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REHABILITATION COUNSELOR CLINICAL JUDGMENT MODEL APPLICATION WITH DATA FROM AN INDIVIDUALIZED PLACEMENT AND SUPPORT TRIAL FOR VETERANS LIVING WITH SPINAL CORD INJURIES

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A dissertation submitted in partial fulfillment of the requirements for the degree of Doctor of Philosophy at Virginia Commonwealth University

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Abstract

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Employment rates for veterans with spinal cord injuries remain low despite legislation aimed at helping individuals with significant barriers to employment succeed in finding competitive work. As access to services and resultant outcomes become more scrutinized, the need for Rehabilitation Counselors to efficiently allocate resources grows more vital to the cause. Existing research supports a mediated path model of rehabilitation counselor clinical judgment asserting observations of disability severity, intelligence, and psychosocial adjustment lead to inferences of functional status and attribution thereof, which collectively influence predictions of successful rehabilitation. The current study investigated the variance attributable to this clinical judgement model in relation to access to services and successful employment outcomes in an implementation study of the Individualized Placement and Support Model of supported employment with a sample of veterans living with spinal cord injuries. The reduced model fit

the data well, Chi-square (6, N=213) = 3.391, P=.758, CFI =1, RMSEA=.00, Hoelter .05 =788. Disability Severity was found to have an indirect effect on employment, .095 *P*<.05. Significant direct effects for disability severity on functional status, education on competitive employment, functional status on competitive employment, and minutes on competitive employment. The results indicate time as a resource was allocated equitably among participants in the first thirty days in regard to the exogenous variables in this study. The reduced model accounted for 8.6% of the observed variance in the data.

Chapter One: Introduction

Study Rationale

The population of individuals living with spinal cord injury (SCI) is growing. The National Spinal Cord Injury Statistical Center (NSCISC) estimates 282,000 individuals in America live with SCI, and the prevalence of injury has increased from 40 cases per million in 2014 (NSCISC, 2014) to 54 cases per million in 2017 (NSCISC, 2017). The average age at injury is currently 42 years old, with 80% of the population being males (NSCISC, 2017) and trends indicate individuals with SCI are living longer (Savic et al., 2017). Most injuries result in incomplete tetraplegia (45.8%), followed by incomplete paraplegia (20.9%), complete paraplegia (19.7%), complete tetraplegia (13.2%) and 0.4% reporting normal functioning. It is estimated 17,500 new injuries will be reported in 2017 (NSCISC, 2017).

Individuals living with SCI are less likely to be employed, though research efforts with this population have found work to be a realistic pursuit (Ottomanelli, Barnett, & Goetz, 2014). Current estimates of employment among individuals with SCI can range from 24% to 68% among developed nations (Carr et al., 2017; Glennie et al., 2017; Krause, Edles, & Charlifue, 2011; Ottomanelli & Lind, 2009; Roels, Aertgeerts, Ramaekers, & Peers, 2016; Sinden, & Martin Ginnis, 2013). Estimates vary due to more conservative operational definitions limiting employment to paid employment over minimum wage, and the more liberal including

volunteering and homemaking (Krause, Terza, Saunders, & Dismuke (2010). Employment rates among the population of veterans living with SCI have been reported as 35% by Ottomanelli (Ottomanelli & Lind, 2009) and 16% (Myaskovsky et al., 2017). Of individuals with SCI who return to work, they are more likely to leave the workforce at a younger age than those without SCI (Lidal, Huynh, & Biering-Srensen, 2007) and to earn less postinjury (Krause et al., 2011).

Estimates of the total costs of SCI range from $1.2 million to $4.8 million over the course of an individual's lifetime dependent on age of onset and injury severity. Benefits received by those with injuries limiting ability to work follow a distinct pattern from short-term to long-term to often permanent Social Security disability benefits as entities shift the costs toward the central government (McMahon et al., 2000). Of the individuals who receive Social Security disability benefits, 1 in 500 are observed to leave the rolls due to paid employment (McMahon et al., 2000). For the growing population of people with SCI who live longer with immense financial burden and multiple barriers to employment, access to vocational rehabilitation (VR) services is vital.

State VR agencies are the primary provider of return to work services for individuals with disabilities, though many with SCI report unawareness of the availability of these services (Ottomanelli, Bradshaw, & Cipher, 2009). The U.S. Department of Veterans Affairs recently funded two studies aimed at increasing access to VR services among veterans with SCI using a supported employment intervention known as Individualized Placement and Support (IPS) (Ottomanelli, Barnett, & Goetz, 2014; Ottomanelli, Goetz, McGeough et al., 2009). The studies found the IPS model to be disability-neutral, and having a vocational rehabilitation specialist (VRS) dedicated to an SCI unit was more effective than one with a generalized caseload (Ottomanelli et al., 2013).

Individual Placement and Support

The IPS model of supported employment was developed to provide comprehensive vocational rehabilitation to the population living with severe mental illness (Becker & Drake, 2003). Services are provided in accordance with the eight principles of zero exclusion, integration of services, competitive employment, benefits planning, rapid job search, follow-along supports, consumer preferences being honored, and services being provided in the community.

The Spinal Cord Injury Vocational Integration Project (SCI-VIP) was a randomized control trial testing the efficacy of IPS vs. treatment as usual of referral to existing VR resources (Ottomanelli, Goetz, et al., 2009). Data were gathered for IPS sites and observation sites, and found 29.6% of veterans participating in the IPS intervention obtained employment compared to 11.8% of those in the treatment as usual condition at intervention sites, and only 2.3% of veterans at observation sites finding competitive employment (Ottomanelli et al., 2014).

The second study, a follow up entitled, "Predictive Outcome Model Over Time for Employment" (PrOMOTE) (Veterans Office of Research and Development, 2015) utilized 11 vocational rehabilitation staff and provided IPS services to 213 veterans at seven sites across America. The study consisted of a 2-hour baseline interview collecting myriad data and then tracked the amount, type, and intervals of services provided. Participants meeting the eligibility criteria of living within 100 driven miles of the medical center and desiring competitive employment in the community were offered the opportunity to participate in a 24-month IPS intervention. Employment rates for the sample of 213 living with SCI were 43.2%, and that number grew to 52.2% for the subsample without traumatic brain injury (Ottomanelli et al. 2017).

These results underscore the effectiveness of the IPS model of supported employment for veterans with SCIs, yet nationwide only a handful of the 24 SCI hubs have hired permanent, SCI dedicated vocational rehabilitation specialists. Veterans living with SCI are most often referred to providers outside of the Veterans Administration's SCI system of care (Ottomanelli et al., 2012).

Existing Services for Veterans

A referral to the Compensated Work Therapy program initiates an evaluation from a provider with a caseload mostly consisting of individuals with severe mental illness (U.S. Department of Veterans Affairs, 2007). Although the Vocational Rehabilitation Specialists (VRS) are trained in the provision of the IPS model, they may not have insight as to the unique employment barriers and support needs of individuals living with SCI, and veterans are usually referred to state or local employment resources (Ottomanelli et al., 2012).

State and local resources may consist of state vocational rehabilitation agencies or employment commissions, the Paralyzed Veterans of America employment program, or the Veterans Benefits Administration Vocational Rehabilitation and Employment program which focuses primarily on providing education and retraining benefits (U.S. Department of Veterans Affairs, 2018). Individuals referred to state VR agencies may spend months to as long as 2 years on a wait list before receiving return to work services (Honeycutt & Stapleton, 2013; O'Neill, Mamun, Potamites, Chan, & da Silva Cordoso, 2015).

Timing of VR services is important. Survey data for the general population of individuals living with SCI show employment rates climb postinjury with the 20-year mark seeming to be the apex of this percentage at 34.4% (Krause et al., 1999; NSCISC, 2016). Vocational rehabilitation services have traditionally not been provided as part of inpatient

rehabilitation for traumatic SCI. However, a recent study from Australia, which tested the efficacy of providing vocational services during the initial rehabilitation phase, found 34.5% of participants to be employed at discharge or in the first 11 months (Middleton et al., 2015) as compared to the 25% reported employed at 2 years postdischarge without receiving VR services during the initial rehabilitation (Krause et al., 1999). Having vocational services during the initial rehabilitation was reported by participants to "provide distraction" and "give hope" (Ramakrishnan et al., 2016, p. 183).

Timing is also important for those veterans who may seek assistance postdischarge. Increased latency to services for individuals with SCI was associated with a decreased percentage successfully employed at discharge (Honeycutt & Stapleton, 2013). This leads to continued costs to taxpayers as individuals opt to maintain government benefits instead of attempting to achieve substantial gainful activity (O'Neill et al., 2015).

Access to rehabilitation services often depends on the clinical judgment of rehabilitation counselors who gather and interpret information and then make decisions regarding eligibility and resource allocation. Clinical judgment of rehabilitation counselors has been supported as following a mediated model, by which observations of disability status (DIS), psychosocial adjustment (PSY), and intelligence lead to inferences of functional status (FUNC) and the attribution thereof (ATTR). These inferences then lead to predictions (PRED) of likelihood of making counseling progress, and likelihood of obtaining employment in a study of state VR counselors evaluating hypothetical VR clients living with SCI (Strohmer & Leirer, 2000).

Implications of this model of counselor judgment in an environment where veterans with SCI likely have the most and more severe barriers to employment does not bode well for those seeking services. Individuals referred to an IPS generalist are more likely to be referred out to

state and local resources, which are more likely to increase wait times to service provision. Increasing wait time to service provision may have decreased motivation and outcomes for veterans referred to treatment as usual in the SCI-VIP study as compared to veterans referred to an SCI dedicated VRS (Ottomanelli et al., 2012).

Statement of Purpose

Existing research on rehabilitation counselor clinical judgment relied on case review-style vignettes. This study conducted exploratory path analysis of variables in the mediated model of rehabilitation counselor clinical judgment using data from a longitudinal observation study of the effectiveness of IPS for veterans living with SCI. Analysis explored the variance attributable to model variables in relation to amount of services in the first 30 days, and employment outcomes.

Theoretical Framework

To conduct this research, an accepted theoretical framework must provide the base upon which to build. Therefore, this study utilized the model of rehabilitation counselor clinical judgment proposed by Pepinsky and Pepinsky (1954, p. 191): (a) counselors elicit verbal and nonverbal information from the client for examination, (b) inferences are made about the relationship and likelihood of success, (c) counselors make predictions based on these inferences, and (d) these predictions inform decisions which the researchers referred to as hypothesis testing. These decisions can include a variety of options from treatment models and techniques, to timing of treatment, all of which relate to the counselor's best guess of what will most efficiently and effectively help the client. After the decisions are made, the counselor begins the observation, inference, prediction, decision cycle anew incorporating the new information with the old, through the lens of their training and experience (Pepinsky & Pepinsky, 1954).

Selection of variables was guided by the fully mediated model of rehabilitation counselor clinical judgment (Strohmer & Leirer, 2000). Research utilizing case review style vignettes supports a model of the clinician observing DIS, PSY, and IQ, then making inferences about the consumer's FUNC and ATTR. Based on these inferences the rehabilitation counselor then makes a PRED about the consumer's likelihood of making progress and likelihood of obtaining employment (see Figure 1). Path analysis was used to support this operationalization of the first three steps of the Pepinskys' model (Strohmer & Leirer, 2000).

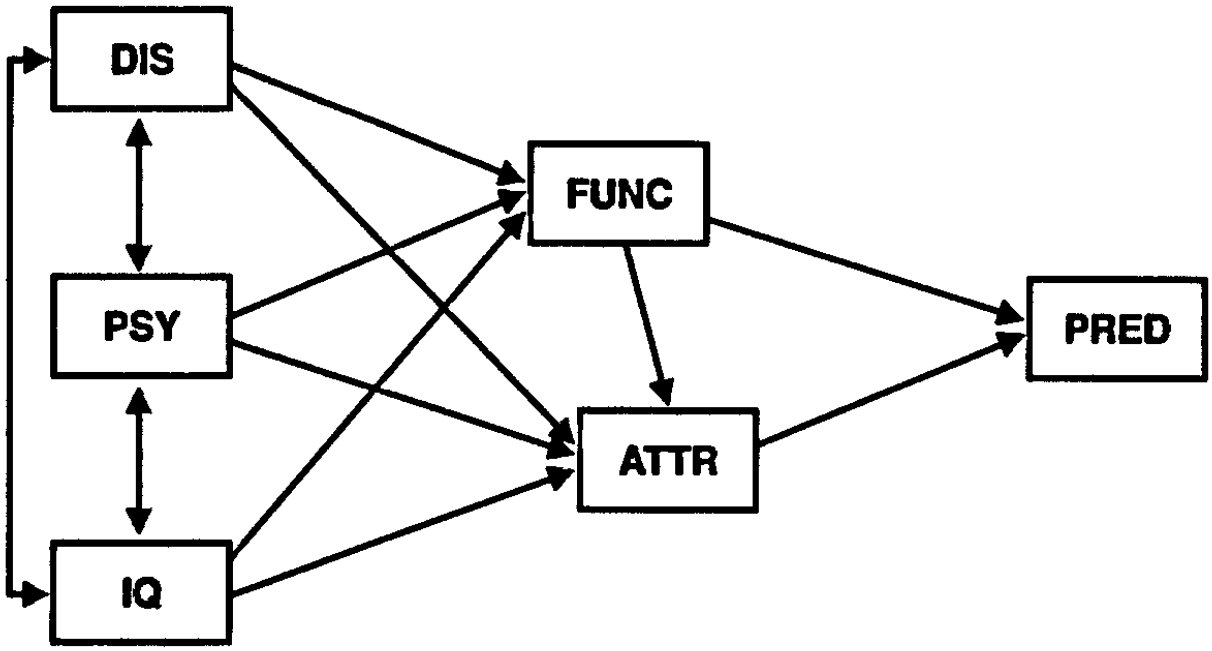

Figure 1. The fully mediated model of clinical judgment. DIS = severity of disability; PSY = psychosocial adjustment; IQ = level of IQ; FUNC = level of functioning; ATTR = possible etiology; PRED = prediction. Adapted from "Modeling Rehabilitation Counselor Clinical Judgment" by D. C. Strohmer and S. J. Leierer, 2000. *Rehabilitation Counseling Bulletin, 44*(1), pp. 3-9.

The current study uses data from the PrOMOTE study to test the model's external validity in accounting for the variance observed for the total number of minutes a VRS spends on a veteran in the first 30 days (MIN), and competitive employment outcomes (CE). Path analytic

techniques allow for variables to act as both dependent and independent variables, and allow for the presumption of causal relationships (Heise, 1969). The Strohmer and Leierer (2000) study had participants explicitly (a) observe the information, (b) make inferences, and (c) make predictions. The PrOMOTE study did not directly measure predictions by soliciting opinions of VRSs. Therefore, the current study did not conduct an exploratory path analysis to identify the amount of variance attributable to relevant variables measured by multiple clinicians or reported by the participants themselves.

The PrOMOTE study database contains a great deal of data relevant to the steps of this model, however, variables included are not exact replicates of those used in previous research. Variables included were DIS data collapsed into four categories related to American Spinal Cord Injury Association Impairment Scale (AIS) (Roberts, Leonard, & Cepela, 2017): PSY measured by the Veterans RAND-36 (VR-36) (Kazis, 2000), ED measured as highest degree completed substituting for IQ, LOC measured by questions about locus of control replacing ATTR, FUNC measured in accordance with the Functional Independence Measure (FIM) (Dodds, Martin, Stolov, & Deyo, 1993), MIN measured the total number of service minutes spent with or on behalf of the veteran, and CE measured as achieved competitive employment.

Predictions were not directly observed or collected from the VRS staff during PrOMOTE, rather the prediction is inferred and measured in the form of resource allocation. ATTR was removed from the input model and LOC was added to the first step as the data were veteran self-report. FUNC was not treated as a direct mediator, and instead was explored as a moderator to allow for estimates of the effects of the other variables on MIN and CE.

This study collapsed SCI status into four categories for the DIS variable: High tetraplegia, AIS, A, B, C; Low tetraplegia, AIS, A, B, C; Paraplegia, AIS A, B, C; and AIS D, E.

Groupings like these maintain integrity with Strohmer and Leierer's (2000) study in relation to categories with significant functional differences and utilize the categories previously examined in other research (Ottomanelli et al., 2017; Ottomanelli et al., 2011). Aggregation of participants into the groups mentioned above represent significant differences that can be considered ordinal in their abilities (Strohmer, Haase, Biggs, & Keller, 1982; Strohmer & Leierer, 2000). Ordinal rankings are assigned as 1 for high tetraplegia, 2 for low tetraplegia, 3 for paraplegia, and 4 for those classified as ASI D or E.

Operational definitions of psychosocial adjustment vary in the literature with the early definitions focusing on the absence of psychological disorder and the more recent descriptions expanding to include successful performance of adaptive tasks, low negativity and high positivity, participation in occupation, and satisfaction and well-being in life domains (Larsen, 2014). For this study, the Mental Components Scale of the VR-36 measures from PrOMOTE served as PSY data. The scale includes measures of physical functioning, role limitations due to physical problems, bodily pain, general health perceptions, energy/vitality, social functioning, role limitations due to emotional problems, and mental health (Kazis, 2000). Data can be considered ordinal, and offer more levels than the evaluations of *very poor*, *poor*, *good* or *very good* provided to raters in the Strohmer and Leierer (2000) study.

Education has been supported as one of the most predictive variables for employment status post-SCI (Franceschini et al., 2012; Hilton, Unsworth, Murphy, Browne, & Olver, 2017; James, DeVivo, & Richards, 1993; Krause, 1992; Krause et al., 2010; Krause, Terza, Erten, Focht, & Dismuke, 2012; Lidal et al., 2007; Ottomanelli & Lind, 2009). Years of education approached significance on the SCI-VIP study, but did not reach the level of statistical significance in a logistic regression analysis (Ottomanelli et al., 2011).

The Functional Independence Measurement serves as data for FUNC. An inference of functional status was not gathered from the VRS for the PrOMOTE study; however, the FIM scores were retrieved from the Computerized Patient Record System for entry into the PrOMOTE database by the Site Coordinator. The FIM was chosen as it is a common measure for assessment of functional independence in the United States as it is required for Medicare reimbursement (Anderson et al., 2008). In the VA SCI system of care, all clinical and nursing staff are trained and certified on the FIM yearly to ensure proficiency.

Questions relating to locus of control serves as data for the ATTR variable. The ATTR variable represents the inference of the potential causal factors of the current functional status (Strohmer, Biggs et al., 1983; Strohmer, Haase, Biggs, & Keller, 1982; Strohmer & Leierer, 2000). The clinician is assumed to use this inference to attempt to better understand the client's behavior, predict potential courses of action to be chosen by the client, and inform future clinician actions toward the client (Murray & Thomson, 2009). The PrOMOTE study collected participants' perception of their degree of control over their life if they could get the help they needed from VRS and medical staff. This does represent a departure from the model as it is not the rehabilitation counselor's assessment of the clients' attribution of their functional status; instead, it is the clients' own evaluation of potential control with the assistance of a powerful other. Assistance from a VRS is considered a facilitator of employment by veterans (Cotner, et al., 2015) and providers (Cotner, Ottomanelli, O'Connor, & Trainor, 2018).

Prediction was not directly measured in the PrOMOTE study, but it is understood to occur (Pepinsky & Pepinsky, 1954; Strohmer & Leierer, 2000; Strohmer, Biggs et al. 1983; Strohmer, Haase et al., 1982). Original and new variables are listed in Table 1.

Table 1

Original Variables from Strohmer & Leierer (2000) and New Variables Used in the Current Study

Original variable	Provided/ Measured as	New variable	Measured as
DIS (provided in vignette)	C5 complete, T1 incomplete, L-5 incomplete	DIS	High tetraplegia AIS A, B, C; low tetraplegia AIS A, B, C; paraplegia AIS A, B, C; AIS D & E
PSY (provided in vignette)	Very poor, poor, good, very good	PSY	V-36
IQ (provided in vignette)	69, 85, 105, 115	ED	Grouped by highest degree achieved
FUNC (rated by reviewer)	1(very poor) 11(very good)	FUNC	FIM
ATTR (rated by reviewer) "Extent to which you think the client's condition is under his/ her control" (Strohmer & Leierer, (2000).	1(no control) 11(great control)	LOC	VRMC questions about ability to control life, etc.
Likelihood of making progress (rated by reviewer)	1(not very likely) 11(very likely)		
Likelihood of obtaining employment. (rated by reviewer)	1(not very likely) 11(very likely)		
		MIN	Total number of minutes of services in the first 30 days
		CE	Achieved competitive employment Y/N

Saturated Input Model

Step 1. The first step of the saturated input model for this study consists of observations of DIS, PSY, ED, and LOC as seen in Figure 2. Physicians made diagnoses about DIS; veterans

self-reported PSY, ED, and LOC. These observations affect inferences and measurement of FUNC.

Step 2. The model's second step consists of FUNC recorded by multiple independent providers administering the FIM for a single quantitative score. These providers consist of medical doctors, psychologists, occupational therapists, and physical therapists all evaluating the domains relevant to their fields. The VRS would have access to this measure, but would also make observations in the course of typical assessment related to the individual's ability to act independently. FUNC, DIS, PSY, ED, and LOC then affect PRED which is indirectly measured as resource allocation in MIN.

Step 3. The model's third step, MIN is the quantifiable allocation of resources influenced by PRED which are understood to occur as mentioned earlier.

Step 4. The fourth and final step shows the effect of DIS, PSY, ED, LOC, FUNC, and MIN on CE measured as achievement of competitive employment.

Research Question and Hypothesis

Given the model introduced by Pepinsky and Pepinsky (1954) and the support of the model of rehabilitation counselor clinical judgment by Strohmer and Leierer (2000), this study aimed to investigate the ability of the model to predict access to services in a real-world scenario.

Research question. What amount of variance observed in employment outcomes is attributable to MIN, FUNC, DIS, PSY, ED, and LOC?

Hypothesis. Higher DIS, PSY, ED, LOC scores will positively correlate with higher FUNC scores; higher scores among these five variables will positively correlate to higher MIN, and higher amounts of all variables will positively correlate with CE.

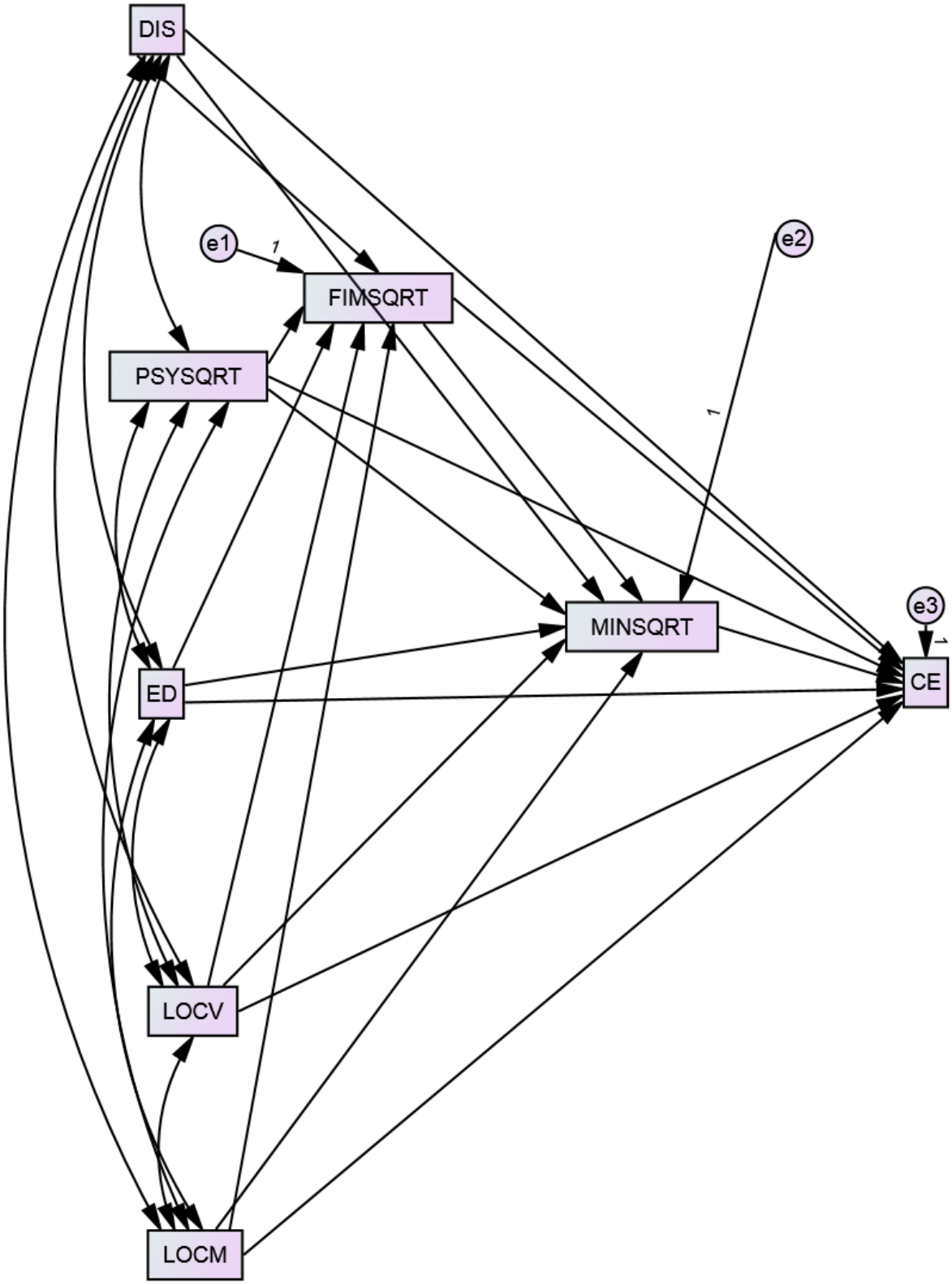

Figure 2. Saturated input model.

Summary

Employment rates among individuals with SCI and other disorders are reported at levels much lower than the overall employment rate. Spinal cord injuries are costly, and generally result in a progression from private insurance to reliance on public benefits. Research conducted regarding vocational rehabilitation counselor clinical judgment for individuals with SCI has supported the influence of disability status, psychosocial adjustment, intelligence, functional status, and attribution of that status on the predictions made by rehabilitation counselors regarding the individual's likelihood of making progress in rehabilitation and likelihood of obtaining employment. This study investigated this phenomenon in a real-world individualized placement and support vocational intervention for veterans living with SCI. The literature review in Chapter 2 provides the rationale for such investigation.

Chapter Two: Literature Review

This section reviews the relevant literature pertaining to SCI, the IPS model of supported employment, and the clinical bias of rehabilitation counselors. Departures from the original model are explained with supporting evidence.

Spinal Cord Injury

Spinal cord injury begins with an initial mechanical trauma, including traction and compression forces, and may include fragments of bone, disc material, and other fascia (McDonald & Sadowsky, 2002). Transmission of information along axons is impaired, and blood vessels may rupture and hemorrhage. The spinal cord swells to occupy the entire canal, restricting blood flow, and thus limiting the supply of nutrients and oxygen to the cells. Other toxic materials are leaked from the damaged cells and the neurons begin to die (McDonald & Sadowsky, 2002).

The World Health Organization (WHO) estimates 250,000-500,000 new cases of SCI yearly including those who do not survive their injuries (WHO, 2013). Prevalence is noted to be higher in the United States than in the rest of the world (DeVivo, 2012) with an estimated 54 cases per million for 2017 (NSCISC, 2017). The WHO reported an estimate of 40-80 cases per million worldwide, but with admission of its unreliability in 2013 (WHO, 2013). Other estimates such as Australia's estimated 21-33 cases per million based on traumatic SCI (New, Epi, Baxter, Farry, & Noonan, 2015).

Estimates of prevalence are widespread, with the upper estimate being from 50% to a 100% increase over the lower estimate. This discrepancy stems from inclusion of nontraumatic SCI in the estimates with the most variability because there does not seem to be a consensus of what categorizes nontraumatic SCI (DeVivo, 2012). Another reason for the range observed in estimates may be due to the nature of the data collection sources from rehabilitation facilities instead of hospitals, which are more prevalent in developed countries, and result in more reliable data collection that skew toward identification of traumatic injury identification over nontraumatic spinal cord injury (New et al., 2015).

The World Health Organization reports worldwide that 90% of SCIs are due to traumatic causes such as motor vehicle crashes, falls, and violence. Demographically, males are most at risk from age 20-29, and then age 70 or older. Females are more likely to experience SCI from age 15-19, and then at age 60 or older. The WHO estimates a 2:1 male to female ratio (WHO, 2013).

In America, males account for 81% of injuries. The average age has risen to 42 years old presently from 29 years old in the 1970s. The cause is most likely to be motor vehicle crash (38.4%), fall (30.5%), violence (13.5%), or sports (8.9%). Whites account for 63.3% since 2010, with non-Hispanic Blacks accounting for 21.7%, and Hispanics accounting for 11.1% (NSCISC, 2017).

As mentioned above, the average age at injury has risen from 29 to 42 (NSCISC, 2017). With this, the percentage of cervical injuries is increasing as the percentage of neurologically complete injuries decline (DeVivo, 2012). The percentage of individuals with SCI from auto injury has decreased by 10% from 48.3% in 2010 (DeVivo, 2012) to 38.4% since 2010 (Chen, He, & DeVivo, 2016; DeVivo, 2012; NSCISC, 2017). During this time, the percentage of

injuries occurring from falls has risen by 10% (Chen, He, & DeVivo, 2016; DeVivo, 2012; NSCISC, 2017). These trends indicate the population with SCI is increasingly becoming injured from falls later in life.

The prevalence of individuals with SCI in the United States has increased from 40 cases per million in 2014 to 54 cases per million in 2017, not including those who succumb to their injuries within the first year (NSCISC, 2014, 2017). This means about 17,500 new cases per year in the United States, a number previously predicted but not to be reached until 2050 by DeVivo (2012). This may be due to the increase of older individuals being injured from falls and the increase of nontraumatic SCI (Chen et al., 2016). Looking at the whole picture, the population of individuals with SCI in America is older on average, and less likely to have complete injuries.

Impact of Spinal Cord Injury

The chronic and extensive nature of SCI can require drastic lifestyle adjustment for even the most minor cases (Krause, 1992). Spinal cord injury presents new challenges to which the individual must adapt (DeVivo & Richards, 1992; Fuhrer, Rinalta, Hart, Clearman, & Young, 1992). The effects of SCI can be physical, psychosocial, and financial.

Physical. The severity of injury is measured by both the level of injury and completeness. Level of injury refers to location on the spine and is identified by being cervical, thoracic, or lumbar, and then the number of the disc or discs closest to or involved in the injury. Completeness in medical practice consists of five levels: A being no sensory or motor function; B having sensory but not motor functioning; C having some motor functioning related to metabolic processes and/or motor functioning on the opposite side at least three levels below the injury; D describes motor incompleteness with at least half of the motor functioning below the

injury as full range of movement against gravity; and E as normal for someone who but now has been recorded as previously having sensory and/or motor deficits, displaying normal sensory and motor function at all levels (Roberts et al., 2017, p. 1502).

For the SCI population the results are mixed with some studies finding disability level to be predictive of employment while others do not (Hilton et al., 2017). As the neurons controlling the legs branch out the lowest, it is common for any SCI to result in altered use of the lower extremities. This often impairs the individual's ability to ambulate, a symptom alone associated with drastically lower employment for the population living with or without SCI (Brucker, Houtenville, & Lauer, 2016; Houtenville, 2013). Additional medical comorbidities include reduced immune functioning (Kleisch, et al., 1996), urinary tract complications, skin conditions including pressure ulcers, and nutritional problems (DeVivo & Farris, 2011) as well as pain, fatigue, and spasticity (Hammell, 2007).

Hospitals nationwide use the FIM (Hall, Cohen, Wright, Call, & Werner, 1999) to measure the extent to which someone can complete tasks independently. It consists of 18 items rated on a scale of 1 *requiring total assistance* to 7 being complete independence. The FIM at discharge was found predictive of probability of paid work (Cohen, Marino, Sacco, & Terrin, 2012; Ferdiana et al., 2014; Murphy, Middleton, Quirk, De Wolf, & Cameron, 2011; Rivers et al., 2018). Functional Independence Measure scores were also found to be negatively affected by age (Putzke, Barrett, Richards, & DeVivo, 2003), high severity injuries, cervical injuries, and more health conditions, while employment was found to have a positive effect (Rivers et al., 2018). No significant differences in FIM scores were noted for those obtaining employment in the SCI-VIP study (Ottomanelli et al., 2013).

Psychosocial. According to Larsen, psychosocial adjustment was originally conceptualized as the absence of mental illness or disorder and has grown to a broader and more inclusive definition that incorporates aspects of the social environment and psychological well-being (Larsen, 2014). Several models of psychosocial adjustment exist (Bergmann & Wallace, 1999; Livneh, 2001; Moos & Shaefer, 1984; Schlossberg, 1981) utilizing common components of antecedent events, process-linked variables, and adaptation associated outcomes (Martz, Livneh, Priebe, Wuermser, & Ottomanelli, 2005). The antecedent events are related to health and psychological status pre-disabling condition and aspects of the disabling condition. Process-linked variables include psychological reactions, personality attributes, coping mechanisms, and environmental characteristics. Adaptation-associated outcomes refer to quality of life domains, life satisfaction, and disability-specific measures of adaptation (Martz et al., 2005).

Disability severity was shown to significantly impact negative affectivity, and both were the strongest indicators of psychosocial adjustment (Martz et al., 2005). Depression has been identified as one of the most common mental health comorbidities for individuals with SCI (Goetz, Ottomanelli, Barnett, Sutton, & Njoh, 2017), and depressive symptoms significantly affect odds of employment status (Burns, Boyd, Hill, & Hough, 2010; Goetz et al., 2017). The number of mental health comorbidities, including substance abuse and post-traumatic stress disorder, was also found predictive of employment, in which success was most strongly correlated with no such comorbidities.

Psychosocial adjustment shares much with definitions of quality of life in the domains of well-being, adaptive functioning, environmental mastery, and socioeconomic indices (Martz et al., 2005). The Veterans RAND SF-36 is a health-related quality of life measure consisting of eight scales: physical functioning, role limitations due to physical problems, bodily pain, general

health perceptions, energy/vitality, social functioning, role limitations due to emotional problems, and mental health. Spinal cord injury is associated with a significant reduction in health-related quality of life (Leduc & Lepage, 2002). Employment has been associated with higher SF-36 scores (Leduc & Lepage, 2002) but not supported as predictive (Ottomanelli et al., 2011).

Research on locus of control among individuals with SCI attempting to secure employment found those with external locus of control to have lower employment outcomes (Krause & Broderick, 2006). Having locus of control issues was also related to lower FIM scores (Heinemann et al., 2012). A study measuring internal and external locus of control observed internal locus of control significant at the $p < .05$ level when compared to external, but overshadowed by a more predictive "work attitude" variable in regression modeling (Murphy & Young, 2005, p. 1299). More recent research supported internal locus of control as predictive of employment in a regression model using a single question regarding the individual's perceived personal control over employment achievements (Murphy et al., 2011).

A third option for locus of control is described as "powerful others" (Murphy & Young, 2005, p. 1299). This supports the belief that individuals believe their success or failure is related to the actions of another, in a gatekeeping type of fashion (Krause & Broderick, 2006; Levenson, 1973; Murphy & Young, 2005). Powerful others locus of control has been associated with reduced likelihood of employment (Krause & Broderick, 2006; Murphy & Young, 2005), but more recent qualitative studies have found veterans and providers to both view assistance of a VRS as a vital facilitator to employment (Cotner et al., 2015; Cotner, Ottomanelli, O'Connor, & Trainor, 2018) as the VRS serves to extend the veteran's network and increase employment opportunities (Cotner et al., 2014).

Studies exploring the model of rehabilitation counselor clinical judgment have found mixed results from the ATTR variable which may be regarded as related to LOC. When queried about the client's status being due to environment or due to client (or an evaluation of the client's problem being under their control) correlations ranged from 0.00 to 0.52 (Strohmer & Leierer, 2000; Strohmer, Biggs et al., 1983; Strohmer, Haase et al., 1982).

Cost of SCI. Estimates of SCI costs over the life span for health care costs and living expenses directly attributable to SCI can range from about 1.6 million U.S. dollars to over 4.7 million for those who survive the first year. These estimates do not include consideration for reduced earnings and benefits of a compensation package, nor the reduced productivity level (NSCISC, 2017). Our country's veterans have a unique benefit. The Department of Veterans Affairs considers SCI to be a catastrophic disability, and costs for all care are covered by Veterans Affairs regardless of whether the injury occurred during active duty or postdischarge (U.S. Department of Veterans Affairs, 2011). Veterans also receive monthly compensation, and for those with severe injuries, potentially special monthly compensation above the typical 100% service connection rate (U.S. Department of Veterans Affairs, 2018). Civilian, nonveteran personnel who incur SCI may resolve billing through private insurance, or through Medicaid/Medicare government programs.

In cases where individuals do begin with private insurance, research has supported a stepwise progression from short-term disability to long-term disability and eventually to Social Security disability income for workers with "work-limiting" disabilities (McMahon et al., 2000, p. 3).

Employment among the population living with SCI. Employment rates among individuals with SCI lag behind those of the general population. Recent studies have found

employment rates among individuals with SCI between 10.7% (Myaskovsky et al., 2017) and 68.4% (Glennie et al., 2017) with some studies closer to 25%-35% (Fidler & Schmidt, 2017; Wong et al., 2017). Higher numbers were reported by developed nations such as Canada (68.4%) by Glennie et al. (2017) and Australia (53%) by Carr et al. (2017). The 10.7 % rate reported by Myaskovsky et al. (2017) was a self-report to the question "Are you employed?" among a veteran population.

A review by Ottomanelli and Lind (2009) of 579 articles found 60 reporting employment rates averaging out to 35% when definitions focused on paid employment. The review identified a range similar to the studies above, but with farther reaching outlier scores of 3%-80%. The 3% report was due to limiting the sample to employment rate 1 year after injury, and the 80% report included 32% of individuals who were in school and considered that full-time employment. The review also found a response rate between 20% to 28% among three studies utilizing samples of veterans. Data from the PrOMOTE study, from which the data for this study are used, reported a 72.1% employment rate at injury and 9.3% employment rate at the baseline survey (Goetz et al., 2017). Of those surveyed, 29.8% reported having been employed at any time post SCI at baseline. The chronic and pervasive effects of SCI made it a prime opportunity for testing with the IPS model of return to work.

Individualized Placement and Support Model

Individualized Placement and Support (IPS) is a model of evidence-based supported employment developed in the 1980s originally intended to assist the population living with severe mental illness. Replications utilizing the model typically report a success rate between 40%-60% depending on the definition of employment used by the study (Yasuda, Wehman, Targett, Cifu, & West, 2002). The IPS model guides service provision in accordance with eight

principles, and includes regular fidelity assessments to ensure proper service provision (Becker & Drake 2003).

Individual Placement and Support Principles

Zero exclusion refers to the philosophy where someone reporting a desire to secure competitive employment should be evaluated and provided services regardless of the barriers that may exist. This practice ensures the biases of the screener do not interfere with an individual's access to return to work services (Becker & Drake, 2003).

Integration of services requires the VRS to be an active member of the interdisciplinary treatment team. The VRS is co-located among the team, in this case on the SCI unit. The VRS attends treatment team meetings which engage in shared decision making. Vocational treatment plans are reviewed by the team, and clinical input assists plan development (Becker & Drake, 2003).

The goal of competitive employment holds that all should receive minimum wage or better for their efforts. Individuals participating in the work force should receive a dignified wage of at least minimum wage, and lesser payment devalues the individual's contributions (Becker & Drake, 2003).

Benefits planning provides the participants with the tools necessary to make an informed decision regarding continued participation in paid employment based on the amount to which it may jeopardize the individual's existing benefits. The VRS reviews any entitlements the individual receives, and either provides the counseling themselves or makes referrals to appropriate subject matter experts. The VRS also helps facilitate accurate disclosure of earnings to necessary entities following employment (Becker & Drake, 2003).

The principle of rapid job search requires the first employer contacts to occur within 30 days of program entry. Referral to state vocational agencies historically leads to months of wait lists, evaluations, and assessments before determination of services to be provided is passed. The principle of rapid job search makes the most of the individuals' motivation and shows their effort to find employment will be met with actions by the service provider. The process transitions from hypothetical to potential. The VRS meets with potential employers to learn about their unique needs and industries. This increases the subject matter knowledge of the VRS conducting the counseling, and indicates to the client that their goals are taken seriously and resources are being devoted to their success. Meetings with employers can be proposed, and the client can actively explore opportunity with area businesses (Becker & Drake, 2003).

Follow along supports provide the safety net to the client's leap of faith. The VRS actively engages with the client and employer to ensure accurate communication of expectations and needs. The VRS is skilled in starting the uncomfortable conversations about reasonable accommodation. Counseling is provided when barriers to maintaining employment present, and transitions are negotiated as needed because not every placement turns out to be feasible (Becker & Drake, 2003).

Consumer preferences are honored in all regards. Treatment plans are patient centered and in the individual's own words. Contacts occur with businesses likely to need the skills the client possesses. Level of VRS intervention aims to respect the autonomy of the client and support his/her ability to negotiate as autonomously as possible (Becker & Drake, 2003).

The eighth principle of community-based services gets the VRS out of the office and into the field. The VRS gets to observe the consumers interacting with their environment, and learn first-hand what barriers exist and how the consumer handles adversity in many forms. It

provides a level of psychosocial assessment which will aid the VRS in finding an appropriate employer, and informs as to what barriers are yet to be surmounted. Meeting with the consumer in the community also begins the relationship on an even playing field, instead of a more traditional assessment across a desk where the counselor interrogates and enters responses into a computer system. It further underlines the partnership nature of the model, a strict departure from the medical model's prescriptive form (Becker & Drake, 2003).

This model found success in supporting the population living with serious mental illness and typical success rates were between 40%-60% when participating in IPS services, compared to 20% found with other models (Bond, 2004). Recently, a randomized clinical trial took place that tested the efficacy of the IPS model for veterans living with SCI.

Evidence for Individualized Placement and Support With Spinal Cord Injury

The Spinal Cord Injury Vocational Integration Project was a randomized clinical trial testing the efficacy of the IPS among a sample of veterans living with SCI (Ottomanelli et al., 2009). Veterans were randomized into either IPS services provided by an VRS dedicated to veterans with SCI, or into treatment as usual which consisted typically of referral to state employment commissions, disability employment services, or a compensated work therapy generalist. Treatment as usual was monitored for both intervention sites and observation sites to discern any research effects among the sample randomized into treatment as usual-intervention sites. Results from the study showed 29.6% of IPS veterans found employment compared to 11.8% of treatment as usual-intervention sites and only 2.3% of treatment as usual-observation sites veterans (Ottomanelli et al., 2012).

Older studies (Inge, Wehman, Strobel, Powell, & Todd, 1998; Targett & Wehman, 2003; Wehman et al., 1994) utilized the IPS model or detailed it in case studies. These studies

documented the success and applicability of the model for individuals living with SCI, but were not controlled trials. Two literature reviews reached the same findings that the SCI-VIP study was the only randomized control trial "of sufficient quality" and described the other studies' fidelity to the respective VR models as low (Roels, Aertgeerts, Ramaekers, & Peers, 2016, p. 2; Trenaman, Miller, & Escorpizo, 2014).

A follow-up study titled "Predictive Outcome Model Over Time for Employment" was a longitudinal observation study of IPS with the SCI population (Veterans Office of Research and Development, 2015). For these participants, 43.2% found employment. The study utilized seven sites matched for size and urbanicity. One goal of the study sought to explore the effectiveness of SCI-dedicated VRSs providing IPS services to veterans living with SCI. The study recruited 13 VRSs and provided IPS model training before and during the study. More information on the IPS methods of this study, which were the same as those in the SCI-VIP study, can be found in Ottomanelli et al. (2009).

The study recruited 213 veterans desiring participation in the intervention portion of the study. The VRSs attended regular trainings before and during the study to establish and maintain interrater reliability. The VRSs were also trained in providing services according to the Veterans Health Administration Consult Policy Directive 2008-056 (Department of Veterans Affairs, 2008).

This directive established standards for consults to be in a pending status for no more than 7 days, and advised, "The ideal process is direct scheduling of consult appointments without clinical review by the receiving service. If review is necessary, however, it needs to be performed on a regular, timely basis to ensure adherence with timeliness standards" (U.S. Department of Veteran Affairs, 2008, p. 2). This directive mandates the receiving service to

acknowledge the consult in 7 days and to act on it, by attempting to contact the veteran for scheduling purposes. Processes for continued attempts to contact, a letter and eventual termination of services due to inability to contact, or lack of follow up from the veteran are also outlined in an attempt to facilitate access to services (U.S. Department of Veterans Affairs, 2008).

Access to Services

Access to timely services increases the likelihood of a successful outcome. A qualitative study found that individuals with SCI attributed their ability to obtain and maintain employment to their access to state VR services (Wilbanks & Ivankova, 2015). However, individuals living with SCI are largely unaware of the available VR services (Ottomanelli, Bradshaw et al., 2009). Access to VR services was found to increase employment rates, especially when paired with physical rehabilitation, assistive technology, and counseling (Chan, Cheing, Chan, Rosenthal, & Chronister, 2006). Analysis of a sample of 5,000 cases from rehabilitation agencies across the United States supported access to job placement services as predictive of employment regardless of disability type (Dutta, Gervey, Chan, Chou, & Ditchman, 2008).

An Australian study, that showed a novel program providing 11 weeks of return to work services, recorded an employment rate of 35% at 3 weeks postdischarge (Middleton, et al., 2015). Of those successful, the authors reported all but five went back to the same job with the same employer, three of whom returned to work in a different role. Two individuals unemployed at the onset of SCI found employment. Rehabilitation center staff expressed a sentiment that access to services was important, though there was disagreement about the appropriate timing of the services and whether disability pension was a more appropriate option (Johnston et al., 2016).

Baseline motivation for employment and changes thereof were significantly predictive of employment outcomes (Choi, Fiszdon, & Bell, 2013). Long wait times are also associated with decreased likelihood of securing competitive employment (Honeycutt & Stapleton, 2013), and access to state VR services is known to have a long latency to initiation of service provision (O'Neill et al., 2015). Individuals with SCI hoping to return to work reported VR as vital regarding the knowledge brought to the situation and ability to deal with unfamiliar subjects (Fadyl & McPherson, 2010). Access to VR services was considered positive, "giving direction and distraction. . .and hope" (Ramakrishnan et al., 2016, p. 183).

Clinical Judgment

Clinical judgment refers to the subjective differences observed among clinicians trained to apply standards equally and equitably. As stated earlier, it implies subtle differences based on the judge in a process that should be conducted identically in each iteration. It speaks to the omnipresent human element despite our efforts to the contrary. Pepinsky and Pepinsky (1954) proposed a model of clinical judgment where counselors observed information or the client, these observations led to inferences, inferences led to predictions, and predictions informed decisions about a host of things (Pepinsky & Pepinsky, 1954).

Clinical judgment refers to both objective and subjective elements at the same time. As a phrase, it implies a scientific approach to a decision made about treatment of an individual, based on the individual's needs relative to others and the resources available (Boumans, 2015). Pepinsky and Pepinsky (1954) offered a model of counselor judgment. Research has been built on this framework to investigate specific constructs accounting for large amounts of attributable variance related to the observation and inference steps. Researchers then set out to determine the simplest yet predictive model for rehabilitation counselor clinical judgment. The simple model

utilized disability severity (DIS), psychosocial adjustment (PSY), and intelligence (IQ) to predict the dependent variable (DV). The model only accounted for 24% of the variance regarding likelihood of making progress and 39% of the variance regarding likelihood of obtaining employment. The complex model added the variables of FUNC and ATTR, but allowed for the influence of all variables on the model at both steps. This complex model accounted for 83% of the variance in likelihood of making counseling progress and 87% of the variance in judgments of likelihood of obtaining employment.

The fully mediated model in Figure 1 was observed to account for 82% of the variance regarding likelihood of making counseling progress, and 84% of the variance concerning likelihood of obtaining employment. This model was judged to be the simplest yet most explanatory model as it accounted for more than 90% of the variance accounted for by the complex model (Strohmer & Leirer, 2000) and also supporting research pertaining to the ability of the mind to handle information from about two sources at one time (Bieri, Atkins, Briar, Leaman, & Miller, 1966). The study was conducted among rehabilitation counselors, and the vignettes used for the study were of individuals with spinal cord injuries.

Chapter Three: Methodology

The purpose of this study was to test the validity of the Strohmer and Leierer (2000) reduced model of rehabilitation counselor clinical judgment in relation to resource allocation and achieving competitive employment with real-world data from a longitudinal implementation trial. The U.S. Department of Veterans Affairs funded research to investigate the efficacy of an individualized placement and support intervention for veterans living with SCI. This study used data generated by VA research to perform a quasi-experimental retrospective secondary data analysis of a subset of the larger PrOMOTE data set organized according to the rehabilitation counselor clinical judgment model (Strohmer & Leirer, 2000). This methodology section reviews the research design, sample, variables, and statistical methods used.

Research Question and Hypothesis

Given the model introduced by Pepinsky and Pepinsky (1954) and the support of the model of rehabilitation counselor clinical judgment by Strohmer and Leierer (2000), this study aimed to investigate the ability of the model to predict access to services in a real-world scenario.

Research question. What direct effects, indirect effects, and amount of variance observed in employment outcomes are attributable to MIN, FUNC, DIS, PSY, ED, and LOC?

Hypothesis. Higher DIS, PSY, ED, LOC scores will positively correlate with higher FUNC scores; higher scores among these five variables will positively correlate with higher

MIN, and higher amounts of all variables will positively correlate with CE while lower scores will correlate with lower values of FUNC, MIN, and CE.

Sample

The PrOMOTE study recruited 1,047 veterans, who completed the baseline interview, of which 279 participated in the IPS intervention. Of the sample participating in the intervention, 213 were first-time IPS research participants (Ottomanelli et al., 2017), a number satisfying the minimum requirements for path analysis of 20 cases per variable (Klein, 1998). Prior participants in IPS intervention, such as the SCI-VIP study, were not included in this analysis. The PrOMOTE study was a 5-year longitudinal observation study conducted at seven Veterans Affairs Medical Center SCI Units. Attrition rate was 21.6%, and analysis found no meaningful differences among those choosing to withdraw (Ottomanelli et al., 2017). Veterans participating in the IPS portion of the study were provided IPS services in accordance with the eight principles listed in the IPS section of the literature review. Services were provided for 24 months and fidelity reviews took place at each site at 6-month intervals to evaluate fidelity to the model and provide suggestions for improving service provision.

Measures

This investigation utilized path analysis to explore the amount of attributable variance among DIS, PSY, ED, LOC, FUNC, and MIN to CE. All measures were retrieved from the computerized patient record system or recorded as part of the PrOMOTE research protocol by PrOMOTE study staff. A limited data set was created by the study data manager for this analysis.

Disability status. Disability status was recorded by a medical doctor via the ASIA Impairment Scale. The ASIA Impairment Scale helps providers identify specific muscle groups

and sensory level to improve the accuracy of identifying the neurological level of injury (Roberts et al., 2017). Sensory function is graded in response to "light touch" and "pinprick." Motor evaluation compares function of 10 muscle groups, five in the upper extremities and five in the lower. The method includes evaluation of necessary sensation and motor capabilities necessary for control of metabolic processes. The scale also classifies the level of impairment. An injury designated as A is regarded as complete, having no motor function or sensation preserved including sacral segments. Injuries that retain some sensory or motor function below the level of the injury are regarded as incomplete and are graded B through E.

The PrOMOTE study recorded level of injury and ASIA Impairment Scale. Level of injury was coded as 1 = C1, 2 = C2, 3 = C3, 4 = C4, 5 = C5, 6 = C6, 7 = C7, 8 = C8, 9 = T1, 10 = T2, 11 = T3, 12 = T4, 13 = T5, 14 = T6, 15 = T7, 16 = T8, 17 = T9, 18 = T10, 19 = T11, 20 = T12, 21 = L1, 22 = L2, 23 = L3, 24 = L4, 25 = L5, 26 = S1, 27 = S2, 28 = S3, 29 = S4-5. The scale was coded as 1 = A: *Complete* (no motor function or sensation is preserved in sacral segments S4-S5); 2 = B: *Sensory incomplete* (sensation but no motor function remains below the level of injury and includes the S4-S5 sacral segment of the spinal cord); 3 = C: *Motor incomplete* (motor function remains in more than half of the key muscles below the level of injury with muscle strength grade of less than 3. Sensory function is present below the neurological level and includes sacral segments S4-S5); 4 = D: *Motor incomplete* (motor function remains below the level of injury and at least half of key muscles below the level of injury, with muscle strength grade of 3 or greater. Sensory function is present below the neurological level and includes sacral segments S4-S5); 5 = E: *Normal* (motor and sensory function is normal).

This study collapsed SCI status into four categories for the DIS variable: High tetraplegia, AIS A, B, C; Low tetraplegia, AIS A, B, C; Paraplegia, AIS A, B, C; and AIS D,E. Groupings like these maintain integrity with Strohmer and Leierer's study in relation to categories with significant functional differences (Strohmer & Leirer, 2000) and utilizing the categories previously examined in other research (Ottomanelli et al., 2017; Ottomanelli et al., 2011). Aggregation of participants into the groups mentioned above represent significant differences that can be considered ordinal in their abilities (Strohmer, Haase et al., 1982; Strohmer & Leierer, 2000). Ordinal rankings are assigned as 1 for high tetraplegia, 2 for low tetraplegia, 3 for paraplegia, and 4 for those classified as ASIA D or E.

Education. Veterans self-reported highest degree achieved to the PrOMOTE site coordinator as part of the baseline interview. Highest degree received was coded as 0 = None, 1 = High School Diploma, 2 = GED, 3 = Associate Degree/Technical, 4 = College Diploma, 5 = Master's Degree, 6 = Doctorate or Professional Degree, 8 = Refused. In the event too many individuals opted out of response for this variable, individuals who chose not to respond were redesignated as 1, as a high school diploma is a minimum requirement for military service or estimated by multiple imputation.

Psychosocial adjustment. Psychosocial adjustment definitions more recently include a holistic view of mental health, social participation, occupation, integration into the community (Larsen, 2014). As psychosocial adjustment exists as such a large and inclusive definition, common practice uses multiple measures to indicate what the author(s) conceptualize as psychosocial adjustment (Burns et al., 2010). The Veterans RAND SF-36 is a health-related quality of life measure consisting of eight scales: *physical functioning*, *role limitations due to physical problems*, *bodily pain*, *general health perceptions*, *energy/vitality*, *social functioning*,

role limitations due to emotional problems, and *mental health*. These measures are commonly broken into the Mental Components Scale and Physical Components Scale. Measures were recorded by PrOMOTE study site coordinators at baseline and periodically throughout the duration of a veteran's participation in PrOMOTE, baseline measures were utilized for this analysis.

Locus of control. Locus of control data substituting for the ATTR variable comes from Form 09 Vocational Rehabilitation and Medical Care questionnaire. Veterans responded to, "If you can get help you need from a vocational rehabilitation counselor or provider, you believe that you will be much better able to" and then data were recorded for several aspects of life. For this analysis, we used VRMC1H and 2H which is "control your life" questions related to getting help from a VRS and medical team, respectively. Participant response options were: 1 = *Strongly agree*, 2 = *Agree*, 3 = *Neutral*, 4 = *disagree*, 5 = *Strongly disagree*. Questions were asked to the veterans verbally, the assessment was not given as a paper and pencil.

One problem with this approach is that the question does not directly query someone's current perceived level of control over his or her existence, but rather it poses a hypothetical about their ability to do so if provided services. Another problem with this statement is the obvious reliance on an external entity for facilitating self-reliance or autonomy. This is referred to as a powerful others locus of control (Krause & Broderick, 2006; Levenson, 1973; Murphy & Young, 2005). It is because of this, that it is assumed that any answers that are recorded in the negative to this query would be most indicative of an external or powerful others locus of control. Answers in the negative to these items would appear to indicate they not think positively about their ability to act in a self-governing manner even with help from a subject matter expert.

On the contrary, a study using qualitative methods among four individuals with SCIs found the VR provider's "personal influence" to be influential on motivation, and motivation to be a predictive factor for return to work (Wilbanks & Ivankova, 2105, p. 739). Participants in the SCI-VIP study and providers surveyed reported assistance of a VRS to be the most vital and second most vital aspect of return to work, respectively (Cotner et al., 2015; Cotner et al., 2018). This suggests a powerful others type of external locus of control may not necessarily be negatively correlated with employment outcomes, and potentially getting the help they perceived to be necessary to obtain and sustain employment was facilitative. These questions therefore should have the sensitivity to identify those with negative expectations about outcomes though they appear to lack the specificity to parse those potentially externalizing blame for their current unemployment from those truly hopeful about potential outcomes from participation.

Locus of control was found to not be predictive of employment in a study of psychological variables including affective experience, quality of life, life satisfaction, vocational attitude, self-efficacy, adjustment, and personality among individuals living with SCI (Kent & Dorstyn, 2014). Having a single response item as indicator for this construct has precedent in the research in a study where it was found to significantly correlate (0.483, $p < .01$) and to approach significance, $p = .06$ for predicting employment outcomes in a regression model (Murphy et al., 2011).

The second issue pertains to the statistical design of the responses for these variables as "NA" being categorical in nature while the other responses of 1-5 have a reverse-ordered scale of lowest to highest. For this analysis, descriptive statistics were run to find 187 individuals indicated getting the help they need from a VRS would not be applicable to their ability to control their life. Follow-up observations for this variable yielded a much greater response rate

indicating a potential misunderstanding of the role of a VRS. Because of this, it is not believed that the question was inappropriate for the sampling frame, but rather that the item was likely misunderstood, so the NA responses were recoded as neutral for the analyses. The items were also reverse coded so lower numbers indicated a more negative response and higher numbers indicating a positive response.

The FIM (Hall et al., 1999) scores represented the FUNC variable. This measure is widely used among hospitals and rehabilitation programs nationwide (Anderson et al., 2008). The FIM measures are ordinal from 1 being total assistance to 7 being complete independence.

The dependent variable for the third step is defined as the total number of minutes of VRS time providing services to or on behalf of the veteran in the first 30 days. This calculation included the travel time with and on behalf of the veteran as recorded by the VRS. Transportation time was included as time was a limiting factor of services because of the forty hour work week. MIN was recorded by the VRSs utilizing the vocational rehabilitation services note template. All VRSs were trained on proper utilization of the template, and weekly program training calls took place with an IPS trainer, national project manager, data manager, statistician, and principal investigator to address any concerns and maintain interrater reliability.

Analysis of the data for the MIN variable found it to be positively skewed (1.148) and had four values in the 1.5-3.0 interquartile range. Square root transformation of the minute values transformed the data into values that were nonsignificant for normality tests as well as skew and kurtosis. No values were identified in the 1.5-3.0 interquartile range. This transformation may be necessary due to the nature of participants entering and leaving the study in a staggered manner resulting in some participants having a higher number of participants on the VRS's caseload during their tenure in the study. As not all participants began at the same

time, there were times when some participants had to compete with fewer individuals on average for minutes than those who enrolled and were provided services during the middle of the study, when the caseload average may have been the highest. For example, a veteran living with SCI at the edge of the 100 mile radius in an area known for heavy traffic may have been among the first few veterans to enroll. The VRS would dedicate more minutes on average to complete the requirements of the IPS model for intake, job development, and vocational assessment. The VRS would have to spend more time traveling for this veterans, and due to low caseload numbers might have more time to meet with the veterans. This could result in a large resource allocation for an individual who may have values assumed to be less predictive of employment.

The dependent variable for the fourth step was attainment of competitive employment at any time during the intervention. Veterans reported employment at 6-month intervals. Self-employment was included in this analysis if the veterans' earnings for time spent were equal to or greater than the federal minimum wage of $7.25 per hour worked. Refer to Table 2 for a list and brief description of exogenous and endogenous variables and Figure 1 for the pictographic representation of their organization for the analysis.

Statistical Procedure

Descriptive statistics were run to check for values inconsistent with measure parameters and missing values using IBM SPSS 26®. Little's (1988) Missing Completely At Random test was used to evaluate potential patterns in missing data. Multiple imputation was used to estimate the values for missing FIM and MIN data points (Newman, 2014). No cases were omitted from the following analysis.

Path analysis was conducted in keeping with the practices for developing the fully mediated model of clinical judgment among rehabilitation counselors (Strohmer & Leirer, 2000).

AMOS® and SPSS® software from IBM was used for calculations and modeling. Path analysis allows the examiner to conceptualize graphic representation of causal structures among

Table 2

Exogenous and Endogenous Variables by Step for the Saturated Model

		Step 1		Step 2		Step 3	
Variable	Brief description	EX*	EN*	EX	EN	EX	EN
DIS	Disability severity	√		√		√	
PSY	Psychosocial adjustment	√		√		√	
ED	Highest degree received	√		√		√	
LOCV	Locus of control	√		√		√	
LOCM	Locus of control					√	
FIM	Functional Independence Measure		√		√		√
MIN	VRS minutes		√		√		√
CE	Competitive employment		√		√		√

Note. *EX = Exogenous, EN = Endogenous.

continuous variables, to observe the extent to which one variable impacts others, including mediating variables. Path analysis supports causality because of the temporal ordering of events. It also allows for creation of algebraic relationships of direct, indirect, and spurious effects meaning a single variable can impact one variable, two variables, or be in a causal chain consisting of three variables. Variables are described as exogenous meaning they largely function as independent variables, and their cause is mostly outside of the model. Endogenous variables can be treated as both dependent and then independent as their cause is believed to be inside the model (Heise, 1969; Menard, 2010).

Variables DIS, PSY, ED, LOCV, LOCM for these analyses are treated as though they are measured on an ordinal scale maintaining with previous research with this model (Strohmer, Biggs et al., 1983; Strohmer, Haase et al., 1982, Strohmer & Leierer, 2000).

SPSS Amos 26® was used to assess model fit through several fit indices. The Chi-square goodness of fit test compared the reduced model to the saturated model that had no degrees of freedom. The Chi-square method tests the null hypothesis that the reduced model recreates the covariance matrix of the saturated model and that the fit of the data is not significantly worse. For this test, *p* values need to be greater than 0.05 to indicate no significant difference between the covariance matrix of the saturated model and the reduced model. Comparative Fit Index and Root Mean Squares Error of Approximation (RMSEA) were used as indicators of model fit as they operate on an assumption that the null hypothesis is true, and thus are more indicating a rejection of the alternative hypothesis. Comparative Fit Index values need to be above .90, while RMSEA values need to be below .06 to be considered good fit (Hu & Bentler, 1999).

Hoelter's (1983) statistic was used to evaluate the adequacy of sample size. Using the degrees of freedom of the model and the Fmin statistic, the Hoelter test calculates the sample size at which the model will reject the null hypothesis (Kyriazos, 2018). Values > 200 are considered to be acceptable for this test. The parsimony ration (PRATIO) indicates the extent to which the model complexity relates to model fit. Values closer to 1 are preferred (Byrne, 2010).

Model reduction decisions were made based on results of the above tests and logic in relation to the model hypothesized by Strohmer and Leierer (2000). Consideration was given to both direct and indirect effects among exogenous and endogenous variables. The variables that grossly violated linearity and normality significance testing may not have proved to be an accurate representation of the construct intended, or not appearing to add to the model in a meaningful manner were removed. Desirable values for inclusion for skew and kurtosis will be within three standard error values. Desirable range for linearity will yield non-significant values at the *P*-value>.05.

Threats to Validity

Utilization of secondary data can result in poor representation of the intended construct (Polit & Beck, 2012). The majority of the variables are direct measurements of their intended constructs; sources for their validity and reliability are documented in earlier sections. It is understood that the LOCV and LOCM variables may not prove reliable indicators of the attribution of the individual's functional status as being under their control or being due to external circumstances.

This research also recognized the difference between educational attainment and intelligence, which may consist of several subtypes of intelligence. Because of this, direct and indirect effects were used to evaluate variables in light of this substitution.

The last limitation and threat to validity comes from FIM, LOCV and LOCM not being data points assessed by the VRS. All providers were trained and certified in FIM administration as part of employment on the SCI units, and tests were given to assess inter-rater reliability as part of the certification process. It must be said, however, that these measures were assessed and recorded by other providers on the SCI units, and FIM total scores were the aggregation of subscales assessed by providers in different disciplines, not by the VRSs providing the intervention.

LOCV and LOCM data were generated as part of a nonvalidated measure and were self-reported by participants. This, like the FIM measure, substituted the judgment of another for a process assumed to be taking place in the VRS. As they were self-report, they were transitioned to exogenous data.

Protection of Human Subjects

The secondary data from the SCI-VIP PrOMOTE study were obtained following a local

Institutional Review Board amendment to an existing research protocol. These data are not publicly available, however, it did meet the criteria for exempted research by the Virginia Commonwealth University Institutional Review Board.

Chapter Four: Results

Demographics of the sample are as following. Participants (N=213) were almost exclusively male (96.7%), aged 26-65 years (Mean = 51.0, SD = 10.1), and primarily White (55.4%). Upon baseline interview and enrollment into the SE intervention, 24.4% were inpatients and 75.6% outpatients. Participants were observed to have admissions and discharges during the study. Less than half of the study participants received VA benefits (47.9%), of whom 22.5% reported service connection for their SCI and 20.7 % reporting 100% service connection (Ottomanelli et al., 2017). A small cohort of participants (9.4%) reported receiving nonservice connected pension (Mean = $946 ± $640 (Cotner B. A., Ottomanelli, O'Connor, Njoh, Barnett, & Miech, 2018). On average participants received $837 ± $463 in Social Security income and $1242 ± $460 in Social Security disability income. The veterans' highest levels of scholastic achievement were categorized as high school diploma (52.6%), Associate's Degree (19.2%), Bachelor's Degree (14.1%), GED (7.5%), Master's Degree (3.8%), and none (2.8%).

Participants reported similar rates of marriage (32.9%), divorced (33.8%), and single/other (33.4%) (Ottomanelli et al., 2017). Table 3 displays the sample demographics.

The majority of the veterans' injuries were reported in the medical record as AIS D/E (45.1%), with paraplegia being the second most common (27.7%), followed by low tetraplegia (17.4%), and high tetraplegia (9.9%). Medical characteristics of the sample are documented in Table 4.

Table 3

Sample Demographics

Characteristic	Value
Age, y	51.0 ± 10.1
Education, y	13.9 ± 2.0
Male	206 (96.7)
Employed in ≤ 5y*	45 (21.1)
Employed pre-SCI	102 (47.9)
Employed post-SCI**	35 (16.4)
Race:	
White	118 (55.4)
Black	83(39.0)
Asian	4 (2.0)
Native American	1 (0.5)
Other/unknown	7 (3.3)
Marital status:	
Married	70 (32.9)
Divorced	72 (33.8)
Other	71 (33.4)
Inpatient at enrollment	52 (24.4)
VA benefits	102 (47.9)
SC benefits for SCI	48 (22.5)
If yes, SC 100%	44 (20.7)
Non-SC pension	20 (9.4)
Monthly non-SC	$946 ± $640
SSI amount, avg	$837 ± $463
SSDI amount, avg	$1242 ± $460

*Any employment post SCI but within 5 years of entry into the study.

**Any employment post SCI but before entry into the study.

Note. Values expressed are mean + SD or n (%). Abbreviations: avg = average, SC = service connected, SSDI = Social Security disability income, SSI = Social Security Income, VA = Department of Veterans Affairs.

Adapted from "Individual Placement and Support in Spinal Cord Injury," by L. Ottomanelli et al., 2017. *Archives of Physical Medicine and Rehabilitation, 98,* p. 1571.

Table 4

Medical Characteristics of Participants of PrOMOTE (N = 213)

Medical characteristic	Value
Cause of injury:	
Vehicular collision	62 (29.1)
Fall	43 (20.2)
Violence	18 (8.5)
Other/unknown	90 (42.3)
Average time since injury, y	10.9 + 11.1
FIM total	77.1 + 25.7
AIS grade:	
A	59 (27.7)
B	26 (12.2)
C	31 (14.6)
D	93 (43.7)
E	2 (1.0)
AIS grade and neurologic level:	
High tetraplegia, AIS grade A, B, or C	21 (9.9)
Low tetraplegia, AIS grade A, B, or C	37 (17.4)
Paraplegia, AIS grade A, B, or C	58 (27.2)
AIS grade D/E	95 (44.6)
History of TBI on OSU-TBIID	126 (59.2)
Medical comorbidities:	
Neurogenic bladder	164 (77.0)
Neurogenic bowel	154 (72.3)
Mental health comorbidities	
Dementia	0 (0.0)
Schizophrenia	4 (1.9)
Depression	75 (35.2)
Bipolar disorder	6 (2.8)
Substance abuse	41 (19.2)

Note. Values expressed are mean + SD or n (%).

Abbreviations: AIS, ASIA Impairment Scale, OSU-TBIID = Ohio State University Brain Injury Identification Method.

Adapted from "Individual Placement and Support in Spinal Cord Injury, " by L. Ottomanelli et al., 2017. *Archives of Physical Medicine and Rehabilitation, 98*, p. 1571.

Missing Data

The FIM variable contained 28 missing values or data errors (13.1%) while MIN contained 3 (1.4%). Little's (1988) Missing Completely At Random test yielded nonsignificant results indicating no significant pattern to the missing data. Maximum likelihood estimate multiple imputation was performed to estimate missing values.

Assessment of Normality and Transformations

Skewness and kurtosis calculations and visual inspection of frequency distributions for normality of the sample distributions were evaluated. The most abnormal was LOCV, observed to be positively skewed (3.156) and leptokurtic (8.517), followed by LOCM, observed to be negatively skewed (-1.471). Analysis of the data revealed values other than NA for those reported as NA at baseline when assessed following a year's participation in the study. This was interpreted for this study as the initial NA value at baseline being more indicative of participants not understanding the role of the VRS and thus being akin to construct-level missingness. It is because of this potential misunderstanding that NA responses were recoded as 3 to represent a neutral value instead of being 0. New frequency data for the variables were as follows: LOCV contained 196 Neutral (92.0%), LOCM contained 52 Neutral (24.4%). This recoding is also important as the original coding indicated a mixing of both ordinal and categorical data, for which there is currently no means by which to analyze such data. Following the recoding, skewness of LOCV reduced (2.477) while kurtosis increased (14.584). Skewness of LOCM reduced (-0.529) and kurtosis decreased from .557 to -.177. As the kurtosis increased for LOCV, all values not 3 for Neutral were subsequently identified as outliers using the method of three interquartile ranges.

The number of minutes in the first 30 days (MIN) was also found to be positively skewed (1.148) while PSY and FIM were observed to be negatively skewed (-.863, -.625). While these values were less than 1, they were also more than three times the standard error which indicates significant skew at the .001 level. The PSY, FIM, and MIN variables all failed Kolmogorov-Smirnov and Shapiro-Wilk tests of normality as well. Square root transformation was applied to MIN to yield nonsignificant Kolmogorov-Smirnov results (p = .064) and improved skewness of 0.294 (Tabachnik & Fidell, 2007). To transform PSY and FIM, the $-\sqrt{(X-1)}$ transformation was applied (Tabachnik & Fidell, 2007). Both variables continued to violate tests of linearity, however, skewness was improved to 0.303 and 0.120 for PSY and FIM, respectively. Estimates for kurtosis were all under three times the standard error value.

Analysis of outliers revealed PSY to have five values in the lower 1.5-3 IQR, LOCM to have three values of 1 technically in the 1.5-3 IQR, and MIN to have 4 in the 1.5-3 IQR indicating divergence from the mean, but not so much so to be considered outliers. Transformation resulted in all but one PSY value being brought within 1.5 IQR of PSY save one, which was not found to exceed the 3.0 threshold so it was maintained in the frame. High kurtosis caused by the 197 values of 3 for the LOCV variable, however, was strong enough to render all values other than 3 as existing outside of the 3 IQR threshold. It is because of this the variable is included in the saturated model but trimmed from subsequent models despite p values that would otherwise be sufficient for continued inclusion. The violations of assumptions for linearity and normality represent a construct-level issue at least at this first baseline survey point that make inclusion in any meaningful model hard to support.

Saturated Model Results

The hypothesized saturated model (see Figure 2) yielded no fit statistics as there were no

degrees of freedom and thus no potentially estimated parameters for comparison, RMSEA = 0.141, Hoelter 61 $p = .05$, 71 $p = .01$. Significant unstandardized regression weights were identified between DIS and FIMSQRT (.874, $p < .000$), MINSQRT and CE (0.010, $p = .008$), and ED and CE (0.062, $p = 0.011$). The LOCV variable was observed to have a borderline significant effect (.154, $p = .059$), however, the issue with this observed statistic, again, lies in violations of normality and linearity for this variable's observed values.

Unstandardized regression weights are shown in Table 5. Unstandardized regression weights can be used to calculate the predicted amount of increase in the endogenous variable per unit of increase in the exogenous variable (Tabachnik & Fidell, 2007).

Standardized regression weights with significance values for the saturated model are shown in Table 6. Standardized regression weights allow for ranking of the effects among exogenous variables of different units because the estimate is measured in units of standard deviation (Tabachnik & Fidell, 2007).

Covariances were significant for LOCV and LOCM, and for DIS and PSYSQRT shown in Table 7. Correlation was .272 for LOCV and LOCM, and .164 for DIS and PSYSQRT.

Squared multiple correlations for the saturated model were 0.335 for FIMSQRT ($P<.01$), 0.017 for MINSQRT ($P>.05$), and 0.109 for CE ($P=.053$). In total, these values indicate the saturated model accounted for 32.5% of the variance in the model at the $P<.05$ level. The full model marginally exceeds the significance threshold of .05 to account for 10.9% of the variance observed.

Post hoc model modification removed most nonsignificant direct effects which resulted in the removal of the LOCM variable. The LOCV variable was removed because of the

Table 5

Unstandardized Regression Weights and Significance Values for the Saturated Model

	Estimate	*SE*	*CR*	*P label*
FIMSQRT <---PSYSQRT	-.138	.098	-1.415	.158
FIMSQRT <---DIS	-1.097	.116	-9.474	*
FIMSQRT <---ED	.055	.087	.633	.527
FIMSQRT <---LOCV	-.083	.288	-.290	.772
FIMSQRT <---LOCM	.029	.125	-.232	.817
MINSQRT <---DIS	.189	.727	.260	.795
MINSQRT <---ED	.283	.456	.620	.535
MINSQRT <---LOCV	.992	1.516	.655	.513
MINSQRT <---LOCM	-.623	.659	-.945	.344
MINSQRT <---PSYSQRT	-.473	.517	-.914	.361
MINSQRT <---FIMSQRT	-.251	.362	-695	.487
CE <---MINSQRT	.010	.004	2.655	.008
CE <---DIS	.034	.039	.882	.378
CE <---ED	.062	.025	2.536	.011
CE <---LOCV	.154	.082	1.894	.058
CE <---LOCM	-.014	.035	-.400	.689
CE <---PSYSQRT	.017	.028	-.600	.549
CE <---FIMSQRT	-.030	.019	-1.528	.127

Table 6

Standardized Regression Weights and Significance for the Saturated Model

	Estimate	Lower	Upper	*P*
FIMSQRT <---PSYSQRT	-.081	-.20	.050	.227
FIMSQRT <---DIS	-.549	-.64	-.433	.002
FIMSQRT <---ED	.036	-.08	.151	.575
FIMSQRT <---LOCV	-.017	-.11	.091	.739
FIMSQRT <---LOCM	-.014	-.11	.090	.789
MINSQRT <---DIS	.022	-.13	.176	.806
MINSQRT <---ED	.043	-.07	.182	.491
MINSQRT <---LOCV	.047	-.08	.188	.485
MINSQRT <---LOCM	-.068	-.20	.068	.302
MINSQRT <---PSYSQRT	-.064	-.20	.083	.394
MINSQRT <---FIMSQRT	-.058	-.22	.096	.427
CE <---MINSQRT	.173	.03	.303	.015
CE <---DIS	.070	-.08	.237	.348
CE <---ED	.165	.02	.298	.017
CE <---LOCV	.130	-.00	.250	.069
CE <---LOCM	-.027	-.15	.104	.666
CE <---PSYSQRT	-.040	-.18	.099	.618
CE <---FIMSQRT	-.121	-.28	.053	185

Table 7

Exogenous Variable Covariances for the Saturated Model

	Estimate	*SE*	*CR*	*P label*
LOCV <---LOCM	.108	.028	3.823	*
ED <---LOCV	-.019	.038	-.509	.611
ED <---LOCM	.090	.086	1.045	.296
DIS <---ED	-.043	.091	-.468	.639
DIS <---LOCV	.032	.029	1.096	.273
DIS <---LOCM	-.088	.066	-1.331	.183
ED <---PSYSQRT	.020	.107	.189	.850
DIS <---PSYSQRT	.195	.083	2.352	.019
LOCV <---PSYSQRT	-.047	.034	-1.384	.166
LOCM <---PSYSQRT	.017	.078	.218	.828

aforementioned issues with linearity and normality, and thus the judgment of its unsuitability to serve as a source of inference about a veteran's locus of control.

The path from PSYSQRT to FIMSQRT was maintained for analysis in the reduced model despite not achieving statistical significance because of an unstandardized indirect effect of -0.047 (-0.006 standardized coefficient) on MINSQRT and because it maintains fidelity to the theoretical model for the following analysis of a reduced model. Other indirect effects of note were DIS on MINSQRT through FIM (.352 unstandardized, 0.040 standardized) and then subsequently on CE (0.036 unstandardized, 0.074 standardized). ED was also observed to have values for indirect effect on MINSQRT through FIMSQRT (-0.016 unstandardized, -0.002 standardized), however, this path from ED to FIMSQRT was trimmed because of its minimal impact. None of the indirect effects were significant at the $p = .05$ level for this model.

The reduced model (Figure 3) appears to have good fit due to the nonsignificant Chi-square χ^2 (6, N = 213) = 3.409, p =.756, CFI = 1.00, RMSEA = 0.000. It is inferred from the

PRATIO = 0.400 further trimming could yield a more parsimonious model. The Hoelter statistic was not significant (784, $p = 0.05$; 1046, $p = 0.01$). This is interpreted as the model having an appropriate sample size as the value exceeds the study N of 213 and the general rule for the measure of 200.

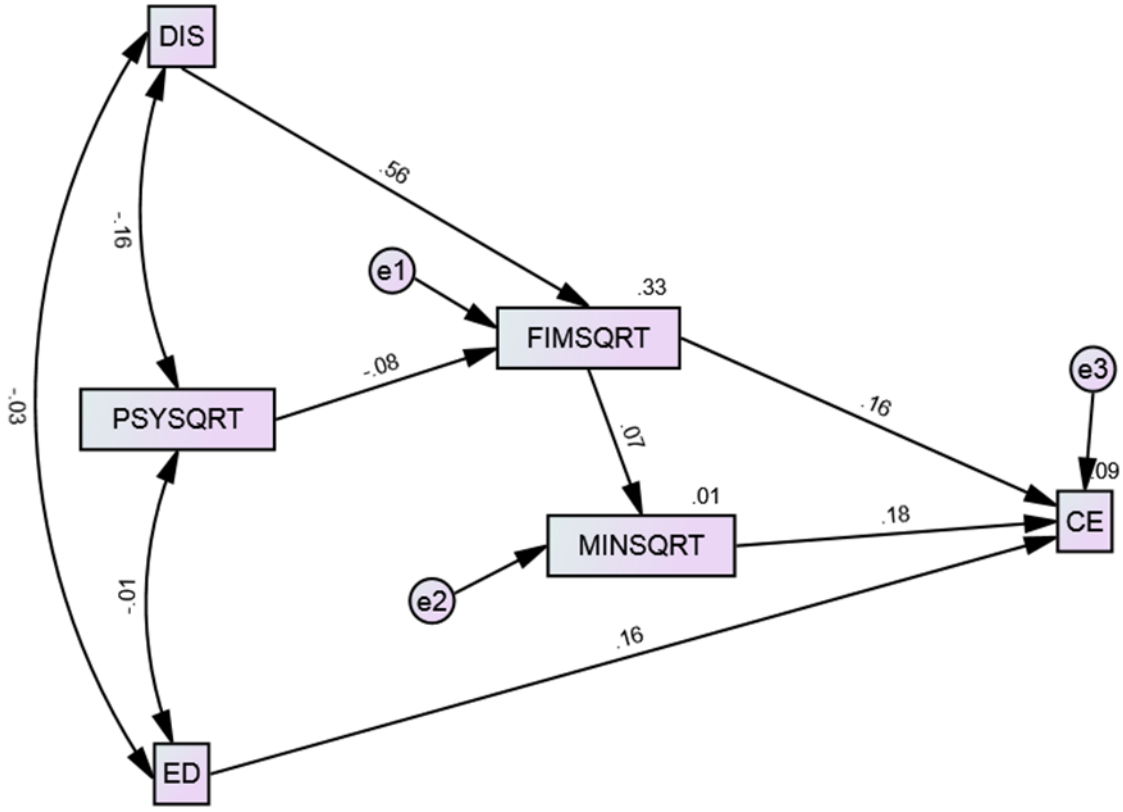

Figure 3. Reduced model with standardized coefficients.

Unstandardized and standardized total effects are shown in Table 8 with significance. Direct and indirect effects are reported in Tables 9 and 10, respectively. From this we can see disability severity directly affected functional status, had no effect on counselor time spent with or on behalf of the veteran, but did affect likelihood of obtaining competitive employment. Indirect effects after mediators enter the model are reported in Table 10.

Table 8

Unstandardized and Standardized Total Effects With Two-Tailed Significance

	DIS	ED	PSYSQRT	FIMSQRT	MINSQRT
Unstandardized					
FIMSQRT	-1.10***	.0	-.134	.0	.0
MINSQRT	.296	.0	.036	-.269	.0
CE	.047*	.059*	.006	-.042*	.010**
Standardized					
FIMSQRT	-.550**	.0	-.079	.0	.0
MINSQRT	.034	.0	.005	-.062	.0
CE	-.095*	.158*	.014	-.172*	.184**

Note. **P*-value < .05, ***P*-value < .01, ****P*-value < .001.

Table 9

Unstandardized and Standardized Direct Effects With Two-Tailed Significance

	DIS	ED	PSYSQRT	FIMSQRT	MINSQRT
Unstandardized					
FIMSQRT	-1.10***	0	-.134	.0	.0
MINSQRT	.0	.0	.0	-.269	.0
CE	.0	.059*	.0	-.040*	.010**
Standardized					
FIMSQRT	-.550**	.0	-.079	.0	.0
MINSQRT	.0	.0	.0	-.062	.0
CE	.0	.158*	.0	-.161*	.184**

Note. **P*-value < .05, ***P*-value < .01, ****P*-value < .001.

Table 10

Unstandardized and Standardized Indirect Effects With Two-Tailed Significance

	DIS	ED	PSYSQRT	FIMSQRT	MINSQRT
Unstandardized					
FIMSQRT	.0	.0	.0	.0	.0
MINSQRT	.296	.0	.036	.0	.0
CE	.047*	.0	.006	-.003	.0
Standardized					
FIMSQRT	.0	.0	.0	.0	.0
MINSQRT	.034	.0	.005	.0	.0
CE	-.095*	.0	.014	-.011	.0

Note. **P*-value < .05.

Effects of note include:

- Disability severity on functional status.
- Disability severity on competitive employment mediated by functional status.
- Education on competitive employment.
- Functional status on competitive employment.
- And amount of minutes on competitive employment.

Squared multiple correlations for the model were 0.323 for FIMSQRT, 0.004 for MINSQRT, and 0.087 for CE. In total, this indicates the model accounted for 41.4% of the variance in the data. This represents an increase in the accuracy of the model with the removal of the LOC variables and trimming of nonsignificant paths. Squared multiple correlations for the full and reduced model are displayed in Table 11.

Table 11

Squared Multiple Correlations for Exogenous Variables in the Saturated and Reduced Models

	Saturated model		Reduced model	
	Estimate	*P*-value	Estimate	*P*-value
FIMSQRT	.335	.005	.333	.002
MINSQRT	.017	.453	.005	.001
CE	.109	.053	.086	.007

Summary

In summary, the sample was primarily male and reported feeling the potential impact of a VRS was not applicable to how much they were able to control their life. Variables PSY, FIM, and MIN were transformed to better satisfy model assumptions of normality and linearity. None of the variables loaded significantly on minutes spent by a VRS in the saturated model. Nonsignificant paths or those believed to be a bad fit with the model were trimmed while those with theoretical relevance and significance remained for the reduced model. The reduced model fit the data well though it did not support the hypothesis in relation to the exogenous variables having an effect on the amount of minutes allocated in the first 30 days. Direct effects were observed as expected for variables of FIM, ED, MIN on CE, but not for PSY. An indirect mediated effect of DIS on CE through FIM was observed. The reduced model accounted for 8.6% of the variance observed.

Chapter 5: Discussion

This chapter reviews the relevant results in relation to previous research. It explores the implications of the analyses and the generalizability of the results. Suggestions for future research are proposed.

The current study tests the applicability of the Pepinsky and Pepinsky (1954) model of counselor clinical judgment later modified by Strohmer and Leierer (2000) for rehabilitation counselor clinical judgment for individuals living with spinal cord injuries. It uses secondary PrOMOTE data generated by counselors providing an IPS intervention to veterans living with spinal cord injuries, to test real-world applicability. Previous studies utilized case study vignettes about individuals living with spinal cord injuries reviewed by rehabilitation counselors who were then tasked to make explicit inferences about functional status and attribution (Strohmer & Leierer, 2000; Strohmer, Biggs et al., 1983). From these inferences the counselors were asked to make predictions related to an individual's likelihood to make progress in the counseling relationship, and likelihood to obtain employment. This research took place in a most controlled environment without real-world consequences weighing on judgments or interactions with clients. The fully mediated model accounted for 82% and 87% of the available variance in counselor predictions for likelihood of making progress in counseling and likelihood of obtaining employment respectively.

The current study utilized a similar model to explore the fit of the model with secondary data from an IPS return to work intervention for veterans living with SCI (Ottomanelli et al. 2017). The initial hypothesis proposed higher levels of higher levels of physical ability, psychosocial adjustment, education, and internal locus of control would positively correlate with functional status, and subsequently lead to more minutes being allocated to the veterans in the first 30 days, which would then affect obtainment of competitive employment. Path analysis was conducted to test model fit with data from the PrOMOTE IPS implementation trial.

Examination of the data found issues needing to be addressed. The LOCV and LOCM variables substituting for the ATTR variable were observed to have a mix of ordinal (strongly disagree through strongly agree) and nominal (not applicable values) data. As not applicable is typically used to indicate a participant should not be included in a sample frame, such as a question asking a single person how long they have been married, it is arguable that one of the ordinal answers was more appropriate as assistance from a VRS could help someone better control their life. LOCV was observed to have a majority of not applicable responses (187 of 213 potential) which was considered to be indicative of a larger problem of participants not understanding the question or potentially not knowing enough about the services of a VRS to make an informed and accurate response. LOCM was found to have a large number of these responses as well. Responses were recoded to neutral with a value of 3 from not applicable. This resulted in 196 3 values for LOCV and 52 for LOCM. Data were more normally distributed for LOCV and LOCM, though LOCV was highly kurtotic to the extent that any values other than 3 were statistical outliers. Because of these issues the decision was made to not maintain LOCV to the reduced model before running computation on the full model.

Variables PSY, FIM, and MIN were found to have significant skew, so transformation to reduce the impact of skew was applied. Following transformation the variables no longer violated necessary model assumptions of normality and some marginally nonlinear. Kurtosis was brought within normal limits for minutes and psychosocial adjustment. Kurtosis for FIM remained above 3 standard errors, but was below a value of 1, so the analysis continued. The negative skew for FIM and PSY may have been a form of sampling error in retrospect as individuals opting into a study aimed at securing competitive employment may have been on average higher functioning on the FIM mobility and cognition scales than the typical baseline interviewee. The positive skew of the MIN variable may be due to caseloads not being maintained at a stable 20-25 as is the goal in IPS, but rather they built and tapered meaning order effects for the first and last few participants that would add noise to analysis.

Computation of the first model produced results consistent with the literature in relation to direct effects of disability severity on FIM (Rivers et al., 2018), minutes on obtaining competitive employment, and education on competitive employment (Franceschini et al., 2012; Hilton et al., 2017; James et al., 1993; Krause, 1992; Krause et al., 2010; Krause et al., 2012; Lidal et al., 2007; Ottomanelli & Lind, 2009). LOCV and LOCM were found to significantly covary, as were disability severity and psychosocial adjustment. The model indicated 43.4% of the variance in the dependent variables was attributable to the predictors if allowing for the marginal *P*-value violation (*P*-value=.052) of the variance for CE. FIMSQRT accounted for the lion's share (32.5%) of the variance. The model accounted for only 10.9% of the variance in CE.

Analysis failed to support the exogenous variables utilized and endogenous variable of functional status as effecting the amount of minutes spent with or on behalf of a participant. This fails to support minutes in the first 30 days as an indicator of resource allocation in relation to the

proposed model. The number of minutes spent by a VRS was observed to have a direct effect on CE. This would suggest that number of minutes does affect the overall outcome, but the exact mechanism by which it relates to demographic characteristics or the type of prediction it represents was not elucidated in this study.

This effect could manifest itself as more moderating in practice as, for example, an individual having Bachelor's or higher degree not receiving more minutes from a VRS because the therapeutic need may be reduced. Individuals with a Bachelor's or higher may be more technologically capable, need less vocational rehabilitation counseling, and require less job development with employers as there may be less of a need to carve out duties from an existing position description or less need to customize employment with a job proposal. Individuals with a high school diploma or FED living with SCI may have a therapeutic need for more services to first resolve ambivalence about working, have more job development take place on their behalf, then need assistance accessing the necessary electronic systems required by the majority of employers to begin the formal application process, and may need a position customized from scratch based on duties the veteran can sustainably perform.

The data utilized were from a secondary source and appeared to represent the original constructs with varying degrees of accuracy. The variables intended to serve as an indicator of locus of control were not supported as representative of this construct in this application. These measures had no reliability and validity data and were also seen as indicators of a powerful others locus of control, a construct appearing to relate poorly to the Strohmer and Leierer (2000) model construct of the counselor's attribution of the individual's functional status as being under their control or not. These variables also had a high occurrence of not applicable answers which was interpreted as a lack of understanding of the question and then recoding as a neutral

response. This recoding appeared to have little reliable impact on the analyses. The decision was made to remove these variables due to violations of model assumptions and lack of significant impact on any of the other variables.

The LOCV and LOCM variables were not observed to contribute in any meaningful fashion. Results from LOCV were significant, but the sensitivity of the measure and the construct validity is in question as the majority of the data were neutral responses following recoding. LOCM was found to not have any significant direct or indirect effects, and was removed from the model with LOCV. Other nonsignificant paths were trimmed from the model; however, those with marginally nonsignificant paths were maintained. The path from psychosocial adjustment to functional status was maintained as was the path from functional status to minutes in keeping with the model.

The reduced model had a nonsignificant Chi-square, and high values for Normed Fit Index and Hoelter's statistic indicating the data fit the model well and sample size was sufficient. The low *P* Ratio suggests more paths could be trimmed for a more parsimonious model. These paths would include covariance for psychosocial adjustment and education, and education and disability severity. This suggests the independence of education from the other measures as correlations were small and insignificant. The significant correlation between disability severity and psychosocial adjustment supports a relationship between the two, but the lack of direct effect on the functional status measurement indicates the FIM either does not measure this aspect of disability or that the variable may have loaded more appropriately on an estimated latent variable or valid and reliable directly measured ATTR variable.

Significant regression weights for the first model were maintained and the direct effect of functional status on competitive employment became significant. A small yet significant indirect

effect was observed from disability severity on competitive employment through functional status, supporting the mediation of this variable as previous direct effect from disability severity to competitive employment was not significant. This finding is in contradiction to the finding of the original SCI-VIP study observing no significant FIM differences among participants in relation to obtaining CE.

The reduced model indicated 8.6% of the variance observed in the dependent variables was observed by the predictor variables. FIMSQRT again accounted for the most (33.3%) and only 8.7% for CE. This is a minimal effect, but may be considerably larger when taking into account that this sample represents only a small subsample of the population living with SCI.

Key Findings

This analysis supported a few things. It appears the model supported a mediating effect of functional status on disability severity for employment outcomes. This coincides with the Strohmer and Leierer (2000) outcomes indicating rehabilitation counselors used disability severity and functional status when making predictions about likelihood of obtaining employment.

The study supports the idea that the VRSs for the PrOMOTE study distributed time resources equitably in consideration of the exogenous variables. This is in keeping with the spirit of the VA directive for scheduling aimed at equitable distribution of resources, and also the ethical principle of equity in the Vocational Rehabilitation field. Second, we supported that the functional status of the veteran, and not necessarily the categorization of high tetraplegia, low tetraplegia, paraplegia, or AIS D/E was directly related to employment.

Previous research findings were replicated in relation to the predictive nature of education, FIM, and provider minutes on obtaining competitive employment. Disability severity was also shown to be significantly predictive of functional status.

These results may underline the importance of structure and rapid job search in the first month in relation to equitable provision of services. As mentioned before, the IPS model has several benchmarks that must be achieved in the first 30 days. This time constraint may be an equalizer that keeps consumers of VR services from becoming stagnant in the initial phase of service delivery. Stagnation was discussed in the literature review as related to decreased motivation and reduced successful outcomes (O'Neill et al., 2015).

Relevance of Theoretical Framework

The theoretical framework of the fully mediated model of VRC clinical judgment (Strohmer & Leierer, 2000) appeared to be relevant to the phenomena being observed. There was a significant effect observed from disability severity through functional status to competitive employment. Number of minutes, however, while an indicator of resource allocation, may not have necessarily been an indicator of prediction of likelihood of obtaining employment. The time duration may play a role as the effects of this feedback cycle may become more salient with increasing iterations. Another construct that may bear more fruit could be a measure of priority. An individual likely to succeed may not require as much time to achieve threshold for securing employment, but they may have a priority status that could warrant some form of observable preference from the VRC.

Another explanation for the disconnect between the rehabilitation counselors' judgment and allocation of resources could be that the VRSs in the study may have not had enough iterations to organize accurate predictions. In other words, they were all too new to or

inexperienced with the population of veterans living with SCI to have reliable judgment regarding what the necessary level of threshold would be for various observable variables to accurately signal increased likelihood for securing gainful employment.

As discussed earlier, locus of control did not prove to be a reliable analogue for the attribution variable. It was observed to be the exogenous variable with the least accountability for variance in an earlier study (Strohmer, Biggs et al., 1983). This weakness paired with the lack of validation of the measure and the potential unfamiliarity of the participants with the services and potential impact of a VRC may have resulted in this being such a poor construct representation.

Education appears to also have proved to be a poor substitute for intelligence in the model as well. It was chosen because of its surface validity to intelligence and its established relationship to employment outcomes among individuals living with SCI. This was an error in the planning phase to not research the correlation between highest education level attained and intelligence. In order to truly do that subject justice, one would have to research the evidence related to multiple types of intelligence in relation to educational attainment. The FIM is composed of mobility and cognition subscales, and may have been predicted more accurately by an intelligence score than an educational score.

Limitations

The current research was conducted on a secondary data set and the fit of the variables with the reduced model of clinical judgment (Strohmer & Leierer, 2000) for LOC and ED may be poor. Locus of control may be the worst fit of the model. The questions used seemed to lack construct validity for gauging internal versus external locus of control, and appeared a fit for the powerful others construct although this was not validated. Locus of control itself was a

substitution for the attribution variable, which as a construct was meant to represent the rehabilitation counselor' attribution variable, which as a construct was meant to represent the rehabilitation counselors' attribution of the participants functional status to being under their control or not. Using a measure two metaphorical steps away from the original construct may have introduced too much noise to make any meaningful generalizations anyway. Add this to the results that 187 participants replied that the question was not applicable to the first administration, while follow-up administrations had seemingly more informed values, and a valid argument against the validity and generalizability of this as a measure becomes apparent.

Another limitation of the research is the generalizability of the results. The study was predominantly male and all were veterans of military service. Therefore, individuals may have had entitlements not available to the general public such as coverage of medical care, assistance with funding for aid and attendants, service connected or nonservice connected income, access to higher quality and longer duration medical services, access to educational benefits, and other disparities with the general public. The sheer act of participation in military service may also relate to a potential sampling error needing exploration to support the generalizability of results from this population. These differences may lead to striking dissimilarities among veterans and nonveterans related to motivation for employment, support systems available, and willingness of employers to hire based on military service.

Implications for Future Practice

This study appears to support the equitable distribution of time as a resource in relation to the observed exogenous variable as none loaded significantly on minutes in the first 30 days. The mediating effects of functional status on disability severity with regard to competitive

employment does imply that focus should be on ability as it translates to functional capacity and thus executable duties a veteran may market to employers.

Recommendations for Future Research

Future research may benefit from inclusion of additional variables for confirmatory factor analysis to identify latent variables that may better exemplify the FUNC and ATTR constructs of the original model. Tests of intelligence may also serve as a more highly related indicator than highest level of education attained in a future study allowing inclusion of such measures. The vocational rehabilitation specialist perception of client motivation may be worthy of analysis as a possible level 2 construct related to allocation of resources. This brings us back to the question of what would be a reliable and measurable indicator of this judgment feedback cycle taking place in relation to outcomes without having to explicitly ask a VRS to quantify a measurement for a construct as having a measurable form of data, allowing the VRS to conduct business as naturally as possible would lead to the most valid results.

Future research may benefit from an expanded timeline as well. Since IPS requires so many things take place in the first 30 days, expanding the measurement to include services in the first 90 days may be appropriate for the hypothesized feedback model to take place. In relation to time, consideration may need to be taken for caseload size in the future as well. Times at the beginning and end of the study when caseloads were low may have contributed to confounding data may have limited generalization of results to services provided in the real world where the caseload size is maintained at a level of 20 or so.

Conclusion

In closing, this research aimed to explore the fit of data from an implementation trial of the IPS model with Strohmer and Leierer's (2000) reduced model of rehabilitation counselor

clinical judgment. The data failed to support a relationship between the variables of disability severity, psychosocial adjustment, education, locus of control, or functional status and the total number of minutes spent with or on behalf of a veteran in the first 30 days. This lack of significant relationship supports that time as a resource was distributed equitably among participants in relation to the observed variables. There were direct effects observed for disability severity on functional status, and for functional status, education, and minutes on competitive employment outcomes. It appears there was a mediating effect of functional status on disability severity for affecting competitive employment outcomes. Improvements for construct validity for intelligence and attribution of functional status may benefit future research utilizing the Strohmer and Leierer (2000) reduced model of rehabilitation counselor clinical judgment.

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