

Predicting Vocational Rehabilitation Employment Outcomes for Individuals with  
Autism Spectrum Disorder

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Dedication

For Judy and Patrick

## Abstract

Employment is a mechanism for individuals with and without disabilities to participate in and benefit from the full social and economic benefits of community living. Individuals with Autism Spectrum Disorder (ASD), a neurodevelopmental disability, are often socially and systematically prevented from full participation in the workforce. Individuals with ASD experience high rates of unemployment and low rates of workforce participation. Despite significant federal and state investment in employment services and supports for individuals with ASD and other disabilities, we understand very little about what programs and services produce successful employment outcomes. State Vocational Rehabilitation (VR) programs provide a critical gateway between individuals with ASD and employment opportunities. Using extant data from the Rehabilitation Service Administration (RSA) from fiscal year 2013, this study examined how ASD impairment type influences access to VR services, which VR services lead to case closure in integrated employment, and which services yield significant changes in earnings and hours worked. Findings indicate that a number of demographic and services factors are associated with improved employment outcomes. An individual's ability to access specific types of VR services can influence their trajectory within the VR program and subsequent outcomes. VR's job-related services yielded improved employment outcomes for individuals with ASD compared to administrative services.

*Keywords: Autism, ASD, vocational rehabilitation, employment, disability*

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## List of Abbreviations

ABA	Applied behavior analysis
ADA	Americans with Disabilities Act
ADDM	Autism and Developmental Disabilities Monitoring Network
ASD	Autism Spectrum Disorder
BLS	Bureau of Labor Statistics
CDC	Centers for Disease Control and Prevention
CMS	Centers for Medicare and Medicaid Services
CRP	Community rehabilitation provider
CSR	Case service record
DOJ	Department of Justice
GAO	Government Accountability Office
EBP	Evidenced-based practice
EF	Employment First
HELP	Health, Education, Labor, and Pensions committee
ID	Intellectual disability
IQ	Intelligent quotient
IPE	Individualized Plan for Employment

ODEP	Office of Disability Employment Policy
OR	Odds ratio
PS	Project SEARCH
RSA	Rehabilitation Service Administration
SE	Supported employment
<i>SE</i>	Standard error
SRV	Social role valorization
SSI	Supplemental Security Income
SSDI	Social Security Disability Insurance
TIME	Transitioning to Meaningful and Integrated Employment Act
TWA	Theory of work adjustment
VIF	Variance inflation factor
VR	Vocational rehabilitation
VRCG	Vocational rehabilitation counseling and guidance
WIOA	Workforce Investment and Opportunities Act

## **Chapter I**

### **Introduction**

Employment outcomes of individuals with disabilities continue to capture the interest of policy makers, professionals, family members, self-advocates, and tax payers alike (Moseley, 2013; Nord & Hoff, 2013; United States Senate, 2012). In addition, there is increased attention to the workforce participation of this population. Numerous federal, state, and local programs exist with the exclusive intent to provide, support, and encourage employment for individuals with disabilities. Within this group, individuals with Autism Spectrum Disorder (ASD), a neurodevelopmental disability, also experience high rates of unemployment and low rates of workforce participation (Burgess & Cimera, 2014; Hendricks, 2010). Individuals with ASD are a heterogeneous group with varied communication, social, and behavioral challenges. Individuals with ASD experience some of the lowest employment and post-secondary education rates compared to other disability groups (Cimera, Burgess, & Wiley, 2013; Nicholas, Attridge, Zwaigenbaum, & Clarke, 2014; Wilczynski, Trammell, & Clarke, 2013). Due to the wide-ranging manifestations of ASD, understanding the types of supports and services needed for successful employment outcomes remains problematic. The purpose of this study was to explore the relationships of participant characteristics, service delivery patterns, and employment outcomes within Vocational Rehabilitation (VR), a federally funded employment program implemented by states, for individuals with disabilities, including those with ASD, in an attempt to understand which types of services lead to improved employment outcomes for this population.

Many rehabilitation researchers recognize the importance of studying VR programs, which support individuals with disabilities to find, access, and maintain employment. VR is a cornerstone in employment services for individuals with disabilities in the United States, serving nearly 600,000 individuals annually. Understanding which variables lead to successful employment for individuals has been of interest to rehabilitation researchers focused on orthopedic disabilities (Chan, Cheing, Chan, Rosenthal, & Chronister, 2006), deafness and hearing impairments (Moore, 2002; Capella, 2003), traumatic brain injuries (Catalano, Pereira, Wu, Ho, & Chan, 2006), psychiatric disabilities (Bromett, 2005; Jones, Perkins, & Born, 2001), visual impairments (Capella-McDonnal, 2005), intellectual disabilities (Migliore & Butterworth, 2008), and epilepsy (Mount, Johnstone, White, & Sherman, 2005).

VR provides a promising avenue to explore employment services for individuals with ASD. This study was designed to investigate VR service utilization as it relates to ASD impairment examining relationships with specific VR services, integrated case closure, earnings, and hours worked. The experiences and outcomes of individuals with ASD in VR have been explored by other researchers including: Butterworth, Smith, Hall, Migliore, Windsor, and Domin (2014); Greene (2006); Lawer, Brusilovskiy, Salzer, and Mandell (2009); Poppen (2014); Schaller and Yang (2005) and many others, but the variables that lead to successful employment outcomes remain elusive and may change over time based on the population studied, as variability within an ASD diagnosis is well documented. Although there is limited information on specific services that lead to employment outcomes, McDonough and Revell (2010) found that individuals with ASD as their primary disability were more likely to experience successful case closure rates

than all other disability groups: 61.3% to 58.4% in 2003, and 63.7% to 59.6% in 2007. This study seeks to connect specific VR services to positive employment outcomes related to integrated closure, earnings, and hours worked.

The growing attention on this topic has led to an increased demand on developing a comprehensive understanding of how employment outcomes can be improved. What services and supports lead to jobs? How can earnings be increased? How can employment be incentivized? In response, advocacy organizations, along with political alliances, continue to promote integrated employment at or above minimum wage as a priority for individuals with disabilities, including individuals with ASD (National Disability Rights Network, 2012; National Governor's Association, 2013; Nord & Hoff, 2013; Moseley, 2013; United States Department of Justice, 2014; United States v. Rhode Island, 2014; United States Senate, 2013 and 2012). At the federal level, the United State Senate Health, Education, Labor, and Pensions (HELP) committee, the National Governors Association, the Centers for Medicare and Medicaid (CMS), and the Department of Justice (DOJ) are promoting multiple initiatives and policy directives focused on promoting employment in community-based and integrated settings. Additionally, there continues to be movement around the *Olmstead v. L.C.* (1999) decision and Home and Community Based Services (HCBS) within CMS programs, which both state and federal agencies look towards for guidance on how to ensure employment programs and supports are provided in the most integrated setting possible. Policy and practice windows are open and amendable to change. Robust rehabilitation research can assist in the framing, direction, and promotion of integrated employment policies and practices.

## **Statement of the problem**

**Autism Spectrum Disorder (ASD).** Individuals with ASD are a heterogeneous group with varied behavioral, social, and communication abilities. *The Diagnostic and Statistical Manual for Mental Disorders* (2013) defines ASD as a condition with “persistent deficits in social communication and social interaction across multiple contexts . . . and restricted, repetitive patterns of behavior, interests, or activities” (p. 27). This can include, but is not limited to, deficits in social interactions and emotional reciprocity, unusual patterns in speech or behaviors, difficulty with social relationships, sensory sensitivities, fixated interests or preoccupation, or inflexibility (American Psychiatric Association, 2013). It is currently estimated that there are 3.5 million individuals with ASD living in the United States (Buescher, Cidav, Knapp, & Mandell, 2014)

Prevalence of ASD is currently reported at 1 in 68 children; however, the Autism and Developmental Disabilities Monitoring Network (ADDM) that provides prevalence data through the Centers for Disease Control and Prevention (CDC), reports significant state-to-state variation in ASD prevalence rates (Baio, 2014; Wingate et al., 2014). The highest prevalence was found in New Jersey at 21.9 (per 1,000 births) and the lowest in Alabama at 5.7 (per 1,000 births) in 2010. The complex nature of ASD assessment and diagnosis, which can be identified through both educational and medical testing, can lead to inconsistencies in the calculation of true incidence nationwide. Not all states participate in the ADDM network and must apply with the CDC to become an ADDM network state (Baio, 2014; Pennigton, Cullinan, & Southern, 2014).

With variation in the numbers of individuals with ASD living in the United States, it is likely that state VR agencies witness similar variation in the percentage of individuals with ASD served. The percentage of individuals ASD served by state VR programs will likely vary because of how states identify individuals with ASD. Beyond the ADDM network, states may individually monitor and track ASD rates using their own in state practices or methodologies. The prevalence of ASD is variable between states which is likely a result of how states collect and report diagnostic data, which in turn could affect the percentage of a state's total VR population.

ASD can co-occur with an Intellectual Disabilities (ID) or other disabilities. Currently the CDC reports that 31% of individuals with ASD also have a co-occurring intellectual disability. Levy et al. (2010) found that the majority of children in their study ( $N = 2,586$ ) had a co-occurring developmental diagnosis, along with 10% having psychiatric, 16% neurologic, and 4% medical co-occurring conditions. Additionally, they found that in their sample 60% had at least one co-occurring condition while 26% had two or more (Levy et al., 2010). The presence of multiple disabilities or conditions may lead to additional challenges and barriers in achieving employment outcomes through VR. Therefore, careful attention to the role these labels play is of interest to rehabilitation researchers. Individuals with ID experience additional challenges in the workplace related to lower IQ scores and potential deficits in adaptive behavior. However, several studies report that individuals with ID can successfully maintain employment in the community (Butterworth et al., 2012; Cater, Austin, & Trainor, 2012; Cimera, 2011). VR provides an array of employment supports and services to individuals with ID, however variation in provider types and services that

are accessible to individuals with ID exists between states (Butterworth et al., 2014). Despite challenges individuals with ASD and ID are reporting their desire to be employed in the community (Bershady, Butterworth, & Hiersteiner, 2014).

As a stand-alone diagnosis, ASD presents a number of challenges related to variability of symptoms and severity. Alone or combined, the array of social, communication, and behavioral challenges an individual with ASD may experience can present significant barriers in the workplace (Hendricks, 2010; Hendricks & Wehman, 2009; Migliore, Mank, Grossi, & Rogan, 2007; Nicholas et al., 2014). There is also variability in the employment support needs of this population (Eve, Shuler, Burton, & Yates, 2003). The nature of the condition itself presents service challenges and the literature currently does not provide insight into how VR agencies are providing services to this population. More attention has been paid to transition age youth with ASD in VR. Although the VR system is designed to support individuals to find, access, and maintain employment, it is unclear if individuals with ASD experience similar and/or predetermined service trajectories that yield consistent outcomes based on their diagnosis. The literature has yielded some results into which service variables lend themselves to positive employment outcomes, but the path of individuals with ASD in VR has not been fully explored.

A state VR system's ability to understand how they are providing services delivers a mechanism for advocates, families, providers, and policy makers to understand, discuss, plan, and develop strategies that produce the preferred outcomes. Without a base knowledge of current service provision and outcomes, state VR agencies and their constituents fail to see the big picture on trends and

services. Anecdotal stories, individual experiences, or small samples—although important—can give the illusion that state VR services are meeting the needs of participants. However, an inability to access and utilize data on a larger scale decreases the likelihood of state-developed insights and new strategies to improve services and outcomes.

**Employment challenges and services.** Similar to individuals with other disabilities, individuals with ASD experience low workforce participation rates (Butterworth et al., 2012; Nicholas et al., 2014) despite a more than \$3 billion dollar federal annual investment to employment supports for individuals with disabilities (GAO, 2012). Monthly reports from the Office of Disability Employment (ODEP) within the Bureau of Labor Statistics (BLS) highlight the low workforce participation rate and high unemployment rate of individuals with disabilities. According to the BLS (May 2014), the employment to population ratio—the ratio of the country’s non-institutionalized civilian working-age population who are employed—is 18.7% for those with disabilities, compared to 58.9% for individuals without disabilities. According to the BLS (2008) being employed is defined as:

Persons 16 years and over in the civilian noninstitutionalized population who, during the reference week, (a) did any work at all (at least 1 hour) as paid employees; worked in their own business, profession, or on their own farm, or worked 15 hours or more as unpaid workers in an enterprise operated by a member of the family; and (b) all those who were not working but who had jobs or businesses from which they were temporarily absent because of vacation, illness, bad weather, childcare problems, maternity or paternity leave, labor-

management dispute, job training, or other family or personal reasons, whether or not they were paid for the time off or were seeking other jobs. (BLS, 2008)

This means that 58.9% working age adults in the United States who are not in an institution are currently employed, as compared to less than 19% of working age non-institutionalized adults with disabilities who are employed. An unemployed individual is more likely to experience poverty, and individuals with cognitive disabilities experience poverty rates almost three times the national average: 34.4% compared to 28.4% of individuals with any disability, and 12.4% of individuals without a disability (Erickson, Lee, & von Schrader, 2014).

Research is beginning to describe the variety of complex barriers that individuals with disabilities in general face; yet despite barriers individuals with disabilities express a desire to have a job (Bershadsky et al., 2014; Hendricks & Wehman, 2009; Migliore et al., 2007; Nord, Luecking, Mank, Kiernan, & Wray 2013; Olmstead Planning Committee, 2012). Regardless of disability type the desire to work is universal human experience. The multifaceted nature of ASD, which includes communication, social, and behavioral differences, means individuals may experience additional challenges to entering the workforce and maintaining employment, but the desire to be have a job is the same regardless of a diagnostic label. For individuals with ASD these challenges come in many forms and can include but are not limited to: identifying career interests and talents, gaining work experiences (paid or unpaid), finding employment opportunities, navigating employment applications, interviews, and job negotiations, understanding the complexities of the workplace, and interacting with coworkers or customers.

These experiences may be fairly consistent across disability groups, but individuals with ASD often experience these barriers in more nuanced ways. More specifically, individuals with ASD may lack the resources or knowledge to find and secure employment (Hendricks & Wehman, 2009; Walsh, Lydon, & Healy, 2014), may exhibit behavior that is unusual or odd in a workplace setting (Hendricks, 2009), may experience difficulty communicating with a supervisor or coworkers, may lack understanding of workplace culture and social cues that lead to interpersonal conflicts (Wehman et al., 2012), may exhibit inflexibility or rigidity regarding work tasks or assignments, and may lack understanding of how reasonable accommodations and workplace customization can support their employment (Chappel & Sommers, 2010; Eve et al., 2003; Hendricks & Wehman, 2009; Wilczynski et al., 2013). In some cases ASD may be an invisible disability, which can complicate employment expectations and interactions. Although an individual with ASD is extremely capable of performing work these challenges make social relationships, supervision, and integration into work place culture more difficult.

Because ASD is considered a neurodevelopmental disability, individuals with ASD have often been placed with others who have intellectual and developmental disabilities (IDD) in employment programs or other services that may not accurately match their needs, interests, or strengths (Astous, Manthroe, Lowton, & Glaser, 2014; Hendricks, 2010; National Disability Rights Network, 2012; United States Senate, 2013). Many of these employment programs, which do not address any of the aforementioned challenges for individuals with ASD, subject participants to facility-based employment that may or may not provide minimum wages, peers without

disabilities, or community access (Domin & Butterworth 2013; Rogan et al., 2002; United States Senate, 2013; Wilczynski et al., 2013). Regardless of disability label, employment programs for individuals with disabilities have not historically taken individual choices, preferences, or strengths into consideration when providing employment services (Nielsen, 2013; National Disability Rights Network, 2012; Scotch, 2009; United States Department of Justice, 2014). The proliferation of these types of employment programs for individuals with disabilities, including ASD, create a significant barrier to community based integrated employment.

In order to access employment services and supports individuals and families must navigate a complex service system. Understanding the convoluted maze of eligibility, benefits, and rules often place service recipients at a significant disadvantage. Additionally, many services and supports offered in one state or community may not be available in another (Butterworth et al., 2014). McDonough and Revell (2010) stress the importance of individuals and families understanding the potential options and supports to pursue employment services.

State VR programs, which are the focus of this study, support more individuals with ASD than any other employment program in the United States. McDonough and Revell (2010) include VR as one of the primary and potentially promising providers of employment services and supports. Over the past ten years VR has increased its attention on services for individuals with ASD with additional attention on those who are of transition age (Lawer et. al, 2009; McDonough & Revell, 2010; Migliore et al., 2013). New policy changes within the Workforce Innovation and Opportunity Act

(WIOA; 2014) provide additional directives to state VR programs about youth, sub-minimum wages, and sheltered workshops (facility based employment).

Even with the ongoing interest in the employment of individuals with ASD from self-advocates, families, policy makers, and providers (Rogan & Rhine, 2011; United States Senate, 2013) and the political momentum of employment disability policy (Moseley, 2013; Nord & Hoff, 2013; Nord et al., 2013) there is a significant gap in the literature about evidenced-based interventions that produce positive employment outcomes. The desire and policy commitments are in place, but the means to produce positive employment outcomes is not fully understood. Two literature reviews on employment interventions and outcomes for individuals with ASD conclude there is little evidence on what types of interventions actually produce results (Taylor et al., 2012; Westbrook et al., 2012). State VR programs can provide a wealth of information about how individuals with ASD are utilizing employment supports and which services result in positive employment changes for this population.

**Vocational Rehabilitation (VR).** Vocational Rehabilitation provides critical access to individuals with disabilities, including individuals with ASD, to services and supports that connect them to employment opportunities. Employment is a critical avenue for individuals with disabilities to be an active part of their community, earn income for independence and self-sufficiency, and play an important role in the economic and social fabric of communities. Employment provides an avenue out of poverty (Nord & Nye-Lengerman, 2015).

Initially conceived under the Smith-Fess Act (1920) and expanded by the Barden-Lafollette Act (1943), VR's modern iterations focusing on employment, self-sufficiency,

and integration were part of the passage of the Rehabilitation Act (1973) (Nielsen, 2013; Scotch, 2009). VR is a powerful federal program focused solely on the employment needs of individuals with disabilities that strives to assist individuals with disabilities achieve independence, self-sufficiency, and quality of life through employment. VR serves nearly 600,000 recipients annually and is one of the largest federal employment programs in the United States.

There are growing numbers of individuals who are seeking out VR for employment supports (Cimera & Burgess, 2014; GAO 2012). The rise in ASD rates over the last 15 years also indicates that the ASD population is growing nationwide. The importance of cost-effective, quality services that lead to successful employment outcomes continues to gain national momentum (APSE, 2014; Laarhoven et al., 2012; Mank & Grossi, 2013; Olmstead Planning Committee, 2012; United States Senate, 2012). VR services and support play a critical role in ensuring that individuals with ASD are provided with employment access that can benefit both the individual and society. However, despite VR's nationwide reach, the outcomes related to successful case closures and service access for individuals with ASD is troublesome as ASD is an expensive population to serve and some studies indicate despite the receipt of services less than 60% leave with a job at closure (Cimera & Burgess, 2014; Cimera & Burgess, 2011; Cimera & Cowan, 2009; Green, 2006; Shaller & Yang, 2005). Rehabilitation researches can provide much needed critical information about service usage and outcomes for this population.

## **Statement of purpose**

The purpose of this study was to explore the relationships of participant characteristics and service delivery patterns upon VR employment outcomes for individuals with ASD. This study utilized descriptive and inferential statistical analysis employing a descriptive non-experimental design. The first portion of the study provides descriptive statistics to describing how VR services are provided to individuals with ASD in various impairment groups. The second portion of the study utilized logistic and linear regression to examine the relationships between VR recipients with ASD and employment outcomes. Logistic regression was used to predict the types of services individuals with ASD utilized, and predict closure in an integrated employment setting based on services provided. Linear regression was used describe the relationship between VR services and changes in weekly hours worked and weekly earnings between closure and application. This study provides information about the trajectories of individuals with ASD in VR programs across the United States.

## **Research questions**

This study is designed to answer a primary research question: Do job-related VR services lead to improved employment outcomes for individuals with ASD? In addition, a number of secondary research questions will be answered:

1. Do the types of ASD impairment influence which service(s) is utilized by individuals with ASD?

2. Do the types of services received affect integrated employment at closure?
3. What types of services produce improved employment outcomes for individuals with ASD?

### **Significance of the study**

This study provided in-depth quantitative knowledge about how VR services are being delivered to individuals with ASD through complex pathway variables influenced by disability type, provider, services, and case closures. As a whole, this study intended to achieve three primary goals: (1) fill gaps in knowledge about the trajectories individuals with ASD experience in VR; (2) build on previous research to better understand which services lead to improved employment outcomes; and (3) support VR system improvements that can lead to concrete strategies and approaches when serving individuals with ASD.

To achieve these goals this study selected the five most utilized services by individuals with ASD in VR for examination. Logistic regression was used to look at how ASD impairment types influenced an individual's ability to access different VR services and which of these services resulted in integrated employment at closure. For those recipients who exited VR with integrated employment at closure, linear regression analysis was then used to explore the changes in weekly earnings and hours worked between closure and application. Gender, race, age, employment status at application, and state system were used as control variables throughout the study. Collectively this study sought to improve the lives of individuals with ASD served by VR through a more

comprehensive understanding of the service paths this population experiences and which specific VR services results in integrated employment and changes in earnings and hours worked.

## **Chapter II**

### **Literature Review**

The purpose of this study was to explore the predictive relationships of participant characteristics and service delivery patterns upon vocational rehabilitation (VR) employment outcomes for individuals with Autism Spectrum Disorder (ASD). This chapter provides a review of two areas of literature focused on individuals with ASD: (1) employment intervention studies, and (2) vocational rehabilitation studies that utilized RSA-911 data. Together these two areas of literature inform the design and hypotheses of the current study. This section is of particular importance as it highlights the lack of rigorous empirical research in the area of employment interventions and outcome research for individuals with ASD. Currently VR employs various types of services and interventions that seek to increase the employment rate of individuals with ASD, but the studies show that within the literature we know very little about what interventions produce successful employment outcomes for individuals with ASD.

#### **Employment intervention research**

**Challenges in ASD employment intervention research.** Understanding the different types of intervention research for individuals with ASD is of central importance to this study, as it attempts to recognize potential connections between literature and what is currently being provided within VR. Current intervention research can inform state VR programs as to how they provide job-related VR services. Although there is a lack of rigorous research on employment interventions targeting individuals with ASD, a number

of researchers are attempting to build the framework for understanding what works and why.

Individuals with ASD face a number of barriers to employment as described in chapter one (Cimera & Cowan, 2009; Hendricks & Wehman, 2009; Holwerda et al., 2013; Honeycutt et al., 2013). Due to the nature of ASD many characteristics of the condition related to social, communication, and behavioral differences may make these individuals appear unemployable (Hendricks, 2010; Westbrook et al., 2013). In the last fifteen years several small-scale studies have been conducted focused on employment interventions for individuals with ASD, in an attempt to identify intervention techniques or support models that lead to better employment outcomes for individuals with ASD. Two systematic reviews conducted on employment interventions for adults with ASD by Westbrook et al. (2012), and for young adults with ASD by Taylor et al. (2012), conclude that the evidence for what works is limited and there is a need for more rigorous research in this area. In addition to the concerns expressed by Westbrook et al. (2012) and Taylor et al. (2012), a review of the literature on ASD employment interventions highlight several shortcomings. These include use of convenience sampling (with very small sample sizes), focus on adolescents or young adults, utilization of stereotypical jobs or work tasks for individuals with disabilities, tested work tasks in segregated settings, and often only included specific sub types of ASD such as those with high or low IQs in their studies. Collectively the literature only provides a partial explanation of what is available and possible for individuals with ASD in the workplace and fails to build strong evidence for specific employment interventions.

In an attempt to better understand strategies used for the employment of individuals with ASD, Walsh et al. (2013) reviewed 26 predictor, impact, and intervention studies and concluded there was limited extant research on employment training and interventions for individuals with ASD. However, they do report despite a lack of evidence-based practices for employment interventions, employment positively impacted an individual's quality of life, cognitive functioning, and well-being (Walsh et al., 2013). Reporting on the literature's limited volume and quality Nicholas et al. (2014) conclude that the most promising employment practices focus on supported employment in community settings which will be discussed later in this chapter.

**Use of technology interventions in ASD research.** Current literature on employment interventions for individuals with ASD focuses heavily on the use and application of assistive technology (AT) or other off-the-shelf devices that can be useful in employment settings. Technology can be a promising practice in providing employment interventions. Humans are social beings who can learn through observation from others with whom they can identify (Bandura, 1999) and many individuals with ASD are drawn to technology and mechanical innovations (Nicholas et al., 2014). With high social validity, flexibility, and customizable tools, applications can be designed to meet an individual or employer's specific needs in the workplace. These AT tools or devices can be used to provide training and support in the workplace including but not limited to: reminders to complete work tasks, teach or cue social reciprocity, organize and schedule work responsibilities, initiate social cues, etc. Due to the nature of ASD, technological instruction may be of greater benefit for those who struggle with

social interaction, reciprocity, and communication (Chappel & Sommers, 2010; Walsh et al., 2014).

The social and interpersonal skills needed for successful employment may not be as natural for individuals with ASD based on the deficits cited earlier in this study. In their study of four young adults with ASD and varying IQs, Kellems and Morningstar (2012) note that attention, information processing, and memory—all of which are often expected in a job—can be difficult for individuals with ASD. The authors studied the use of a portable media device for modeling paired with written instructions in the acquisition of new work skills. With the use of the media device and written instructions, participants made immediate and substantial gains in the number of tasks completed correctly. In addition, participants reported higher levels of social validity—determined through participant interviews—when they used the portable media device in the workplace.

Referencing observational learning, Kellems and Morningstar (2012) and Allen, Wallace, Renes, Bowen, and Burke (2010) employed video modeling techniques to teach students with ASD new vocational tasks across varied work environments. Allen et al. (2010) taught four adolescents with ASD to wear an inflatable costume in a retail setting and interact with customers. In addition, Laarhoven, Winiarski, Blood, and Chan (2012) attempted to maintain the current vocational skills of students with ASD through the use of video modeling. Laarhoven et al. (2012) used a modified pretest-posttest design, to assign one of two work tasks to a video modeling or no video model condition. Of the six individuals in the study, all the participants improved their work performance in both work tasks (video/no video). There was a statistically significant difference in performance between the groups, suggesting the video modeling led to greater skill

improvement. It is important to note the intervention was provided in a community-based setting in jobs that were currently held by participants. Video modeling provides a potential promising intervention practice with some individuals with ASD and the use of current technology, such as an iPod or iPad, can increase the social acceptance and minimize intrusive instruction in the workplace (Kellems & Morningstar, 2012).

In two separate studies published within one article, Burke, Andersen, Bowen, Howard, and Allen (2010) explored the use of behavioral skills training and a performance cue system (PCS) intervention using an iPhone to assist nine young adults with ASD to complete assigned job tasks. Using a multiple baseline design, six participants were taught to wear an inflatable costume and interact with customers in a retail setting. Their results indicate that five of the six participants were able to meet criterion for success only after the introduction of the PCS. Burke et al. (2010) report that a PDA device, like the iPhone, can be an effective intervention for teaching work skills to individuals with ASD. The author's made a number of assumptions, including generalizing participants' success in other employment settings based on their success wearing the mascot costume. Employment in retail settings may be of interest to only a small number of individuals with ASD and the use of the Walk Around mascot would only be available in specific settings. They also asserted that the Walk Around mascot could be a desirable employment opportunity because the individual wearing the costume would not have to directly interact with the public which, according to some, may not be productive or useful as many training programs and interventions attempt to improve the social skills and tolerance for interaction with others (Muller & VanGilder, 2014; Wehman et al., 2014).

Bennett et al. (2013) evaluated the effectiveness of covert audio coaching (CAC) to develop photocopying skills in three young adults, ages 13–22 with ASD. The subjects were outfitted with headphones, which allowed them to hear verbal instructions from a job coach who was not in the immediate vicinity of the worker. Three individuals, who achieved 85% inner rater agreement, provided behavioral coding. Outlining their use of task analysis, verbal cues, and reinforcement, this multiple baseline design follows an applied behavior analysis (ABA) model. The subjects were identified as having ASD but their communication skills and work experience varied; each was taught a series of ten steps to complete a copying task within a school setting. Results indicate CAC was effective in helping students develop and maintain their copying skills. The nature of the participant numbers, communication skills, and narrow work tasks do not allow the findings to be generalized to other populations.

Changing technologies also allow for new and innovative ways to prepare individuals with ASD for the workforce. In a single blind randomized control trial, Smith et al. (2014) tested the feasibility and efficacy of virtual reality job interview training (VR-JIT). This study included 26 individuals with ASD between the ages of 18 and 31 who were assigned to the intervention ( $n = 16$ ) or the control group ( $n = 10$ ). The premise of VR-JIT is to provide users a realistic experience with job interviewing in which a variety of emotions, social nuances, and personalities can be displayed. The software used in the intervention group allowed for varying levels of interviewing difficulty and included pre-training preparatory sessions. Results indicated that individuals in the VR-JIT intervention expressed positive feelings about the experience related to confidence and preparedness. In addition, those using the VR-JIT demonstrated improvements in

job-interview content and interviewee performance, which improved as they progressed through varying levels of difficulty. Results indicate that VR-JIT may be an effective way to prepare individuals with ASD for job interviews.

**Employment intervention studies with supported employment components.**

Identified in the Developmental Disabilities Act of 1984, supported employment (SE) is a model for workers with disabilities focused on paid employment in a variety of settings, made possible by the inclusion of external supports including supervision, training, and transportation (Federal Register, 1984). The SE model will be discussed at length in chapter three. A number of intervention studies centered on individuals with ASD contain elements of SE models.

Hillier et al. (2010) evaluated the effectiveness of a vocational program tailored specifically to nine individuals with ASD ages 16-36, with IQ scores ranging from 95-133. Using both qualitative (case notes and observations) and quantitative (demographics and outcomes) data, Hillier et al. (2010) attempt to more deeply understand how community rehabilitation provider's (CRP) services designed for individuals with ASD work. This was the only study reviewed which explored the effectiveness of a specific CRP, which is a public or private, non-profit or for-profit organization that provides a wide range of services to individuals with disabilities. CRP services can include both employment and/or residential supports. CRPs who provide employment services may provide facility-based support, community-based supports, or both. Providing both pre-placement and post-placements services, results show that this model of services lead to higher employments rates (seven of nine remained employed after two years), increased average wages (from \$1.60 to \$7.17), increased participant social integration (as

measured by a socialization scale), and reported overall job satisfaction. The average time to placement into a competitive community based job was just under five months.

Application of SE models can be found in the United States and abroad. There can be unique challenges when supporting individuals with ASD as their support needs and abilities can vary greatly despite carrying the same diagnostic label. A recent study conducted by Lynas (2014) on Project ABLE—a SE program targeting individuals with ASD in Ireland—looked at different categories of individuals with ASD, those in special education, mainstream education, and individuals with “high functioning” ASD. Using principles of SE including assessment, vocational profiling, vocational training, work experience, and job support, Project ABLE sought to improve the work opportunities and employment outcomes of individuals with ASD while providing community education to employers and business. Results indicate that individuals with ASD in special education required higher levels of support but had the opportunity to experience one or more work experiences, while 56% individuals with ASD in general education or who were labeled “higher functioning” were employed full or part time at the end of the program. The length of time it took to secure employment varied from eleven to thirty months (Lynas, 2014). The highly personalized SE approach provided 95% of all participants the experience of at least one work experience, and 66% had two or more experiences, over the course of the four-year program.

Lattimore, Parsons, Reid, and Ahearn’s (2006) work on enhancing worksite training for individuals with ASD using simulation training did not address how their training intervention was directly tied to principles of ABA and learning theory, although they did highlight a SE model of training for individuals with disabilities. They compared

the use of on-site job training to on-site job training plus simulation training for four individuals with ASD and/or severe IDD. Lattimore et al. (2006) found that in three out of four comparisons that on-site job training plus simulation training resulted in higher skills levels and increased skill acquisition. The segregated work environment and nature of the work tasks in this study make it impossible to replicate in a community-based setting, and it may be unlikely that participants could transfer their skills across environments due to the severity of their disability.

Several studies used a more complete SE model to explore individual employment interventions. Project SEARCH (PS) is a business-led transition program that provides internships and on-the-job learning. Muller and VanGilder (2014) explored the relationship between job readiness and employment rates for twenty transition-aged students with disabilities, including ASD in Hawaii. Through the use of a job readiness assessment tool and participant interviews they found that there was significant overall growth in participants as well as growth in specific work related skills and behavior, and upon completion of the program 60% of participants were offered employment at the PS site. It is worth noting that 27% of the initial study participants were lost to attrition. The addition of post interviews (after the completion of PS) with participants, VR counselors, teachers, and coworkers add to the qualitative validity of the findings, however, interview protocols were not disclosed. The PS model has been implemented in over 200 sites worldwide (Muller & VanGilder, 2014).

Wehman et al. (2014) conducted a randomized control trial of a modified version of Project SEARCH (PS) with additional ASD supports with 40 (16 control, 24 treatment) participants in Virginia. Interviews with participants were conducted along

with the completion of the Support Intensity Scale (SIS), which measures adaptive behavior and support needs. The addition of the SIS addressed construct validity as it attempted to relate scores in the SIS to variables within the PS model. PS is not a disability-specific model, therefore, the researchers added additional supports to target the specific needs of individuals with ASD. The addition of these customized add-ons likely increased the validity of the findings. Upon completion of the program 87.5% of the treatment group attained employment compared to 6.25% of the control group. There were also significant differences in the post SIS scores between the treatment and control group, which grew over time. In addition to the acquisition of employment the treatment group had wages that were on average more than 24% higher than minimum wage in Virginia at the time. Utilization of the PS model increased the quantitative reliability as a formulated model was outlined. This study highlights the success of the PS plus ASD supports model in procuring employment after graduation for students with ASD regardless of support needs, and begins to address the need for successful interventions that can be replicated. The results from early PS studies are promising but criterion validity may be somewhat elusive as maturation, selection, and interactions likely affect the findings and how participants respond to the PS model.

Additionally, staff working for organizations that provide SE services vary widely. The quality, validity, and consistency of SE models may be highly dependent on those professionals who provide training, coaching, and assessment. In a qualitative study exploring staff experience with SE, Gore, Forrester-Jones, and Young (2014) found that staff experienced significant personal and structural barriers in supporting individuals with complex needs in employment. Many of the individuals interviewed expressed the

need to be creative, persistent, and determined when providing employment support, as communities and business were not always ready and willing to support workers with disabilities. In addition, several expressed doubts about the abilities of individual workers but over time were surprised about the progress and skills individuals with complex need could accomplish in community-based employment. Despite the growing presence of SE models and specialty program the quality, support, and training of staff remain of critical importance for effective implementation.

The literature provides a variety of SE models and services with varying levels of empirical evidence. Until recently the literature did not include any large-scale studies focused on SE. Using a case-control study design, Wehman, Chan, Ditchman, and Kang (2014) utilized RSA-911 data from 2009 to evaluate the employment outcomes of youth with intellectual disabilities (which includes ASD). A sample of 23,298 of 16- to 25-year-olds were collected and through classification and regression tree (CART) analysis resulted in six homogenous groups. Within this sample, 1,719 individuals were identified as having ASD. Results indicate that SE was found to increase the employment rates in all groups, but was especially strong for those individuals who received Social Security benefits and or special education. High school graduates with IDD or ASD also experienced significant benefits from SE. This study provided much-needed evidence to support SE as a high-quality intervention provided by state VR programs and yields successful employment closures for youth with IDD, including ASD.

## **Vocational Rehabilitation**

Passed into law in 1973, Title V of the Vocational Rehabilitation Act was implemented to address the discrimination of people with disabilities in the workplace. Known as “the Act”, the federal legislation authorizes funding for vocational rehabilitation, supported employment, and independent living. The Act is a complex piece of legislation, which includes components related to employment supports, and protection and advocacy for individuals with disabilities. The aim of the Act is to assist individuals with disabilities achieve independence, self-sufficiency, and quality of life through employment. Title I of the Act centers on Vocational Rehabilitation (VR), and Title V centers on rights and advocacy provisions.

Title I of the Act authorizes the development and oversight of a national network of state vocational rehabilitation agencies. Each state has a state VR agency that is directed to purchase, deliver, and monitor employment services for individuals with disabilities. Administered under the auspice of federal guidelines, state VR agencies have some flexibility in how programs and services are implemented with state matching. In order to meet the needs of their clients, state VR agencies may contract with other vendors or community rehabilitation providers (CRP) to supply employment services and supports (Domin & Butterworth, 2013).

VR provides a broad range of services including several referenced in the studies reviewed later in this chapter. To access VR services an individual must apply and be determined eligible for service. The next step requires the development of an Individualized Plan for Employment (IPE) in conjunction with a VR counselor. The IPE will outline the type, scope, and goals of the services provided. VR participants may

receive any combination of services deemed “necessary and appropriate” (Vocational Rehabilitation Kansas, 2011, p. 68). VR provides 22 different types of services based on availability, fit, and need. These services include: assessment, diagnosis and treatment, vocational rehabilitation counseling and guidance, college and university training, occupational and vocational training, on-the-job training, basic academic remedial or literacy training, job readiness training, disability-related augmentative skills training, miscellaneous training, job search assistance, job placement assistance, on-the-job supports, transportation, maintenance, rehabilitation technology, reader services, interpreter services, personal attendant, technical assistance, information and referral, as well as an ‘other’ category. A number of services, although not specifically provided by VR (provided by other entities such as public schools), were utilized in the studies reviewed above, including: occupational and vocational training, on-the-job training, disability-related augmentative skills training, on-the-job supports, and rehabilitation technology.

As the primary source of employment services for individuals with disabilities in the United States, VR is subject to oversight from various federal and state regulators. The Government Accountability Office (GAO; 2005) recommended improved measure and monitoring to enhance program outcomes. Despite a targeted goal of 55.8% of recipients leaving VR with employment under an employment plan, only 33% did so successfully in 2003. Extensive variability in cost, service availability, and outcomes are seen as problematic, particularly for certain disability groups and services recipients in some states (GAO, 2005 & 2012). In an attempt to better understand the unique needs of

services recipients and improve outcomes rehabilitation researchers continue to focus on using VR as a source of high-quality employment data.

The Rehabilitation Service Administration (RSA) 911 dataset provides comprehensive information on VR services and outcomes with more than 150 variables. Data are collected by RSA from states through the Case Service Report (CSR) to ensure compliance with the Rehab Act of 1973. Researchers are actively exploring this dataset as it relates to the employment of individuals with disabilities and ASD (Cimera, 2009; Cimera & Burgess, 2011; Green, 2006; Honeycutt et al., 2013; Lawler et al., 2009; Migliore et al., 2013; Mwachofi, Broyles, & Khaliq, 2009; Poppen, 2014; Schaller & Yang, 2005). As the prevalence of ASD continues to rise there will be a marked increase of individuals with ASD looking to VR for employment services.

**Studies utilizing RSA-911 data.** VR plays a significant and influential role in improving employment outcomes for this population. VR is uniquely positioned at the front lines of employment services and supports, assisting in matching the needs of the job seeker with the appropriate services to secure successful employment or post-secondary education. Current rehabilitation literature utilizing RSA-911 data highlight some problematic areas requiring further exploration, but promising findings also exist.

Migliore, Timmons, Butterworth, and Lugas (2012) explored predictors of employment and post-secondary education in youth with 2,913 youth with ASD served in VR in 2008. The case sample included individuals with ASD as a primary or secondary disability, who were between the ages of 16-26 at application, did not have integrated employment at application, and received VR services. Almost the entire sample included

individuals labeled with a significant disability. Using logistic and multiple regressions they highlighted specific services, which lead to improved employment outcomes and post-secondary education. Results indicate that receiving job placement services significantly increased the likelihood of employment. However, only 48% of the sample received this service. Demographic characteristics assisted in predicting employment outcomes, but not post-secondary education outcomes. Post-secondary education was the strongest indicator of increased earning power; however, only 10% of the sample received the service. On-the-job supports, job readiness training, and receiving SSI/SSDI were negatively associated with higher weekly earnings. Those recipients who received college services were fourteen times more likely to exit VR with a post-secondary outcome, highlighting the importance of educational supports and services as an avenue to improve post-secondary and employment outcomes.

Furthering their work with youth with ASD, in a secondary data analysis Migliore, Butterworth, and Zalewska (2013) analyzed RSA-911 from 2006-2010 and identified 8,990 individuals between the ages of 16–26 with ASD as a primary or secondary diagnosis and who received services from a state VR agency. The entire population of individuals with ASD who received VR services was included in the sample. The percentage of youth who actually received VR services varied substantially across three selected disabilities categories (ASD, IDD, and other disabilities). Migliore et al. (2013) found that although the number of youth who exited VR had doubled, only about half of them left the program with integrated employment, which actually declined over the period reviewed. While Migliore et al. (2013) explored differences between youth with ASD and other disability groups in how they access VR, the differences in

service access to VR actually varied more between states than between disability groups. Additionally, only about half of the youth were directly served by VR and only about half exited the program with an integrated employment outcome.

Even with the existence of federal guidelines regarding eligibility and access, it is how individuals with disabilities utilize VR that varies. Their work highlights that although youth with ASD are accessing VR at growing rates, youth do not necessarily receive VR services consistently, and receiving services doesn't necessarily lead to integrated employment outcomes. The work of Migliore et al. (2013) is closely related to the questions posed in this study; however, Migliore et al. (2013) focused only on youth ages 16–26, the analysis included only 19 of 50 states from years 2006–2010, and provided analysis of other youth with disabilities beyond those with ASD and IDD.

Cimera and Cowan (2009) procured a sample of 11,569 individuals with ASD, representing the total ASD population in VR, who accessed VR between 2002–2006, to understand the costs and outcomes associated for those with ASD. They found that the population of individuals with ASD who accessed VR increased sustainably from 2002 to 2006, from 0.2% of the total VR population to 0.6% of the VR population, constituting a 121% increase. For every dollar earned by an individual with ASD, VR spent an average of \$26.74 in services in 2002; this number dropped to \$19.19 in 2006, which was a trend across disability groups. Similar to other studies, Cimera and Cowan (2009) report that VR services for individuals with ASD were the second most costly group served by VR of the nine disability groups studied. However, an ASD diagnosis alone was less costly to serve than those with an ASD diagnosis and other co-occurring conditions. It is important to note that in their findings Cimera and Cowan (2009) report that individuals

with ASD had the highest employment rates, an average of 40.8%, which was higher than any other group in their study, although the individuals with ASD worked fewer hours per week, and earned less per hour. Their findings are of particular interest as the results highlight the role of co-occurring conditions related to employment outcomes. While a number of other studies highlight the low employment outcomes of individuals with ASD, this study confirms that while the outcomes are low (in terms of hours and wages) individuals were more likely to obtain employment compared to other groups.

Schaller and Yang (2005) also looked at individuals with ASD in RSA-911 in 2001 in an attempt to explain what service variables yielded the most successful employment outcomes. Their sample included 815 individuals with ASD, who received services for competitive employment ( $n = 450$ ) and who received supported employment services ( $n = 365$ ). They determined that job finding, job placement, and maintenance services led to the highest competitive employment outcomes, and that job placement was related to the highest successful supported employment outcomes. Together both studies may lead to a hypothesis that when individuals with ASD alone are provided with job placement, job finding, and maintenance services, they may produce employment outcomes that exceed the success rates of 40.8%.

***Earnings and hours worked.*** Both earnings and number of hours worked is an indicator of employment success and economic self-sufficiency (Human Services Research Institute, 2014; United States Senate, 2013). In a study using RSA-911 data from 2002–2007 of 19,436 individuals with ASD, Cimera and Burgess (2011) attempt to explain if working in the community was cost-effective from the workers' perspective, and if employment outcomes were improving for individuals with

ASD. They report that even when individuals with ASD can be employed, their rates of employment (40.6%), hours worked per week (23.7), and monthly wages (\$793.34) are dismally low across the United States. Roughly translated this means six in every ten individuals with ASD remained unemployed even after being served by VR. They found employment outcomes did not decrease from 2002-2007, rather they remained consistent. However, more positively, for every support dollar participants gave up as a result of working, they generated \$5.28 in wages earned from employment which was calculated by looking at foregone wages and converting dollars values from 2002 to 2007 using the Consumer Price Index. This study highlights the value of work for individuals with ASD on a large scale. Individuals with ASD can make significant monetary gains through employment; however, the VR mechanisms that make this happen were not explored in this study.

Rogan and her colleagues (2002) targeted state level supported employment (SE) usage in their review of RSA-911 data from 1997 and 1998 to highlight the use of SE models, promoting the integrated and competitive employment of individuals with disabilities. Citing language changes from a January 2001 RSA Title I rule change, which no longer accepted sheltered work outcomes as successful work case closures in VR, they emphasized VR's inconsistent usage of SE across the nation. They highlight that the number of persons in SE per 100,000 served ranged from 1–89% in states. The average hours worked ranged between 18–36 hours, and the mean expenditure for a successful SE closure ranged from to \$1,710–\$9,399 (Rogan et al, 2002). Inconsistent application and interpretation of VR rules and policies create inequalities in access, which has also been a theme across the literature. However, these findings can be useful at the state level in

providing specific figures about the activity in a state, which allows for more local action to a state's specific needs.

***State system variation.*** States have some autonomy in to whom and how VR services are provided to individuals with disabilities. After state matching required by RSA, states may also choose to augment their VR programs with additional services and funding. Some VR recipients with ASD may receive employment supports directly through their state VR agency, while others may receive services through a contracted vendor such as a CRP. Previous research in the field not specifically related to ASD has noted significant differences in service delivery and access within state VR programs (Butterworth et al., 2014; Honeycutte, Bardos, & Mcleod, 2014; Honeycutt, Thompkins, Bardos, & Stern, 2013; Migliore et al., 2013). A state's economic health is related to the employment outcomes of individuals with cognitive disabilities in state VR programs (Nord, Hewitt, & Nye-Lengerman, 2013). However, the precise source of this variation has not been adequately explored and is not well understood. Literature supports the likelihood that a multitude of economic, social, political, and cultural factors influence the delivery of state VR program services.

Previous literature using hierarchical linear modeling (HLM) has shown that relationships can be drawn between the individual and system level outcomes including: changes in vocational and educational activities for adults with ASD (Taylor & Mailick, 2014); youth outcomes in community mental health programs (Glisson, Hemmelgarn, Green, & Williams, 2013); and unemployment rates and competitive employment for individuals with ASD (Chan et al., 2013). Although there is acknowledgment of state variation between VR programs this study did not employ HLM. Instead this study's

design controlled for each state system and how the state system provided services to individuals with ASD. This will be explained in further detail in Chapter IV. The state system variable is important in controlling for the influence of a state's VR system on outcomes. If no control was provided it could be assumed that all state VR programs are implementing each service uniformly, and the literature acknowledges there is variation between states in VR programs (Butterworth et al., 2014; Honeycutt et al., 2013).

*Impairment type within ASD.* Despite recognition that ASD is an extremely varied disability diagnosis, no literature was found specifically using impairment, symptoms, or barriers as a mechanism to explore the ways in which behavioral features of the disability could be related to services or outcomes. In RSA-911 data ASD is identified as the source of a primary or secondary disability, but there are 18 possible codes for types of impairment within the disability. This study identified five impairment codes associated with ASD: (1) psychosocial; (2) cognitive; (3) communicative; (4) other mental; and (5) all others. These were identified through frequency distributions within the FY 2013 RSA-911 data set.

RSA-911 also provides a significant disability variable that can be selected for those individuals who meet the predefined criteria. Any individual who is identified as having ASD as a primary or secondary disability automatically meets VR's criteria for significant disability (Arizona Vocational Rehabilitation, 2015). Therefore, regardless of impairment type it is impossible to ascertain how the significant disability determination influences an individual with ASD's services or outcomes. There is some indication that the severity of an individual's disability may be a determining factor if the individual

receives straight VR or contracted vendor services (Lawer et al, 2009; Rogan, Novak, Mank, & Martin, 2002).

Lawer et al. (2009) explored overall VR usage ( $N = 322, 221$ ) by individuals with Autism ( $n = 1,707$ ) in 2005 and concluded that adults with ASD were more likely to be excluded from VR services based on the severity of their condition, using the binary “significant disability” label along with additional factors. Of the individual level data reviewed, 4.3% of individuals with ASD had their VR cases closed due to a significant disability compared to individuals with IDD (2%), speech language disorders (0.4%), or other impairments (2.2%). Although there were individuals with ASD who became successfully employed, the cost of their supports was significantly higher than other disability groups. In their post hoc analysis Lawer et al. (2009) found that employment of individuals with ASD was highly associated with on-the-job supports.

The work of Lawer et al. (2009) does include some overlap in focus with this study. While both studies focus on service recipients with ASD, this study focused on the type of impairment within the ASD label and which type of service these individuals received, whereas Lawer et al. (2009) focused specifically on case closure status. This study also delved more deeply into the issue, looking at the differences in case closure outcomes based upon type of service. In addition, this study looked at four more closely-related impairment categories—referenced above—to explore potential differences in service type and employment outcome that may exist with participants who experience higher levels of employment challenges.

## **Addressing gaps in the literature**

The amount of literature in the field of ASD has expanded exponentially over the past 15 years, yet despite an interest in ASD limited research has been done on employment and ASD, specifically looking at employment interventions. RSA-911 has been used extensively to understand service demographics, usage, and outcomes for different disability populations. Current gaps in literature highlight the importance of this study in a number of ways.

**State VR service overview.** Current literature has spent a great deal of attention on youth with ASD. Most of the current RSA-911 studies on ASD have used transition-aged youth (16-24) as the population of interest. Based on prevalence there are a greater number of youth with ASD, it is not the only age group served by VR. The literature does not provide a complete overview of the entire ASD population served by VR in current service years. Therefore, there is a lack of knowledge about how this population is engaging with and receiving service from VR. This study looks specifically at all individuals with ASD with case closures in FY 2013, what services they are receiving, and the outcomes they are achieving. This study uses gender, race, age, employment status at application, and state system as control variables to account for the varying roles they potentially play in service receipt and outcomes.

**Impairment as a predictor.** The ASD diagnostic label represents a broad range of social, behavioral, and communicative challenges. As a condition that exists on a spectrum there is a great deal of variability in how the condition manifests itself, resulting in different types of challenges and opportunities for employment. Within FY 2013, RSA-911 identified five impairment types caused by ASD. No previous study has

included impairment type in ASD as a potential predictor of services and outcomes. The current study examined the relationship between impairment type and services received, integrated employment achieved, and changes in earnings, and hours worked.

**Expanded pathways to success.** A number of previous studies have reported on case closures, competitive employment, weekly wages and hours worked. These studies highlight the challenging situation of job seekers with ASD. Many do not leave VR with employment and when they do they make less money than other disability groups. Previous research has focused on various components of successful employment outcomes, but not necessarily in combination drawing a connection from service receipt to a multidimensional (closure, earnings, hours) employment outcome.

The literature does not explain a complete pathway to success for individuals with ASD in VR. What services lead to integrated employment closures? What services result in significant changes to weekly earnings and hours worked? This study explores the pathways of VR recipients with ASD by highlighting which services this population is using, which of these services are more likely to result in successful employment closure in integrated employment that leads to significant changes in earnings and hours worked. Because this study includes all individuals with case closure, more meaningful conclusions can be drawn about the entire ASD population in VR rather than specific age or impairment groups.

## Chapter III

### Theory

#### Foundational theories and models

Current rehabilitation research, similar to other types of disability research, often fails to address the theoretical foundations of its work. Theory provides a general framework for observations achieved through empirical means. Theory can be used as a blueprint to explain complex problems and predict events in the social science (Jaccard & Jacoby, 2011). In rehabilitation research, employment and work-related theories can be applied to the employment experiences individuals with Autism Spectrum Disorder (ASD) as well as be used to understand the broader service system. Although there may be marked differences in physical, social, intellectual, and emotional functions, individuals with disabilities share core human experiences. The lens of disability through which an individual experiences employment, self-determination, and independence is affected by his or her unique cultural and social experiences, which are distinctly different from those without disabilities (Fyson & Cromby, 2013; Kunc, 1992; Nielsen, 2013). This study draws upon a number of important theories, which assist in explaining the broad social, cultural, and economic systems that influence the employment of individuals with ASD that play a potential role in the employment outcomes they achieve.

**Foundations of Inclusion.** Society's view of the role of individuals with disabilities in the community has been fluid over time. Although persistent misconceptions and fears remain today, the role individuals with disabilities play in our

social, cultural, and economic communities is changing. Inclusion means that regardless of disability or support needs, all people have the inherent right to be treated with dignity and respect, participate and live in communities of their choice, and participate in meaningful ways in employment and educational settings (Thompkins & Deloney, 1995). According to the Americans with Disabilities Act (ADA) and reaffirmed by the Olmstead decision (*Olmstead v. L.C.*, 1999), individuals with disabilities are granted the right to freedom, equality, and opportunity in community life (Americans with Disabilities Act of 1990, Pub. L. No. 101-336, § 1, 104 Stat. 328 (1990)). Community life includes employment. The ability to access and be included in the workforce is of critical importance for individuals with disabilities, including ASD. Inclusion is of central importance when discussing employment and workforce issues in this population. Failure to promote, expect, and require inclusive policies and practices results in individuals with disabilities being relegated to a lesser social status and economic oppression.

The roots of inclusive practices can be found throughout history; however, the United States entered in to a more formal means of including individuals with intellectual disabilities in society and funding targeted initiatives in the 1960s (Nielsen, 2013). President Kennedy's panel on mental retardation, formed in 1961, was the United States' early formal action to build infrastructure, allocate funding, and direct attention to the needs of individuals with IDD. The significant social and policy changes of the 1960s focusing on civil rights and equality inspired further development of the importance and value of the inclusion of individuals with disabilities (Osgood, 2005). Although there was continued debate and conflicting research finding about of the role inclusion in schools and community, Lloyd Dunn's seminal article, *Special Education for the Mildly*

*Retarded—Is Much of It Justifiable?*” challenged the notion of segregation, discriminatory practices, and inferior opportunities. He argued separate, segregated programs are inherently unequal and special education is “obsolete and unjustifiable” (Dunn, 1968).

The social and political climates of this era promoted further discussions about the role of inclusion. However, regardless of research findings highlighting the value of inclusion (Gickling & Theoabold, 1975; Guskin & Spicker, 1968; King-Sears, 1997; MacMillian, 1971), segregation in housing, school, and employment continued. For many, the debate about inclusion was one of ideology rather than empiricism (Kavale & Forness, 2000). The ongoing debate about the evidence and ideology of inclusion of individuals with disabilities advanced additional theories on inclusion. The role of inclusion is at the center of disability policy and service debates across the country. Today the discussion about inclusion includes employment as a central and critical ingredient to meaningful community life, and access to employment is a necessary component of social and economic equality (Beyer, Brown, Akandi, & Rapley, 2010; Hendricks, 2010; Van Heijst & Geurts, 2014).

This study specifically looks at integrated employment at closure as a successful employment outcome for individuals with ASD in Vocational Rehabilitation (VR) programs. Although not all individuals will leave VR with integrated employment (in fact over 40% do not), promoting and expecting inclusion in employment is central to this study’s model. *This study hypothesizes that job-related services will result in improved employment outcomes related to case closure in integrated employment and changes in earnings and hours worked.* Inclusion is a required ingredient to successful employment,

but inclusion alone is not enough to combat the stigma and misconceptions about individuals with disabilities in the workplace. Normalization and social role valorization provide additional insights into to improving long-term employment outcomes for individuals with disabilities by addressing some of the core features of societal value.

**Normalization and social role valorization theory.** This study hypothesizes that job-related VR services result in improved employment outcomes for individuals with ASD. Improved employment outcomes (integrated employment, earnings, and hours worked) can result in the improved social standing and value of workers with ASD. In the pursuit for more valued social roles for this population, employment in the community at equitable wages, these two theories argue, can result in more valued social roles and more typical lives for workers with ASD. Having a job is a valued social role in western society and, through the support of VR services, individuals with ASD can experience an increase in their perceived social value by having a job.

Wolf Wolfensberger's social role valorization (SRV) theory provides insight in the valued and devalued roles individuals with disabilities play in society. First conceptualized in 1983, Wolfensberger contends that our assigned social roles significantly influence how the world sees and values us as individuals. Therefore, individuals who have valued social roles (in a western view) such as home ownership, employment, family membership, and economic independence, would hold a higher value or social role in society than an individual who did not have those things (Wolfensberger, 2000). SRV has close ties to Wolfensberger and Bengt Nirje's earlier principle of normalization first published in 1972. The normalization principle states that individuals with disabilities should be able to experience "typical" life experiences as

close to those without disabilities as possible. These experiences and life rhythms should follow the same or similar patterns as the rest of society (Wolfensberger & Nirje, 1972). Additionally, Wolfensberger and Nirje state that individuals with disabilities can benefit from normal routines, choices, and experiences the same as anyone without a disability. Normalization theory was used as a foundational construct for the deinstitutionalization movement in the 1970s and beyond.

Wolfensberger continued to use the idea of normalization in SRV and argues that society has placed individuals with disabilities in devalued roles and that our language, service system, and social order promote the continued devaluing of individuals with disabilities in society. Alternatively, the promotion of valued social roles of individuals with disabilities is identified through six steps related to the understanding of risk factors, person-centered thinking and action, and positive messaging publically and privately (Wolfensberger, 2000).

Wolfensberger's SRV has powerful implication related to employment. Work is a powerful pathway to achieve economic independence, personal well-being, self-satisfaction, and access to one's community. One's ability to identify as a worker or employee has strong positive social connotations. Many individuals with disabilities have been systematically denied the opportunity to be an employee or wage earner, thus leading to further devalued roles in society. The United States has a long history of providing segregated and many times abusive services to individuals with disabilities. Individuals with disabilities' purposeful segregation from society and community life throughout history have led to fear, misinformation, and low expectations that currently are alive and well even today. The closing of state hospitals and institutions more than

forty years ago played a central role in opening up community options of individuals with disabilities, however the workforce has continued to remain largely inaccessible to individuals with disabilities (Barnes, 2005; United State Senate, 2013).

Public policies and initiatives such as the Vocational Rehabilitation Act of 1973, Developmental Disabilities Act (1984), Americans with Disabilities Act (1990), and *Olmstead v. L.C.* (1999) have played a significant role in attempting to open up the workforce to individuals with disabilities. According to SRV, until individuals with disabilities are able to participate in the workforce at similar rates to persons without disabilities, and with equal pay, individuals with disabilities will continue to play a devalued role in society. Having a job is of central importance in many western cultures, and failure to fully participate in the workforce as an employee, citizen, taxpayer, and community member leads to marginalization and a diminished role in the community. According to the principle of normalization and SRV individuals with disabilities should not only be expected and given the opportunity to work, by doing so they increase their social value to society.

It is important to note that normalization and SVR focus on typical or ordinary roles for all people regardless of label; this study focuses exclusively on the importance of integrated employment in the community because employment in the community is what the majority of what working-aged adults do. Segregated or facility-based employment supports are not normal or typical in society, and therefore do not fit as part of normalization or SVR. Additionally, with over 40% of individuals with ASD in VR leaving with no employment, it is critical to further recognize and explore the reasons for this; and normalization and SVR would contend that society identifies unemployment or

economic dependence as undesirable social roles in society.

**Theory in intervention models.** Supported employment (SE) is the practice of providing employment-related supports in the workplace to individuals with disabilities in community settings. SE is a term that encompasses a number of different types of supports including, but not limited to: job coaching, job development, job carving, customized supports, natural supports, or group employment (Rusch & Hughes, 1989). Wehman et al. (2012) outlined four steps in SE for individuals with ASD which include: (1) development of a job seeker profiles; (2) job development; (3) job site training; and (4) long-term supports. This study seeks to affirm the importance of job-related services, as outlined in the SE model as a mechanism to support individuals with ASD in achieving integrated employment in the community and improving earnings and hours worked.

SE services are provided by state VR programs and other community rehabilitation providers (CRPs) across the nation as a mechanism to support the employment of individuals with ASD and other disabilities. In the menu of services provided by VR listed within RSA-911 the following are closely related, have elements of, or are identical to strategies outlined in SE models, which include but are not limited to: occupational/vocational training, on-the-job training, job search assistance, job placement assistance, on-the-job supports, rehabilitation technology, assistive technology services, or personal assistance services.

***Theoretical roots of SE.*** The SE model is rooted in applied behavior analysis (ABA), and ABA is connected to behaviorism and social learning. As knowledge of and expectations for the vocational skills and abilities of adults with disabilities changed in

the 1970s, new models appeared supporting the concept that individuals with disabilities, even severe forms, can learn and be trained to complete many types of tasks; this led to the creation of early “train and place” models in the community (Rusch & Hughes, 1989). SE builds on the importance of social roles, which has led to growth and research in social validation techniques (Kadzin, 1977). Social role valorization recognizes that society has “value” for certain roles and that these roles are an important part of how we see and value each other (Wolfensberger, 2000). Work is a valued role in society. When individuals with disabilities are working they can play a more “valued” role in society. SE is a mechanism for this to occur, supporting the importance of learning and inclusion. SE models also have roots in social learning theory, with a focus on teaching generalization and maintenance of vocational skills (Rausch & Hughes, 1989), which is particularly useful for individuals with ASD (Ihrig & Wokchik, 1988).

Applied behavior analysis (ABA) is a systematic method of teaching an individual to respond to a stimulus through targeted social, cognitive, and environmental modification (Burch, 2002). ABA is a form of behavior modification looking at how an individual learns and interacts with their environment. ABA stems from social learning theory in which behavior can be learned through modeling and then applied in different circumstances (Bandura, 1986). ABA seeks to modify the behavior of the learner using techniques related to rewards, memory, knowledge of self, and relationships within the environment. In some cases learners can learn to do things when these techniques are applied (Burch, 2002).

Early work in ABA focused on the importance of a systematic approach to address a behavior, not the individual specifically, using analysis with a focus on

replication across environments and researchers (Baer, Wolf, & Risley, 1968). According to the operant conditioning, behavior can be changed over the course of consistent implementation of reinforcers or punishments, although later research moved away from punishment or negative reinforcements (Reynolds, 1975). Central to ABA, behaviorists highlight the importance of consistent and clear instructions regarding implementation and procedures. Failure to do so would not result in long-term behavior change.

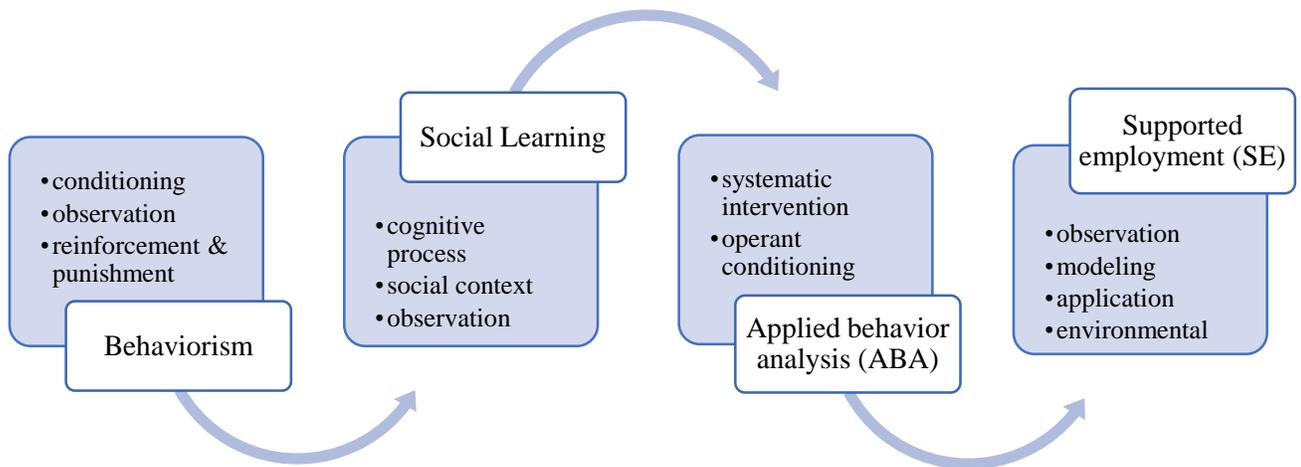


Figure 3.1.  
*Theoretical connections in supported employment models*

SE and ABA models have similar targets, each seeking to modify behavior in a purposeful way. SE models grew out of the work of early behaviorists from ABA interested in changing behavior around specific target behaviors in the workplace. While both models share common components such as task analysis, shaping, chaining events, and reinforcement (Gerhardt & Weiss, 2011), SE models are most concerned with how individuals specifically learn employment-related skills (Rusch & Hughes, 1989), whereas ABA models are more focused with learning, cognition, and the environment around a targeted behavior. ABA is recognized as a scientific evidenced-based practice

method in the treatment of ASD (Rogers & Vismara, 2008) but it is not specific to employment interventions. However, SE applies the components of ABA's social and behavioral roots to apply them to job-related behaviors and skills.

*Current outcomes in SE.* SE is a well-documented model in the field of disabilities. Through SE, individuals with disabilities can be successfully employed in the community (Cimera, 2012; Cimera & Cowan, 2009; García-Villamizar & Hughes, 2007; Mawhood & Howlin, 1999; Rusch & Hughes, 1989; Wehman et al. 2012) and experience increased earnings and hours worked (Burgess & Cimera, 2014; Howlin et al., 2005; Mawhood & Howlin, 1999; Nicholas et al., 2014). SE's focus on job training and long-term supports are two factors that result in the achievement of positive employment outcomes. Three of the five services explored in this study are job-related (job search, job placement, and on-the-job supports) and are parts of the SE model. The two administrative services explored in this study (assessment and vocational rehabilitation counseling and guidance (VRCG)) are not completely transparent by definition; however, it is possible that VRCG could include the development of a job seeker profile identified by Wehman et al. (2012) as a step in SE.

Although not exclusive, central to SE models is the importance of inclusive employment experiences in the community. A number of other studies reviewed in this study utilize elements of a SE training model in their research but do not reference it by name (Hillier et al., 2007; Garcia-Villamizar, Ross, & Wehman, 2000). To date, there is little evidence in the literature that discusses the role SE plays in increasing the inclusion. Lysaght, Cobigo, & Hamilton (2012) conducted a literature review on SE for individuals with IDD and concluded that of the 245 studies reviewed fewer than five focused on the

role of inclusion in SE studies, leaving a significant gap for the evidence base of SE as it relates to increasing inclusion. The fact that SE can produce increased employment rates, wages, and hour worked may overshadow the role of inclusion in the model. There may be an assumption that increased wages and hours worked means that an individual with a disability is working in an inclusive setting, which appears reasonable based on the literature as the SE model itself should be implemented in community-based settings (Rusch & Hughes, 1989). However, a debate on the role that inclusion plays in the implementation of SE is not clearly articulated in the literature.

**Theory of work adjustment (TWA).** The theory of work adjustment (TWA) developed by researchers Lloyd Lofquist and Rene Dawis provides insight to understanding the relationship between individuals and their work environment. Dawis and Lofquist (1984) define work adjustment as a “continuous and dynamic process by which a worker seeks to achieve and maintain correspondence with their work environment” (p. 237). More simply put, satisfaction of the worker and employer must be met. To achieve a desired work environment both the worker and employer must meet each other’s expected requirements (Eggert, 2008). The process in which an individual seeks to achieve satisfaction with their environment is called work adjustment (Dawis & Lofquist, 1984).

Central to TWA is the understanding that work meets physical, social, and psychological needs, and in order to assist workers in choosing an occupation or job these needs must be met (Renfro, Mitchel, Burlew, & Robert, 2009). As VR counselors provide services, guidance, and support to job seekers with disabilities, TWA explains the importance a good fit in a job match. Without the reciprocation of satisfaction, described

above, from the employee and work environment/employer, a successful long-term employment relationship is unlikely (Eggert, 2008). The employee must benefit the employer and vice versa in order to foster long-term work adjustment.

TWA was developed as an exploratory model that builds on the notion that individuals interact with their environment in predictable ways to meet their own needs. According to TWA, environmental events that satisfy individual needs are called reinforcers. These reinforcers and interactions were modeled into an instrument called the Minnesota Satisfaction Questionnaire (MSQ) developed by Weiss, Dawis, England, and Lofquist (1967). TWA and the MSQ have been applied across disciplines in research, program, and policy development (Eggert, 2008).

Many of services provided by VR tie directly to the importance of TWA. The services explored in this study: assessment, VR counseling and guidance, occupational and vocational training, on-the-job training, job search assistance, job placement assistance, are directly tied to assumptions that in order to select ideal work condition the notion of “correspondence” or satisfaction must be met to ensure a good job match. Without individuals’ satisfaction in their environment through “reinforcers” and an employer’s satisfaction, or approval, with individuals’ ability to meet their environmental expectation, successful or long-term employment is doubtful.

Vocational rehabilitation provides a mechanism for thousands of individuals with ASD to connect with employment opportunities each year. As one of the most utilized services by individuals with ASD, this study examined VRCG, with 61% of the population receiving it. The service definition is somewhat ambiguous:

. . . is individual counseling and guidance services that are necessary for an individual to achieve an employment outcome, including personal adjustment counseling, counseling that addresses medical, family, or social issues, vocational counseling, and any other form of counseling and guidance that is necessary for an individual with a disability to achieve and employment outcome. (Arizona Vocational Rehabilitation Administration, 2015)

The receipt of vocational rehabilitation counseling and guidance (VRCG) could include elements of work adjustment including getting to know the job seeker, recognizing employment strengths and preferences, and job selection support. However, to achieve improved employment outcomes this study hypothesizes that the receipt of job search and job placement service better explains the value of theory of work adjustment.

This study sought to understand the connections between services and integrated employment, and changes in earnings and hours worked. TWA provides the rationale for the importance of good job fit as a critical ingredient to employment success. Good fit could be achieved through both administrative and job-related VR services, however this study hypothesizes that it is the job-related services of job search and job placement that have the most connection for finding a good job fit resulting in TWA's "correspondence."

Many individuals with disabilities lack choice and options in the types of employment supports or job options they receive (NDRN, 2012; United States Senate, 2012). According to TWA, job "correspondence" and work adjustment is out of reach for employees with a disability as they lack the ability to be reinforced by their environment, and in many cases they did not choose it. Lack of choice and self-determination likely

influence work outcomes. Recent work conducted with VR counselors by Fleming, Phillips, Kaseroff, and Huck (2014) found factors other than participant choice influenced the type of services they provided VR participants. Factors such as caseload size, anticipated intensity of services, existing employer relationships, availability of service providers, and placement skills were more influential than participant interest or choice as VR services offered to participants.

Graham et al. (2013) conducted surveys with 355 VR staff in three states and found that although over half could identify evidence-based practice (EBP) and find research online, few respondents indicated that they used EBP to inform their practice or develop services with their clients. Respondents also felt that VR agencies did not value EBP nor were they expected to use it in their practices. These findings highlight the continued disconnect in VR service provision to individuals with disabilities. Without meaningful and engaged choices by the individual with ASD, employment success and fulfillment will continue to be elusive.

**Theory to practice.** Social role valorization, normalization, and theory of work adjustment each contribute elements of inclusion for employment services and supports for individuals with ASD. Valued roles in the workforce (SRV) lead to the increased likelihood of earnings and work hours for workers with disabilities, but in order to achieve these valued roles good job fit is essential (TWA). The delivery of high quality job-related services in VR can lead to both improved social and economic benefits for individuals with ASD.

Current debates in public policy across the nation are focused on integrated, community-based employment at or above minimum wages as the first expectation for all

workers with disabilities, which are all part of the Employment First (EF) policy movement which will be discussed further in Chapter VI. Combining both the values of social roles and the benefits of employment, EF states that “Employment in the general workforce is the first and preferred outcome in the provision of publicly funded services for all working age citizens with disabilities, regardless of level of disability” (Association of People Supporting Employment First [APSE], 2010). VR defines competitive employment as:

...a job in which an individual must earn at least minimum wage, as defined by the Fair Labor Standards Act, but not less than the customary wage and level of benefits paid by the employer for the same or similar work performed by a non-disabled worker, is in an integrated setting in which the individual interact with non-disabled people, excluding service providers, to the same extent that a non-disabled worker in a comparable position typically found in the community interacts with others, and that interaction between individuals with disabilities and the general public need not be fact to face as not all position require face to face interaction. (Fester, memorandum, 2005)

Understanding the roots of inclusive practices, the theories that developed from the ideology of inclusion, and how the SE model provides a foundation for many VR practices supports a more nuanced view of the importance of inclusive employment for individuals with ASD and other disabilities. In addition it provides important avenues to understanding and building a continued evidence base for research, policy, and practice on employment services and supports. Furthermore, as the demand for more cost-effective programs increases, these concepts can play a critical role in validating and

explaining why programs such as vocational rehabilitation or special education are essential and beneficial for individuals with disabilities and society.

Both small-scale intervention research and large-scale empirical research in literature on ASD, disability, and employment lack the identification of foundational theory and philosophical justifications for their work. By connecting theory, rigorous methodology, and data, researchers can expand their knowledge of which employment interventions for individuals with ASD lead to the best outcomes and why they produce results.

### **Conceptual model**

This study attempted to build and explain various trajectories individuals with ASD may experience in VR in order to better understand how to achieve successful employment outcomes. Understanding the pathway of a VR service user with ASD can highlight both the successes and challenges to achieving successful employment outcomes. The conceptual model provided in Figure 3.2 diagrams the variables that play a potential role in influencing an individual with ASD trajectory in VR and highlights the placement of theory or models informing each of factors.

ASD is a heterogeneous condition where the variability of impairments can be markedly different. First, this study used five impairment types within the ASD label (psychosocial, cognitive, communicative, other mental, or all other) to build a foundation to articulate how the ASD specific impairment influences which services VR recipients' access and who provides these types of services. There is currently no theoretical foundation or literature that indicates that ASD impairment is related to service receipt.

There is, however, recognition that disability type and severity is related to employment outcomes (Lawer et al., 2009; Rogan, Novak, Mank, & Martin, 2002). The variability between impairment types provides a new and unique way of examining the employment outcome and VR trajectories of individuals with ASD. Impairment type may influence which services are accessed by individuals with ASD and plays an important role in understanding their path within VR services. Yet, regardless of impairment type, access and inclusion into the workforce is central to an improved quality of life and a right as a citizen (Olmsted v. L.C., 1999; Thompkins & Deloney, 1995).

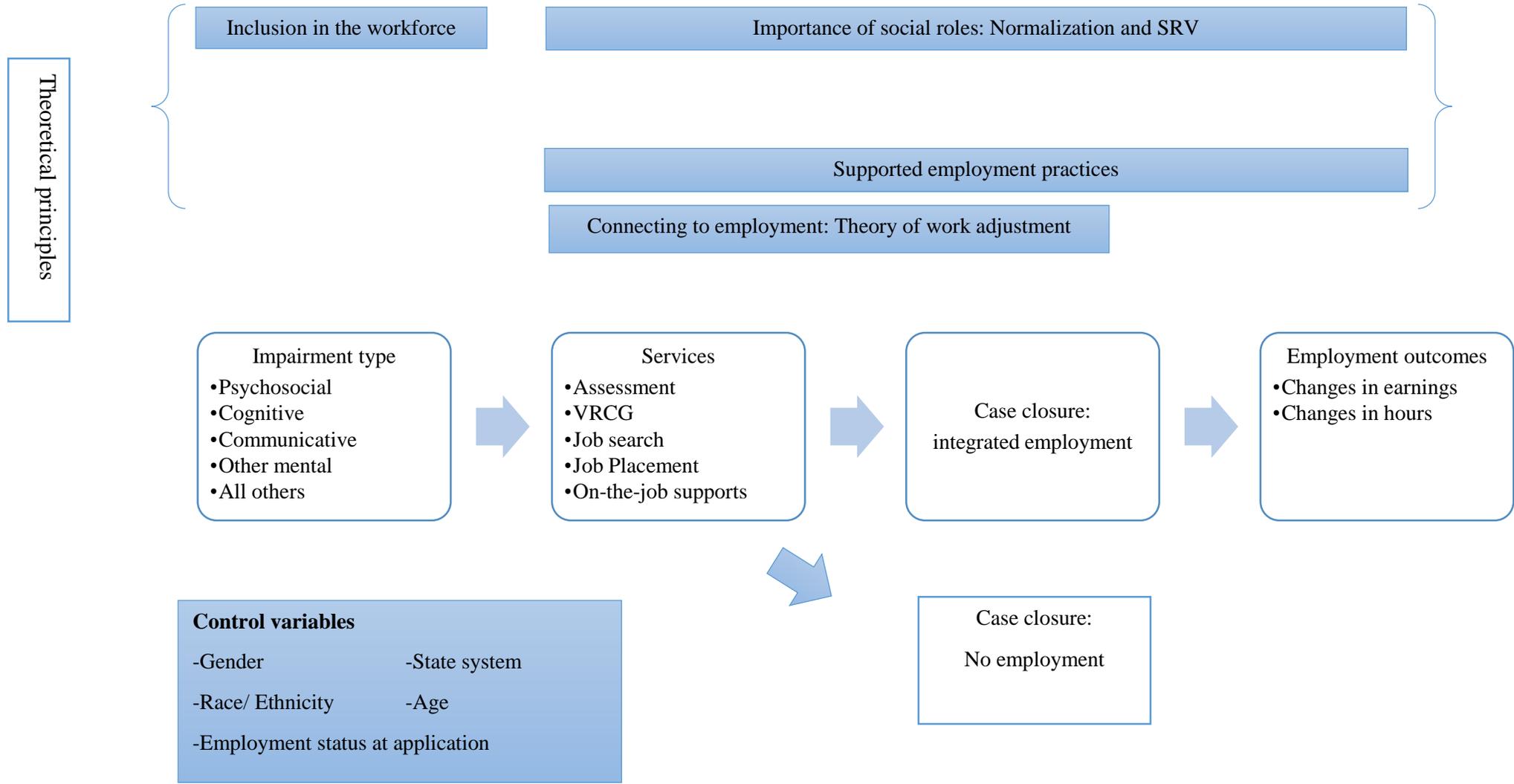


Figure 3.2.  
*Conceptual Model*

Second, this study looked at case closure in integrated employment settings for individuals with ASD served in FY 2013. In an attempt to predict integrated employment at closure this study looked at the most commonly accessed services by VR recipients with ASD. Central to integrated employment as primary outcome was the acknowledgment of the “normal” and valued social roles individuals with ASD can experience by being employed in community settings earning regular wages. In addition the importance of good job fit, as achieved through quality VR services can lead to employment in the community, and failure to adhere to TWA can result in unemployment or with decreased access to the community. Supported employment practices found in VR’s job-related services will result in the increased likelihood that an individual with ASD will have integrated employment at closure. By controlling for impairment type and services the results provide a more defined vision of which types of services and impairment types lead to case closures in integrated employment settings.

Third, this study looked at which types of VR services lead to successful employment outcomes as defined by changes in weekly earnings and hours worked. Successful employment outcomes in the literature include variables related to wages, hours worked, public benefits, and case closures (Burgess & Cimera, 2014; Butterworth et al., 2014; Chen, Leader, Sung, & Leahy, 2014; Delin, Hartman, & Sell, 2014). Earnings and hours worked in the community are important indicators of inclusion and economic well-being. SVR would posit that working in the community more often and earning money for a job leads to a valued and normal role in society. TWA recognizes that a mutually beneficial employment relationship between an employee and employer

make this more likely, and SE services focused on job-related tasks provide a proven mechanism for this to occur.

This step within the study provided the last phase in highlighting the potential trajectories for individuals with ASD in VR to better understand which services in fact lead to increased weekly wages and hours worked. Controlling for impairment, service type, state system, gender, age, race, employment status at application produced an illuminated pathway in which individuals with ASD can find potential success through VR programs and services.

In order to increase the employment rate of individuals with ASD and improve the effectiveness of the services provided it is critical to have a more comprehensive and in-depth understanding of what is currently occurring within VR agencies and what factors influence the experiences and outcomes of individuals with ASD. Findings from this work fill gaps in the literature around how individuals with ASD are utilizing VR services, how ASD impairment type influences service receipt and outcomes, and which services lead to integrated employment and changes in earnings and hours worked.

With the increasing interest of Employment First initiatives, measurable employment outcomes, and the effective use of public monies this study provides a framework for discussion around which types of VR services provide the best employment outcomes for individuals with ASD. Although the why behind these services could not be answered in this study, this work can begin to point towards which services within the VR system show the most promise.

## Chapter IV

### Methods

#### Design

This study utilized descriptive and inferential statistical analysis by employing a non-experimental design to describe how Vocational Rehabilitation (VR) services are provided to individuals with Autism Spectrum Disorders (ASD) across the United States. Drawing from extant data from the Rehabilitation Service Administration (RSA), the non-experimental nature of this study is limited to correlational research. Causal relationships cannot be determined from this type of research design (Babbie, 2012). This study examined the relationships between VR recipients with ASD and employment outcomes to answer the following research questions:

1. Do the types of ASD impairment influence which services are utilized by individuals with ASD?
2. Do the types of services received affect integrated employment at closure?
3. What types of services produce improved employment outcomes for individuals with ASD?

Previous research has not been conducted on the impact of ASD impairment type in VR. Therefore, a non-directional relational hypothesis is appropriate for question one; *the type of impairment will influence which VR services an individual will receive*. Due to the varied nature of ASD it is difficult to ascertain which ASD impairment type would be considered the most severe. Previous findings suggest that the severity of impairment can influence an individual's access to services as well as their employment outcomes (Rogan & Rhine, 2011; Timmons et al., 2006; Wolfe, & Winsor,

2011). Cimera and Cowan (2014) also identify ASD severity as a possible factor in employment outcomes.

Research has indicated that certain types of job-related and educational supports in VR can lead to improved employment outcomes for individuals with ASD (Greene, 2006; Migliore et al., 2012 & 2013; Nicholas et al., 2014). This study's focus on improving employment outcomes supports the development of two directional relational hypotheses for questions two and three. *Individuals who receive job-related services (job search, job placement, and on-the-job supports) are more likely to have their cases closed in integrated employment, and individuals who receive job-related services (job search, job placement, and on-the-job supports) are more likely to experience changes in weekly earnings and hours worked.* These hypotheses seek to identify relationships between the variable rather than establish cause and effect.

### **Data Source**

Data for this study were drawn from the Rehabilitation Service Administration (RSA) Case Service Report (CSR) (RSA-911) for fiscal year 2013 (FY 2013). RSA-911 FY 2013 contains information on nearly 600,000 VR participants and provides comprehensive information on services and outcomes in VR. This study utilized the most current dataset available to researchers that captured data collected from October 1, 2012 to September 30, 2013.

Annually, RSA collects data from VR agencies through the CSR, which is completed in each state and U. S. territory. Data collected in the CSR is imputed by VR counselors or a proxy, and includes information on applicant demographics, services

provided, and outcomes. RSA-911 data are used to generate data and reports, which can then describe VR recipients, services, and outcomes within a given program year. Data can also be used longitudinally across program years. Completion of the CSR is required by all state and territorial VR agencies for continued VR funding. The required nature of CSR results in a robust dataset. Upon visual review of the variable values, missing data are not a significant issue for those selected for analysis. Aggregate data from RSA-911 are publicly available, while de-identified individual level data require special permission from RSA. RSA is under the auspice of the U.S. Department of Education.

## **Sample**

This study relied on a restricted sample based on a number of characteristics. A sample of individuals with ASD was extracted from RSA-911. Cases extracted include individuals with a primary or secondary disability with the source impairment as Autism (code 08). There are a total of 37 impairment categories in the data set. The initial sample identified 15,679 individuals with ASD as the source of their disability.

**Inclusion criteria.** To be included in the final analyses inclusion and exclusion criteria were identified.

**Research questions one and two.** This study analyzed only individuals with ASD who received services from VR and had their cases closed in FY 2013. The sample for this analysis included 10,209 individuals with ASD that met the inclusion criteria for questions one and two.

**Research question three.** This question explored the connections between services and changes in earnings and hours worked between closure and application. In

order to be included in the sample for question three the sample had to be restricted further to include only individuals that had experienced case closure in integrated employment. This resulted in a total sample of 5,805 individuals for this analysis.

**Exclusion criteria.** If individuals with ASD were accepted to VR, but did not ever receive services through VR, they were excluded from the sample. A total of 5,470 individuals were excluded from the sample. This study looked at the relationships between services and employment outcomes; including this group would not have provided any meaningful results.

**Research question three.** In order to accurately calculate changes in earnings and hours worked between closure and application, an individual had to be employed in order to report earnings and hours at closure. Because individuals who did not have employment at closure were listed as having no earnings and no hours worked, including them in the analysis would have provided an inaccurate picture of which services lead to changes in earnings and hours worked. This sample included 5,805 individuals.

**Summary Statistics.** This section provides an overview of the descriptive statistics of the extracted sample of 10,209 service users with ASD who received services and had their cases closed in FY 2013. A restricted sample of 5,805 was created for question three which represented only individuals who experienced case closure in integrated employment.

**Individual characteristics.** In the full sample service users were 83.6% male with an age range of 11–69 ( $M = 21.57$ ); 86.9% were white, 10.5% Black or African American, 1.3% American Indian or Alaska Native, 2.7% Asian, 0.5% Pacific Islander, and 5.3% identified as Hispanic or Latino.

All service users had ASD as their primary or secondary cause for impairment. The sample was divided into five impairment types (which were caused by ASD): psychosocial, cognitive, communicative, other mental, and all other impairments. The majority of the service users were labeled as having a cognitive impairment (43.8%), or psychosocial impairment (45%). The remainder of the sample was identified as having communicative impairments (4.2%), other mental impairments (7%), or all other impairments (<1%). Table 4.1 provides an overview of the sample used in this study.

Table 4.1  
*Sample description*

Variable descriptors	Full sample					Restricted sample				
	<i>n</i>	%	Range	<i>M</i>	<i>SD</i>	<i>n</i>	%	Range	<i>M</i>	<i>SD</i>
<i>Gender</i>										
Female	1,673	16.4				853	14.6			
Male	8,536	83.6				4952	85.4			
<i>Age</i>			11-69	21.57	7.13			14-69	21.96	7.26
<i>Race/ Ethnicity</i>										
White	8,868	83.6				4850	83.5			
Black/African American	1,073	10.5				504	8.6			
American Indian/Alaska Native	130	1.3				28	0.5			
Asian/ Pacific Islander	319	3.2				110	1.8			
Hispanic/Latino	545	5.3				132	2.3			
						281	4.8			
<i>Impairment type</i>										
Psychosocial	4,590	45				258	4.4			
Cognitive	4,467	43.8				2586	44.5			
Communicative	426	4.2				426	43.6			
Other mental	719	7				1	0			
All other impairment types	7	0.1								
<i>Integrated employment at application</i>										
No IE at app	9,217	90.3				5053	87			
IE at app	992	9.7				752	13			

Variable descriptors	<i>n</i>	%	Range	<i>M</i>	<i>SD</i>		<i>n</i>	%	Range	<i>M</i>	<i>SD</i>
<i>Integrated employment at closure</i>											
No IE at closure	4,404	43.1					0	0			
IE at closure	5,805	56.9					5805	100			
<i>Weekly earnings</i>											
At application	10,209		\$0-2,400	\$15.06	\$65.67				\$0-2,400	\$20.73	\$78.83
At closure	5,825		\$7-2,400	\$213.35	\$148.44				\$7-2,400	\$213.35	\$148.31
<i>Weekly hours worked</i>											
At application	10,209		0-58	1.72	6.23				0-58	2.31	7.17
At closure	5,825		1-84	23.31	10.52				1-84	23.31	10.52

*Service characteristics.* At the time of application only 9.7% of the service users were in integrated employment. Almost 90% of the individuals were not employed at the time of application. The full sample ( $N = 10,209$ ), which included individuals who were employed and not employed, they had average weekly earnings of \$15.06 ( $SD = \$65.67$ ) and worked an average of 1.72 ( $SD = 6.23$ ) hours per week. At VR closure, 56.9% of the sample were in integrated employment with average weekly earnings of \$212.99 ( $SD = \$148.44$ ), and worked an average of 23.26 ( $SD = 10.55$ ) hours per week, while 43.1% were not in integrated employment even after receiving VR services.

Although provided with VR services, only 56.9% ( $n = 5805$ ) of the sample was employed at the time of closure, leaving 4,404 individuals without integrated employment. Tables 4.2 and 4.3 provide an overview of how earnings and hours changed from application to closure for those that had their cases closed in integrated employment. As would be expected due to low employment at the time of application, the mean earnings and hours worked at application are also low. The mean change in earnings between closure and application is \$399.00 ( $SD = \$488.65$ ) with a mean change in hours of 3.08 ( $SD = 1.37$ ). Although the average weekly earnings of \$212.99 ( $SD = \$148.44$ ) and weekly hours of 1.72 ( $SD = 6.23$ ) were low, during the course of service between application and closure, 20.5% of the service users gained an additional 11–20 hours per week, and 23.5% increased their earnings between \$101–\$200.

Table 4.2

*Change in weekly hours between closure and application for those with employment*

Change in hours	Frequency	Percent
No change in hours	284	2.8
Gain of 1-5 hours	381	3.7
Gain of 6-10 hours	632	6.2
Gain of 11-20 hours	2,088	20.5
Gain of 21-39 hours	1,597	15.6
Gain of > 40 hours	751	7.4
Loss of 11-20 hours	2	0
Loss of 6-10 hours	18	0.2
Loss of 1-5 hours	72	0.7
Total	5,805	56.9
Not employed	4,404	43.1
Total	10,209	100

Table 4.3

*Change in weekly earnings between closure and application for those with employment*

Change in earnings	Frequency	Percent
No change in earnings	89	0.9
Gain of \$1-\$50	374	3.7
Gain of \$51-\$100	714	7
Gain of \$101-\$200	2,403	23.5
Gain of > \$200	2,108	20.6
Loss of \$1-\$50	71	0.006
Loss of \$51-\$100	29	0.003
Loss of \$101-\$200	23	0.002
Loss of > \$200	14	0.001
Total	5,805	56.9
Not employed	4,404	43.1
Total	10,209	100

*Service system characteristics.* Utilization of services by state was used as a control variable, as rehabilitation research indicates that location can play a significant role in VR service outcomes (GAO, 2007; Gruman et al., 2014; Honeycutt et al., 2014; Leahy, Chan, & Lui, 2014; Nord et al., 2013; Rogan et al., 2002; U.S. Department of Education, 2012). Table 4.4 provides an overview of how each state VR system provided services to individuals with ASD. The average nationwide cost of VR services for an individual with ASD was \$4,379 per year. Of the top five services provided by VR, state systems varied in how much they provided each service within their state. The descriptive statistics provide an overview of the variability in service provision across states.

The state system variable was a crucial control in each analysis because it accounted for: (1) individual level participation; recipients within a state were coded with their state's proportion of a service; and (2) aggregate level system influence as a state's average proportion was an indicator of how each state VR system utilized a service for this population. The dataset does not provide a mechanism to account for variability within a state, such as rural versus urban, but the inclusion of this variable in the analysis allowed for a snapshot of each state's VR service system and the unique way each implements services for individuals with ASD. In addition, the state system variable attempts to control for how individuals use their state's VR system. Failure to account for each state's VR system would have assumed that all states would be providing each service in the same way. Despite being a federal program, state VR programs have some autonomy in implementation. Each state's unique policy, economic, service system, and culture likely influence how VR services are provided. Additional information on the

development and inclusion of this variable are discussed in the independent variable section later this chapter.

Table 4.4  
*State and territory utilization of services*

State/Territory	<i>n</i> (total served statewide)	Mean cost of purchased services	Percentage who received service					
			Assessment	VRCG	Job Search	Job Placement	On-the-job supports	Integrated employment at closure
AK	31	\$3,808.45	45.2%	100.0%	41.9%	3.2%	67.7%	87.0%
AL	124	\$4,709.64	0.0%	0.0%	12.9%	97.6%	5.6%	65.0%
AR	51	\$2,494.08	37.3%	100.0%	5.9%	5.9%	2.0%	47.0%
AS	0		0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
AZ	95	\$7,491.95	58.9%	100.0%	65.3%	5.3%	17.9%	53.0%
CA	897	\$4,997.79	37.2%	43.0%	67.0%	26.2%	46.0%	40.0%
CO	166	\$2,525.15	66.3%	98.8%	56.0%	68.7%	43.4%	78.0%
CT	143	\$7,429.23	87.4%	100.0%	26.6%	48.3%	58.0%	59.0%
DC	9	\$5,095.78	44.4%	100.0%	0.0%	33.3%	22.2%	56.0%
DE	51	\$7,274.02	62.7%	2.0%	0.0%	64.7%	41.2%	86.0%
FL	346	\$4,502.72	3.2%	3.5%	3.5%	25.4%	53.8%	43.0%
GA	313	\$3,923.59	50.2%	10.5%	0.0%	25.2%	0.3%	31.0%
GU	1	\$6,854.00	0.0%	0.0%	100.0%	100.0%	100.0%	0.0%
HI	48	\$2,326.96	50.0%	10.4%	39.6%	27.1%	27.1%	35.0%
IA	105	\$3,263.10	71.4%	10.5%	24.8%	43.8%	0.0%	61.0%
ID	127	\$2,358.51	76.4%	98.4%	19.7%	52.8%	22.8%	58.0%
IL	425	\$3,830.03	41.4%	96.5%	59.1%	57.2%	18.6%	53.0%
IN	349	\$5,539.35	91.1%	55.0%	67.0%	63.3%	62.5%	63.0%
KS	116	\$4,072.16	80.2%	0.9%	0.0%	69.0%	55.2%	51.0%
KY	119	\$4,828.96	82.4%	16.8%	43.7%	11.8%	47.1%	59.0%

State/Territory	<i>n</i> (total served statewide)	Mean cost of purchased services	Assessment	VRCG	Job Search	Job Placement	On-the-job supports	Integrated employment at closure
LA	127	\$3,266.20	83.5%	99.2%	12.6%	44.1%	43.3%	32.0%
MA	235	\$1,117.65	29.8%	97.4%	18.7%	86.0%	29.8%	62.0%
MD	207	\$2,966.17	69.1%	95.2%	55.6%	62.3%	46.9%	72.0%
ME	84	\$4,337.18	61.9%	96.4%	15.5%	92.9%	73.8%	50.0%
MI	467	\$4,236.99	72.2%	30.2%	8.6%	50.1%	26.6%	45.0%
MN	294	\$3,624.81	69.4%	95.2%	44.6%	54.1%	20.4%	64.0%
MO	267	\$6,817.13	83.5%	92.5%	87.6%	78.3%	83.5%	70.0%
MP	0	\$0.00	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
MS	51	\$885.65	82.4%	96.1%	9.8%	74.5%	19.6%	55.0%
MT	57	\$4,388.91	94.7%	36.8%	61.4%	29.8%	36.8%	44.0%
NC	446	\$4,605.39	99.8%	30.0%	24.7%	46.6%	58.5%	55.0%
ND	22	\$3,663.18	54.5%	100.0%	54.5%	45.5%	18.2%	68.0%
NE	78	\$456.62	91.0%	84.6%	56.4%	59.0%	64.1%	73.0%
NH	87	\$3,130.25	82.8%	56.3%	66.7%	5.7%	49.4%	56.0%
NJ	224	\$3,385.09	36.6%	100.0%	43.8%	50.9%	22.8%	61.0%
NM	33	\$4,202.55	69.7%	100.0%	69.7%	63.6%	54.5%	45.0%
NV	46	\$3,023.96	89.1%	95.7%	39.1%	54.3%	13.0%	54.0%
NY	666	\$4,638.30	54.4%	4.7%	0.0%	18.2%	51.1%	64.0%
OH	412	\$9,058.00	78.4%	3.2%	16.7%	65.5%	48.1%	51.0%
OK	92	\$7,972.67	22.8%	95.7%	18.5%	51.1%	54.3%	64.0%
OR	221	\$4,189.45	79.2%	17.2%	27.1%	28.1%	22.6%	67.0%
PA	589	\$3,919.46	89.5%	99.3%	44.5%	36.7%	30.7%	51.0%
PR	12	\$10,586.08	58.3%	25.0%	8.3%	8.3%	16.7%	67.0%
RI	37	\$9,004.78	86.5%	100.0%	0.0%	48.6%	8.1%	65.0%
SC	59	\$2,309.93	100.0%	100.0%	88.1%	88.1%	69.5%	54.0%

State/Territory	<i>n</i> (total served statewide)	Mean cost of purchased services	Assessment	VRCG	Job Search	Job Placement	On-the-job supports	Integrated employment at closure
SD	55	\$3,533.13	65.5%	94.5%	49.1%	60.0%	56.4%	69.0%
TN	102	\$7,358.83	96.1%	100.0%	40.2%	27.5%	58.8%	65.0%
TX	537	\$6,832.68	79.7%	95.2%	45.3%	58.8%	28.9%	62.0%
UT	164	\$4,319.18	71.3%	67.7%	65.9%	56.1%	43.3%	75.0%
VA	307	\$4,348.04	47.6%	98.7%	13.4%	59.9%	56.7%	64.0%
VI	2	\$287.50	50.0%	100.0%	50.0%	0.0%	0.0%	0.0%
VT	92	\$4,761.32	68.5%	98.9%	73.9%	52.2%	53.3%	76.0%
WA	246	\$6,189.49	64.2%	94.3%	0.0%	80.9%	32.9%	74.0%
WI	299	\$6,866.35	63.5%	82.6%	54.5%	61.2%	20.4%	67.0%
WV	45	\$5,741.47	91.1%	95.6%	75.6%	66.7%	57.8%	67.0%
WY	31	\$1,898.74	100.0%	93.5%	58.1%	41.9%	51.6%	45.0%
M		\$4,379.44	69.20%	66.40%	36.30%	41.10%	37.70%	55.0%
<i>SD</i>		2,312.65	27.9	40.5	27.7	26.3	23.3	19.5
Total	10,209							

In order to determine which services were selected for analysis, frequency distributions were reviewed for all of VR's twenty-two services. The most highly utilized services for this population were: (1) assessment; (2) vocational rehabilitation counseling and guidance (VRCG); (3) job placement assistance; (4) job search assistance; (5) on-the-job supports. Of the total sample ( $N = 10,209$ ), 94.4%, or 9,642 individuals received one or more of the top five services.

Table 4.5  
*Utilization: All services, all providers*

Service type	<i>n</i>
Assessment	6,535
Vocational rehabilitation counseling and guidance (VRCG)	6,209
Job placement assistance	4,900
On-the-job supports	4,028
Job search assistance	3,647
Other services	2,478
Transportation	2,337
Job readiness training	2,303
Diagnosis & treatment	2,274
Information and referral	2,194
Miscellaneous training	1,353
College or university training	1,036
Maintenance	941
Occupational/vocational training	760
On-the-job training	518
Rehabilitation technology	322
Disability-related augmentative services	206
Basic academic remedial or literacy training	125
Technical assistance	111
Reader	73
Personal attendant	67
Interpreter	27

Assessment and vocational rehabilitation counseling and guidance are administrative services, and job placement assistance, on-the-job supports, and job search assistance are considered job-based services. VR services are provided directly by VR or by contracted vendors. VR programs often contract with community rehabilitation providers (CRP) in the public or private sector to provide direct services to VR recipients. In addition VR may also utilize one-stop employment or training centers or other private or public sources. This analysis also was interested in who provided each VR service. The percentage of each service provided by provider type was calculated looking specifically at VR, CRPs, and all others (one-stop centers and other sources). VR provided 40.6% of the services analyzed, while CRPs provided 36.9%, and all other vendors provided 22.4% of these services. Assessment was provided primarily by CRPs (24.4%) and all other sources (20.9%). The majority of VRCG service was provided by VR (58.6%). Job-related services (job search, job placement, and on-the-job supports) were more often provided by CRPs. Table 4.6 provides an overview how much of each service was provided by VR, CRPs, and all other providers. This analysis did not look at the effectiveness of each provider type in achieving employment outcomes; however, this information is useful in understanding which types of providers individuals with ASD are receiving services from.

Table 4.6  
*Proportion of each service by provider type*

Service by vendor	<i>n</i>	%
<i>VR</i>		40.6
Assessment	1919	18.8
VRCG	5986	58.6
Job Search	791	7.7
Job Placement	1221	12
On-the-job supports	315	3.1
<i>CRP</i>		36.9
Assessment	2486	24.4
VRCG	93	0.9
Job Search	2492	24.4
Job Placement	2687	26.3
On-the-job supports	1819	17.8
<i>All other</i>		22.4
Assessment	2130	20.9
VRCG	130	1.3
Job Search	1037	10.2
Job Placement	1187	11.6
On-the-job supports	1026	10

## **Variables**

This study sought to explain the relationship between VR services and employment outcomes for individuals with ASD. The variables selected for analysis will attempt to answer the primary research question for this study: Do job-related VR services lead to improved employment outcomes for individuals with ASD? In order to understand the complexity of this relationship, three research questions were developed which utilize RSA-911 variables. The definitions of some variables are defined using parameters presented in the RSA-911 codebook. Additional variables were created to address

specific research questions. The selection of variables for this study are in line with previous research conducted by Cimera and Burgess (2011), Cimera and Cowan, (2009), Migliore et al. (2012), Migliore et al. (2013), and Shaller and Yang (2005). Findings from this study seek to further advance understanding in this area of rehabilitation research using a common set of accepted variable and metrics.

Variables in this study played multiple roles based upon the analysis approach selected. Tables 4.7-4.9 outline the multiples use of each variable in this study, and Table 4.10 the narrative in the following section provides a definition of each.

Table 4.7  
*Variable usage analysis one*

Variable name	Variable usage		
	IV	DV	CV
<i>Service</i>			
Assessment		✓	
VRCG		✓	
Job placement		✓	
Job search		✓	
On-the-job supports		✓	
Impairment type	✓		
Integrated employment status at application			✓
<i>State system</i>			
Assessment			✓
VRCG			✓
Job search			✓
Job placement			✓
On-the-job supports			✓
Gender			✓
Race/Ethnicity			✓
Age			✓

Note: Binary logistic regression. Five models predicting service receipt based on impairment.

Table 4.8  
*Variable usage analysis two*

Variable name	Variable usage		
	IV	DV	CV
<i>Service</i>			
Assessment	✓		
VRCG	✓		
Job placement	✓		
Job search	✓		
On-the-job supports	✓		
Impairment type			✓
Integrated employment status at application			✓
Integrated employment status at closure		✓	
State system: Integrated employment at closure			✓
Gender			✓
Race/Ethnicity			✓
Age			✓

Note: Binary logistic regression. One model predicting case closure based on service type.

Table 4.9  
*Variable usage analysis three*

Variable name	Variable usage		
	IV	DV	CV
<i>Service</i>			
Assessment	✓		
VRCG	✓		
Job placement	✓		
Job search	✓		
On-the-job supports	✓		
Earnings difference		✓	
Hours difference		✓	
Impairment type			✓
Integrated employment status at application			✓
Integrated employment status at closure			✓
State system: Integrated employment at closure			✓
Gender			✓
Race/Ethnicity			✓
Age			✓

Note: Multivariate linear regression. Two models predicting changes in earnings and hours based on service type.

**Dependent variables.** Three research questions were developed to explore the relationship between VR services for individuals with ASD. The following were identified as dependent variables for each research question. The services used in this study are explained in Table 4.10.

Table 4.10

*VR Service Definitions*

Service Type	Definition
<i>Administrative services</i>	
Assessment	Broad range of services and activities provided in order to determine an individual's eligibility for VR, assignment to VR priority category, and/or determine the type and scope of VR services to be outlined in an individual's IPE. Assessments could include but are not limited to: medical, psychological, specialty, or vocational exams.
Vocational rehabilitation counseling & guidance (VRCG)	Counseling and support services designed collaboratively with the individual to target specific needs related to achieved the desired employment outcome. These services may provide counseling that addresses social, family, medical, vocational needs.
<i>Job-related services</i>	
Job search assistance	Service provided to assist an individual in searching for a job which could include but is not limited to: resume development, searching for available job opportunities, interview skill development, and/or making contacts with a potential employer.
Job placement assistance	Referral for a specific job that results in an interview. The individual may or may not obtain employment through this referral.
On-the-job supports	Services provided to an individual who is employed that assist in supporting the current job placement. These could include but are not limited to job coaching, follow-along, and job retention supports.

Note. Definitions provided by State of Arizona VR program manual (2015).

***Analysis one.***

*Services.* Frequency distributions were used to capture the most utilized services across VR. The top five most utilized services were extracted for deeper analysis. The most utilized services are: (1) assessment; (2) vocational rehabilitation counseling and

guidance (VRCG); (3) job placement assistance; (4) on-the-job supports; and (5) job search assistance. Each variable was recoded to determine if a participant received each service listed: (0) did not receive service, (1) received service.

*Assessment.* Assessment represents a broad range of services and activities provided in order to determine an individual's eligibility for VR, assignment to VR priority category, and/or the type and scope of VR services to be outlined in an individual's IPE. Assessments could include but are not limited to: medical, psychological, specialty, or vocational exams. This variable represents the individuals who received or did not receive assessment services.

*Vocational Rehabilitation Counseling and Guidance (VRCG).* Counseling and support services designed collaboratively with the individual to target specific needs related to achieved the desired employment outcome. These services may provide counseling that address social, family, medical, and vocational needs. This variable represents the individuals who received or did not receive VRCG services.

*Job placement assistance.* Job placement is designed to assist an individual in searching for a job which could include but is not limited to: resume development, searching for available job opportunities, interview skill development, and making contacts with a potential employer. This variable represents the individuals who received or did not receive job placement assistance services.

*Job search assistance.* Job search assistance is a referral for a specific job that results in an interview. The individual may or may not obtain employment through this referral. This variable represents the individuals who received or did not receive job search assistance services.

*On-the-job supports.* On-the-job services are designed to support an individual who is employed in supporting the current job placement. These could include but are not limited to job coaching, follow-along, and job retention supports. This variable represents the individuals who received or did not receive on-the-job supports services.

***Analysis two.***

*Integrated employment at closure.* This variable represents a VR participant that exited VR with integrated employment. ‘Integrated employment at closure’ represents a binary variable that is coded (0) no integrated employment at closure, (1) integrated employment at closure. This variable was created by transforming the VR’s “employment status at closure” variable and collapsing the eight categories, (01) employment without supports in an integrated setting; (02) extended employment; (03) self-employment; (04) state agency managed business enterprise program (BEP); (05) homemaker; (06) unpaid family worker; (07) employment with supports in an integrated setting; (08) no employment, into two categories. This variable is entered when a participant’s case is closed and represents the participant’s employment status. Numbers two, five, six, and eight were coded as (0) no integrated employment at closure; numbers one, three, four, and seven were coded as (1) integrated employment at closure.

***Analysis three.***

*Earnings difference.* This variable was calculated by subtracting the weekly earnings at closure from the weekly earnings at application. ‘Weekly earnings at application’ represents the weekly earnings recorded at a VR participant’s application. The VR counselor or proxy enters the amount of money to the nearest dollar earned in a

typical week. Earnings for this purpose include all income from wages, salaries, tips, and commissions before payroll deductions.

*Hours difference.* This variable was calculated by subtracting the weekly hours worked at closure from the weekly hours worked at application. ‘Hours worked in a week at application’ represents the total number of weekly hours worked at a VR participant’s application. The VR counselor or proxy enters the number of hours an individual worked for a typical week at application. Earnings may be in the form of wages, tips, salaries, commissions, profits from self-employment, adjusted gross income for salespersons, and the like.

‘Hours worked in a week at closure’ and ‘Weekly earnings at closure’ represents the total number of weekly earnings and hours worked by the VR participant at case closure. For an individual who achieved an employment outcome, the VR counselor or proxy enters the earnings and number of hours an individual worked for a typical week when the service record was closed. To calculate the earnings and hour difference variable, the weekly earnings and hours at closure was subtracted from the weekly earnings and hours at application.

**Independent variables.** Independent variables were identified to assist in predicting the relationships between VR services and individuals with ASD. The following were identified as independent variables for the three secondary research questions.

*Analysis one.*

*Impairment.* Impairment code represents the VR participant’s most significant barrier to employment. In this study the cause of all impairments is ASD. In addition to

being labeled with ASD as a primary and secondary disability, RSA-911 includes coding for the type of impairment an individual is experiencing as a subcategory of disability. The impairment types within the ASD label were included in this analysis to compare the experiences of different groups within ASD. The impairment variable represents four distinct impairments within ASD: (1) psychosocial; (2) cognitive; (3) communicative; and (4) other mental. The ‘other mental’ category was not defined within the VR RSA-911 manual. These four impairment types represent the core features of ASD as a diagnostic label, which are related to communication, social interaction, behavior, and cognition.

To create the impairment variable, primary and secondary impairment were combined into one variable for analysis. Each case has an impairment type with a corresponding cause for the impairment. For cases that had multiple impairments for the list above, the first impairment was used to assign them to an impairment category. An additional category was created for those individuals who did not have a primary impairment in the impairments referenced above. This group was labeled as ‘all other impairments’ and included seven cases.

‘Primary disability’ and ‘Secondary disability’ within RSA-911 represents the primary and secondary impairment of the VR participant. The impairment label, such as psychosocial, cognitive, and communicative, represents the individual’s most significant barrier to employment. Each impairment lists a primary cause. The cause is a reason or source of the impairment. There are 37 different causes for impairment, including ASD. Anxiety disorders, cancer, blood disorders, epilepsy, intellectual disability, and multiple sclerosis are other examples of causes for impairments. In this sample all participants had

ASD as the cause for their primary or secondary or secondary disability. Not all cases had a secondary disability.

*Analysis two and three.*

*Services.* See dependent variable under analysis one for descriptions.

**Control variables.** Control variables will be held constant to test the impact of the independent variables described. For this study a number of control variables were used.

*State system.* Research using hierarchical linear modeling (HLM) has shown that relationships can be drawn between the individual and system level outcomes (Chan et al., 2013; Glisson, Hemmelgarn, Green, & Williams, 2013; Taylor & Mailick, 2014). HLM was not used in this study, however understanding and controlling for the uniqueness of each VR state system was an important factor in accounting for the differences between state systems.

New variables were created to capture each state's utilization of a given service. Rather than controlling only for location, the state system variable took into account each state's VR system and how much it provided services to individuals with ASD. Using descriptive statistics, a proportion for each state could be determined based on how many VR recipients has received that service within a state. A new variable was created that recoded all recipients within each state (who received and didn't receive the service), with their state's proportion. Table 4.11 provides an example of state system variability in the assessment service. For example, 45.2% of Alaska's VR recipients with ASD received assessment, whereas 96.1% received the service in Tennessee. The table identifies the number of recipients who received the service, the number who did not receive the service, and the total number of recipients with ASD service within a state. It

is the proportion of recipients who received the service in the state that was used to create the state system: assessment variable. The state system variable was calculated for each of the five services and integrated employment at closure and was used in other analyses.

Although HLM was not used in this study, intraclass correlation (ICC) can be useful in understanding the role the state system variable plays throughout the analyses. According to Field (2013), “ICC represents the proportion of the total variability in the outcome that is attributable to the classes” (p. 817). If the class (i.e., state system) had a large effect on the outcome (which varied by analyses) then the variability within the class would experience similar results. Conversely, if the class had a small effect then it is likely that the outcome would vary considerably within the class making the class differences small. However, when variability can be minimized (through the use of a standardized state system variable providing a weighted average by state) the outcomes within classes can be minimized (Field, 2013). The ICC indicates that the variability within levels of the contextual state system may be small (variability at the individual level within the state), but between state systems (aggregate comparison between state systems) variability is large. Table 4.11 highlights the variability within a state at the individual level and between states at a national aggregate level.

The state system variable is important in controlling for the influences of a state’s VR system on outcomes. If no control was provided it could be assumed that all state VR programs are implementing each service uniformly. Literature suggests otherwise. Therefore the state system variable captures each state’s unique approach to providing a service to individuals with ASD. At the individual level this variable indicates whether or

not the service was received, and on an aggregate level it provides an indicator of how a state uses a service for this population.

Table 4.11  
*State System: Assessment (sample states)*

State	Did not receive		Received service		Total served in the state
	<i>N</i>	%	<i>N</i>	%	
AK	17	54.8%	14	45.2%	31
AL	124	100.0%	0	0.0%	124
CA	563	62.8%	334	37.2%	897
CO	56	33.7%	110	66.3%	166
CT	18	12.6%	125	87.4%	143
DE	19	37.3%	32	62.7%	51
FL	335	96.8%	11	3.2%	346
IN	31	8.9%	318	91.1%	349
KY	21	17.6%	98	82.4%	119
MA	165	70.2%	70	29.8%	235
MD	64	30.9%	143	69.1%	207
MI	130	27.8%	337	72.2%	467
MN	90	30.6%	204	69.4%	294
NY	304	45.6%	362	54.4%	666
PA	62	10.5%	527	89.5%	589
PR	5	41.7%	7	58.3%	12
RI	5	13.5%	32	86.5%	37
SC	0	0.0%	59	100.0%	59
SD	19	34.5%	36	65.5%	55
TN	4	3.9%	98	96.1%	102
UT	47	28.7%	117	71.3%	164
VA	161	52.4%	146	47.6%	307
VI	1	50.0%	1	50.0%	2
VT	29	31.5%	63	68.5%	92
WA	88	35.8%	158	64.2%	246
WY	0	0.0%	31	100.0%	31

The resulting state system variables provided a way to determine what percentage of a state's VR population had received a service and provided a means to compare states with each other. States that provided more of a service received higher values, while states that did not provide as much or none of the service received smaller values. The following state system controls were developed: (1) State system: Assessment; (2); State system: VRCG; (3) State system: Job search; (4) State system: Job placement; and (5) State system: On-the-job supports.

Additional tables were built to check the new variables proportions, ensuring they accurately captured the percentages of a state's ASD population using the service. These variables were used as a control for each state VR system in research question one. A similar process was used to create the State system: Integrated employment closure variable for research questions two and three. By calculating each state's integrated employment at closure rate, a continuous scale variable displaying a state's percentage of its ASD population closed in integrated employment was created. Each recipient within the state, including those that closed with and without integrated employment, was recoded with their state's proportion.

***Gender.*** The variable of gender represents a VR participant's self-identified sexual category and is labeled as (0) male, or (1) female.

***Race/ethnicity.*** Race and ethnicity are self-identified by the VR participant. RSA utilizes the same racial and ethnic categories defined by the federal Office of Management and Budget (OMB). Race was coded differently for the logistic and linear regression. For analysis one and two (binary logistic regression) race or ethnicity is entered as a categorical variable with values from 1-6 which indicate the following:

(1) White; (2) Black or African American; (3) American Indian or Alaska Native, which includes individuals who have ties to the original peoples of North, South, and Central America; (4) Asian, which includes individuals having ties to any of the original people of the Far East, Southeast Asia, or the Indian subcontinent; (5) Native Hawaiian or Other Pacific Islander; (6) Hispanic or Latino, which includes individuals of Cuban, Mexican, Puerto Rican, South or Central American, or other Spanish culture or origin, regardless of race. Category 6 will capture those identified as Hispanic or Latino for ethnicity purposes. For analysis three (multivariate linear regression) each category list above was dummy coded: (0) if they are not of that race/ethnicity, and (1) if they are of that race/ethnicity.

*Age.* The age of each recipient during FY 2013 was calculated by subtracting the service year from the recipient's birth year.

*Integrated employment at application.* This variable represents whether or not a VR participant's case was closed in an integrated employment settings. 'Integrated employment at application' represents a binary variable that is coded (0) no integrated employment at application, (1) integrated employment at application. This variable was created by transforming the VR's 'employment status at application' variable and collapsing the eleven categories: (01) employment without supports in an integrated setting; (02) extended employment; (03) self-employment (not BEP), (04) state agency-managed business enterprise program; (05) homemaker; (06) unpaid family worker; (07) employment with support in integrated setting; (08) not employed- student in secondary education; (09) not employed- all other students; (10) not employed- trainee, intern, volunteer; (11) not employed- other. For this study, items two, five, six, and eight—

eleven were coded (0) no integrated employment, and items one, three, four, and seven were coded (1) integrated employment.

*Integrated employment at closure.* Integrated employment at closure was defined in dependent variable under analysis two.

*Impairment.* Impairment was defined in independent variable under analysis one.

## **Data Analysis**

RSA-911 data were analyzed using IBM's SPSS 21.0. This study used a non-experimental design to explore the relationships between a number of dependent and independent variables within VR. Descriptive statistics were used to describe the various features of how VR provided service to individuals with ASD. This included descriptive data on state VR systems, age, gender, race, and service usage.

The three research questions examined variables in an attempt to predict VR employment outcomes related to integrated case closure, earnings, and hours worked. Table 4.12 outlines the primary statistical test for each of the three research questions. Logistic regression was used to answer questions one and two. Linear regression was used to answer question three. For question one logistic regression was used to predict service provided based upon the type of impairment (within ASD). The analysis detected how the type of impairment (psychosocial, cognitive, communicative, other mental, and all other impairments) can predict which type of service individuals receive. In addition the descriptive analysis provided insight into the proportion of each service provided by different service providers.

Table 4.12  
*Variable identification with statistical test*

Research question	Independent variable(s)	Dependent variable(s)	Primary statistical test
1	Impairment type	Assessment VRCG Job search Job Placement On-the-job supports	Binary logistic regression
2	Assessment VRCG Job search Job Placement On-the-job supports	Integrated employment at closure	Binary logistic regression
3	Assessment VRCG Job search Job Placement On-the-job supports	Earnings difference Hours difference	Multiple linear regression

The analysis for question two focused on integrated employment at closure based on the type of service received, and question three focused on employment outcomes (earnings and hours) based on each service type. Taken together, the questions provide a pathway to understanding which services result in improved employment outcomes for individuals with ASD, with additional attention being paid to the type of impairment within ASD.

**Effect size.** In this study odds ratios (OR) and Pearson's  $r$  were used to determine effect size in logistic and linear regression. An odds ratio (OR) is an estimate of the predictor variable's ability to influence the independent variable and is an indicator of the change of odds resulting from changes in the predictor variable (Field, 2013). When the OR is greater than one, it indicates that as the predictor increases the odds of the outcome

occurring also increases, and when the OR is less than one it suggests that as the predictor increases the odd of the outcome, or service, would decrease. An OR equal to one indicates that the probability of the dependent variable is equally likely or unlikely based on independent variable (Field, 2013; Howell, 2010). According to Cohen (1988) OR values of 1.5, 3.5, and 9.0 represent small, medium, and large effect sizes. Percentages were calculated by subtracting the OR value from one (Hosmer & Lemeshow, 2000; UCLA Statistical Consulting Group, 2015). Confidence intervals (CIs) were also calculated with OR values. Large CI values indicate a low level of precision whereas small CI values are recognized as being more precise (Field, 2013; Szumilas, 2010).

Pearson's  $r$ , provides a measure of the linear relationship between the independent and dependent variables often referred to as the strength of the relationship (Field, 2013). Pearson's  $r$  ranges from -1 to +1. Negative values indicate a negative correlation and positive values indicate a positive association. A value of zero indicates that there is no correlation between variables. For the linear regression analyses Pearson's  $r$  value were calculated between each of the variables in the model. Field (2013) reports  $r$  values of  $> .10$  as having a small effect, values of  $> .30$  as a medium effect, and values  $> .50$  as having a large effect. Results of Pearson's  $r$  calculations and odds ratios are outlined in Chapter V.

**Regression analysis.** Logistic regression attempts to find the best fitting model to assist in describing the relationship between the dependent (services and integrated employment at closure) and independent (impairment and services) variables in questions one and two. Logistic regression does not require the same assumptions as linear

regression and can be applied in a variety of ways with categorical variables (Howell, 2010). In logistic regression a linear relationship between the dependent and independent is not required (Stoltzfus, 2011). Due to the nature of this study, binary logistic regression allowed for the prediction of an outcome based on a set of independent variables, or those which can be controlled to estimate the effect that each independent variable has on the outcome. Fewer independent variables allow for a more accurate and precise fit of the regression line (Stoltzfus, 2011). SPSS features were used to test dependent variables for homoscedasticity, multicollinearity, and linearity by visually inspecting scatterplots.

The logistic regression models for questions one and two were built in one block to test for significant coefficients. For question one, five regression analyses were conducted using each of the VR services. Research question two included one regression analysis entered in one block. For each of the categorical predictor variables a reference group was selected to provide additional insight into each of the categories within the predictor variable. The alpha level was set at .05 for all analyses. The p-value was then compared to the alpha level to measure for statistical significance. If a p-value was less than .05 then the variable was interpreted to have predictive capacity on the independent variable.

The strength of relationships was further examined in the regression model using varying methods. Utilizing a correlational design this study sought to explore relationships between variables rather than being able to determine direct cause and effect. Directional relationships for each predictor variable are represented by (B) coefficients, and the  $\text{Exp}(B)$  value provides an odds ratio referenced above.

Due to the continuous nature of the dependent variables in question three, linear regression analyses were required. Linear regression was used to model the relationships between earnings and hours worked across five types of service by fitting the linear equation to the observed data. The linear regression model attempted to determine if wages and hours worked were equal across service type while controlling for extraneous variables in an attempt to predict a VR recipient's wages and hours worked based on services received.

Table 4.13  
*Question three regression equations: Blocks 1-4*

Block	Regression equation
1	$Y = b_0 + \text{state system}$
2	$Y = b_0 + \text{state system} + \text{gender} + \text{race/ethnicity} + \text{age} + \text{employment status application}$
3	$Y = b_0 + \text{impairment} + \text{state system} + \text{gender} + \text{race/ethnicity} + \text{age} + \text{employment status at application}$
4	$Y = b_0 + \text{service type} + \text{impairment} + \text{state system} + \text{gender} + \text{race/ethnicity} + \text{age} + \text{employment status at application}$

Linear regression attempts to find the best fitting straight line through the data points and provides the ability to test for differences in between group means while holding covariates constant (Howell, 2010). In addition, Howell (2010) recommends an analysis of variance (ANOVA) model in conjunction with the linear regression to further analyze the differences between group means. SPSS outputs for linear regression include an ANOVA table. The ANOVA will detect the presence of statistically significant differences between groups.

Linear regression also requires a priori non-parametric testing of the predictor or independent variables to ensure that the assumptions of linear regression are not violated. In some cases additional transformation of the variables may be required before they can proceed in the regression model (Howell, 2010). Testing for multicollinearity, or strong correlations between predictors, is recommended to review variance inflation factors (VIF) and tolerance. This was done within SPSS. All predictor variables' VIF and tolerance values were analyzed. In addition Pearson's  $r$  correlation coefficient was used to measure the relationship and statistical dependence between the predictors. Q-Q plots and histograms were used for visual inspection of outliers, while descriptive statistics of skewness and kurtosis revealed that each variable did not significantly violate any major assumptions and could therefore continue in the model without further transformation.

In order to determine which predictor variables are accounting for change in the dependent variable the linear regression models were developed in blocks. A linear regression analysis with four blocks was created for earnings difference and hours difference. Table 4.13 provides an overview of each block. The blocks in the linear regression model allow for the parsing out of each of the block and the variables within in order to determine which of the blocks account for any statistically significant changes in the hours difference and earnings difference.

## Chapter V

### Results

This chapter presents the results from the analyses of the data. The purpose of this study was to explore the predictive relationships of participant characteristics and service delivery patterns upon Vocational Rehabilitation (VR) employment outcomes for individuals with Autism Spectrum Disorder (ASD). This study utilized logistic and linear regression analysis to examine relationships of recipient characteristic variables and service delivery patterns with vocational rehabilitation outcomes. The presentation of the findings follow in three sections based on each research question.

#### **Research question 1: Do the types of ASD impairment influence which service is utilized by individuals with ASD?**

This research question was answered applying binary logistic regression using impairment type as the independent variable. Five regression models were produced, one for each service type and served as the dependent variable.

**Model summary: Impairment to service.** Five separate standard binary logistic regression analyses were executed. A regression model was run for each of the five services (assessment, vocational rehabilitation counseling and guidance, job placement, job search, and on-the-job supports). For question one, gender, race, employment status at application, state system, and age were identified as controls. The alpha level was set at .05 for all analyses. If a  $p$  value was .05 or less then the variable was interpreted to have predictive capacity on the independent variable. Conversely if the  $p$  value was .05 or

greater the variable was interpreted not to have a significant effect on service. Odds ratios were calculated from the Exp(B) values in the regression model to determine effect size.

Table 5.1  
*Omnibus test: Logistic regression analysis*

Service	Chi-Square Analysis
Assessment	$\chi^2(12, N = 6535) = 2758.307, p < .001$
VRCG	$\chi^2(12, N = 6209) = 7676.264, p < .001$
Job Search	$\chi^2(12, N = 4900) = 3286.329, p < .001$
Job Placement	$\chi^2(12, N = 4028) = 1932.404, p < .001$
On-the-jobs supports	$\chi^2(12, N = 3647) = 1616.439, p < .001$

Significance testing was conducted for each of the five binary logistic regression analyses. The omnibus test provided insight into whether or not the data are a good fit for the model (Howell, 2010). Each of the five service models was statistically significant, indicating that at least one of the predictors was significantly related to service type shown in Table 5.1. Nagelkerke  $R^2$  was also calculated for each of the five regression models. Nagelkerke  $R^2$  indicates the variance in each service that can be accounted for by the predictor variables (Howell, 2010). Cox and Snell (pseudo  $R^2$ ) and Nagelkerke  $R^2$  are used in logistic regression. Both provide a gauge of the significance of the model. Wald statistics were also computed for each variable. The Wald statistic is a  $z$  score and uses a chi-squared ( $\chi^2$ ) distribution. The  $z$  statistic is used to determine whether or not a variable is significant in predicting the outcome, in this case each type of service (Field, 2013). Table 5.2 highlights the  $R^2$  value for each regression

analysis the predictive capacity for each model and tables 5.3-5.7 outline the results for each of the five binary logistic regression analyses.

Table 5.2  
*Logistic regression model fit*

Service type	Nagelkerke $R^2$	Pseudo $R^2$	Predictive capacity
Assessment	0.325	0.325	73.60%
VRCG	0.716	0.529	87.30%
Job search	0.378	0.275	74.50%
Job placement	0.23	0.172	67.30%
On-the-job supports	0.198	0.146	66.70%

**Findings: Impairment to service.** Although five separate logistic regressions were produced to better understand the role of each variable the results below are describe independent and control variable’s influence across the five regression models. All variables were entered in block one for the regression analysis.

**Impairment.** Individuals with ASD primarily fell into four impairment categories in this analysis. Impairment provided predictive capacity in the receipts of administrative VR services (assessment and VRCG), but not job-related services (job search, job placement, and on-the-job supports). For assessment the impairment types of cognitive, communicative, and other mental were statistically significant within the model. Individuals with a cognitive impairment ( $-0.321, df = 1, p < .01$ ) (OR = .726) experienced decreased odds ratio of 27% of receiving assessment services than those with a psychosocial impairment, while individuals with a communicative impairment ( $-0.262, df = 1, p < .05$ ) (OR = .769) had decreased odds ratio of 23%, and those with another mental impairment ( $-0.354, df = 1, p < .05$ ) (OR = .702) had decreased odds ratio

of 30% in receiving assessment as compared to the reference group. For VRCG the impairment reference group was significant but the subsequent impairment categories were not. The OR values for impairment are less than one indicating a negligible effect size, although statistical significance was found within the analyses for administrative services.

**Gender.** Gender provided no predictive capacity in administrative services, but was statistically significant in job-related service. In all job-related services women experienced decreased odds of receiving these types of services. In job search (-0.188,  $df = 1$ ,  $p < .01$ ) (OR = .828) women have decreased odds ratio of 17% in this service; in job placement (-0.132,  $df = 1$ ,  $p < .05$ ) (OR = .876) decreased odds ratio of 12%, and in on-the-job supports (-0.164,  $df = 1$ ,  $p < .01$ ) (OR = .848) decreased odds ratio of 15% as compared to their male counterparts.

**Race.** VR tracks racial and ethnic groups across VR services. Race was not significant in four out of five services. However, race was significant in job search. The reference group (White) was significant ( $p < .05$ ). In addition service users who were of Asian/Pacific Islander decent (-0.4,  $df = 1$ ,  $p < .01$ ) (OR = .67) experience a decreased odds ratio of 33% of receiving the job search service compared to their White counterparts.

**Age.** The mean age of a VR service user is 21.6. Age did not provide predictive capacity in administrative VR services and job search. For job placement and on-the-job supports older VR recipients were more likely to receive the services. In job placement although significant the effect size was negligible (.015,  $df = 1$ ,  $p < .001$ ) (OR = 1.015).

This was similar for on-the-job supports (.02,  $df = 1$ ,  $p < .001$ ), (OR = 1.02) revealing OR values almost equal to one highlighting equal odds of receiving each service.

**Employment status at application.** Integrated employment at application did not have predictive capacity for the VR services of VRCG, job search, job placement, and on-the-job supports. Integrated employment at application was statistically significant for assessment (0.287,  $df = 1$ ,  $p < .001$ ). Individuals who were not employed at the time of their VR application (OR = 1.332) had increased odds ratio of 33% of receiving assessment as compared those who entered VR with a job. Although significant the OR value indicates a very small effect size.

**State system.** How a VR system utilizes different VR services significantly affects the likelihood of an individual receiving these services in a given state system. State systems provided strong predictive capacity for all five of the VR services analyzed in the regression analyses. Each service also produced an extremely strong effect sizes with OR values exceeding 9.0. For each service, if a state system provided this service to a large proportion of its VR recipients, individuals within those state systems were more likely to receive the service. Administrative VR services were most strongly influenced by state systems; for assessment (5.308,  $df = 1$ ,  $p < .001$ ) (OR = 201.972) and VRCG (6.649,  $df = 1$ ,  $p < .001$ ) (OR = 772.199). For job-related services job search (5.558,  $df = 1$ ,  $p < .001$ ) (OR = 259.275), job placement (4.708,  $df = 1$ ,  $p < .001$ ) (OR = 110.882), and on-the-job supports (4.891,  $df = 1$ ,  $p < .001$ ) (OR = 133.11) reveal significance as well as strong effect sizes.

The standard error ( $SE$ ) is an estimate of the standard deviation ( $SD$ ) of the coefficient (Field, 2013; Howell, 2010). The amount of  $SE$  varies across cases in a given

sample and represents how different a sample mean is from the population mean. Small *SE* values indicate that most of the sample from the population will have a similar mean (Field, 2013). *SE* values within a logistic regression model may be viewed as stable if the size of the values are relatively similar (Pettingell, personal communication, June 29, 2015). Unable or inconsistent *SE* values may indicate issues within a variable's construction or values. Binary variables in logistic regression also provide additional stability in *SE* values as the dependent variables have a limited amount of values. Findings indicate that despite large OR values in the state system variables each model has stable *SE* values that are consistent with other *SE* values in the model. The state system variables have estimates of error that are small which is also a good indicator of fit within the model (Pettingell, personal communication, June 29, 2015).

Table 5.3  
*Binary Logistic Regression for Assessment*

Parameter	Assessment Model						
	<i>B</i>	<i>SE</i>	Wald	<i>df</i>	Sig.	<i>OR</i>	95% CI
<i>Impairment</i>							
Psychosocial (Ref)			9.343	4	0.053		
Cognitive	-0.321	0.117	7.518	1	<b>0.006**</b>	0.726	[0.577, 0.913]
Communicative	-0.262	0.118	4.977	1	<b>0.026*</b>	0.769	[0.611, 0.969]
Other mental	-0.354	0.14	6.386	1	<b>0.012*</b>	0.702	[0.533, 0.924]
All other	-1.066	0.907	1.381	1	0.240	0.344	[0.058, 2.038]
<i>Race/ethnicity</i>							
White (Ref)			3.048	4	0.550		
Black/African American	0.123	0.084	2.15	1	0.143	1.131	[0.959, 1.333]
Native American	-0.289	0.329	0.772	1	0.380	0.749	[0.393, 1.427]
Asian/Pacific Islander	0.032	0.142	0.052	1	0.819	1.033	[0.782, 1.365]
Hispanic	-0.007	0.105	0.005	1	0.945	0.993	[0.808, 1.22]
Gender (Male Ref)	-0.049	0.064	0.58	1	0.446	0.952	[0.839, 1.08]
Employment at application	0.287	0.081	12.562	1	<b>.001***</b>	1.332	[1.137, 1.562]
Age	0	0.003	0.002	1	0.964	1	[0.993, 1.007]
State system: Assessment	5.308	0.121	1938.572	1	<b>.001***</b>	201.972	[159.467, 255.807]
Nagelkerke <i>R</i> <sup>2</sup>	0.325						
Pseudo <i>R</i> <sup>2</sup>	0.237						

Note. OR = odds ratio. CI = confidence interval.  $p < .05^*$ .  $p < .01^{**}$ .  $p < .001^{***}$ .

Table 5.4  
*Binary Logistic Regression for VRGC*

Parameter	VRGC Model						
	<i>B</i>	<i>SE</i>	Wald	<i>df</i>	Sig.	<i>OR</i>	95% CI
<i>Impairment</i>							
Psychosocial (Ref)			15.814	4	<b>.003**</b>		
Cognitive	-0.208	0.156	1.765	1	0.184	0.813	[0.598, 1.104]
Communicative	0.065	0.155	0.178	1	0.673	1.068	[0.787, 1.448]
Other mental	0.038	0.199	0.037	1	0.847	1.039	[0.704, 1.534]
All other	1.015	1.068	0.904	1	0.342	2.76	[0.34, 22.377]
<i>Race/ethnicity</i>							
White (Ref)			7.123	4	0.13		
Black/African American	-0.058	0.116	0.248	1	0.619	0.944	[0.752, 1.185]
Native American	0.92	0.521	3.125	1	0.077	2.511	[0.905, 6.966]
Asian/Pacific Islander	0.05	0.185	0.073	1	0.788	1.051	[0.731, 1.512]
Hispanic	-0.271	0.143	3.586	1	0.058	0.762	[0.576, 1.01]
Gender (Male Ref)	-0.006	0.091	0.005	1	0.944	0.994	[0.831, 1.187]
Employment at application	0.201	0.117	2.936	1	0.087	1.223	[0.971, 1.54]
Age	-0.002	0.005	0.228	1	0.633	0.998	[0.989, 1.007]
State system: VRGC	6.649	0.116	3279.154	1	<b>.001***</b>	772.199	[615.023, 969.543]
Nagelkerke <i>R</i> <sup>2</sup>	0.716						
Pseudo <i>R</i> <sup>2</sup>	0.529						

Note. OR = odds ratio. CI = confidence interval.  $p < .05^*$ .  $p < .01^{**}$ .  $p < .001^{***}$ .

Table 5.5  
*Binary Logistic Regression for Job Search*

Parameter	Job search Model						
	<i>B</i>	<i>SE</i>	Wald	<i>df</i>	Sig.	<i>OR</i>	95% CI
<i>Impairment</i>							
Psychosocial (Ref)			6.654	4	0.155		
Cognitive	-0.097	0.121	0.641	1	0.423	0.907	[0.716, 1.151]
Communicative	-0.007	0.122	0.003	1	0.953	0.993	[0.782, 1.26]
Other mental	-0.065	0.151	0.186	1	0.666	0.937	[0.697, 1.259]
All other	-2.303	1.207	3.637	1	0.057	0.1	[0.009, 1.066]
<i>Race/ethnicity</i>							
White (Ref)			11.856	4	<b>0.018*</b>		
Black/African American	0.004	0.088	0.002	1	0.966	1.004	[0.845, 1.192]
Native American	-0.691	0.373	3.422	1	0.064	0.501	[0.241, 1.042]
Asian/Pacific Islander	-0.4	0.151	6.987	1	<b>0.008**</b>	0.67	[0.498, 0.902]
Hispanic	-0.147	0.106	1.929	1	0.165	0.863	[0.701, 1.062]
Gender (Male Ref)	-0.188	0.067	7.791	1	<b>0.005**</b>	0.828	[0.726, 0.945]
Employment at application	0.105	0.083	1.583	1	0.208	1.11	[0.943, 1.307]
Age	0.006	0.003	2.535	1	0.111	1.006	[0.999, 1.012]
State system: job search	5.558	0.118	2210.235	1	<b>.001***</b>	259.275	[205.651, 326.881]
Nagelkerke <i>R</i> <sup>2</sup>	0.378						
Pseudo <i>R</i> <sup>2</sup>	0.275						

Note. OR = odds ratio. CI = confidence interval.  $p < .05^*$ .  $p < .01^{**}$ .  $p < .001^{***}$ .

Table 5.6  
*Binary Logistic Regression for Job Placement*

Parameter	Job Placement Model						
	<i>B</i>	<i>SE</i>	Wald	<i>df</i>	Sig.	<i>OR</i>	95% CI
<i>Impairment</i>							
Psychosocial (Ref)			2.686	4	0.612		
Cognitive	-0.148	0.111	1.755	1	0.185	0.863	[.694, 1.073]
Communicative	-0.14	0.111	1.587	1	0.208	0.869	[0.699, 1.081]
Other mental	-0.126	0.135	0.861	1	0.354	0.882	[0.677, 1.150]
All other	-1.029	0.948	1.178	1	0.278	0.357	[0.056, 2.291]
<i>Race/ethnicity</i>							
White (Ref)			1.408	4	0.843		
Black/African American	-0.053	0.074	0.523	1	0.469	0.948	[0.821, 1.095]
Native American	-0.12	0.312	0.147	1	0.701	0.887	[0.482, 1.635]
Asian/Pacific Islander	0.069	0.141	0.244	1	0.621	1.072	[0.814, 1.412]
Hispanic	-0.071	0.098	0.519	1	0.471	0.932	[0.768, 1.130]
Gender (Male Ref)	-0.132	0.059	5.025	1	<b>0.025*</b>	0.876	[0.780, .983]
Employment at application	-0.027	0.075	0.13	1	0.719	0.973	[0.841, 1.127]
Age	0.015	0.003	23.583	1	<b>.001***</b>	1.015	[1.009, 1.022]
State system: Job placement	4.708	0.122	1496.005	1	<b>.001***</b>	110.822	[87.301, 140.681]
Nagelkerke <i>R</i> <sup>2</sup>	0.230						
Pseudo <i>R</i> <sup>2</sup>	0.172						

Note. OR = odds ratio. CI = confidence interval.  $p < .05^*$ .  $p < .01^{**}$ .  $p < .001^{***}$ .

Table 5.7  
*Binary Logistic Regression for On-the-Job Supports*

Parameter	On-the-Job Supports Model						
	<i>B</i>	<i>SE</i>	Wald	<i>df</i>	Sig.	<i>OR</i>	95% CI
<i>Impairment</i>							
Psychosocial (Ref)			4.023	4	0.403		
Cognitive	-0.049	0.113	0.189	1	0.664	0.952	[0.764, 1.187]
Communicative	-0.1	0.113	0.784	1	0.376	0.905	[0.726, 1.129]
Other mental	-0.203	0.135	2.253	1	0.133	0.816	[0.626, 1.064]
All other	-20.868	14021.092	0	1	0.999	0	0
<i>Race/ethnicity</i>							
White (Ref)			0.672	4	0.955		
Black/African American	-0.012	0.075	0.024	1	0.877	0.988	[0.853, 1.146]
Native American	-0.155	0.313	0.247	1	0.619	0.856	[0.464, 1.58]
Asian/Pacific Islander	0.032	0.138	0.053	1	0.817	1.032	[0.788, 1.353]
Hispanic	-0.058	0.098	0.356	1	0.551	0.943	[0.779, 1.142]
Gender (Male Ref)	-0.164	0.06	7.582	1	<b>0.006**</b>	0.848	[0.755, 0.954]
Employment at application	-0.051	0.075	0.455	1	0.500	0.951	[0.821, 1.101]
Age	0.02	0.003	43.201	1	<b>.001***</b>	1.02	[1.014, 1.027]
State system: On-the-job	4.891	0.139	1244.307	1	<b>.001***</b>	133.11	[101.434, 174.677]
Nagelkerke <i>R</i> <sup>2</sup>	0.198						
Pseudo <i>R</i> <sup>2</sup>	0.146						

Note. OR = odds ratio. CI = confidence interval.  $p < .05^*$ .  $p < .01^{**}$ .  $p < .001^{***}$ .

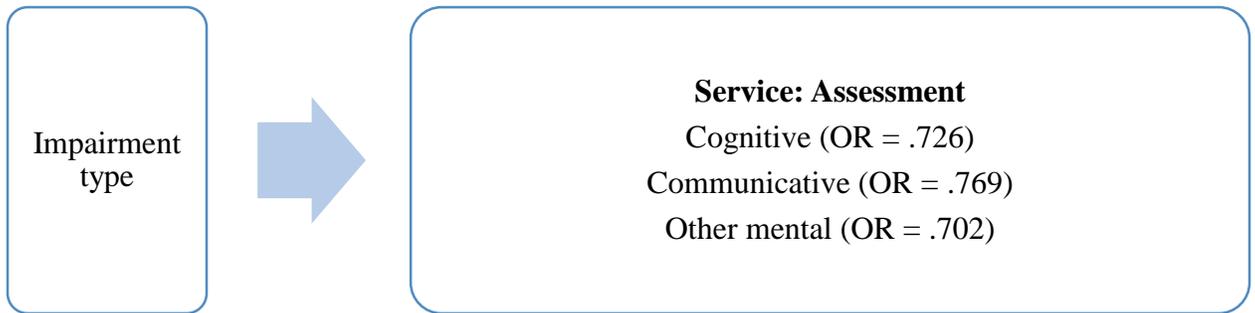


Figure 5.1.  
*Significant findings for impairment to service and corresponding effect sizes*

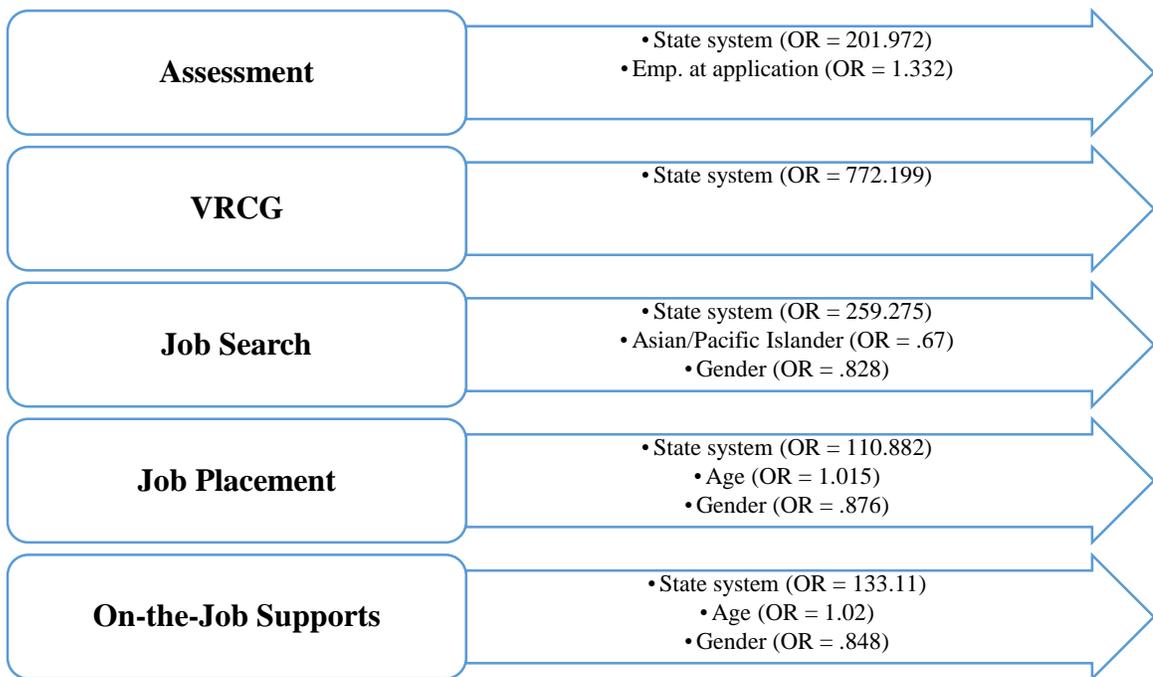


Figure 5.2.  
*Significant findings for control variables for each service and corresponding effect sizes*

## **Research question 2: Do the types of services received affect case closure type?**

This research question was answered using binary logistic regression executed with integrated employment closure (closed with integrated employment, closed with no integrated employment) as the dependent variable. Impairment type, gender, race, employment status at application, location, and age were identified as control variables in the model.

**Model summary: Service to integrated employment at closure.** Odds ratios were calculated to further explore the strength of relationships, and omnibus testing along with Nagelkerke  $R^2$  and Cox and Snell  $R^2$  provide an indicator of the fit of the model. Omnibus test results indicate that model is statistically significant ( $\chi^2 (17, n = 5805) = 2699.222, p < .001$ ). All variables were entered in block one for the regression analysis. The classification table output in SPSS indicated that the model was able predict 72.4% of case closures in integrated employment. A test of the full model against the constant resulted in statistical significance indicating that the predictors ability to predict service receipt ( $\chi^2 = 2699.222, p < .001$  with  $df = 2$ ). Nagelkerke's  $R^2$  of 0.312 indicates a relatively weak relationship between integrated case closure and services as a full model.

Table 5.8  
*Binary Logistic Regression for Integrated Employment Closure*

Parameter	Service Model						
	<i>B</i>	<i>SE</i>	Wald	<i>df</i>	Sig.	<i>OR</i>	95% CI
<i>Impairment</i>							
Psychosocial (Ref)			11.505	4	<b>0.021*</b>		
Cognitive	-0.051	0.119	0.184	1	0.668	0.95	[0.752, 1.2]
Communicative	-0.17	0.119	2.037	1	0.153	0.844	[0.668, 1.065]
Other mental	0.064	0.143	0.202	1	0.653	1.066	[0.806, 1.411]
All other	-1.222	1.112	1.206	1	0.272	0.295	[0.033, 2.608]
<i>Race/ethnicity</i>							
White (Ref)			9.49	4	<b>0.05*</b>		
Black/African American	-0.221	0.079	7.905	1	<b>0.005**</b>	0.802	[0.687, 0.935]
Native American	-0.069	0.317	0.047	1	0.828	0.934	[0.502, 1.736]
Asian/Pacific Islander	0.136	0.146	0.871	1	0.351	1.146	[0.861, 1.526]
Hispanic	-0.078	0.1	0.606	1	0.436	0.925	[0.761, 1.125]
Gender	-0.302	0.062	23.947	1	<b>.001***</b>	0.74	[0.655, 0.835]
Employment at application	0.946	0.086	120.371	1	<b>.001***</b>	2.575	[2.175, 3.049]
Age	0.002	0.003	0.281	1	0.596	1.002	[0.995, 1.008]
State system: Employment at closure	3.659	0.215	289.105	1	<b>.001***</b>	38.819	[25.461, 59.185]
<i>Service</i>							
Assessment	-0.184	0.048	14.442	1	<b>.001***</b>	0.832	[0.757, 0.915]

Parameter	<i>B</i>	<i>SE</i>	Wald	<i>df</i>	Sig.	<i>OR</i>	95% CI
VRCG	-0.003	0.051	0.004	1	0.948	0.997	[0.902, 1.101]
Job search	0.289	0.052	30.401	1	<b>.001***</b>	1.335	[1.205, 1.479]
Job placement	1.176	0.048	592.762	1	<b>.001***</b>	3.242	[2.949, 3.564]
On-the-job supports	1.352	0.05	737.566	1	<b>0.001***</b>	3.867	[3.507, 4.263]
Nagelkerke <i>R</i> <sup>2</sup>	0.312						
Pseudo <i>R</i> <sup>2</sup>	0.232						

Note. OR = odds ratio. CI = confidence interval.  $p < .05^*$ .  $p < .01^{**}$ .  $p < .001^{***}$ .

**Findings.** In the single model there were significant findings in each variable group with the exception of age. Female recipients ( $-0.302, df = 1, p < .001$ ) (OR = .74) experienced a decreased odds ratio of 26% to experience case closure in integrated employment. Black/African American ( $-0.221, df = 1, p < .01$ ) (OR = .802) recipients also had a decreased odds ratio of 20%. If an individual was in integrated employment at the time of their VR application they fared better than those who did not have integrated employment at application ( $.946, df = 1, p < .001$ ) (OR = 2.575) having a 158% increased odds ratio of experiencing case closure in integrated employment. The OR value indicates a small effect size between employment at application and case closure in integrated employment.

Of the administrative services only assessment was statistically significant ( $-0.184, df = 1, p < .001$ ) (OR = .832) which indicated that those who received this service experienced a decreased odds ratio of 17% in experiencing case closure in integrated employment. Of the job-related services each was associated with an increased odd ratio of integrated employment at closure. Receiving job search ( $0.289, df = 1, p < .001$ ) (OR = 1.335), job placement ( $1.176, df = 1, p < .001$ ) (OR = 3.242), and on-the-job supports ( $1.352, df = 1, p < .001$ ) (OR = 3.867) increased VR recipient's odds ratio of exiting VR with integrated employment by 34%, 224%, and 287% respectively. Receiving job-related services increases the odds that an individual would have integrated employment at closure, whereas receiving assessment would decrease the odds of this outcome occurring.

The type of VR state system that individuals received service in played a significant role in whether or not they experienced integrated employment at closure and revealed an extremely large effect size ( $3.659, df = 1, p < .001$ ) (OR = 38.819). Additional consideration should be given to interpreting the *SE* as a means to further recognize the fit and appropriateness of this variable within the model.

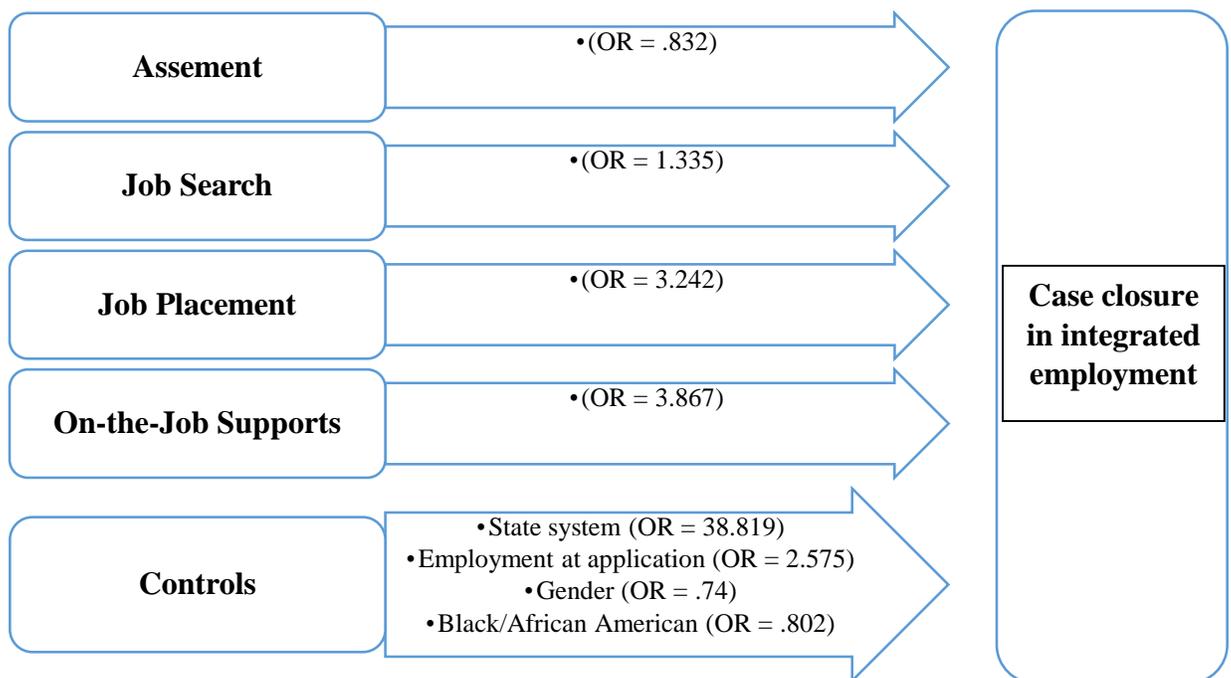


Figure 5.3. Significant findings for service to integrated employment at closure and corresponding effect sizes

**Research question 3: What types of services produced improved employment outcomes for individuals with ASD?**

This research question was answered using two multiple linear regression analyses. The analysis was conducted with two continuous outcome variables: change in weekly hours worked from closure to application (hours difference), and change in

weekly earnings from closure to application (earnings difference). Each variable was tested in order to ensure that it did not violate the assumptions of linear regression. Table 5.9 provides an overview of kurtosis and skewness of the earnings difference and hours difference variables. Neither required additional transformation to continue within the model. QQ plots and histograms were also visually inspected for each variable.

Table 5.9  
*Skewness and Kurtosis Analysis*

Variable	<i>n</i>	<i>M</i>	<i>SD</i>	Skewness	<i>SE</i>	Kurtosis	<i>SE</i>
Earnings difference	5825	192.28	147.96	2.25	0.03	13.73	0.06
Hours difference	5805	20.96	11.92	-0.11	0.03	0.15	0.06

Multicollinearity can be problematic in linear regression. It occurs when there is a strong relationship between two or more of the independent or predictor variables (Howell, 2010). Multicollinearity can lead to a number of problems within the linear regression model including untrustworthy B's, limitations in the size of *R*, and unclear predictor influence in the model (Field, 2013). Although there is some debate about which values should cause concern, generally variance inflation factors (VIFs) greater than three and tolerance values below 0.2 are potentially problematic (Field, 2013; Howell, 2010). Tables 5.10-5.19 outline the multicollinearity analysis for each predictor variable. The results indicate that although the predictors do have a relationship it should not be problematic within the linear regression model.

Table 5.10  
*Multicollinearity analysis: Race*

Independent variables	Collinearity Statistics	
	Tolerance	VIF
Gender	0.997	1.003
State system	0.895	1.118
Age	0.961	1.041
Integrated employment at application	0.965	1.036
Assessment	0.962	1.04
VRCG	0.844	1.185
Job search assistance	0.854	1.171
Job placement assistance	0.846	1.182
On-the-job supports	0.92	1.086
Impairment	0.996	1.004

Table 5.11  
*Multicollinearity analysis: Assessment*

Independent variables	Collinearity Statistics	
	Tolerance	VIF
Gender	0.996	1.004
State system	0.895	1.117
Age	0.959	1.042
Integrated employment at application	0.963	1.038
Race	0.985	1.015
VRCG	0.851	1.175
Job search assistance	0.856	1.168
Job placement assistance	0.847	1.18
On-the-job supports	0.924	1.082
Impairment	0.995	1.005

Table 5.12  
*Multicollinearity analysis: Impairment*

Independent variables	Collinearity Statistics	
	Tolerance	VIF
Gender	0.996	1.004
State system	0.891	1.122
Age	0.959	1.043
Integrated employment at application	0.963	1.038
Assessment	0.961	1.04
VRCG	0.845	1.184
Job search assistance	0.854	1.17
Job placement assistance	0.846	1.183
On-the-job supports	0.92	1.086
Race	0.986	1.015

Table 5.13  
*Multicollinearity analysis: VRCG*

Independent variables	Collinearity Statistics	
	Tolerance	VIF
Gender	0.996	1.004
State system	0.949	1.053
Age	0.959	1.042
Integrated employment at application	0.963	1.038
Assessment	0.969	1.032
Race	0.985	1.015
Job search assistance	0.894	1.118
Job placement assistance	0.855	1.169
On-the-job supports	0.928	1.078
Impairment	0.996	1.004

Table 5.14  
*Multicollinearity analysis: State system*

Independent variables	Collinearity Statistics	
	Tolerance	VIF
Gender		
Race	0.989	1.011
Age	0.959	1.042
Integrated employment at application	0.965	1.036
Assessment	0.965	1.036
VRCG	0.9	1.112
Job search assistance	0.855	1.169
Job placement assistance	0.857	1.167
On-the-job supports	0.923	1.084
Impairment	0.995	1.005

Table 5.15  
*Multicollinearity analysis: Job search*

Independent variables	Collinearity Statistics	
	Tolerance	VIF
Gender	0.996	1.004
State system	0.893	1.12
Age	0.959	1.043
Integrated employment at application	0.963	1.038
Assessment	0.964	1.037
VRCG	0.885	1.131
Race	0.985	1.015
Job placement assistance	0.891	1.123
On-the-job supports	0.935	1.07
Impairment	0.996	1.004

Table 5.16  
*Multicollinearity analysis: Age*

Independent variables	Collinearity Statistics	
	Tolerance	VIF
Gender	0.997	1.003
State system	0.891	1.122
Race	0.987	1.014
Integrated employment at application	0.992	1.008
Assessment	0.961	1.04
VRCG	0.844	1.184
Job search assistance	0.853	1.172
Job placement assistance	0.846	1.182
On-the-job supports	0.924	1.082
Impairment	0.995	1.005

Table 5.17  
*Multicollinearity analysis: Job placement*

Independent variables	Collinearity Statistics	
	Tolerance	VIF
Gender	0.996	1.004
State system	0.903	1.107
Age	0.96	1.042
Integrated employment at application	0.963	1.038
Assessment	0.963	1.038
VRCG	0.854	1.171
Job search assistance	0.899	1.112
Race	0.986	1.014
On-the-job supports	0.952	1.051
Impairment	0.995	1.005

Table 5.18  
*Multicollinearity analysis: Integrated employment at application*

Independent variables	Collinearity Statistics	
	Tolerance	VIF
Gender	0.996	1.004
State system	0.893	1.12
Age	0.987	1.013
Race	0.987	1.013
Assessment	0.961	1.04
VRCG	0.844	1.184
Job search assistance	0.853	1.172
Job placement assistance	0.846	1.183
On-the-job supports	0.92	1.086
Impairment	0.995	1.005

Table 5.19  
*Multicollinearity analysis: On-the- job supports*

Independent variables	Collinearity Statistics	
	Tolerance	VIF
Gender	0.996	1.004
State system	0.893	1.12
Age	0.963	1.038
Integrated employment at application	0.963	1.038
Assessment	0.965	1.037
VRCG	0.851	1.175
Job search assistance	0.867	1.154
Job placement assistance	0.874	1.144
Race	0.985	1.015
Impairment	0.995	1.005

Two separate multivariate linear regression analyses were executed with service (received and not received) as the independent variable and earnings difference as the dependent variable in the first analysis, and hours difference as the dependent variable in the second analysis. The predictor variables for each analysis were entered in four blocks in order to parse out the effects each group of variables had on the outcome. Block

one included state system, block two then added gender, race, age, and integrated employment status at application, block three added impairment type, and block four added all of the five services. The alpha level was set at .05 for all analyses to measure for statistical significance and was interpreted to have predictive capacity on the independent variable or service type if the  $p$  value exceeded .05. Effect sizes were calculated using Pearson's  $r$ . See Tables 5.21 and 5.22 for results.

Table 5.20  
*Linear regression block design*

Block	Variables included
1	State system, Employment at closure
2	State system, Employment at closure, Gender, Age, Race, Employment status at application
3	State system, Employment at closure, Gender, Age, Race, Employment status at application, Impairment type
4	State system, Employment at closure, Gender, Age, Race, Employment status at application, Impairment type, Service type

The multiple linear regression analyses included only the individuals who had case closures in integrated employment ( $N = 5805$ ). Those with no employment at closure ( $n = 4404$ ) did not have earnings to report and including them in the analysis would have produced an inaccurate picture of how services affect earnings. The model summary table provides information about the linear regression line's ability to account for the total variation in the dependent variable or earnings difference. The dependent variable's variation can be interpreted through  $R^2$  values that indicate how well the data fit the linear regression model (Howell, 2010).

Table 5.21

*Pearson's r effect size: Earnings difference (Section one)*

	Pearson's <i>r</i>														
Variables	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Earnings difference	1														
Black or African American	-0.022	1													
American Indian or Alaska Native	0.004	-0.013	1												
Gender	-.068**	-.024*	0.018	1											
Native Hawaiian or Other Pacific Islander	0.012	-0.009	-0.008	0.004	1										
White	0.006	-.825**	-.121**	.025*	-.132**	1									
Asian	.027*	-.049**	-0.013	-0.011	.043**	-.367**	1								
Hispanic or Latino	0.005	-.048**	.043**	-.032**	0.016	.046**	-.028**	1							
Age	-0.013	-.037**	-0.004	.037**	-0.004	.035**	0.001	-.051**	1						
Integrated employment at application	-.278**	-.035**	0.004	0.003	-0.008	.044**	-0.017	-.046**	.175**	1					
Assessment	-.033*	0.017	0	-0.002	-0.005	0.008	-.030**	-.022*	-0.005	-0.006	1				
VRCG	-0.019	-.036**	.021*	-0.002	-0.006	.039**	-.027**	-0.008	-0.003	.028**	.138**	1			
Job search	-0.016	-.038**	-0.017	-.027**	0.009	.034**	-0.001	0.016	.021*	0.007	.111**	.255**	1		
Job placement	-.067**	-0.006	-0.009	-0.018	0.011	0.017	-.026**	-.036**	.046**	.026**	.110**	.202**	.294**	1	
On the job	-.161**	0	-0.004	-0.018	0.009	0	-0.006	-0.013	.077**	.020*	.088**	0	.173**	.227**	1
State system: Integrated employment at closure	-.026*	-.059**	.036**	-0.004	-0.009	.086**	-.064**	-.037**	.039**	.066**	.113**	.279**	.067**	.179**	.075**
Psychosocial	0.015	-0.017	-0.006	-0.014	0	-0.005	.048**	0.003	0.01	-0.004	-0.001	0.012	.038**	0.011	-0.003
Cognitive	-0.025	.039**	-0.002	-0.015	.026**	-.041**	0.01	0.003	-.026**	-0.002	-0.008	.028**	0.017	0.006	-0.009
Communication	0.007	-.029**	0.006	0.013	-.022*	.036**	-.023*	-0.005	.022*	0.003	0.011	-0.014	-0.018	0.003	0.017
Other mental	0.022	-0.006	-0.004	0.016	-0.008	0.013	-0.012	-0.001	0.001	0.001	-0.005	-.038**	-.025*	-.025*	-0.011
All other	-0.015	-0.009	-0.003	-0.001	-0.002	0.01	-0.004	.027**	-0.006	-0.009	-0.012	0.006	-0.012	-0.01	-.021*

\* Correlation is significant at the 0.05 level (2-tailed). \*\* Correlation is significant at the 0.01 level (2-tailed).

Table 5.22

Pearson's *r* effect size: Earnings difference (Section two)

Variables	Pearson's <i>r</i>					
	16	17	18	19	20	21
State system: Integrated employment at closure	1					
Psychosocial	0.015	1				
Cognitive	.029**	-.184**	1			
Communication	-.051**	-.189**	-.797**	1		
Other mental	.032**	-.057**	-.243**	-.249**	1	
All other	-.021*	-0.005	-.023*	-.024*	-0.007	1

\* Correlation is significant at the 0.05 level (2-tailed). \*\* Correlation is significant at the 0.01 level (2-tailed).

**Model summary: Service to earnings difference.** Each block calculates an intercept that denotes the mean difference when all variables are set to zero. Each block provides the effects of each variable in relation to other variables within the block. Therefore each block accounts for the unique contribution of the combination of variables within the block. Block one with state system as the predictor can explain less than 1% of earnings difference. Block two includes both state system and demographic variables of race, gender, age, and integrated employment at application, which account for 8.4% of variation in the model. Block three then adds the additional variable of impairment, which increases the model's predictability to 8.5%. The final block includes all of the predictors from the previous blocks and adds five types of service. This model now explains 12.1% of the earnings difference in the linear model. Although the  $R^2$  values are not high, they are statistically significant which can be seen in Table 5.23. Meaningful conclusions about the predictor variables can still be made with low  $R^2$  values. Significant coefficients within the model still represent the mean change in earnings difference for

one unit in the predictor while controlling for other predictors in the model regardless of the  $R^2$  value (Field, 2013).

Table 5.23

*Model summary: Earnings difference*

Model	$R$	$R^2$	Adjusted $R^2$	$SE$ of the Estimate
1	0.026	0.001	0	147.96888
2	0.293	0.086	0.084	141.62386
3	0.295	0.087	0.085	141.58028
4	0.351	0.123	0.121	138.80052

Conducting multiple linear regression in SPSS produces an ANOVA table, which assists in explaining the potential significance in each model. The ANOVA is testing for significant difference between group means and produces an  $F$  statistic, which can be used to compare statistical models (Howell, 2010). Blocks two through four produced statistically significant results and therefore the null hypothesis was rejected. Block two was significant ( $F_{9,5783} = 60.298, p < .001$ ), as was block three ( $F_{13,5779} = 45.352, p < .001$ ), and block four ( $F_{18,5774} = 45.091, p < .001$ ). This highlights that the predictors in models two through four had a significant effect on earnings difference between closure and application. The ANOVA table does not state which specific predictors had the most effect, but the layered models show the change between models when groups of predictors are added.

Table 5.24

*Earnings difference ANOVA*

Model		<i>SS</i>	<i>df</i>	<i>M</i> <sup>2</sup>	<i>F</i>	$\sigma$
1	Regression	83520.543	1	83520.543	3.815	0.051
	Residual	126792721.7	5791	21894.789		
	Total	126876242.3	5792			
2	Regression	10884773.24	9	1209419.249	60.298	0.000
	Residual	115991469	5783	20057.318		
	Total	126876242.3	5792			
3	Regression	11036332.93	13	848948.687	42.352	0.000
	Residual	115839909.3	5779	20044.975		
	Total	126876242.3	5792			
4	Regression	15636756.45	18	868708.692	45.091	0.000
	Residual	111239485.8	5774	19265.585		
	Total	126876242.3	5792			

Each model uses multiple predictors to explain the variance in the earnings difference between closure and application. Building the regression model in blocks assists in understanding which variables have the most effect. Table 5.23 reports coefficients within each model and provides changes in  $R^2$  in each model. As predictors are added the  $R^2$  value increases indicating an improved fit of the model. The addition of individual characteristics in block two accounted for a .085 change in  $R^2$ , while the addition of impairment in block three only led to a .001 change in  $R^2$ . The introduction of service type in block four increased the  $R^2$  value by .036. Tables 5.25-5.28 outline the findings for each block run in the regression analysis.

Table 5.25

*Earnings difference: Block1 for individuals with employment at closure*

Predictor	<i>B</i>	<i>SE</i>	Block 1			95% CI
			$\beta$	<i>t</i>	Sig.	
Intercept	213.007	10.572		20.149	.001***	[191.998, 233.388]
State system: Employment at closure	-34.252	17.537	-0.026	-1.953	0.051	[-68.64, 0.030]
<i>R</i> <sup>2</sup>	0.001					
Change in <i>R</i> <sup>2</sup>						

Note. CI=confidence interval. *p* < .05\*. *p* < .01\*\*. *p* < .001\*\*\*.

Table 5.26

*Earnings difference: Block 2 for individuals with employment at closure*

Predictor	<i>B</i>	<i>SE</i>	Block 2			95% CI
			$\beta$	<i>t</i>	Sig.	
Intercept	235.627	13.167		17.895	<b>.001***</b>	[211.175, 262.657]
State system: Employment at closure	-23.525	16.863	-0.018	-1.953	0.163	[-56.278, 9.767]
Gender (Male Ref)	-26.34	5.267	-0.063	-5.001	<b>.001***</b>	[-37.932, -17.355]
Age	0.868	0.261	0.043	3.319	<b>0.001**</b>	[0.336, 1.358]
Integrated employment at application	-126.844	5.656	-0.288	-22.427	<b>.001***</b>	[-137.442, -115.275]
<i>Race</i>						
White (Ref)						
Black/ African American	-17.495	6.412	-0.034	-2.728	<b>0.006*</b>	[-29.976, -4.845]
American Indian/ Alaska Native	11.151	17.7	0.008	0.63	0.529	[-23.118, 46.319]
Asian	15.258	11.898	0.016	1.282	0.200	[-5.216, 41.308]
Native Hawaiian/Pacific Islander	19.716	25.563	0.01	0.771	0.441	[-30.304, 69.981]
Hispanic or Latino	-7.625	8.751	-0.011	-0.871	0.384	[-25.083, 9.189]
<i>R</i> <sup>2</sup>	0.086					
Change in <i>R</i> <sup>2</sup>	0.085					

Note. CI=confidence interval.  $p < .05^*$ .  $p < .01^{**}$ .  $p < .001^{***}$ .

Table 5.27  
*Earnings Difference: Block 3 for individuals with employment at closure*

Predictor	Block 3					
	<i>B</i>	<i>SE</i>	$\beta$	<i>t</i>	Sig.	95% CI
Intercept	243.689	15.87		15.356	<b>.001***</b>	[213.628, 275.644]
State system: Employment at closure	-22.911	16.906	-0.017	-1.355	0.175	[-56.234, 9.987]
Gender (Male Ref)	-26.575	5.267	-0.064	-5.045	<b>.001***</b>	[-38.033, -17.454]
Age	0.867	0.262	0.043	3.316	<b>0.001**</b>	[0.337, 1.359]
Integrated employment at application	-126.844	5.656	-0.288	-22.427	<b>.001***</b>	[-137.532, -115.371]
<i>Race</i>						
White (Ref)						
Black or African American	-17.048	6.414	-0.034	-2.658	<b>0.008*</b>	[-29.559, -4.425]
American Indian/ Alaska Native	11.473	17.696	0.008	0.648	0.517	[-22.829, 46.589]
Asian	15.396	11.902	0.016	1.294	0.196	[-5.078, 41.455]
Native Hawaiian/Pacific Islander	21.666	25.576	0.011	0.847	0.397	[-28.47, 71.855]
Hispanic or Latino	-7.841	8.75	-0.011	-0.896	0.370	[-24.875, 9.412]
<i>Impairment</i>						
Psychosocial (Ref)						

Predictor	<i>B</i>	<i>SE</i>	$\beta$	<i>t</i>	Sig.	95% CI
Cognitive	-12.662	9.299	-0.043	-1.362	0.173	[-30.245, 6.097]
Communication	-6.596	9.315	-0.022	-0.708	0.479	[-24.483, 11.919]
Other mental	4.799	11.223	0.008	0.428	0.669	[-16.319, 27.596]
All other	-77.89	141.888	-0.007	-0.549	0.583	[-330.909, 63.893]
<i>R</i> <sup>2</sup>	0.087					
Change in <i>R</i> <sup>2</sup>	0.001					

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Note. CI=confidence interval.  $p < .05^*$ .  $p < .01^{**}$ .  $p < .001^{***}$ .

Table 5.28

Earnings difference: Block 4 for individuals with employment at closure

Predictor	Block 4					
	<i>B</i>	<i>SE</i>	$\beta$	<i>t</i>	Sig.	95% CI
Intercept	277.344	15.853		17.494	<b>.001**</b>	[246.434, 308.453]
State system: Employment at closure	-19.754	17.148	-0.015	-1.152	0.249	
						[-53.403, 13.827]
Gender (Male Ref)	-28.12	5.166	-0.067	-5.444	<b>.001**</b>	[-39.424, -19.225]
Age	1.132	0.257	0.056	4.401	<b>.001**</b>	[0.597, 1.603]
Integrated employment at application	-131.986	5.56	-0.3	-23.74	<b>.001**</b>	[-142.21, - 120.406]
<i>Race</i>						
White (Ref)						
Black or African American	-13.129	6.3	-0.026	-2.084	<b>0.037*</b>	[-25.361, -0.65]
American Indian or Alaska Native	12.605	17.359	0.009	0.726	0.468	[-20.933, 47.217]
Asian	14.389	11.68	0.015	1.232	0.218	[-5.425, 40.279]
Native Hawaiian/Pacific Islander	24.715	25.078	0.012	0.986	0.324	[-24.498, 73.953]
Hispanic or Latino	-8.495	8.58	-0.012	-0.99	0.322	[-25.151, 8.499]
<i>Impairment</i>						
Psychosocial (Ref)						

Predictor	<i>B</i>	<i>SE</i>	$\beta$	<i>t</i>	Sig.	95% CI
Cognitive	-12.181	9.119	-0.041	-1.336	0.182	[-29.315, 6.351]
Communication	-5.271	9.133	-0.018	-0.577	0.564	[-22.726, 12.998]
Other mental	1.897	11.02	0.003	0.172	0.863	[-18.557, 24.6]
All other	-94.823	139.167	-0.008	-0.681	0.496	[-353.371, 34.162]
<i>Service</i>						
Assessment	-2.341	3.941	-0.008	-0.594	0.552	[-9.931, 5.512]
VRCG	-0.847	4.167	-0.003	-0.203	0.839	[-9.321, 7.011]
Job search assistance	7.25	4.007	0.024	1.809	0.070	[-0.4, 15.311]
Job placement assistance	-20.073	3.979	-0.065	-5.044	<b>0.001***</b>	[-27.365, -11.779]
On-the-job supports	-52.27	3.772	-0.176	-13.856	<b>.001**</b>	[-58.701, -43.913]
<i>R</i> <sup>2</sup>	0.123					
Change in <i>R</i> <sup>2</sup>	0.036					

Note. CI=confidence interval.  $p < .05^*$ .  $p < .01^{**}$ .  $p < .001^{***}$ .

When interpreting the results from the earning difference models it is critical to remember that earnings difference represents a change in earnings between closure and application. This could be a gain in earnings or a loss. The mean income in block four is \$277.43, meaning that when all predictors are set to the reference groups the average change in earnings between application and closure is a net change of \$277.43. Table 4.3 in the previous chapter provides an overview of the change in earnings reflecting both gains and losses.

State system and employment at closure was significant in blocks two through four. It was the only predictor in block one but was not significant. Gender, age, and integrated employment at application, and Black/African American were statistically significant across blocks two through four. These predictors alone and combined with state system, impairment type, and service significantly influenced an individual's change in earning from closure to application.

**Findings.** Race had mixed effects across blocks two through four. Black/African American recipients were significant in all models ( $B = -17.50, -17.05, -13.13$ ) and meaning that an individual who was Black/African American was significantly different from the reference group and experienced less of an earnings change than whites. There was also a large effect size between White and Black/African American recipients ( $r = -.897$ ). However, other racial and impairment groups did not differ significantly, but a medium effect size was identified between White and Asian/Pacific Islanders ( $r = -.367$ ).

Gender, employment at application, and age were significant in blocks two through four. Women had less of an earnings difference than their male counterparts

( $B = -26.34, -26.58, \text{ and } -28.12$ ). In the final model women had an earnings difference that was \$28.12 less than men. Employment at application was also significant in blocks two through four. Recipients who had a job at application had an earnings difference that was ( $B = -126.84, -126.84, \text{ and } -131.99$ ) less than those who had no job at application. It is possible that an individual who had a job at application would not experience as great an increase in earnings because they already had earnings at application, whereas someone who had no job and no earnings at application would likely experience a greater increase in earnings from closure to application. There was also a medium negative effect size between earnings difference and integrated employment at application ( $r = -.278$ ). Age was a significant predictor of earnings difference. In blocks two through four for every year in age older an individual experienced a greater difference in earnings from closure to application ( $B = .87, .87, 1.13$ ).

Services were added in block four which include; job placement ( $B = -20.07, t(5795) = -5.044, p < .001$ ) and on-the-job supports ( $B = -52.27, t(5795) = -13.856, p < .001$ ), which were statistically all significant. Results indicate that those who received job placement services had earnings differences that were \$20.07 less than those who did not receive the service, and those who received on-the-job supports had earnings difference that were \$52.27 less than recipients who received this type of support from VR. This result does not mean that receiving these services was negative; rather those who received it had less of a change in their earnings between closure and application. With the addition of services in the model medium and large effect sizes occurred between each service and state system. This includes positive correlations with VRCG ( $r = .279$ ), and job placement ( $r = .179$ ). The analyses revealed

small and medium effect sizes between job search and VRCG ( $r = .255$ ), job placement and VRCG ( $r = .202$ ), job placement and job search assistance ( $r = .294$ ), on-the-job supports and job search ( $r = .173$ ), and on-the-job supports and job placement ( $r = .227$ ). Integrated employment at closure had a strong positive relationship with job placement ( $r = .349$ ), and on-the-job supports ( $r = .339$ ). Overall, the job related services yielded the strongest positive relationships with other services and integrated employment at closure.

Although impairment was not statistically significant in the regression analyses correlations did exist between impairment types which include large effect size between communication and cognitive impairments ( $r = -.797$ ) and small effect sizes between other mental and cognitive ( $r = -.243$ ) and communication ( $r = -.249$ ) impairments.

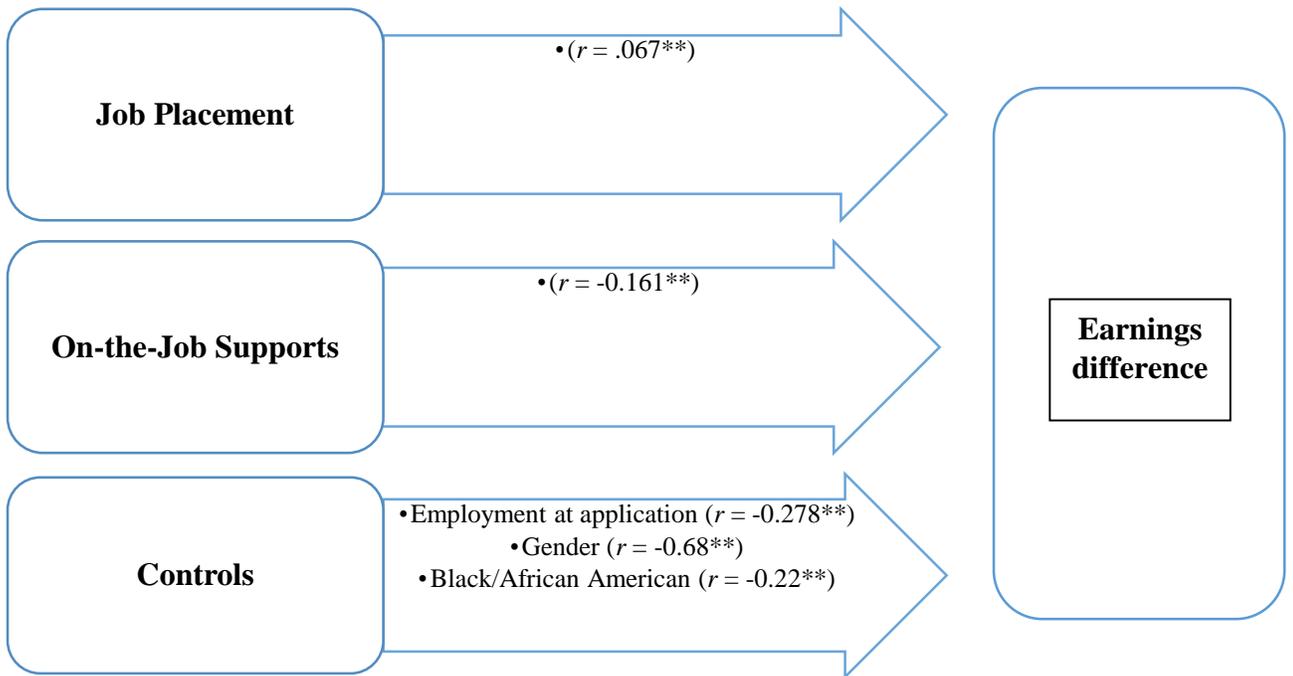


Figure 5.4.  
*Significant findings for earnings difference model in block four and corresponding effect sizes*

Note: \*\* Correlation is significant at the 0.01 level (2-tailed).

Table 5.29

*Pearson's r effect size: Hours difference (section one)*

	<i>Pearson's r</i>														
Variables	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Black or African American	1														
American Indian or Alaska Native	-0.013	1													
Gender	-.024*	0.018	1												
Native Hawaiian or Other Pacific Islander	-0.009	-0.008	0.004	1											
White	-.825**	-.121**	.025*	-.132**	1										
Asian	-.049**	-0.013	-0.011	.043**	-.367**	1									
Hispanic or Latino	-.048**	.043**	-.032**	0.016	.046**	-.028**	1								
Age	-.037**	-0.004	.037**	-0.004	.035**	0.001	-.051**	1							
Integrated employment at application	-.035**	0.004	0.003	-0.008	.044**	-0.017	-.046**	.175**	1						
Assessment	0.017	0	-0.002	-0.005	0.008	-.030**	-.022*	-0.005	-0.006	1					
VRCG	-.036**	.021*	-0.002	-0.006	.039**	-.027**	-0.008	-0.003	.028**	.138**	1				
Job search	-.038**	-0.017	-.027**	0.009	.034**	-0.001	0.016	.021*	0.007	.111**	.255**	1			
Job placemen	-0.006	-0.009	-0.018	0.011	0.017	-.026**	-.036**	.046**	.026**	.110**	.202**	.294**	1		
On the job supports	0	-0.004	-0.018	0.009	0	-0.006	-0.013	.077**	.020*	.088**	0	.173**	.227**	1	
State system: Integrated employment at closure	-.059**	.036**	-0.004	-0.009	.086**	-.064**	-.037**	.039**	.066**	.113**	.279**	.067**	.179**	.075**	1
Psychosocial	-0.017	-0.006	-0.014	0	-0.005	.048**	0.003	0.01	-0.004	-0.001	0.012	.038**	0.011	-0.003	0.015
Cognitive	.039**	-0.002	-0.015	.026**	-.041**	0.01	0.003	-.026**	-0.002	-0.008	.028**	0.017	0.006	-0.009	.029**
Communication	-.029**	0.006	0.013	-.022*	.036**	-.023*	-0.005	.022*	0.003	0.011	-0.014	-0.018	0.003	0.017	-.051**
Other mental	-0.006	-0.004	0.016	-0.008	0.013	-0.012	-0.001	0.001	0.001	-0.005	-.038**	-.025*	-.025*	-0.011	.032**
All other	-0.009	-0.003	-0.001	-0.002	0.01	-0.004	.027**	-0.006	-0.009	-0.012	0.006	-0.012	-0.01	-.021*	-.021*
Hours difference	0.01	0.005	-.081**	0.007	-0.011	0.006	.036**	-.091**	-.440**	-0.022	-.037**	0.001	-.040**	-.111**	-.071**

\* Correlation is significant at the 0.05 level (2-tailed).\*\* Correlation is significant at the 0.01 level (2-tailed).

Table 5.30

Pearson's *r* effect size: Hours difference (section two)

Variables	Pearson's <i>r</i>					
	16	17	18	19	20	21
Psychosocial	1					
Cognitive	-.184**	1				
Communication	-.189**	-.797**	1			
Other mental	-.057**	-.243**	-.249**	1		
All other	-0.005	-.023*	-.024*	-0.007	1	
Hours difference	0.015	-.030*	0.015	0.018	-0.017	1

\* Correlation is significant at the 0.05 level (2-tailed)\*\*. Correlation is significant at the 0.01 level (2-tailed).

**Model summary: Service to hours difference.** The linear regression analysis for hours difference included only those individuals who were employed at closure ( $N = 5,805$ ), as referenced earlier. Similar to the earnings difference models, the hour difference model summary table summarizes the  $R^2$  values that represent the models' ability to explain the proportion of predictor variables on the outcome variable, or hours difference. Block one, which includes state system, accounts for 0.5% of a change in weekly hours from application to closure. The addition of individual characteristics of gender, age, employment status at application, and race in block two increases the model's predictive capacity 20.3%, and increases  $R^2$  by .199. Block three's inclusion of impairment increased the predictive capacity of the model with a change in  $R^2$  of .001. The forth block include five services and allows the model to predict 22.3% of the change in hours worked, with a change in of  $R^2$  of .021. The  $R^2$  values in the hours difference model are higher than those found in the earnings difference model.

Table 5.31  
*Model summary: Hours difference*

Model	<i>R</i>	<i>R</i> <sup>2</sup>	Adjusted <i>R</i> <sup>2</sup>	<i>SE</i> of the Estimate
1	0.07	0.005	0.005	11.88816
2	0.452	0.204	0.203	10.64104
3	0.453	0.205	0.203	10.63586
4	0.475	0.226	0.223	10.50192

Table 5.32 provides additional insight into the role of each model in predicting a change in hours worked. Results indicate that each of the four models are statistically significant and have predictive value for the outcome. The statistical significance of each of the models results in the rejection of the null hypothesis. Model one was significant at ( $F_{1,5791} = 28.91, p < .001$ ), as was block two ( $F_{9,5783} = 164.56, p < .001$ ), model three ( $F_{13,5779} = 114.78, p < .001$ ), and block four ( $F_{19,5774} = 93.54, p < .001$ ). In these four models the *F* statistic was higher (28.91-164.56) than the models for the earnings difference (3.82-60.30). The *F* statistic represents the between group variance divided by the within group variance. A high *F* statistic indicates that the between groups variance exceeds the within group variance (Field, 2013; Howell, 2010).

Table 5.32

*Hours difference ANOVA*

Model		SS	df	$M^2$	F	$\sigma$
1	Regression	4086.275	1	4086.275	28.913	0.000
	Residual	818432.51	5791	141.328		
	Total	822518.79	5792			
2	Regression	167700	9	18633.333	164.56	0.000
	Residual	654818.79	5783	113.232		
	Total	822518.79	5792			
3	Regression	168788.94	13	12983.765	114.78	0.000
	Residual	653729.85	5779	113.122		
	Total	822518.79	5792			
4	Regression	185702.88	18	10316.827	93.543	0.000
	Residual	636815.91	5774	110.29		
	Total	822518.79	5792			

Each block uses varying combinations of predictors in an attempt to predict a change in weekly hours worked. The use of blocks allows for additional exploration of the predictors. Table 5.31 provides an overview of the changes in  $R^2$  in each model. As predictors are added the  $R^2$  value increases indicating an improved fit of the model. Each block calculates an intercept that denotes the mean difference when all variables are set to zero.

Table 5.33

*Hours difference: Block 1 for individuals with employment at closure*

Predictor	<i>B</i>	<i>SE</i>	Block 1			95% CI
			$\beta$	<i>t</i>	Sig.	
Intercept	25.495	0.849		30.017	<b>0.001***</b>	[23.781, 27.109]
State system: Employment at closure	-7.576	1.409	-0.07	-5.377	<b>0.001***</b>	[-10.327, -4.806]
<i>R</i> <sup>2</sup>	0.005					
Change in <i>R</i> <sup>2</sup>						

Note. CI=confidence interval. *p* < .05\*. *p* < .01\*\*. *p* < .001\*\*\*.

Table 5.34  
*Hours Difference: Block 2 for individuals with employment at closure*

Predictor	<i>B</i>	<i>SE</i>	Block 2			95% CI
			$\beta$	<i>t</i>	Sig.	
Intercept	29.441	0.989		29.758	<b>0.001***</b>	[27.676, 31.55]
State system: Employment at closure	-6.11	1.267	-0.057	-4.823	<b>0.001***</b>	[-8.562, -3.592]
Gender (Male Ref)	-2.341	0.396	-0.07	-5.917	<b>0.001***</b>	[-3.266, -1.718]
Age	-0.005	0.02	-0.003	-0.236	0.814	[-0.046, 0.03]
Integrated employment at application	-15.558	0.425	-0.439	-36.612	<b>0.001***</b>	[-16.332, -14.664]
<i>Race</i>						
White (Ref)						
Black/ African American	-0.477	0.482	-0.012	-0.989	0.322	[-1.418, 0.474]
American Indian/ Alaska Native	1.045	1.33	0.009	0.786	0.432	[-1.518, 3.707]
Asian	-0.301	0.894	-0.004	-0.336	0.737	[-1.993, 1.507]
Native Hawaiian/Pacific Islander	0.829	1.921	0.005	0.431	0.666	[-2.89, 4.656]
Hispanic or Latino	0.537	0.658	0.01	0.817	0.414	[-0.797, 1.781]
R <sup>2</sup>	0.204					
Change in R <sup>2</sup>	0.199					

Note. CI=confidence interval.  $p < .05^*$ .  $p < .01^{**}$ .  $p < .001^{***}$ .

Table 5.35

*Hours difference: Block 3 for individuals with employment at closure*

Predictor	<i>B</i>	<i>SE</i>	Block 3			
			$\beta$	<i>t</i>	Sig.	95% CI
Intercept	30.025	1.192		25.186		[27.854, 32.519]
State system: Employment at closure	-5.989	1.27	-0.056	-4.716	<b>0.001***</b>	[-8.504, -3.522]
Gender (Male Ref)	-2.357	0.396	-0.07	-5.957	<b>0.001***</b>	[-3.268, -1.72]
Age	-0.005	0.02	-0.003	-0.262	0.793	[-0.047, 0.03]
Integrated employment at application	-15.566	0.425	-0.439	-36.643	<b>0.001***</b>	[-16.342, -14.675]
<i>Race</i>						
White (Ref)						
Black/ African American	-0.434	0.482	-0.011	-0.901	0.368	[-1.378, 0.513]
American Indian/ Alaska Native	1.067	1.329	0.009	0.802	0.422	[-1.5, 3.721]
Asian	-0.28	0.894	-0.004	-0.314	0.754	[-1.974, 1.526]
Native Hawaiian/Pacific Islander	1.028	1.921	0.006	0.535	0.593	[-2.7, 4.846]
Hispanic or Latino	0.524	0.657	0.009	0.797	0.425	[-0.765, 1.814]
<i>Impairment</i>						
Psychosocial (Ref)						
Cognitive	-1.074	0.699	-0.045	-1.537	0.124	[-2.402, 0.332]
Communication	-0.385	0.7	-0.016	-0.551	0.582	[-1.739, 0.999]
Other mental	0.229	0.843	0.005	0.271	0.786	[-1.348, 1.955]
All other	-4.862	10.659	-0.005	-0.456	0.648	[-28.807, 0.891]

Predictor	<i>B</i>	<i>SE</i>	$\beta$	<i>t</i>	Sig.	95% CI
<i>R</i> <sup>2</sup>	0.204					
Change in <i>R</i> <sup>2</sup>	0.001					

Note. CI=confidence interval.  $p < .05^*$ .  $p < .01^{**}$ .  $p < .001^{***}$ .

Table 5.36

*Hours Difference: Block 4 for individuals with employment at closure*

Predictor	Block 4					
	<i>B</i>	<i>SE</i>	$\beta$	<i>t</i>	Sig.	95% CI
Intercept	31.996	1.2		26.675	<b>0.001***</b>	[29.734, 34.432]
State system: Employment at closure	-5.665	1.297	-0.053	-4.366	<b>0.001***</b>	[-8.223, -3.13]
Gender (Male Ref)	-2.446	0.391	-0.073	-6.259	<b>0.001***</b>	[-3.35, -1.819]
Age	0.011	0.019	0.007	0.555	0.579	[-0.031, 0.045]
Integrated employment at application	-15.861	0.421	-0.447	-37.704	<b>0.001***</b>	[-16.612, -14.96]
<i>Race</i>						
White (Ref)						
Black/ African American	-0.19	0.477	-0.005	-0.399	0.690	[-1.123, 0.749]
American Indian/ Alaska Native	1.163	1.313	0.01	0.885	0.376	[-1.365, 3.798]
Asian	-0.347	0.884	-0.005	-0.393	0.694	[-2.006, 1.457]
Native Hawaiian/Pacific Islander	1.195	1.897	0.007	0.63	0.529	[-2.493, 4.965]
Hispanic or Latino	0.475	0.649	0.009	0.731	0.465	[-0.796, 1.753]
<i>Impairment</i>						
Psychosocial (Ref)						
Cognitive	-1.036	0.69	-0.043	-1.502	0.133	[-2.342, 0.36]
Communication	-0.298	0.691	-0.012	-0.431	0.666	[-1.631, 1.076]

Predictor	<i>B</i>	<i>SE</i>	$\beta$	<i>t</i>	Sig.	95% CI
Other mental	0.069	0.834	0.002	0.083	0.934	[-1.47, 1.799]
All other	-5.823	10.53	-0.006	-0.553	0.580	[-30.165, -0.806]
<i>Service</i>						
Assessment	-0.176	0.298	-0.007	-0.589	0.556	[-0.763, 0.407]
VRCG	-0.215	0.315	-0.009	-0.682	0.495	[-0.86, 0.377]
Job search assistance	0.729	0.303	0.03	2.404	<b>0.016*</b>	[0.157, 1.348]
Job placement assistance	-1.241	0.301	-0.05	-4.123	<b>0.001***</b>	[-1.77, -0.589]
On-the-job supports	-3.174	0.285	-0.133	-11.119	<b>0.001***</b>	[-3.656, -2.536]
<i>R</i> <sup>2</sup>	0.226					
Change in <i>R</i> <sup>2</sup>	0.021					

Note. CI=confidence interval.  $p < .05^*$ .  $p < .01^{**}$ .  $p < .001^{***}$ .

When interpreting the results from the hours difference models it is critical to remember that hours difference variable represents a change in weekly hours worked between closure and application. The mean hours in block four is 32.0, indicating that when all predictors are set to the reference groups the average change in hours worked between application and closure is a net gain of 32 hours. Table 4.3 in the previous chapter provides an overview of the change in hours reflecting both increases and reductions.

**Findings.** Each block provides the effects of each variable in relation to other variables within the block. Therefore each block accounts for the unique contribution of the combination of variables within the block. State system was the only predictor in block one and was statistically significant ( $B = -7.576$ ,  $t(5791) = -5.377$ ,  $p < .001$ ), this significance was maintained across subsequent blocks two through four when additional predictors were added. Review of the *SE* values for each variable as discussed in previous analyses indicate that despite the continuous nature of the dependent variable in this analysis (which would yield more variation in *SE* values) indicate that they are stable and do provide a standardized way to interpret how far the sample mean is from the population mean. The *SE* values for the state system variable indicate that it can continue within the model (Pettingell, personal communication, June 30, 2015).

Block two included the addition of individual characteristics. Race and age were not significant in this block, but there were significant effect sizes between White and Black/African American ( $r = -.827$ ), and White and Asian ( $r = -.367$ ) VR recipients. Gender was significant in block two and subsequent blocks ( $B = -2.34$ ,  $-2.36$ , and  $-2.45$ );

as was employment status at application ( $B = -15.56, -15.57, \text{ and } -15.86$ ). Integrated employment at application and hours difference produced a medium effect size ( $r = -.440$ ). The inclusion of these individual characteristics accounted for a change of .199 in  $R^2$ . Block three included the addition of impairment, which only resulted in a change in of  $R^2$  of .001. However, gender and employment status at application maintained their significance. Block three incorporated impairment type into the model. Although there were not significant results in the regression analysis small and large effect sizes existed between impairment types including: communicative and cognitive ( $r = -.797$ ), other mental and cognitive ( $r = -.243$ ), and other mental and communicative ( $r = -.249$ ).

The fourth block incorporated services provided by VR along with the inclusion of all of the previous predictor variables. The final block produced a number of statistically significant results. Alone (block one) and combined (block four) state system was significant ( $B = -5.67, t(5774) = -4.37, p < .001$ ). Gender was also statistically significant. Women ( $B = -2.45, t(5774) = -6.26, p < .001$ ) have a smaller change in work hours (2.45 less) compared to men. Integrated employment at application ( $B = -15.86, t(5774) = -37.70, p < .001$ ) also produced significant results across all blocks, including block four. This indicates that those who were employed at the time of their VR application has less of an increase in weekly hours worked than those who were unemployed at application. Individuals who entered VR with employment were reporting work hours at application, therefore they did not experience as a great of a change in work hours as those who had not employment at application and were working zero hours per week.

The fourth block produced statistically significant results for three of the five services. Job-related services (job search, job placement, and on-the-job supports) provided the most predictive value when calculating a change in weekly hours, whereas the administrative VR services did not. Results indicate that individuals who received job search services ( $B = .73, t(5774) = 2.40, p < .05$ ) experienced a greater change in work hours by almost one hour (.73) more than the intercept. Job search and VRCG ( $r = .255$ ) and job search and job placement ( $r = .294$ ) produced positive small effects. Those who received job placement ( $B = -1.24, t(5774) = -4.12, p < .001$ ) experienced a smaller change in weekly hours with a decrease of 1.24 hours. Job placement produced small effect sizes with VRCG ( $r = .202$ ) and on-the-job supports ( $r = .227$ ) Finally, VR recipients who received on-the-job supports ( $B = -3.17, t(5774) = -11.12, p < .001$ ) experienced a smaller change in weekly work hours between application and closure. Those who received this service experienced a smaller change of 3.17 hours. As with the earnings difference model, the receipt of these services does not suggest that the recipient's total hours were less; rather the difference in hours between application and closure was less than the intercept of 32 hours. Interestingly although not significant in the regression analysis VRCG and integrated employment at closure had a small positive effect size ( $r = .279$ ).

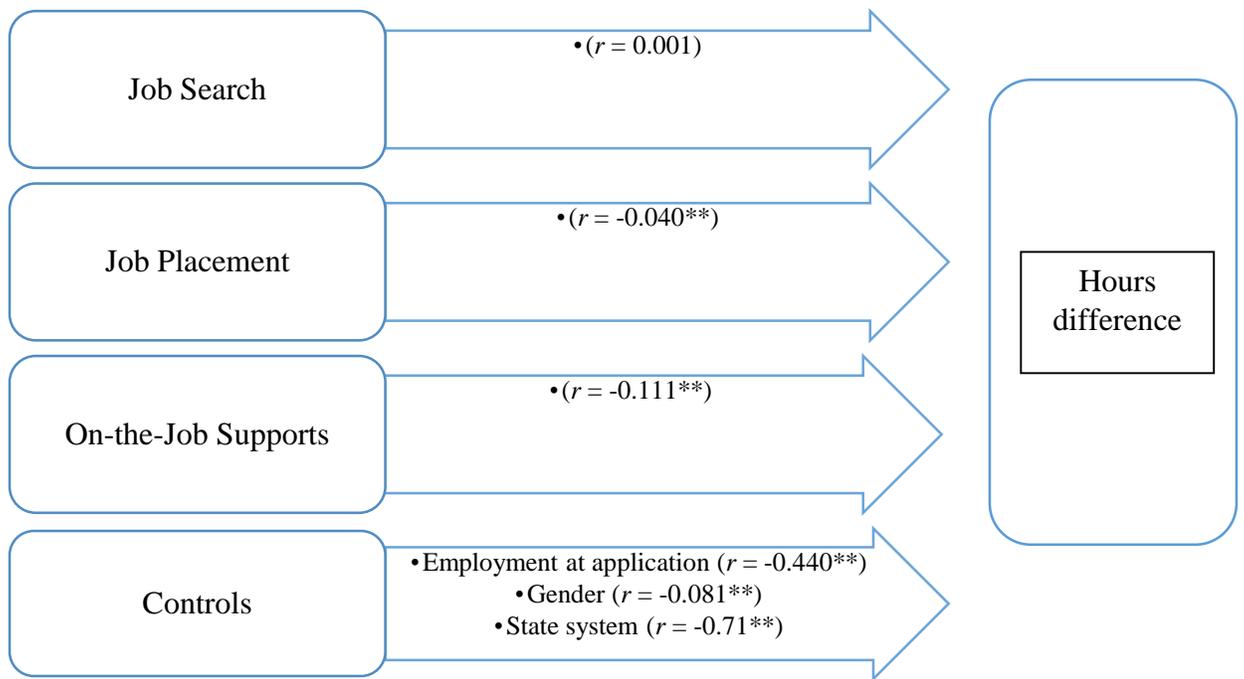


Figure 5.5.

*Significant findings for hours difference model in block four with corresponding effect sizes*

Note: \*\* Correlation is significant at the 0.01 level (2-tailed).

## **Chapter VI**

### **Discussion and Implications**

The purpose of this study was to explore the predictive relationships of participant characteristics and service delivery patterns upon Vocational Rehabilitation (VR) employment outcomes for individuals with Autism Spectrum Disorder (ASD). Previous literature indicated the growing need for understanding what types of interventions and services improved employment outcomes for individuals with ASD. In an attempt to further expand on the knowledge in rehabilitation research, this study focuses on three central tenants from the findings: equality in service access to job-related VR services is critical; job-related services result in improved rates of integrated employment at closure; and job-related services lead to greater changes in earnings and hours worked. This chapter will incorporate previous rehabilitation research and: (1) discuss apply the findings in relation to the research hypotheses and conceptual model; (2) discuss implications for VR practices; (3) outline the limitations of the study and findings; (4) provide suggestions for future research.

#### **Exploring integrated employment and outcomes**

This study sought to develop additional connections between integrated employment and employment outcomes and hypothesized that integrated employment would result in improved employment outcomes. The hypotheses developed and tested seek to identify relationships between the variables rather than establish cause and effect. The three hypotheses tested were:

- 1) Individuals with psychosocial impairments will be more likely to experience positive employment outcomes.
- 2) Individuals who receive job-related services (job search, job placement, and on-the-job supports) are more likely to have their cases closed in integrated employment,
- 3) Individuals who receive job-related services (job search, job placement, and on-the-job supports) are more likely to experience changes in weekly earnings and hours worked.

**Application of a conceptual model.** The conceptual model provided in Chapter III attempted to explain the how individuals with ASD experienced VR programming from application to closure. The model attempted to draw a connection between ASD impairment type and access to specific types of VR services. ASD impairment type was used as a potential gateway to explain services access, case closure, earnings, and hours worked. In figure 6.1 the orange lettering highlights the significant findings between impairment type and service, and the green lettering highlights the significant findings between services, integrated employment at closure, and changes in earnings and hours worked which were outlined in Chapter V. Although impairment was related to two administrative VR services it did not have further significance across the other employment outcomes. Throughout the course of the study the control variables exhibited significant relationships with services, integrated employment at closure, earnings, and hours worked. This study confirmed some but not all the hypotheses from the model. At the conclusion of this discussion an updated theoretical model is proposed.

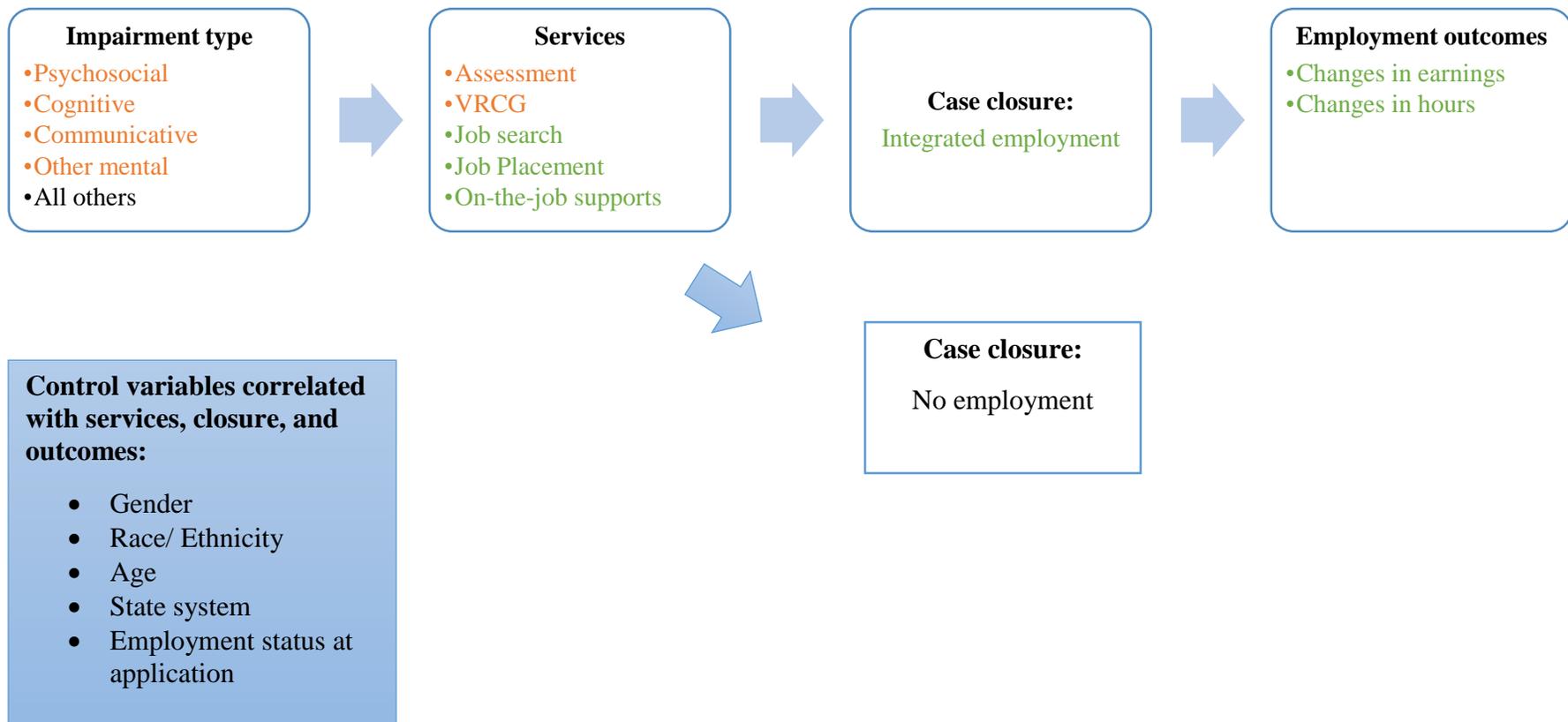


Figure 6.1.

*Conceptual model findings*

**Hypothesis one.** Service receipt could not be predicted by impairment type, with the exception of the assessment service. Although assessment services were associated with various impairment types, the role of impairment did not produce significant findings when looking at vocational rehabilitation counseling and guidance (VRCG) and job-related services, case closure in integrated employment, or changes in earnings and hours worked. In subsequent analyses impairment type was not associated with integrated employment at closure, and therefore not associated with changes in earnings and hours worked.

This finding is of particular interest because the medical and educational communities recognize several different yet common core features in an ASD diagnosis. Due to the varying nature in type and severity, ASD impairment type was thought to play a potential role in what types of services this group would access in VR. Previous literature has not looked at impairment type in connection with services or employment outcomes. Although the results did not confirm the value of ASD impairment type as an indicator in employment outcomes, these findings are an informative contribution literature in rehabilitation research.

***Impairment.*** Research has not explored how the different types of impairment within the ASD label potentially influence VR services and outcomes although it is of interest to researchers (Cimera, Burgess, Novak, & Avellone, 2015). Findings from this study indicate that impairment was a significant indicator of the receipt of administrative VR services (assessment and VRCG), but not job-related VR services (job search, job placement, and on-the-job supports). Assessment is the most highly-utilized service within this population with 69.2% of individuals with ASD receiving it. Chen et al.

(2015) also found that assessment followed by VRCG was the most common type of service across three different age groups with ASD. Due to the fact that the very nature of ASD is extremely nuanced and varied it is not completely surprising that a large proportion of this group received the service.

Assessment can be a critical step in determining current needs, skills, and interests of a VR recipient. Cognitive and other mental impairments may require additional information in order for the VR counselor to develop the most appropriate individualized plan for employment (IPE). Additionally, those with communication impairments may require additional supports or modifications that could be determined through the assessment process. While assessment can provide VR counselors with important information about the job seeker, it is actually significantly negatively associated with case closure in integrated employment.

Logistic regression analysis indicated that the addition of impairment type did not provide any additional predictive capacity when predicting changes in earnings or hours worked. The inclusion of impairment only increased the predictive capacity by less than 1% in both models. There were also not significant effect sizes related to impairment type. These results show that despite the variation in impairment within the ASD label, an individual's ability to experience net gains and losses in earnings and hours worked cannot be explained by his or her impairment. While the ASD label encompasses a broad range of impairments, each subgroup is not significantly different from the other and achieves similar outcomes related to earnings and hours worked.

Although impairment did produce some significant findings in this study, its overall value as an indicator of employment outcomes in this study is limited. Regardless

of impairment type with the ASD label, individuals with ASD still experience case closures of less than 60% and lower than average weekly earnings compared to the rest of the VR population. ASD is wide-ranging diagnostic label with individuals experiencing varying degrees of strengths and deficits. However, despite these differences, the type of impairment itself appears to have little to do with employment outcomes measured in this study. Other demographic features used as controls in this study provided more significant findings than impairment type.

**Hypothesis two.** Job-related services resulted in increased rates of case closures in integrated employment. The receipt of job related services did increase a VR recipient's odds ratio of leaving the VR program in integrated employment. There was also a significant negative relationship between the receipt of assessment and case closure in integrated employment. However, there were positive medium effect sizes detected between integrated employment at closure and job placement and on-the-job supports. Despite this finding, assessment remains the highest utilized service for individuals with ASD and several other disability groups. These findings confirm the importance of job-related services in experiencing positive case closure outcomes in integrated employment. The connection between job-related services and case closure in integrated employment should remain in the model.

***Closure in integrated employment.*** High unemployment and low workforce participation rates of individuals with disabilities are found nationwide and across disability groups (Butterworth et al., 2014). At application, 90.3% of service users do not have integrated employment. Even after the receipt of VR service at an average cost of \$4,379.44 per recipient per year, only 56.9% leave VR with an integrated employment

outcome. However, when compared to all individuals with case closures in VR in FY 2013 ( $N = 589,377$ ), only 29.6% or 174,700 individuals exited VR with integrated employment at a mean cost of \$2,812.58 per recipient. While VR recipients with ASD were more costly than average, they exited VR with integrated employment outcomes almost twice as high as the entire VR population. The proportion of those served in VR that leave with no (zero) employment is similar for both the ASD VR population (42.7%) and full VR population (42.2%). These results reflect the findings Burgess and Cimera (2014); Cimera and Burgess, (2011); Cimera and Cowan (2009); Shaller and Yang (2005), indicating the higher costs of serving individuals with ASD but improved employment outcomes and expenditures as compared to other disability groups.

Research in the field has explored the use of some types of VR services by individuals with ASD. Shaller and Yang (2005) found that job finding, job placement, and maintenance services lead to the highest competitive employment outcomes, and that job placement was related to the highest successful supported employment outcomes. Results from Migliore et al. (2012) indicate that receiving job placement services significantly increased the likelihood of employment. However, only 48% of their sample ( $N = 2,913$ ) received this service.

Of the five services analyzed in this study, four of the five had predictive abilities on integrated employment at closure. Assessment was negatively associated with integrated case closure. Whereas the receipt of job-related services of job search (34%), job placement (224%), and on-the-job supports (287%) were positively associated with integrated case closure and increased the odds ratio that an individual would leave VR with integrated employment.

In order for VR counselor to make recommendations for IPE (individual plan for employment) and pay for VR services they must understand the nature of a VR recipient's needs which could explain the high rates of assessment in this group. To fully understand these needs and in turn recommend the appropriate services, administrative services can play a role in determining which other VR services are most appropriate for the recipient. Therefore administrative services could play a role in making the recommendation for job-related services and are a necessary step for some VR recipients. The design of this study does not provide insight into why some services are provided at higher rates than others; it does, however, indicate that job-related services are more positively associated with integrated employment at closure.

Similarly to Shaller and Yang (2005) and Migliore et al. (2012), this study's findings make a strong case for increasing the accessibility of job-related services for individuals with ASD. Additionally they also support previous research, which indicates job-related service produce improved employment outcomes (Lawler et al., 2009; Migliore et al., 2012; Wehman et al., 2014a; Wehman et al., 2014b). With the Workforce Innovation and Opportunity Act's (WIOA) focus on competitive and integrated employment, state VR program will need to carefully examine the services, which lead to the most desired outcomes. Combined, these studies suggest that when individuals with ASD are provided with job placement, job finding, and maintenance services they may produce employment outcomes that exceed other types of VR service.

Other studies have focused on the importance of post-secondary education. For individuals with ASD, college and university training was the twelfth most accessed service in VR (of twenty-two) and received by only 1,036 individuals in the population.

Access to post-secondary education and training is positively associated with improved employment outcomes for youth and adults with disabilities (Greene, 2006; Migliore et al., 2012; Yin, Shaewitz, & Megra, 2014). While employment is a primary goal of VR, college and university training potentially provide improved pathways to careers. Access to post-secondary training and education is a critical step in addressing the wage disparities between individuals with and without disabilities (Yin et al., 2014), while at the same time acting as a mechanism to lift individuals with disabilities out of poverty through pathways to better paying jobs and careers.

Migliore et al. (2013) suggested that the states with best employment outcomes should be used as benchmarks for other state VR programs in an effort to raise the expectations on performance. Further examination of factors that contribute to improved outcomes is necessary, but many high-performing states highlight that improved employment outcomes are possible in this population. The State Employment Leadership Network (SELN) is a community of practice engaging state leadership (including state VR programs) that provides support, information, and discussion around best practices, barriers to employment, robust data collection, and policy advocacy (State Employment Leadership Network, 2014). The GAO (2005) and Honeycutt et al. (2014) recommended a number of activities to improve VR performance. Continued formal and informal collaborations and discussions are critical to improved policy and practice within VR. State VR engagement in the process is essential.

*Service usage.* Consistent with previous findings, this study also found that individuals with ASD were a more expensive population to serve (\$4,379 versus \$2,812) (Burgess & Cimera, 2014; Chappel & Somer, 2010; Hendricks, 2010; Lawer et al.,

2009). However, despite the increased expense this population experienced higher rates of integrated employment at closure compared to the VR population as a whole (56.9% versus 29.6%).

Despite the more positive indicator of case closure rates in integrated employment for individuals with ASD it is critical to remember that individuals with ASD remain unemployed and underemployed across the nation (Cimera & Cowan 2009; Taylor et al., 2012; Westbrook et al., 2012; Wilczynski et al., 2013). Compared to other disability groups within VR and VR as a whole, the overall employment rate of individuals with ASD appears more promising, but average weekly earnings of \$213.35 at 23.31 hours per week still leave an individual with no dependents below the poverty level. Wages will be discussed in more detail later in this chapter.

Public dollars provide continuing support for VR, and although it is a cornerstone of employment services for individuals with disabilities in the United States, a critical light must highlight poor outcomes within VR as well as develop improved accountability for outcomes. Little is still known about what works for individuals with ASD in employment interventions (Taylor et al., 2012; Westbrook et al., 2012), however these findings further outline a pathway to improved employment outcomes. As a federal program VR has more access to workers with disabilities than any other employment program nationwide. Investment in and an understanding of the most effective services are critical to ensure the best outcomes for service users as well as support accountability in public funding.

*Demographics.* This study looked at a number of demographic characteristics as control variables including gender, race, age, and employment at application. Each of these variables provides additional insight into the accessibility of job-related VR services that can result in improved integrated employment rates.

*Gender.* Women in this study ( $n = 1,674$ ) experienced poorer outcomes than their male counterparts in a number of areas. Being female negatively impacted one's ability to access and benefit from job-related services. Women experienced a decreased likelihood of having job-related services than their male counterparts; job search 17% less, job placement 12% less, and on-the-job supports 15% less. Additionally, being female decreased an individual's odds ratio to experience case closure in integrated employment. This highlights a significant disparity within VR.

These disparities translate into significant impacts long-term as women do not benefit from the positive employment outcomes at the same rates as males because they do not access the services that lead to higher cases closures in integrated employment, increased changes in earnings, and hours worked. Lawer et al. (2009) also identified females as being more likely to have a VR case closure due to a disability too severe to benefit from services or experience competitive employment outcomes if VR services were received. Within this study racial minorities are better positioned to access job-related services. Interestingly, women do not experience these disparities in administrative-type VR services; rather, disparities were strictly reserved to job-related services.

Women with ASD not only experienced fewer changes in earnings, but also experienced few changes in hours worked. A female's inability to access the services that

result in integrated employment in turn influence her ability to make significant changes in weekly earnings and hours worked. Shaller and Yang (2005) reported that females were less likely to achieve competitive or supported employment in VR and therefore not extended the benefits of higher earnings. A predetermined pathway for women in VR begins at application and follows them through services and outcomes resulting in fewer women experiencing positive employment outcomes.

Although there are far fewer women with ASD nationwide (Baio, 2014; Wingate et. al., 2014) and were less than 20% in this study sample, significant disparities exist that prevent women from fully benefiting from VR services. Gender plays a significant role in woman's access and ultimate ability to experience success in the workplace (Barreto, Ryan, & Schmitt, 2009; Cohen, 2013; Wolf, 2014). Discrimination based on gender has long prevented women from achieving the same earnings and employment outcomes as men. Women may also benefit from difference types of employment services and supports, as women in the workforce have difference needs and experiences regardless of disability (Blake-Beard, 2001; Ely, Ibarra, Kolb, 2011; Lindstrom, Doren, Post, & Lombardi, 2013).

Being female and having a disability places individuals with ASD in particularly precarious circumstances. Not only are they hindered by disability status in employment (Boeltzig, Timmons, & Butterworth, 2009) but also by their gender label. Equality and equity of service access and benefits is of critical importance in VR programs. Additional attention should be paid to these disparities to further inform state VR leadership and its counselors to make service more accessible to women so that they can experience the benefits of employment. Without an adjustment of strategy within VR, women with ASD

will be tracked into pathways that do not lead to integrated employment and changes in earnings and hours worked, further promoting the inequality of women.

*Race.* ASD is present in all racial and ethnic groups (Baio, 2014; Wingate et. al., 2014). The sample's racial distribution is supported by the CDC's (2014) most current prevalence findings related to race. White children are more likely to be identified as having ASD at higher rates (1 in 63) than Black (1 in 81) or Hispanic (1 in 93) children (Baio et al, 2014). In this study racial minorities did not always experience equal access to job-related services. There was a large negative effect between white and Black/African American recipients ( $r = -.897$ ), and medium negative effect between White and Asian recipients ( $r = -.367$ ). Leahy et al. (2014) also reported that minorities receive only 80% of VR services compared to those who are White.

Access to services early on in the VR process can be an indicator of what types of employment outcomes an individual will experience. Equality in access to services is critical for all racial groups to ensure equal opportunity in achieving employment outcomes. The Bureau of Labor Statistics (BLS) report large racial and ethnic disparities in the labor force participation rate of Black and Hispanic individuals with disabilities compared to whites (United States Senate, 2013). In a study of the workforce of individuals with IDD, Siperstein, Parker, and Dracher (2013) reported that only 8% of Black individuals with IDD were employed. The social and economic circumstances racial minorities may experience compounded life challenges that make employment difficult and VR an unlikely avenue to achieve success.

This study found that race significantly influenced an individual's ability to access the job search service. However, only Asians/ Pacific Islander experienced a

decreased odds ratio of 33% to receive job search than their White peers. Job search is associated with changes in weekly hours worked. Failure to be able to access this service could result in a diminished capacity to increase the number of hours worked in a job.

This study also found that Black/African American recipients with ASD had odds ratios of 20% to experience case closure in integrated employment, again preventing a pathway to increased earnings and hours worked. However, when Greene (2006) explored service outcomes with transition age youth with ASD she found that African Americans had case closures in competitive or supported employment at similar rates to white VR recipients. This study used a different employment outcome variable, which may account for the difference in findings.

Black/African American VR recipients did not work significantly different hours from their white counterparts but did experience fewer changes in earnings. Despite working similar amounts of hours, Black/African American VR recipients still experienced smaller changes in earnings. Greene (2006) reported that significant differences existed between Black and White VR recipients with ASD when it came to earnings and hours worked. Greene (2006) hypothesized that since more Black recipients in the sample were receiving public benefits, like SSI, that they were more likely to be subjected to income limits through substantial gainful activity (SGA), and therefore may not have as high earnings to keep them below the SGA threshold. This study did not look at receipt of public benefits as an indicator of employment outcomes, but there is a growing body of literature supporting the notion of the receipt of public benefits having a suppressing effect on employment participation and outcomes (Delin et al., 2014; Gruman et al., 2014; Houtenville and Brucker, 2013; Mann, Mamum, & Hemmeter,

2015; Wehman et al., 2014; United States Senate, 2013). This study's findings do support the existence of disparities between Black/African American, Asian, and White VR recipients with ASD accessing some VR services, experiencing case closure in integrated employment, and changes in earnings.

*Age.* Many previous studies using RSA-911 data focus on transition-aged youth from 16–24 (Chen et al., 2015; Migliore et al., 2012; Shattuck et al., 2012; Wehman et al., 2014; Wehman et al., 2013). In this study the average age of a VR service user with ASD was 21.6 years old. Age played a role in the receipt of two job-related VR services, job placement and on-the-job supports, but the effect size was negligible. The older a service user the more likely he or she was to receive these two services. However, providing on-the-job supports to young workers can be an important ingredient to long-term job success by providing necessary job coaching, follow-along, and job retention supports (Lawer et al., 2009; Mcdonough & Revell, 2010; Migliore et al., 2013). Chen et al. (2015) also report that youth with ASD under age 18 experience the highest rates of unemployment while adults over 26 have the highest competitive employment rates. As young adults enter the workforce, employment supports are often required to ensure workplace success. Job-related services in VR could provide critical supports to ensure a young adult is prepared, matched, and successful in employment. Again, equality in access to job-related services was important for all ages of VR recipients.

Rehabilitation research literature has not fully explored the differences between youth and adults with ASD specifically by age. Chen et al. (2015) highlighted that age played a role in the type of VR services an individual received, although did not tie specific services to employment outcomes. In this study a VR recipient's age was

significant when predicting changes in earnings but not significant in changes in hours. In linear regression analysis for earnings, for every additional year in age a VR recipient experienced a greater difference in earnings. Findings from this study indicate that older VR recipients experience higher rates of case closures in integrated employment; therefore, those older VR participants who are working are also experiencing greater changes in their earnings and hours worked. Additionally, older VR recipients had an increased odd ratio to receive job placement and on-the-job support services, which increase an individual's likelihood to experience significant changes in earnings and hours worked.

***Employment at application.*** Integrated employment at application was a powerful indicator in this study and was a significant predictor for the receipt of assessment services, case closure in integrated employment, changes in earnings and hours worked. There were large and medium positive effect sizes between employment at application and changes in hours and earnings. This variable has not been explored in previous research with the ASD population.

The number of those individuals entering VR with integrated employment is extremely low (9.7%). Because VR provides supports and services that lead to employment those currently employed may not be as likely to be referred to VR or apply for the service. Individuals who were employed at application were less likely to receive assessment services, but more likely to close in integrated employment. Assessment may not be as necessary for those who are currently employed as they have a work history and exploration and analysis of skills may be less beneficial. Having a job at application was also an indicator that employment could be maintained at some level, and a work history

established, therefore improving the likelihood employment could be maintained or improved through the VR process. It was not possible to ascertain from this study's design whether an individual entered with employment closed in the same or different type of job.

If individuals enter VR with a job they are more likely to experience fewer changes in earnings and hours worked as they were employed at the beginning of VR services. Although these individuals do not have the same level of net gains as those who are unemployed at application they still are increasing their weekly earnings by \$145.35 and working an additional 16.1 hours per week. This is of critical importance as improving earnings and hours worked highlight the potential benefits of using specific VR services. Growing attention is not only being paid to the importance of earnings but the number of hours worked each week (Kas & McKimmie, 2015). In order to begin to more fully address the economic barriers individuals with disabilities face living below the poverty level, additional attention to the types of services and supports that lead to increases in earnings and hours is useful. The Workforce Innovation and Opportunity Act (WIOA) focus on preparatory work experiences prior to graduation can be an important step into setting youth with ASD up for success in VR programs by entering with employment, as evidenced by these results.

**Hypothesis three.** Findings indicate that job-related services were related to changes in earnings and hours worked between closure and application. All three job-related services resulted in produced significant relationships in hours worked, and job placement and on-the-job supports resulted in significant changes in earnings.

Linear regression analysis found that the addition of all VR services (assessment, VRCG, job search, job placement, and on-the-job supports) provided slight increases in the model's ability to predict changes in earnings and hours worked: 2.1% for hours difference model and 3.6% for the earnings difference model. All three job-related services were correlated with VR recipient's ability to experience net gains in both their hours and earnings. It is important to note that there was a negative association between job placement and on-the-job supports for both earnings and hours worked. Though the results were significant for these two services, they resulted in fewer hours worked than the intercept, but still represent an overall net gain. There was also a medium negative effect between integrated employment at closure and earnings difference and hours difference.

These results could be explained by the fact that all individuals in this analysis were part of a restricted sample ( $N = 5,805$ ) and employed in integrated employment. Individuals who have successfully achieved employment may not be as likely to require job-related services for ongoing success or only receive them for a short period of time. There were positive medium effect sizes between job placement and job search, one-the-job supports and job search and job placement. Second, the job search service is focused on finding a job, whereas the job placement and on-the-job supports are designed as direct support services after employment is achieved. It is possible that individuals with more significant impairments or barriers are in need of the latter two services more frequently and may be need to work fewer hours as a result. Literature supports the notion that individuals with significant disabilities work fewer hours than other groups (Boeltzig, Timmons, & Butterworth, 2009). Third, job placement and on-the-job supports

require direct interaction with an employer. Interaction with this third party is a potentially confounding variable could account for a great deal of variation in the number of hours available to work. Hours worked will depend greatly on the type of work as well as the employer. Again, if individuals with more significant impairments are in this group an employer may be less inclined to employ them more hours.

This study was not able to account for the personal factors imposed by individuals, employment professionals, and employers all of which have an ability to influence employment outcomes. Drawing on Dawis and Lofquist's (1984) theory of work adjustment the importance of correspondence, matching of employer and worker's needs, is central to employment success. Both workers and employers preferences and need play a role in determining the quality of a job match. These factors likely come into play when determining wages and hours worked by the employee.

What is of interest is that despite the lack of significance of administrative VR services in producing substantial changes in earnings, hours worked, and integrated employment at closure, they are still the most highly-utilized services in VR for this population. This reveals a potential disconnect in what is being offered most often in VR and what actually produces the successful employment outcomes that are expected by recipients, family members, professionals, policy makers, and taxpayers.

**Earnings.** Earnings from employment provide a means for individuals with ASD to meet their basic needs and achieve an improved quality of life (NDRN, 2011; President's Committee for People with Intellectual Disabilities, 2009). This study provides new insights into the types of VR services that lead to significant changes in earnings between closure and application. Providing a means of achieving increased

earnings is a vehicle to support increased economic independence for individuals with ASD.

VR recipients with ASD are financially less well off than the typical VR recipients both before and after VR services. The average weekly hours ( $M = 23.31$ ,  $SD = 10.52$ ) and weekly earnings ( $M = \$213.35$ ,  $SD = \$148.31$ ) of ASD recipients at closure were similar to previous research where earnings ranged from \$186–\$198 with weekly hours between 22-24 (Burgess & Cimera, 2014; Migliore et al., 2013; Sullivan et al., 2012). Job-related services provided to individuals with ASD resulted in a significant difference in earnings between application and closure with over 23.5% of individuals experiencing changes between \$101–\$200, and 20.6% experiences differences of \$200 or more. Job-related services in VR should be highlighted as promising practices that result in significant changes in earning supporting increased economic well-being.

The relationship between benefits and earnings is not well understood. Walls and Dowler (2015) reviewed VR data from FY 2012 and found that individuals with ASD ( $N = 12,899$ ) entered VR annual income (including earnings and benefits) of \$3,780 and exited with \$13,476, which represented a 357% increase in income. Promisingly, these changes represented a shift from benefits to earnings. For individuals with ASD at application, 18% of their annual income was from earnings, and at closure it had increased to 76% of their earnings (Walls & Dowler, 2015). Their findings also revealed similar difference between VR recipients with ASD and the VR population found in this study and provided additional evidence of the relationship between benefits and earnings but also an individual's ability to increase earnings through employment.

Despite promising findings in earnings for individuals who receive job-related services, the wages earned still leave a single individual below the poverty line in the United States. According to the U.S. Department of Health and Human Services (2015) the current poverty guidelines for a single individual in 2015 are \$11,770. An individual in this study earning \$213.35 per week for 52 weeks would have an annual gross income of \$11,094.20. Walls and Dowler's (2015) findings show that individuals with ASD in VR can increase their annual income to rates slightly above the poverty level in conjunction with benefits. However, these findings still highlight the precarious situation of individuals with intellectual disabilities, of which ASD is included, who are living at poverty rates almost three times of those without disabilities, 34.4% versus 12.4% (Erickson et al., 2014). Most individuals with ASD do not access VR and therefore do not necessarily have an avenue out of poverty through state VR programs. Conversely, Walls and Dowler's findings support the notion that while individuals with ASD still receive public benefits during the VR process, their benefits in combination with earnings only slightly lift this population above the current poverty guideline. In order for individuals—regardless of disability status—to thrive and access the full benefits of community life, income well above the poverty guideline is required (Iceland, 2012; Nord & Nye-Lengerman, 2015).

**Hours.** Most individuals with ASD are working part time, around twenty hour per week. The weekly number of hours an individual is working provides an indication of their earnings as well as an approximation of how much time they may be spending in the community while employed. Hours worked are included as a potential indicator of positive employment outcomes. As previously reported, job-related services resulted in a

greater change in hours between closure and application. Job-related VR services could pave an avenue for individuals with ASD to increase the hours worked in the community.

How an individual with ASD spends the remainder of his or her week when not employed in the community requires additional attention. Some states are moving towards the elimination of facility-based segregated employment to provide and promote only community-based employment for individuals with disabilities (Butterworth et al., 2014; Kas & McKimmie, 2014; Novak, 2015). As a result many individuals with disabilities are not able to secure adequate hours of supported or community employment and therefore spending more time at home (Kas & McKimmie, 2014). Rather than being isolated in a segregated employment facility, these individuals are now experiencing isolation in their homes without a means to increase community employment.

Including weekly hours as an indicator of employment outcomes is critical. Increasing hours worked also increases an individual's ability to not only earn wages but also be included in and have access to community. Focusing on services that lead to increased hours worked can decrease the likelihood an individual may be isolated in other settings. Purposeful policy planning is essential to ensure that services that support increasing hours worked in the community are available to those in need. Special attention needs to be paid to those individuals who were previously placed in segregated facilities to ensure isolation in one setting is not being replaced with isolation in another.

**Influence of state VR systems.** Previous literature in rehabilitation research recognizes the potential influence of state service systems on employment outcomes. Although services may have the same name and are provided under the auspice of local, state, or federal employment program, unique factors within a state can influence how an

individual accesses and receives services. Although this study did not develop specific hypotheses around state systems, findings indicated that the state system that an individual receives services within accounts for differences in employment outcomes. There were both medium and large effect sizes between the state systems variables and each of the five service types.

*State variability.* Both descriptive and inferential statistics indicated that state system was a significant predictor of service receipt and employment outcomes. There is substantial variability in the number of individuals with ASD served by each state VR program. Central to the findings of this study is equality in access to job-related services that can lead to integrated employment at closure and changes in earnings and hours. Significant variation in a state VR program's interest and ability to provide job-related services result in increased disparities in access for some VR recipients with ASD.

The design of this study did not address the reasons or causes of variability, rather only controlled for it. It was critical to control for state system because despite federal directives and rules about VR, state VR programs implement, prioritize, and serve varying populations based on the unique characteristics of the state. Failure to control for state system would assume that all VR services are implemented similarly, which the literature does not support (GAO, 2007; Gruman et al., 2014; Leahy, Chan, & Lui, 2014; Nord et al., 2013; Rogan et al., 2002; U.S. Department of Education, 2012). There is a significant variation in how many youth with ASD access VR within their state, representing both increases and decreases in the population over a five year period (Migliore et al., 2013). State system is a strong predictor of accessibility to service.

In this study, state system was a significant factor in the receipt of all VR services, integrated employment at closure, and changes in hours. What state system an individual received services in influenced their ability to access certain types of services as well as experience case closure in integrated employment. Of the services provided by VR, state systems varied in how much they provided each service within their state. While it is positive that the over half the sample did close in integrated employment, it is concerning that despite the provision of services more are not leaving in integrated employment.

In this study, state system was a significant predictor for hours difference, but was not significant in earning difference. Regardless of the state system in which an individual received service, earnings differences could not be predicted by location. While state system was an influential predictor throughout this study, results from this analysis indicate that there are other factors occurring within a state's economic and cultural structure that could provide better indicators for earnings within a state. Recent findings indicate that both national and state level economic indicators such as the employment population ratio, number of new VR applicants, and recipient-to-counselor ratio influence the employment rates of individuals with cognitive disabilities in VR (Nord et al., 2013). However, state systems function at a high macro-level of practice and do not provide a good predictor of how earnings and hours worked trickle down to the individual level. Gruman et al. (2014) also struggled to make connections between broad system level and individual level dynamics.

A number of state systems show promise in their ability to achieve higher outcomes with this population. In a review of state VR practices with youth in eight

states, Honeycutt, Bardos, and Mcleod (2014) reported that although states shared similar approaches in identification and service offerings, other factors such as program location (within a state), state leadership, transition ratios, high cost resource services, age of enrollment, intensive school-based programs, and post-secondary connections for youth lead to variability across programs. The current study did not delve into programmatic difference between VR programs but results indicate that state system variation accounts for a significant proportion of employment outcomes. As referenced earlier VR exists as a single component within a complex maze of state and federal long-term services and supports. Within states other systems may be providing more robust employment supports to individuals with ASD. More attention must be paid to state differences programmatically and politically at a state level.

**Revised conceptual model.** This study's findings in conjunction with other rehabilitation research on ASD confirms the importance of job-related services as a pathway to improved employment outcomes for individuals with ASD in VR. However, to further refine the model it will be necessary to provide additional clarification around the changes in earnings and hours worked to ensure that only increases from closure to application are captured. As a result of the findings an updated model is outlined highlighting the associations between job- related services and employment outcomes.

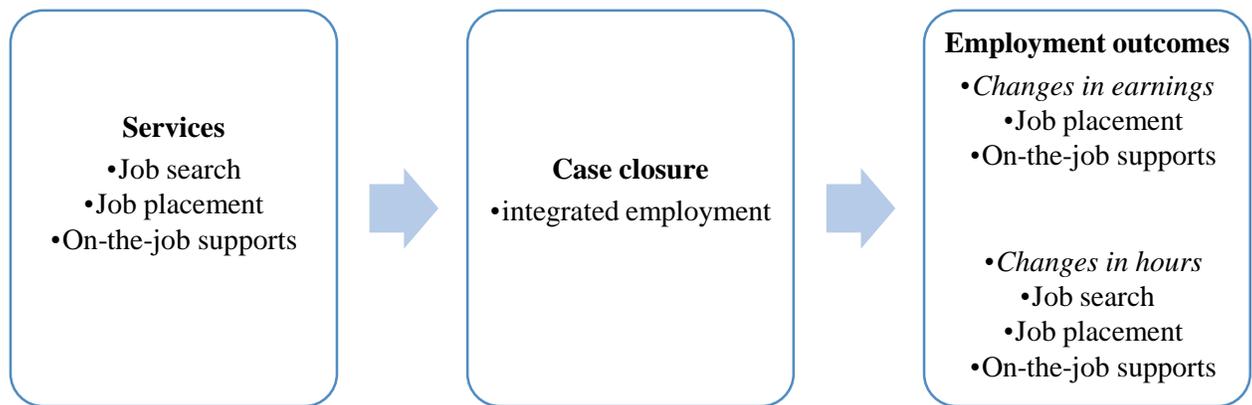


Figure 6.2.

*Refined conceptual model: Pathways to employment outcomes in VR*

### **Implications for VR system practices**

Results from this study indicate that at application a pathway for VR recipients with ASD is being paved. A number of factors influence whether or not an individual with ASD receives certain types of services; the type of services received can influence an individual's ability to experience case closure in integrated employment, and changes in earnings and hours worked. Protective factors such as being White, male, and being employed at application can increase the likelihood that an individual with ASD experiences positive employment outcomes. However, greater attention should be paid to the challenging factors of being an unemployed at application, female, or Black/African American in an attempt to provide more targeted and socially responsive services to address the disparities and support success in VR. It is also of critical importance to consider a state's service system when interpreting these findings. The unique social,

economic, and cultural environments state VR programs operate within play a substantial role in how individuals with ASD access and experience different state systems.

**Service usage.** Rehabilitation researchers have been exploring how individuals with ASD have been using VR services for more than ten years with different lenses. With the significant increases in VR service usage by individuals with ASD (Cimera, 2009; Cimera & Burgess, 2011; Cimera & Cowan, 2009), an understanding of how services are being used and outcomes achieved is critical. Particular attention has been paid to transition-aged youth with ASD (Chen et al., 2015; Migliore et al., 2012; Wehman et al., 2013). The literature has lacked a broad overview of all VR service users with ASD, and how the type of ASD impairment influences the services and outcomes they receive, which this study sought to fill.

This study found that numerous providers and vendors were providing different types of services to this population. VR directly provided 40.6% of all services with CRPs providing 36.9%, and all other sources 22.9%. The type of services provided varied by provider type. Of the administrative services, CRPs and other sources provided over 20% of assessment while not surprisingly VR provided 58.6% of VRCG. VR was dependent upon CRPs to provide job-related services. The presence or absence of these types of services within a state or community could influence an individual's ability to receive certain type of services.

CRPs are a highly variable group of providers (Butterworth et al., 2014). This dependence may be viewed as a challenge and opportunity. An opportunity in the fact that many CRPs are embedded within their communities and have established linkages and networks that benefits job seekers with disabilities; a challenge in that, CRP quality,

outcomes, and priorities can vary considerably and do not report consistent results (Butterworth et al., 2014; Butterworth, Cilmore, Timmons, Inge, & Revell, 2007; Domin & Butterworth, 2013; GAO, 2012; Rogan & Rinne, 2011, Wehman et al., 2014b). The higher dependence on administrative services is of concern as later analyses reveal that neither administrative service results in statistically significant improvements in integrated case closure, earnings, or hours worked. Access to job-related VR services is an important element to successful employment outcomes.

**State variability.** In employment services and supports for individuals with ASD it is useful to think of VR under a very broad umbrella of other long-term services and supports (LTSS). VR does not exist in isolation; rather, it is part of a complex federal and state system of benefits and services for individuals with disabilities. Therefore it is possible that other systems are providing supports to this population and could have an effect on employment outcomes (integrated case closure, earnings, and hours), and in some cases a possible suppressing effect.

Results from the 2012 national survey of state intellectual and developmental disabilities agencies day and employment services, reported by Butterworth et al. (2014) highlight the significant differences in state IDD systems and the nature of investments states are making in integrated versus facility based employment. Table 6.1 shows the varying level of investment by states on employment services for people with IDD and how many individuals with IDD, which includes ASD, are served in various settings. States have unique funding structures and priorities that occur in parallel and overlap VR services. The interaction between local, state, and federal systems likely has some relationship with employment outcomes, but could not be determined in this study.

Rather the capacity and priorities of states as a “whole” system (VR and other programs) would possibly be able to better predict employment outcomes.

Table 6.1  
*State IDD Spending on Employment Services in 2012 (selected states)*

State	Total funding for IDD employment services (in thousands of dollars)	Served in integrated community employment	Served in facility based employment
Alabama	58,049	2,727	489
Arizona	94,828	13,435	5,610
Minnesota	255,163	19,129	182,509
New Hampshire	74,561	15,504	0
Nevada	24,880	3,708	8,741
Ohio	751,702	94,107	152,373
South Carolina	56,405	11,028	18,743

Note. Does not include those served in facility-based non-work, or community based non-work settings. Data originally reported by Butterworth, Smith, Hall, Migliore, Winsor, and Domin, (2014). *StateData: The national report on employment services and outcomes*. Boston, MA: University of Massachusetts Boston, Institute for Community Inclusion.

Currently data systems that track and monitor recipients, costs, and outcomes are not connected. It is therefore extremely difficult, if not impossible, to track recipients across various benefit and services programs. The GAO (2012) identified 45 supported employment (SE) programs of people with disabilities and report that despite a significant federal and state investment we understand very little about their effectiveness and interactions with each other. In 2005 the GAO provided specific recommendations to Congress and the Department of Education to improve monitoring and accountability. At the present time states and the federal government continue to struggle with the development of streamlined data management system. Until improved data systems are in

place it will be impossible to understand the connection between system level variables and individual indicators.

Additionally, it is essential to recognize the unique state services systems that operate in parallel to state VR programs. How states invest employment services for individuals with disabilities varies significantly (Butterworth et al., 2014); therefore, the very existence of other robust or non-existent supports likely influences the role of state VR programs in serving individuals with ASD. VR may be a linkage for many with ASD to other long term services and supports. Although the implementation of the Workforce Innovation and Opportunity Act (WIOA) will result in a substantial shift in VR it is important to understand that only a small portion of individuals with ASD apply for VR, and an even smaller number ever make it to services. With changing funding formulas and the possible necessity of order of selection (OOS), implementation at state's capacity to provide employment support to individuals with disabilities extends beyond the bounds of VR. Gruman et al. (2014) state that VR alone will not yield long-term employment success; rather, it is often a combination of programs and services along with benefits counseling that result in long-term sustainable changes in employment outcomes.

Due to the varying nature of state VR programs and budgets some state may institute OOS in order to prioritize and serve the individuals with the most significant disabilities first. While OOS may be advantageous for individuals with ASD, as ASD is considered a significant disability within VR (Department of Workforce Development, 2014; Vocational Rehabilitation, Kansas, 2011), it also highlights the budgeting challenges facing VR programs across the nation. There are not always enough funds to

serve every individual who is eligible for services. WIOA provides new and improved mechanisms for VR program to focus on youth. It is unlikely that state VR programs will have the capacity to serve all individuals with ASD, particularly those who are 24 and older.

Improved information and training should be translated and made available to VR counselors across the United States. Due to the complex nature of RSA-911 analysis of services and outcomes are not always readily accessible to front-line staff within VR (GAO, 2005). Therefore, a concerted effort on the part of VR to disseminate findings from RSA-911 could prove to be a productive avenue to engage and inform VR staff about which practices lead to positive employment outcomes. Additionally an understanding of demographic factors, which influence services and outcomes, should be taken into consideration in order to target at-risk populations.

Research indicates that VR counselor training can be an important factor in connecting VR recipients to the appropriate services and jobs (Froehlich & Linkowski, 2002; Holmes & Karst, 1990; Kundu et al., 2011; McCarthy, 2014). The use of evidence-based practices along with the application of rehabilitation literature is a significant ingredient to improving the competencies and consistence among VR counselors (Graham et al., 2013). Findings from this study provide important insight into understanding the differences between administrative and job-related VR services for individuals with ASD and which lead to integrated employment and changes in earnings and hours worked.

## **Limitations**

The findings of this study should be viewed with discretion. As inherent with all research there are number of limitations to consider. Potential limitations of this study will be discussed in this section.

**Design.** Non-experimental research designs have the potential for practical applications while building a framework for exploration by studying what has already naturally occurred. Non-experimental research design provides a means to explore individuals in naturally occurring environment (Creswell, 2013). However, there are a number of limitations to these types of design and inherent challenges in working with administrative data. Non-experimental design is not able to determine cause and effect (Shadish, Cook, & Campbell, 2002). Therefore, it was impossible to establish causality in this study.

The variables selected provided new insight into how services were being provided to individuals with ASD; however, variable construction, and analysis looked at each of the services individually rather than in combination. Results indicated that job-related services individually yielded the best employment outcomes compared to administrative services. Individuals within VR often receive more than one service. Therefore a combination of services may actually provide the best avenues to integrated employment, increased wages, and hours worked. Administrative services in combination with job-related services could also identify promising pathways, but this could not be determined in this analysis. The design of this study is limited as services were evaluated individually.

**Administrative data.** Administrative data present a number of benefits and challenges. Administrative data are cost-effective, have the ability to be linked to other data sources, may be easily accessible, and cover a large portion of a population in question (Madeira, 2012; Virnig & Dotson, 2012). Administrative data in this study provide a snapshot of service usage during a specific time.

VR counselors or their proxies enter datum into the Case Service Record that become RSA-911 data. The quality of datum entry and interpretation has not been studied. There is likely a considerable degree of variability in experience, knowledge, technical know-how, time, and interpretation between VR counselors, which cannot be accounted for in this study. Data interpreted and entered by one VR counselor could potentially be entered differently by another VR counselor. There is not currently a means to test the reliability of the data entered into the Case Service Record.

The current RSA-911 data are comprehensive administrative data from VR cases from FY 2013. This data lags approximately two years behind the current program year. Changes in policy, practice, implementation, availability, and funding all have the ability to influence the data collected each year. This has an impact on the external validity of findings depending on the years explored. Literature often can lag three to five years behind the current service year. This study utilized the more current data available to researchers from RSA, therefore the most current services and outcomes are described.

In the case of RSA-911 construct validity may be comprised. The VR program broadly defines ASD within a single category (Workforce Development, 2014; Vocational Rehabilitation, Kansas, 2011). However, the condition itself occurs on a broad spectrum with individuals experiencing varying levels of impairment and need.

RSA-911 data do not take additional variables such as IQ scores, adaptive behavior, or communication skills into consideration. These features attempt to differentiate the varying levels of need that occur across individuals, which are used in prevalence analysis by the CDC. Therefore, it may be difficult to ensure construct validity, as the label of ASD within this dataset may not truly measure or capture what it claims to (Babbie, 2012; Creswell, 2013). Although all individuals in this study are labeled as having ASD, there is no mechanism to confirm or refute an official medical or educational diagnosis of ASD.

Despite the limitations presented by using non-experimental design with administrative data this work provides an opportunity to answer several pressing questions about how individuals with ASD are being served by VR. VR provides a necessary and critical service to those individuals seeking employment across the U.S. To date RSA-911 data provides one of the most comprehensive data sets regarding the employment of individuals with disabilities that is currently available for research.

**Access to VR services after application.** In FY 2013, 15,679 individuals with ASD applied for VR services in the United States, of those applicants 5,740 (35%) were lost between application and service receipt. The primary reasons for failure to receive services were:

(1) refused services (19.3%); (2) inability to locate (13.5%); (3) other reasons (12.9%);  
and

(4) failure to cooperate (9.3%). Although there are a variety of reasons for an individual's inability to access VR services after application, a large proportion of individuals excluded from VR services could not be included in this study.

**Significant disability identification.** This study was initially interested in exploring the role of severity of disability as it pertained to employment outcomes. As per federal VR policy, all individuals who have an impairment caused by ASD are automatically labeled as having a significant disability by virtue of the label alone (Arizona Vocational Rehabilitation Administration, 2015; Department of Workforce Development, 2014; Kansas Vocational Rehabilitation, 2011). Using VR's own significant disability variable was not possible in this study as all recipients in this study were identified as having a significant disability. The use of ASD impairment type was a possible mechanism to identify more concretely the services that yield the best results for this population.

**Singular versus multiple service usage.** Using frequencies distributions this study focused on only five (in a menu of twenty-two) services most utilized services in VR by individuals with ASD. The limited selection of services results in only a partial picture of services utilized by this population. Other services within VR may also provide promising employment outcomes but were not explored in this study. Additionally, many VR recipients utilize more than one service within VR. This study did not account for layered or multiple services, within the top five or other VR services. The combination of services can also provide insight into which services together rather than singularly lead to improved employment outcomes. This study only looked at each service individually

in the regression analyses; therefore no additional conclusion can be made about the value of combined services.

**Service variability.** In this study, 94.4%, or 9,642 individuals received one or more of the services explored. Each of these services is defined by RSA and implemented at the state level by VR counselors or contracted providers. As referenced throughout there is variation in state VR program access and outcomes. It is therefore a possibility that the actual service provided varies not only state to state, but VR office or even VR counselor. Despite being a federal program it highly unlikely that how and under what circumstances each VR service is provided under cannot be understood due to the nature and design of this study. This study could not take service implementation variability into account.

**Extraneous variables.** Consideration should also be given to the presence of extraneous variables. Extraneous variables could potentially occur both within the service system and within an individual's circumstances. This could include the quality and types of VR services offered, experience of the VR counselor, socioeconomic background, presence of additional external support, and cultural norm or habits. It is possible that individuals received similar types of services, which resulted in varying outcomes predicated upon the presence of extraneous variables not included within this study. In an attempt to control for extraneous variables this study included factors including: age, gender, race/ethnicity, employment status at application, and state system. However, as referenced throughout this study external factors related to the individual and environmental conditions could play a role in how individual with ASD accesses VR and how they experience services within their state system. As a condition, ASD is extremely

varied as evidenced by impairment type, and therefore likely plays a role in the experiences of an individual in their environment.

### **Implications for future research**

This study highlighted a number of important features about how individuals with ASD are receiving services through state VR programs. Replication of this study with different samples based upon disability and impairment type has the potential to illuminate which types of VR services yield successful employment outcomes. With a service menu of twenty-two different types of services it is likely that different groups utilize services differently. In addition it would be beneficial to explore the service types across disability groups to better understand which services universally yield more successful employment outcomes. This information could be used to improve employment outcomes for individuals serviced by VR.

The influence of the severity of an individual's disability and how it affects access to services and outcomes is of interest to rehabilitation researchers (Cimera et al., 2015; Nord et al., 2014; Wehman et al., 2012). RSA-911 includes the variable 'significant disability' within the dataset to indicate which recipients require higher levels of services and supports, however, VR counselors are instructed to mark all recipients with ASD as having a significant disability. In order to better understand which individuals are in fact significantly disabled future research may wish to focus on a recipient's use of SSI and/or SSDI at application to determine the level of disability severity. The Social Security Administration (SSA), which administers SSI and SSDI, outlines detailed requirements

on disability determination. Therefore it may be reasonable to assume that those who are receiving SSI or SSDI at application have been deemed to be at a higher level of disability as they have already qualified for federal benefits by SSA through a federal disability determination process. In this study's final sample of 10,209 VR recipients with ASD, 604 individuals were receiving SSDI, 2,599 were receiving SSI, and 274 were receiving both SSDI and SSI at application. Further analysis of this population could likely produce additional insights into how individuals with the most significant disabilities are being served by VR. This type of analysis could also be expanded to other disability populations.

A number of researchers are focusing their attention on the role that benefits play in incentivizing and dis-incentivizing employment. This study did not look at public benefits at application and closure, but previous studies have indicated that public benefits can have a suppressing effect on employment outcomes (Butterworth et al., 2014; Gokhale, 2014; Riley & Rupp, 2012, 2014; Wehman et al., 2014b). Understanding more fully the changes in earnings between application and closure in relation to the receipt of public benefits can capture the potential influence they have upon one another in this population. An individual and family's understanding of benefits plays a central role in promoting and incentivizing workforce participation.

An important promising practice includes the promotion of benefits counseling in providing individuals with disabilities and their families the knowledge they need to make informed choices about employment (Gruman et al., 2014; Kregal & Mara, 2011). Gruman et al. (2014) found that although benefits counseling did provide some improvement in employment outcomes over time, it was the combination of benefits

counseling with VR services that provided the most successful and sustainable employment outcomes over time. New initiatives such as SSA's Promoting Readiness of Minors in Supplemental Security Income (PROMISE) include benefits counseling components. In order to be able to fully engage workers with disabilities in conversations about employment benefit systems should be designed to support work rather than penalize those with earnings. Future research should continue to focus on the role benefits play in employment for individuals with ASD and other populations.

The nature of qualitative analysis does not allow for interpretation into the "why" or "how" different types of services yielded improved outcomes over others. Future research to expand upon this study's finding would benefit from the inclusion of a mixed methods design incorporating a phenomenological approach, including qualitative questions to explore the lived experiences of VR participants and/or their families. Qualitative data can potentially provide additional rich in-depth contextual information about VR recipient's experiences, which can shed light on to how and why job-related services lead to better outcomes.

Additionally, over one-third of the ASD population in VR was lost between application and service. The literature also identifies a substantial number of individuals who never access services that can lead to employment, post-secondary education, and greater inclusion (Lawler et al., 2010; Migliore et. al., 2013; Sullivan; 2007). Further exploration of this population quantitatively and qualitatively is critical to understanding how individuals with ASD are interacting with VR. There are a multitude of factors, from service access to interactions with a VR counselor, which could be explored to better understand why and how certain types of VR services are more successful than others at

producing positive employment outcomes. In order to address the devastatingly low workforce participation rates and the VR case closures with no employment for individuals with ASD, this group needs to be better understood.

## **Conclusion**

The promotion of employment individuals with disabilities continues to gain momentum at the local, state, and federal level. State VR programs provide an avenue for individuals with ASD to access employment services and supports. Although VR programs posit case closure rates in integrated employment at 56.9%, there are a number of job-related services (job search, job placement, and on-the-job supports) provided through VR that result in an increased likelihood of integrated employment and changes in earnings and hours worked. Increased attention should be paid to those services that yield positive employment results. This study highlighted the importance of equity in access to job-related services and that job-related services were associated with integrated employment at closure and larger changes in weekly earnings and hours worked. This study highlights the following findings:

- Equity in service access matters. An individual's ability to access certain types of services can influence their employment outcomes.
- Job-related services are more likely to lead to positive employment outcomes.
- The state system in which an individual receives service within has a significant influence on their access to services and employment outcomes.

VR pathways are being paved for individuals with ASD at application based on a number of demographic and service features. Consideration of secondary populations within ASD (unemployed, women, and Black/African Americans) is necessary to address the disparities in access, services, and outcomes for some groups. VR is a critical conduit in addressing the employment rate of individuals with ASD, and has the mechanisms to provide services that result in positive employment outcomes that are expected from participants, families, professionals, policy makers, and taxpayers. In order for individuals with ASD to experience the full benefits of community life and access pathways out of poverty, employment should be accessible to those with ASD as it is one of the essential features to full integration into society.

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