VR program, further analysis of the stability of post-VR services employment and data regarding consumers return to VR services for assistance would identify the long-term effectiveness of VR dollars in maximizing consumer self-sufficiency and empowerment consistent with Rehab legislation.

*RSA 911 Database*

One direction of this analysis was towards furthering a prediction model with RSA consumers with TBI. If additional information could be collected through the existing RSA 911 Database system, this would be helpful in furthering such a prediction model in future research. For instance, information such as a consumers’ injury severity
classification and the date of their injury would have produced more specific findings. Additionally, as assessment is such a frequently provided service (i.e., 60%), additional information regarding the type of assessment (i.e., vocational evaluation, functional capacity evaluation, work hardening, or neuropsychological examination) would have produced multiple layers of information for future analysis.

Summation

There are both differences and similarities between consumers with TBI in the VR program who are employed or unemployed following VR services. The most significant demographic differences occurred in level of education and substance abuse. The VR services provided to the two groups were different and significant in their relationship to employment outcome. The most frequently provided services were assessment, counseling/guidance, job placement, job search and diagnosis and treatment. Only counseling and guidance did not significantly relate to employment outcome, nor did this variable relate to consumer wages at case closure. Further research is necessary to investigate this variable’s ability to benefit TBI consumers in the VR program. Less frequently provided variables (i.e., vocational training) showed a strong relationship with employment outcome. Further research may show this variable to improve consumer employment outcome. Given the young age of TBI consumers, it is important that future research and services be directed towards improving consumer empowerment and self-sufficiency in maintaining and seeking employment over their work life expectancy.
### APPENDIX A
RSA RECORD ENTRY FORMAT

<table>
<thead>
<tr>
<th>Record Position</th>
<th>Element Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-3</td>
<td>Agency Code</td>
</tr>
<tr>
<td>4-12</td>
<td>Social Security Number</td>
</tr>
<tr>
<td>13</td>
<td>Closure Order</td>
</tr>
<tr>
<td>14</td>
<td>Previous Closure</td>
</tr>
<tr>
<td>15-22</td>
<td>Date of Application</td>
</tr>
<tr>
<td>23-30</td>
<td>Date of Birth</td>
</tr>
<tr>
<td>31</td>
<td>Gender</td>
</tr>
<tr>
<td>32-37</td>
<td>Race and ethnicity</td>
</tr>
<tr>
<td>38</td>
<td>Source of Referral</td>
</tr>
<tr>
<td>39</td>
<td>Level of Education at Application</td>
</tr>
<tr>
<td>40</td>
<td>IEP</td>
</tr>
<tr>
<td>41-42</td>
<td>Living Arrangement at Time of Application</td>
</tr>
<tr>
<td>43-46</td>
<td>Primary Disability</td>
</tr>
<tr>
<td>47-50</td>
<td>Secondary Disability</td>
</tr>
<tr>
<td>51-52</td>
<td>Employment Status at Application</td>
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<tr>
<td>53-56</td>
<td>Weekly Earnings at Application</td>
</tr>
<tr>
<td>57-58</td>
<td>Hours Worked in a Week at Application</td>
</tr>
<tr>
<td>59-65</td>
<td>Type of Public Support at Application</td>
</tr>
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<td>82</td>
<td>Primary Source of Support at Application</td>
</tr>
<tr>
<td>83-87</td>
<td>Medical Insurance Coverage at Application</td>
</tr>
<tr>
<td>88-95</td>
<td>Date of Eligibility Determination</td>
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<td>96-103</td>
<td>Date of IPE</td>
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<td>104-109</td>
<td>Cost of Purchased Services</td>
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<td>110-153</td>
<td>Services Provided</td>
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<td>154</td>
<td>Level of Education Attained at Closure</td>
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<td>155-160</td>
<td>Occupation at Closure</td>
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<td>161</td>
<td>Employment Status at Closure</td>
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<td>162</td>
<td>Competitive Employment</td>
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<td>163-166</td>
<td>Weekly Earnings at Closure</td>
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<td>167-168</td>
<td>Hours Worked in a Week at Closure</td>
</tr>
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<td>163-167</td>
<td>Earnings/Hours Comparison</td>
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<td>169-175</td>
<td>Type of Public Support at Closure</td>
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<tr>
<td>176-191</td>
<td>Monthly Public Support Amount at Closure</td>
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<tr>
<td>192</td>
<td>Primary Source of Support at Closure</td>
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<td>193-197</td>
<td>Medical Insurance Coverage at Closure</td>
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<td>198</td>
<td>Type of Closure</td>
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<td>199-200</td>
<td>Reason for Closure</td>
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<td>201-208</td>
<td>Date of Closure</td>
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<td>209</td>
<td>Supported Employment Status</td>
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<td>210</td>
<td>Veteran Status</td>
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<td>211</td>
<td>Significant Disability</td>
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<td>212</td>
<td>Migrant and Seasonal Farmworkers</td>
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<td>213</td>
<td>Projects with Industry</td>
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</tbody>
</table>
APPENDIX B
VR SERVICES

Assessment: Services provided to determine a consumer’s eligibility for VR services, assign a VR priority code and determine the nature and scope of VR services to be provided.

Diagnosis and Treatment of Impairments: Corrective surgery or therapy, diagnosis and treatment of mental health services, dentistry, nursing services, hospitalization, drugs and supplies, prosthetics and hearing aids, eyeglasses and visual services, podiatry, physical, speech or occupational therapy, or other medically related rehabilitation services.

VR Counseling and Guidance: Therapeutic counseling or guidance services necessary for an individual To achieve employment outcome. May address medical, family, social, or vocational concerns.

Training: Services designed to help the individual improve educationally or vocationally. Categories include:
- College or University Training
- Occupational/Vocational Training
- On the Job Training
- Basic Academic Remediation
- Job Readiness Training
- Disability Related Augmentative Skills Training

Job Related Services: Categories include:
- Job Search Assistance
- Job Placement Assistance
- On the Job Supports

Transportation: Travel and related expended necessary to enable a counselor to participate in a VR service

Maintenance: Monetary support necessary for the individual to participate in VR services

Rehabilitation Technology: Application of technology, engineering or scientific principles to address the needs and barriers of consumers with disabilities in the VR process. Category includes:
- Rehabilitation Technology Service
- Assistive Technology Devices
- Assistive Technology Services

Personal Assistance Services: Range of services provided to assist with ADL on and off the job
- Reader or Interpreter Services
- Personal Attendant
- Technical Assistance
- Information and Referral
- Other Services
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