Spring 4-14-2022

Assessing for Social and Economic Inequities in Vocational Rehabilitation Services among Individuals with Intellectual and Developmental Disabilities

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Assessing for Social and Economic Inequities in Vocational Rehabilitation Services among Individuals with Intellectual and Developmental Disabilities

by

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Under the Direction of Erin Vinoski Thomas, PhD, MPH

A Dissertation Submitted in Partial Fulfillment of the Requirements for the Degree of

Doctor of Philosophy

in the School of Public Health

Georgia State University

2022

ABSTRACT

Individuals with intellectual and developmental disabilities (IDD) face disparities in employment. Vocational Rehabilitation (VR) agencies in every U.S. state offer services intended to improve employment outcomes for people with disabilities. Yet, institutionalized supports such as VR services may inadvertently perpetuate social inequities as a result of biases in implementation and/or barriers to access due to an individual's race, ethnicity, gender identity, sexual orientation, and disability. Additionally, factors associated with economic stability (socioeconomic factors) can also perpetuate inequities in interventions and institutional supports. The goal of this dissertation research is to understand the role of social and economic factors within state VR services for individuals with IDD. This dissertation used a cross-sectional secondary analysis of the RSA-911 dataset of applicants for VR services to 1) assess for social inequities in service provision and economic outcomes among VR service users; 2) assess for social and economic inequities between applicants who did and did not receive services; and 3) explore the relationship between factors associated with economic stability factors among applicants for VR services. Results indicated: 1) social inequities exist in both if applicants received VR services and what services they received from their VR agency; 2) interaction terms between severity of disability and demographic characteristics revealed differences in outcomes for demographic identities at different levels of severity of disability; 3) outcomes varied, based on amount of wage earned and level of education; and 4) a complex relationship exists between level of education, wage earned, and receipt of Social Security benefits should be considered in research and interventions that aim to improve economic stability in people with IDD. Considerations for future research and practice are presented for each main finding.

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May 2022

DEDICATION

This document is dedicated to my mom, Wanda Schram. Her unconditional support in all of my endeavors in life, whether she understood them or not, has allowed me to explore and achieve in ways that would not have been possible without her.

ACKNOWLEDGEMENTS

I would like express my appreciation to Dr. Erin Vinoski Thomas and Dr. Daniel Crimmins for serving as my chair and advisers through the program, as well as Dr. Shannon Self-Brown for being on my committee.

This program emphasized the important role of community. Therefore, I'd like to also thank those in my community that offered much needed support throughout this process. A huge thank you goes to my colleagues from Georgia State for helping navigate my GSU PhD experience and for all the support offered throughout, including Victoria Churchill, Dr. Cherell Cottrell, Dr. Brooke DiPetrillo, Katie Pearce, and Taelor Moran. I'd also like to thank colleagues and friends outside of GSU. First, my weekly check-in meetings with Dr. Samantha Ross, Dr. Kae McCarty, and Dr. Laynie Case were instrumental in offering the support needed to complete this program, during a pandemic. I also would like to thank friends and colleagues Chloe Simpson, Christina Hospodor, Dr. Rebecca Amantia, and Dr. Winston Kennedy for being available to listen and provide help as needed. Finally, I'd like to thank my family and friends located in Atlanta and beyond who provided support by offering a listening ear, a shoulder to lean, and/or a place to escape and explore. You all helped me stay grounded and help remind me of my life outside of the PhD program.

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1 LITERATURE REVIEW AND STATEMENT OF PURPOSE

1.1 Literature Review

People with intellectual and developmental disabilities (IDD) experience disparities across a wide range of health outcomes (Krahn et al., 2006). Health disparities are defined as differences that are due to systemic or environmental factors that may prevent access and lead to poor health outcomes (*Centers for Disease Control and Prevention*, 2020). Disparities for people with disabilities are so profound in numerous areas that Krahn and colleagues (2015) called for the need to identify people with disabilities as an official health disparity population. For example, people with IDD have been shown to have increased rates of high blood pressure and obesity, which are highly correlated with chronic conditions such as cardiovascular disease and diabetes (*Centers for Disease Control*, 2020). They are also more likely to engage in risky health behaviors; for example, they have almost double the rate of smoking than their non-disabled counterparts, and are 75% more likely to engage in zero minutes of physical activity (Paul et al., 2020). Krahn and colleagues (2006) identified that these outcomes can be attributed to a cascade of disparities, including lack of medical care access, exclusion from health promotion activities, environmental conditions, and social circumstances. Other studies have also suggested that health outcomes in this population are also closely tied to societal and environmental restrictions, with sociodemographic characteristics and participation in other social components as predictors of health outcomes (Alonso et al., 2013; Shandra, 2018).

1.1.1 Social Determinants of Health in People with IDD

In recent decades, the field of public health has evolved in understanding that health outcomes are controlled by more than just factors in healthcare settings, and have started incorporating the social determinants of health (SDOH) in research to help account for the multiple factors that influence health outcomes (P. Braveman et al., 2011). The CDC (*Centers for Disease Control and Prevention*, 2021) defines the SDOH as "conditions in the places where people live, work, and play that affect a wide range of health and quality-of-life-risks and outcomes." There are five main areas which are often considered SDOH, including health care quality and access, economic stability, education, neighborhood and built environment, and social and community context (*Centers for Disease Control and Prevention*, 2021). This dissertation assesses and supports the body of work addressing economic stability and education among people with IDD.

Interventions that address the SDOH have been shown to improve health disparities within for marginalized communities (P. A. Braveman et al., 2011). The SDOH can take a social disadvantage lens (Bharmal et al., 2015), which removes the emphasis on the individual and instead examines their access to resources that could prevent or improve risk (Phelan et al., 2010.). A health equity lens within the SDOH highlights the roles that systems and power structures play in influencing health within marginalized communities (Bharmal et al., 2015). This approach considers that most institutions, organizations, and policies that provide resources to support improved health were developed and are maintained in a way that excludes various populations; therefore, marginalized populations may experience racism, ableism, and sexism in these environments (Williams et al., 2008a).

Individuals with IDD are one example of a marginalized population which has been historically excluded from American society. People with IDD have been, and continue to be, placed in institutional settings to live and receive education in segregated settings. This dissertation will use a SDOH approach to assess services and outcomes for individuals with IDD.

1.1.2 Upstream Approaches to Health

The social determinants of health can be assessed using two different approaches, upstream and downstream (Bharmal et al., 2015). A downstream approach focuses on the main outcome of interest, while an upstream approach focuses on factors that create complex, causal pathways that lead to negative health outcomes. For example, if a program goal is to support individuals who are experiencing homelessness, a program using a downstream approach would help find a secure living environment for the individual, whereas an upstream approach may assess how the regional housing market supports all economic backgrounds with affordable housing options. Upstream approaches and interventions to the social determinants of health are supported by many researchers as the best solution to improving health outcomes (Freudenberg et al., 2015; Phelan et al., 2010; Williams et al., 2008b). In fact interventions focusing only on downstream outcomes can, in some cases, create intervention-generated inequalities (Lorenc et al., 2013; White et al., 2009). Intervention-generated inequalities are inequalities that are created or enhanced due to an intervention that intended on improving the overall outcomes in a population (White et al., 2009). These inequalities may be due to the interventions being created and targeted at the majority of individuals who are typically lower risk, opposed to those that are higher risk (Lorenc et al., 2013). Therefore, the overall outcomes improve, however those most at-risk may have stayed the same. For example, mass media

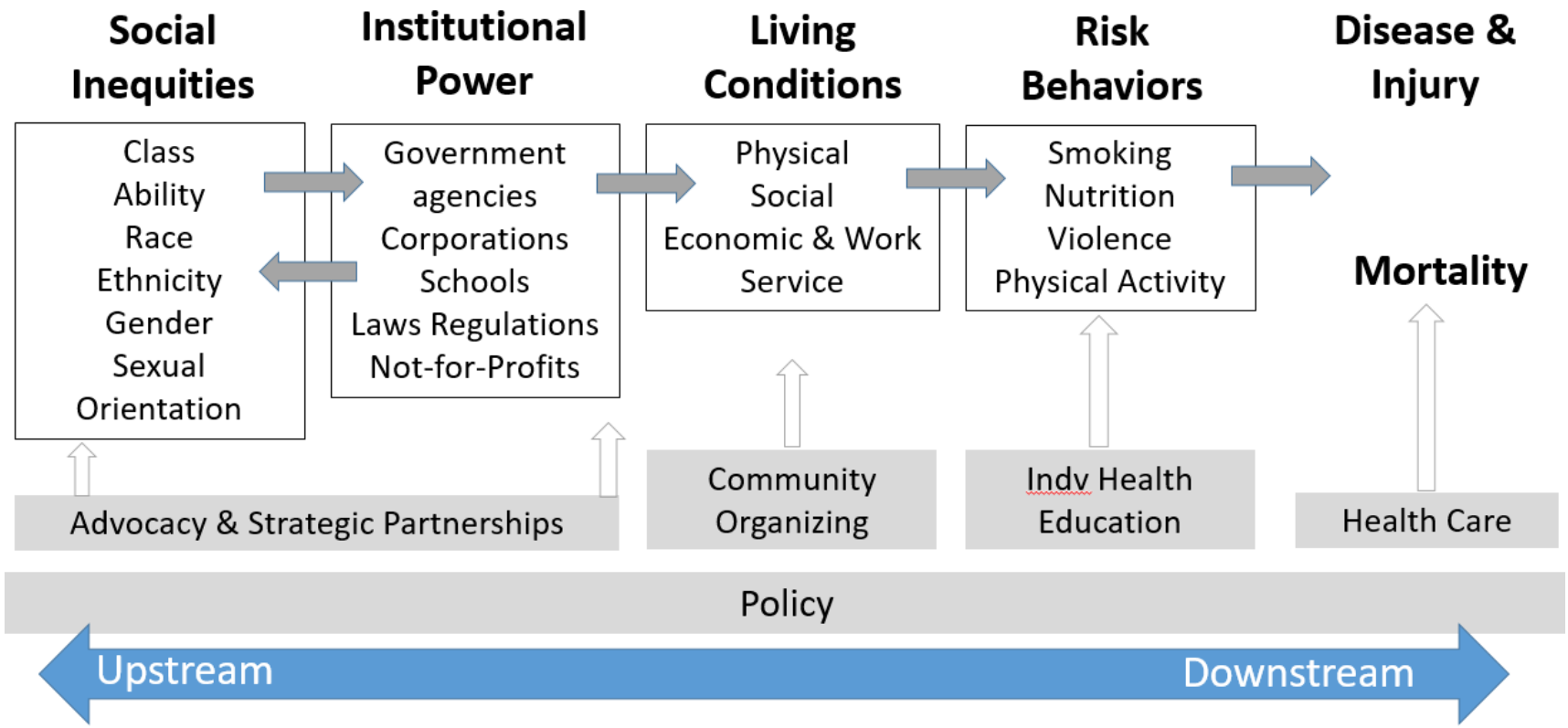

Figure 1.1 BARHII Health Inequities Framework.

Note: Figure as represented on the Bay Area Regional Health Inequities Initiative website: https://www.barhii.org/barhii-framework

campaigns have been shown to increase inequity because it has increased effect on individuals who have consistent access to televisions, smart phones, and/or other media that are used for the intervention. Intervention-generated inequalities are created when communities often marginalized experience the same barriers to access and inclusion in intervention that prevent them from accessing the appropriate supports in the first place.

Interventions that focus on upstream approaches, versus downstream, are less likely to create intervention-generated inequalities (Lorenc et al., 2013; Williams et al., 2008). An upstream approach focuses on environmental and institutional drivers that influence a person's behavior, opposed to placing the focus solely on the individual's behavior alone. Therefore, it recognizes that inequities in health are shaped by the unequal distribution of wealth and power and contribute to marginalization of certain communities. The Bay Area Regional Health Inequities Initiative (BARHII) developed a framework that outlines this approach (*The BARHII Framework*, n.d.). As shown in Figure 1.2, this framework highlights the role social inequities can play in creating institutional inequities and thus downstream disparities.

1.1.3 Economic Stability & Poverty

Economic stability and social opportunities are upstream SDOH that are associated with multiple factors that shape and influence positive health outcomes both at the individual and population levels (P. Braveman et al., 2011). Economic stability is a multidimensional construct that can be explained and measured using multiple factors, including individual income, household income, occupational social class, education level, ownership and wealth, and others (P. A. Braveman et al., 2005; Lahelma et al., 2004). These different measurements of economic stability and socioeconomic determinants have complex relationships with each other, and with

outcomes associated with improved economic stability. For example, Lahelma and colleagues (2004) used education, occupational class, and household income as socioeconomic factors and found that the effect on the outcome was explained by a mediated relationship between the three, concluding that their use was not interchangeable and instead were partially inter-dependent determinants of health. With approximately 25.9% of people with IDD living at or below the poverty line in the United States ($12,490 a year), it is important to find ways to improve economic stability for people with IDD and understand how inequities are faced by people with IDD because of their lack of economic stability (Paul et al., 2020). This dissertation will assess three socioeconomic determinants among individuals with IDD: employment, receipt of Social Security benefits, and level of education.

Employment. People with IDD experience disparities in employment rates and wages. The employment rate among individuals with IDD is less than half of that among people without disabilities (30.4% vs 78.6%; Paul et al., 2020). A wage disparity also exists for people with IDD and other disabilities. Median yearly earnings data for individuals with full-time employment reveal that those without disabilities earn almost $5,800 more annually than those with disabilities (Paul et al., 2020). Workers with disabilities earn 66 cents to every dollar earned by workers without disabilities, regardless of schedule or occupation (Cheeseman Day & Taylor, 2019). On average, people with disabilities that are employed are paid less per hour than those without disabilities (Paul et al., 2020). Additionally, laws in 43 states allow for individuals with disabilities to be compensated below the federal minimum wage of $7.25 per hour (Kimbrough, 2021).

Social Security Benefits. Two programs offered through the Social Security Administration in the US that provide financial support to individuals with IDD are Social Security Income (SSI) and Social Security Disability Insurance (SSDI). SSI is the result of the federalization of state welfare programs that were developed to support individuals who are aged, blind, and have disabilities (*Introduction to Social Security Disability Benefits, Work Incentives and Employment Support Programs*, n.d.). The program is funded by tax dollars and was intended to help cover costs for food and shelter for individuals with limited incomes. SSI payments are federally set; however, some states provide supplemental resources based on an individual's financial ability, which considers earned and unearned income. SSDI is not a welfare-based program, but rather is a form of insurance that is paid through the Social Security trust fund. Therefore, eligibility and resources received are determined by the individual's work history or the work history of a deceased family member who had been part of the work force.

People with IDD make up approximately 14% of all SSI and SSDI beneficiaries (G. Livermore et al., 2017). Beneficiaries with IDD have an hourly wage that is significantly less than those without IDD (Livermore et al., 2017). Those with IDD using Social Security benefits earn an average of $5.54 an hour compared to $9.18 an hour for those without IDD, with half of beneficiaries with IDD paid below minimum wage (Livermore et al., 2017). In contrast, people with IDD are almost two times more likely to have current or recent work experience, compared to other beneficiaries and were also more likely to have recently used employment services (Livermore et al., 2017). These data demonstrate that individuals with IDD who receive SSI and SSDI benefits are indeed interested in obtaining meaningful employment.

***Postsecondary Education*.** Education is interconnected with health through three pathways: 1) by contributing to health knowledge and literacy; 2) through improving an individual's social support; and 3) through its influence and association with improved employment opportunities and wages (Bharmal et al., 2015; P. Braveman et al., 2011), as shown in Figure 1.1. Although education has been shown to improve employment outcomes, an individual's social advantage can predict engagement in and outcomes from advanced education (Campbell et al., 1986; Demakakos et al., 2008). This means that having a higher social status can improve the outcomes provided through education. People with IDD have been historically excluded from education opportunities and placed in segregated environments like institutional living or special education classes that award a high school certificate instead of a diploma, preventing access to opportunities in postsecondary education (Wehman et al., 2018). This exclusion has led to decreased involvement in postsecondary education opportunities by people with IDD.

Indeed, students with disabilities participate in postsecondary education, including 2-year programs, community colleges, technical colleges, and 4-year colleges, at lower rates than students without disabilities. A study using The National Longitudinal Transition Study-2 found that 67.4% of students without disabilities went on to pursue postsecondary educational opportunities after high school, while approximately 28.7% of students with IDD went on to postsecondary education (Sanford et al., 2011). Adults with disabilities are also less likely to complete their high school degree and 2.5 times less likely than those without disabilities to

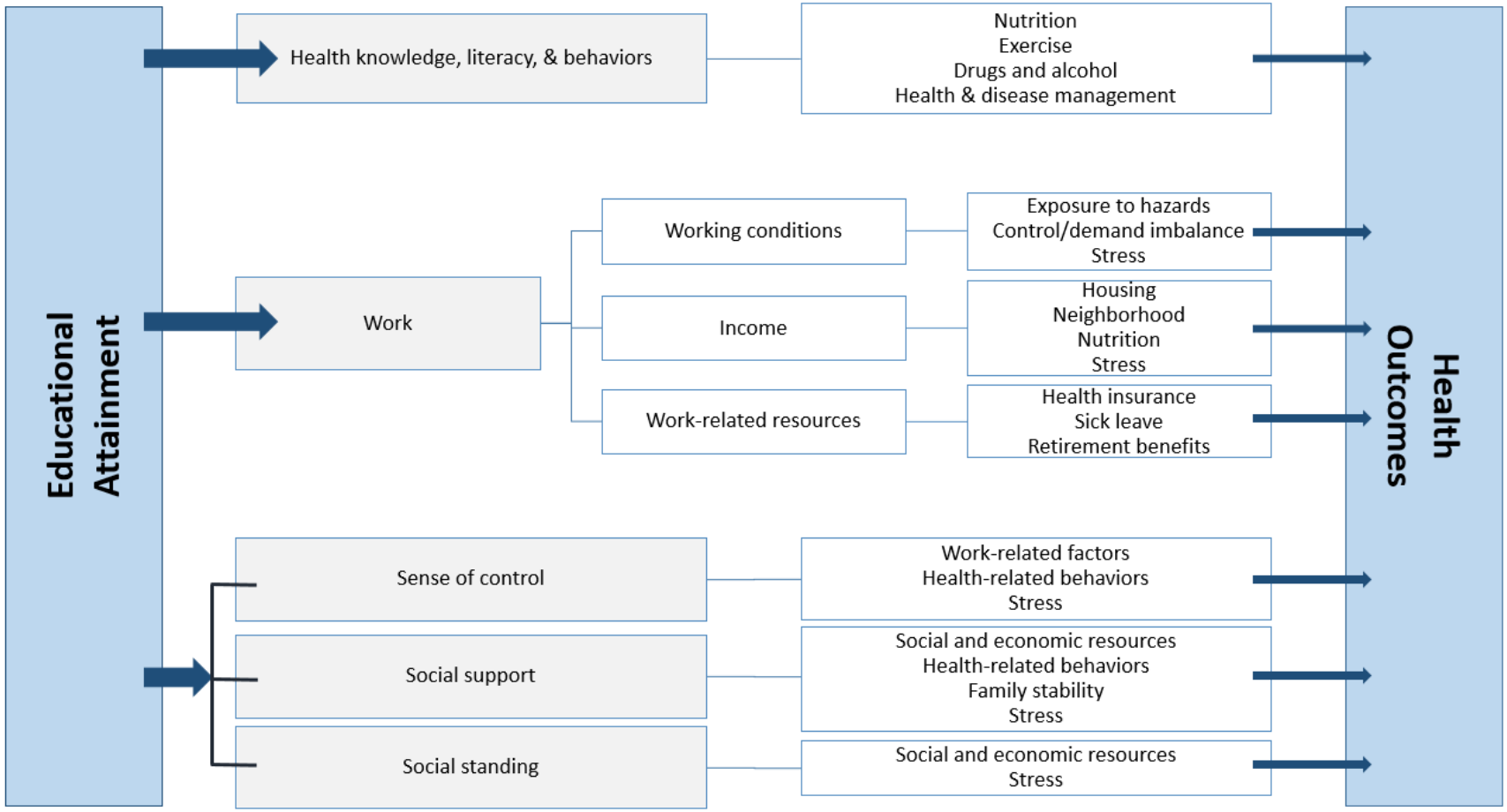

Figure 1.2. Pathways link education to health outcomes

obtain their Bachelor's degree (Houtenville & Boege, 2019). Opportunities to increase access to inclusive and supportive education opportunities for people with IDD that also have the potential to improve social status are needed.

The reauthorization of The Higher Education Opportunity Act (HEOA) in 2008 positively shifted support for the inclusion of people with disabilities in higher education opportunities (Vinoski Thomas et al., 2020). The HEOA was designed to increase access to higher education opportunities for individuals with IDD. It allowed students with IDD who had not earned a high school diploma or GED to be eligible for federal student aid if attending a comprehensive transition and postsecondary (CTP) or other approved program (Vinoski Thomas et al., 2020). This change improved access to higher education for those without the monetary means to independently fund education beyond secondary school. The HEOA also helped establish networks of inclusive education programs, including funding opportunities and platform to support program and outcome surveillance (Grigal et al., 2013). These improved supports for inclusive post-secondary education are steps forward in enhancing educational opportunities for people with IDD that could also lead to improved outcomes in employment, economic stability, and other health outcomes.

1.1.4 Vocational Rehabilitation Services

Vocational rehabilitation (VR) is a service provided by state and federal governments dedicated to providing employment supports and services to individuals with disabilities. The goal of the program is to improve participation of people with disabilities in the workforce (*Vocational Rehabilitation Services | Dds*, n.d.). There are VR agencies in every state; each agency is unique with regard to their services and approach to supporting clients. However,

every agency provides the same core services: pre-employment transition services to support preparation for the workforce, which include job counseling, work-based learning experiences, and self-advocacy supports; training services to advance skills and knowledge, which include educational opportunities and on the job training; career services to support maximum performance in the employment, including impairment rehabilitations and job benefit training; and other services that may be needed to support employment, including transportation and assistive technology (*Case Service Report (RSA-911)*, 2021). All state agencies participate in mandatory reporting of all applicants and service users. This data set, the Rehabilitation Services Administration's Case Service Report (RSA-911) includes information on each applicant, including demographic information, services received, reason for case closure, and outcome information at application and exit for employment status, wages earned, and receipt of public supports such a Social Security Income and Medicaid (*Case Service Report (RSA-911)*, 2021). This study used the RSA-911 dataset to assess the relationship between employment and other factors in people with IDD who received VR services.

Employment outcomes for people with IDD who participate in VR services is significantly higher than those who have not participated (Rosenthal, 2015). Those who participate in VR services have, on average, an employment rate of 50%. This doubles the rate of those who do not participate in VR services and is much closer to the US national employment rate of 78% (Dutta et al., 2008). Participating VR services has also been associated with receiving benefits from the Social Security Administration, such as SSI and SSDI. Some assessment has been conducted to determine if VR services act as a type of early intervention that could decrease the need for SSI or SSDI. Schimmel Hyde and colleagues (2014) found that in individuals who

had not received Social Security benefits prior to applying to VR services, longer time spent waiting VR Services increased the likelihood that they would apply for services. With both VR and Social Security benefits being state and federally supporting programs, the relationship between these two needs to be better understood to fill gaps in services that could improve economic stability in people with IDD.

VR service utilization and outcomes vary across different demographic identities. People of color have lower VR service utilization rates, are less likely to be employed at time of exit and have on average lower wages at exit (M. Alsaman & Lee, 2017; Nord & Hepperlen, 2016). Additionally, women and those who were older at the time of their VR services were less likely to be employed at exit, showing that potential compounding disparities exist within the outcomes of the institutional setting of VR services. This dissertation will assess for potential differences in VR service receipt by people with IDD who identify with intersecting marginalized identities.

1.2 Statement of Purpose & Study Summaries

Individuals with IDD face disparities in employment (Almalky, 2020; Jajtner et al., 2020; Wehman et al., 2018). VR agencies in every state within the United States offer services in efforts to improve employment outcomes for people with disabilities. The BARHII Public Health Framework for Reducing Health Inequities (see Figure 1.2) outlines that institutionalized supports can perpetuate social inequities as a result of bias and stigma due to an individual's race, ethnicity, gender identity, sexual orientation, and disability (*The BARHII Framework*, n.d.). Additionally, factors associated with economic stability (socioeconomic factors) can also perpetuate inequities in interventions and institutional supports (P. A. Braveman et al., 2005;

White et al., 2009). VR is a state and federally funded program providing services to support improved employment outcomes. As an institutionalized support, VR could house social inequities in the provision of services and the outcomes related to their services.

The goal of this dissertation is to understand the role of social and economic factors within state VR services for individuals with IDD through three secondary data analysis studies. This dissertation will use a secondary dataset of applicants for VR services to 1) assess for social inequities in service provision and economic outcomes in VR service users; 2) assess for social and economic inequities between applicants who did and did not receive services; and 3) to improve understanding of the relationship between economic factors in applicants for VR services.

1.2.1 Manuscript 1 (Chapter 2)

Significance and Justification. VR offers various types of services to support improved employment outcomes for people with IDD, including education services. As a federal and state support service, VR has potential to house institutional bias that might lead to social inequities. Social inequities can be a product of bias during the distribution of services or in the results of receiving those services. Therefore, it is important to better understand who is receiving the services offered through VR agencies and if social inequities exist that would indicate the need for adjustments to service provision, service recruitment, policies, and/or if additional services need to be developed.

Purpose. The purpose of this study is to examine if social inequities exist in services provided and employment outcomes in individuals with IDD through their state VR services. A secondary data analysis will address the three aims of the study.

1) To what extent do demographic characteristics (i.e., race, ethnicity, age, gender, and severity of disability) predict differences in education-based support services received through VR for individuals with IDD?

   Hypothesis: There are no demographic differences in those who did and did not receive educational services among individuals with IDD who applied for VR services.

2) To what extent do demographic characteristics predict differences in the level of monetary support provided through VR Services for individuals with IDD?

   Hypothesis: There are no demographic differences in amount of monetary support received among individuals with IDD who applied for VR services.

3) To what extent do demographic characteristics predict differences in employment wage for individuals with IDD who received VR support services?

   Hypothesis: There are no demographic differences in wages earned at exit among individuals with IDD who applied for VR services.

1.2.2 Manuscript 2 (Chapter 3)

Significance and Justification: Manuscript 1 (Chapter 2) assesses applicants who completed the eligibility and application for VR Services and received an individualized plan for employment. However, almost 17% of applicants identified through the Manuscript 1 (Chapter 2) findings did not receive an individualized employment plan, therefore were excluded from the analysis. The application and eligibility process for VR services is lengthy, including a work assessment and often a waitlist, which could lead to applicants exiting before receiving services. It is important to not only understand social and economic inequities that might exist in those

receiving services, but also in those who started the application process but did not complete eligibility.

Purpose: The purpose of this paper is to examine social and economic inequities in applicants for VR services with IDD who did not move past eligibility screening to complete an individualized employment plan.

1) To what extent do demographic characteristics predict reason for exit for those who did not receive services from their VR agency?

    Hypothesis: There are no demographic differences in reason for exit among applicants with IDD who did not receive services from their VR agency.

2) To what extent do demographic characteristics predict who received VR services and who did not?

    Hypothesis: There are no demographic differences between applicants with IDD who did and did not receive services.

3) Are there differences in factors of economic stability (education, SSI, SSDI, wage) between those who did and did not receive services?

    Hypothesis: There are no differences in factors of economic stability between applicants with IDD who did and did not receive services.

1.2.3 Manuscript 3 (Chapter 4)

Significance and Justification: Economic stability is a social determinant of health that is associated with numerous positive outcomes including health, independence and overall quality of life (Bharmal et al., 2015). A range of factors can represent an individual's economic stability, or socioeconomic status. For individuals with IDD, some important considerations

include wages earned, education level, and Social Security benefits received. Not only is improved economic stability through employment the main goal of VR services, but factors associated with it can lead to bias and inequities within interventions. Therefore, it is important to understand the relationship between the factors of economic stability in applicants for VR services with IDD in order to better assess the mechanisms that could lead to more improved outcomes within VR, as well as examine for bias.

Purpose: The purpose of this study is to improve understanding of the relationship between factors of economic stability in individuals with IDD who applied for services with their state VR agency. A secondary data analysis will assess the three aims of the study:

1) What is the relationship between different types of postsecondary education and employment among people with IDD?

    Hypothesis: Participation in postsecondary education will improve employment outcomes for people with IDD, compared to those who did not participate in postsecondary education.

2) What is the relationship between different types of postsecondary education and the receipt of SSI or SSDI received among people with IDD?

    Hypothesis: Participation in postsecondary education will decrease odds of receipt of SSI and SSDI among people with IDD, compared to those who did not participate in postsecondary education.

3) Does employment mediate the relationship between types of education and the receipt of SSI or SSDI received among people with IDD?

Hypothesis: Employment will mediate the full effect found between education and receipt of SSI and SSDI received by people with IDD

2 MANUSCRIPT 1

EXAMINATION OF SOCIAL INEQUITIES IN VOCATIONAL REHABILITATION SERVICES AND SUPPORTS AMONG ADULTS WITH INTELLECTUAL AND DEVELOPMENTAL DISABILITIES.

2.1 Introduction

Economic stability and social opportunities are upstream SDOH that shape and influence all factors that lead to positive health outcomes (P. Braveman et al., 2011). Economic stability is often measured by an individual's annual income or employment status (P. A. Braveman et al., 2005). Individuals with intellectual or developmental disabilities (IDD) in the United States live at or below the poverty line at a disproportionate rate. Approximately 11.4% of people in the United States live at or below the poverty line, whereas 25.9% of people with IDD live at or below the poverty line (Paul et al., 2020). These disparities for people with IDD are replicated in employment. The employment rate for individuals with IDD is less than half of the rate for people without disabilities (30.4% vs 78.6%) (Paul et al., 2020). Of those who are employed, people with IDD and other disabilities are on average paid less, with laws in 44 states allowing for individuals with disabilities to be compensated below the 2020 federal minimum wage of $7.25 an hour (Kimbrough, 2021). Upstream approaches to supporting economic and employment outcomes for people with IDD are needed.

Education is interconnected with health through several pathways. One pathway is through its influence and association with improved employment opportunities and wages (Bharmal et al., 2015; P. Braveman et al., 2011). In this pathway, education is associated with improved wages, work related resources and benefits, and working conditions. The National Longitudinal Transition Study-2 (NLTS2) tracked outcomes of students up to eight years after

graduation, they found that approximately 28.7% of students with IDD went on to pursue any postsecondary educational opportunities after high school, including 2-year programs, technical colleges, and 4-year colleges. In comparison, approximately 67.4% of their peers without disabilities pursued postsecondary education (Sanford et al., 2011). People with IDD have historically been excluded from educational opportunities and placed in segregated environments such as institutional living or special education classes that award a high school certificate opposed to a diploma, preventing access to opportunities in postsecondary education (Wehman et al., 2018). Although education can improve employment outcomes, an individual's social advantage can predict engagement in and outcomes from advanced education (Demakakos et al., 2008). Improved access and inclusion of people with IDD in advanced educational opportunities is needed to reduce the economic disparities they face.

2.1.1 Compounded disparities in people with IDD with intersecting identities

Individuals who live at the intersection of disability and other marginalized identities experience compounded disparities in employment and education. In fact, an individual's personal demographic characteristics have been identified as one of the three main categories that serve as predictors of employment for individuals with IDD, along with employment skills and employment experiences (Carter et al., 2011). Limited information currently exists that demonstrates the compounded disparities faced by people with IDD with other marginalized identities. For example, people with disabilities who identify as Black or African American have a poverty rate of 37% (compared to 20% among those who identify as Black or African American who do not have disabilities). Additionally, people with disabilities who identify as White have a poverty rate of 24% (compared to 9% among those who identify as White who do

not have disabilities; Goodman et al., 2019). This pattern is mirrored in those with disabilities who identify as Hispanic or Latino who have a poverty rate at 29% (compared to 18% in those without disabilities; Goodman et al., 2019). Findings from a National Disability Institute report demonstrate that as education level increases, the disparity in poverty rate decreases across all race identities. However, education does eliminate the disparity in poverty rate that exists between different races. Additionally, a bachelor's and graduate degree should not be the only path that lead to decreased poverty.

These compounded disparities across marginalized identities are also reflected in employment rates. Within the literature looking at people with all disabilities, those who identify as Black or African American have an employment rate of 25% (compared to 70% in those without disabilities), people with disabilities who identify as White have an employment rate of 35% (compared to 77% in those without disabilities). In addition to race and ethnicity, women and older adults with disabilities face compounded disparities in employment and education (O'Hara, 2004; Paul et al., 2020; Sima et al., 2015). Although there is an abundance of evidence that compounded disparities exist for people with disabilities with multiple marginalized identities (Hassiotis, 2020; Nord et al., 2020; Scott & Havercamp, 2014), very little is known about how outcomes related to upstream determinants within people with IDD differ across different demographic characteristics.

2.1.2 Vocational Rehabilitation Services

The VR program in the United States is a state and federally funded program that provides services that support individuals with disabilities in obtaining and retaining employment (*Vocational Rehabilitation Services*, n.d.). VR services are offered through agencies

in each state. Each state agency varies in funding and service availability, however they all have the goal of achieving employment outcomes for individuals with disabilities through a variety of support services including job placement, job training, and educational opportunities.

Employment rates for individuals participating in VR services are around 60% (Dutta et al., 2008; Rosenthal, 2015), which shows a large increase and places the employment rate much closer to the national average of 78.6%. For individuals with IDD, the employment rate for those who participate in VR services is around 50% (Nord & Hepperlen, 2016). While those who participate in VR services are more likely to obtain and maintain employment, the employment rate for individuals with IDD and other disabilities has remained steady over time (Paul et al., 2020).

However, outcomes of people with IDD who participate in VR services are not equal across all demographic groups. VR participants who identify as white are more likely to have a job at time of exit compared to their counterparts of color (M. Alsaman & Lee, 2017; Nord & Hepperlen, 2016). Additionally, women and those who were older at the time of their VR services were less likely to be employed at exit showing that compounding disparities exist within the outcomes of the institutional setting of VR services (M. Alsaman & Lee, 2017; Grossi et al., 2020; Nord & Hepperlen, 2016). An improved understanding is needed on potential differences in receipt of employment supports and services across different demographic characteristics for people with IDD.

Differences in employment rates have also been found based on the state where the individual receives their VR services. States with higher unemployment rates statewide are associated with lower employment outcomes for individuals who utilize their state VR services

(Chan et al., 2014). Chan and colleagues (2014) found that state unemployment rates were associated with the disparities in employment by race. States with higher unemployment rates were found to have lower disparities in employment rates between individuals receiving VR services who are white and non-white. These disparities demonstrate that although services are available to individuals with IDD to support employment, better understanding is needed on why the disparities in employment outcomes between different demographic characteristics exist.

2.1.3 Upstream Approach to Social Inequity

Despite an increased emphasis on the role of SDOH in health outcomes, profound disparities in health still exist for marginalized communities. In fact, it is believed that some intervention can actually increase inequality in their targeted outcomes, creating intervention-generated inequalities (Lorenc et al., 2013; Williams et al., 2008). These inequalities are a result of the interventions being created and targeted at the majority of individuals who often have lower risk, opposed to those who have higher risk. Therefore, communities that are historically marginalized experience the same barriers to access and inclusion in these intervention spaces that prevent them from accessing the appropriate supports in the first place. However, interventions that focus on upstream versus downstream approaches are less likely to create intervention-generated inequalities (Lorenc et al., 2013; Williams et al., 2008).

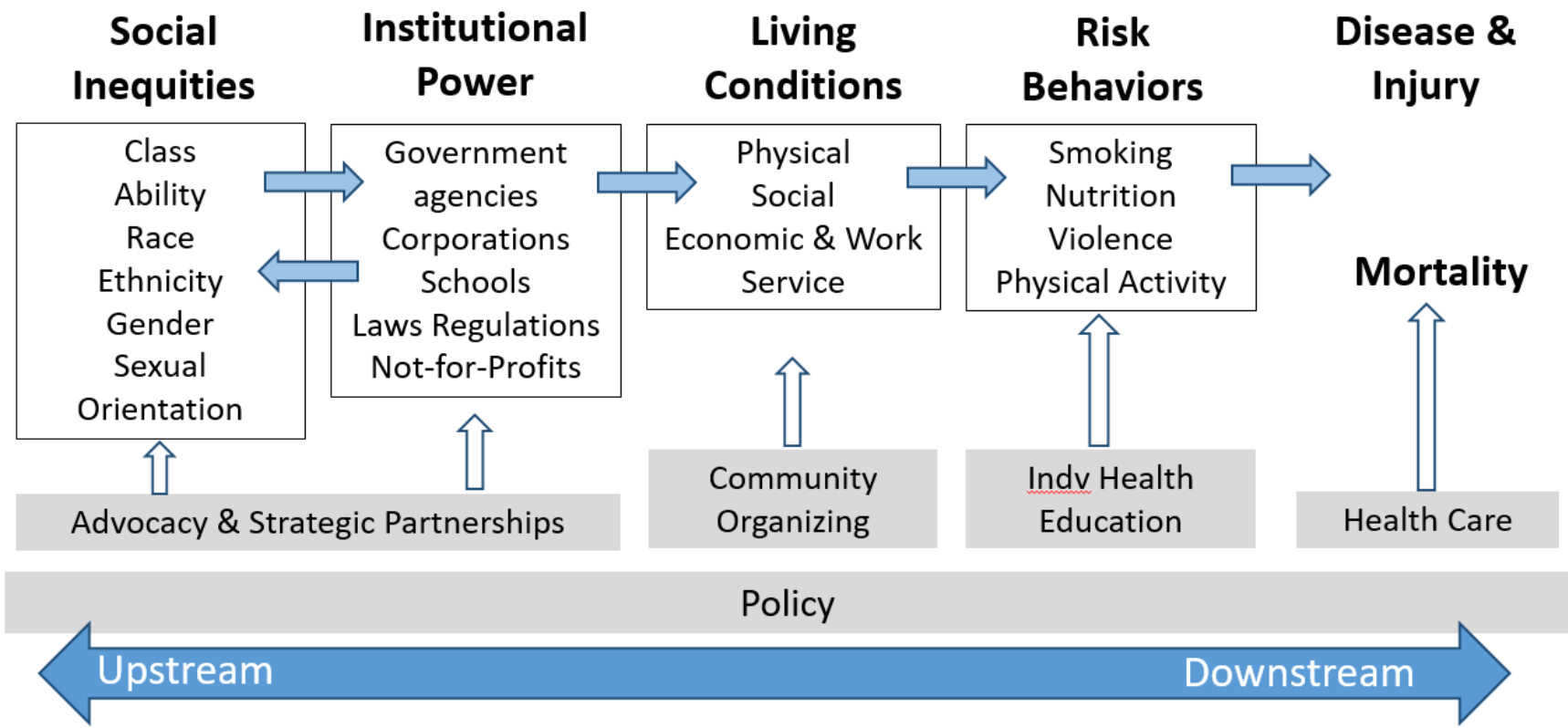

Figure 2.2. BARHHI Health Inequities Framework

Note: Adapted from figure as represented on the Bay Area Regional Health Inequities Initiative website.

An upstream approach to the social determinants of public health outcomes focus on environmental and institutional drivers that influence a person's behavior, rather than placing the focus solely on the individual's behavior (Bharmal et al., 2015). It also recognizes that inequities in health are shaped by the unequal distribution of wealth and power and contribute to the marginalization of certain communities. Therefore, upstream approaches offer greater promise for reducing health disparities. The Bay Area Regional Health Inequities Initiative developed a framework (Figure 2.2) that outlines considerations at upstream versus downstream approaches (*The BARHII Framework*, n.d.). This framework highlights the role social inequities can play in creating institutional inequities and thus downstream disparities.

VR services are provided and funded through the state and federal government with efforts to provide supports, services, and educational opportunities to improve employment outcomes. All of these environments face threat to institutional inequities that could result in disparities for people with IDD across intersecting marginalized communities. In fact, recommendations for addressing internal racial bias within state VR agencies were provided by Anderson and colleagues (2021) to confront the stress and trauma experienced by people of color with IDD trying to utilize employment services. There is a need for better understanding of how demographic characteristics influence the services and supports for people with IDD in employment and education.

The purpose of this study is to examine if social inequities exist in the supports provided and employment outcomes in individuals with IDD through their state VR services. This study examined the following research questions using a secondary data analysis:

1) To what extent do demographic characteristics (i.e., race, ethnicity, age, gender, and severity of disability) predict differences in education-based support services received through VR for individuals with IDD?

   Hypothesis: There are no demographic differences in those who did and did not receive educational services among individuals with IDD who applied for VR services.

2) To what extent do demographic characteristics predict differences in the level of monetary support provided through VR Services for individuals with IDD?

   Hypothesis: There are no demographic differences in amount of monetary support received among individuals with IDD who applied for VR services.

3) To what extent do demographic characteristics predict differences in employment wage for individuals with IDD who received VR support services?

   Hypothesis: There are no demographic differences in wages earned at exit among individuals with IDD who applied for VR services.

2.2 Methods

2.2.1 Dataset

This is a secondary, cross-sectional data analysis using the Rehabilitation Services Administration's Case Service Report (RSA-911) dataset for program years 2017-2019. The RSA-911 is a public access dataset sponsored by the Office of Special Education and Rehabilitation Services Administration in the Department of Education (*Case Service Report (RSA-911)*, 2021). The dataset is a report of all applicants to VR agencies in the United States that exited within that program year, detailing data for each individual from application through closure date,

including personal and demographic data and services received. The study was approved by the Georgia State Institutional Review Board (IRB) as non-human subjects research (IRB #: H22051), the approval letter can be found in Appendix 1.

2.2.2 Sample

The analytic sample of this study had 50, 949. The complete dataset included 1,495,099 cases (503,239 cases in the 2017, 507,219 cases in 2018, and 484,641 cases in 2019). There were 70,463 applicants after delimiting the sample to only individuals with intellectual disability who were between the ages of 22 and 65 years old. The RSA-911 asks applicants to identify a primary and secondary disability, where applicable (*Case Service Report (RSA-911)*, 2021). For each, the applicant was asked to report the type of impairment and source of impairment. The type of impairment is grouped into 3 categories (sensory/communicative, physical, and mental), with specific impairments identified within each. The applicant is then given a list of 37 potential diagnoses (plus other) that identify the source of impairment. Only participants that reported intellectual disability as their source of impairment for either their primary or secondary disability were included in this study.

This study was also delimited to individuals 22 years old or older. Students are covered under the Individuals with Disabilities Education Act (IDEA) through the age of 21, when available services and supports shift to adult services. Therefore, only individuals 22 years old and over were included for this analysis to best capture VR supports after the individual transitions out of IDEA.

The VR application process is lengthy and includes multiple steps prior to being able to receive services. These steps include eligibility determination, including the application and a

trial work experience, and often includes time spent on an order of selection waiting list. Next, applicants develop an individualized plan for employment with their VR Agency to outline services they could receive that support their goals. This study excluded applicants who did not make it past the application stage, eligibility stage (including trial work experience) or develop an IPE plan with their state's VR agency. All applicants included in this study completed an IPE, meaning they were deemed eligible to receive services.

2.2.3 Independent Variables

The independent variables of this study focus on demographic characteristics to best assess the extent to which they predict receipt of VR services and their employment outcome among individuals with IDD. This study assesses age, sex, race, ethnicity, severity of disability, and state of service receipt as measured in the RSA-911 application. A matrix outlining questions from the RSA-911 used to create variables in this study can be found in Appendix 2.

Age. Age was determined using the person's year of birth and the date of their application.

Sex. The *sex* of the applicant was measured using a binary male or female option.

Race. *Race* was measured by a series of questions asking individuals if they identified as American Indian or Alaska Native; Asian; Black or African American; Native Hawaiian or other Pacific Islander; White; and/or Other. Sample sizes for multiple race categories were too small to compare across the multiple categorical co-variates and provide statistically reliable results. Therefore, this study only included applicants who identified in the White and Black race categories.

Ethnicity. Applicants identified their *ethnicity* through one question asking if they identified as Hispanic or Latino, with a yes/no response.

Severity of disability. *Severity of disability* was recorded by VR staff and is measured using an ordinal classification on a scale of 0 (no significant disability), 1 (significantly disabled), and 2 (most significantly disabled). The definitions of severity category follow criteria established by the VR agency.

State employment rate. There are differences between states that could influence the VR agencies and their outcomes. The state unemployment rate has shown to be one considerations that influences these outcomes (M. A. Alsaman & Lee, 2017; Honeycutt et al., 2015; Sannicandro et al., 2018). Therefore, states were divided into four quartiles based on their employment rates in 2018. Appendix 3 outlines which states, and their subsequent employment rates, were represented in each quartile.

Interaction terms. This study aims to better understand how demographic characteristics may predict services received and/or outcomes through VR. Disability severity is often a predictor of access and participation in interventions and services which could interact with social inequities as a result of sex, ethnicity, and race (Gkiouleka et al., 2018). Interaction terms help us understand how individual differences in one demographic characteristic may vary based on their identity with another demographic characteristic (Bauer et al., 2021). . Therefore, this study is intentionally including interaction terms between Disability severity* and sex, ethnicity, and race.

2.2.4 Dependent Variables

VR offers a variety of services to support employment outcomes. The RSA-911 reports all services that individuals receive before exit, reporting in four main categories of services: Pre-employment transition services; Training services; Career services; and Other Services.

Education services received. This variable is the main outcome for aim 1. It reports the number of VR services received by the individual that support improved employment through the pursuit of formalized education. There were 5 potential services offered to support education, which could have been offered either through the VR agency or through a referral to a comparable service provider. All services supporting employment through education were included in the Training services. If individuals were reported to have received training services for (a) Basic academic remedial or literacy training (RSA Question XII.G), (b) Occupational or vocational training (RSA Question XII.D), (c) Junior or community college training (RSA Question XII.C), (d) Four-year college or university training (RSA Question XII.B), and/or (e) Graduate college or university (RSA Question XII.A). This variable treated as a dichotomous variable, comparing those who did receive education-based training services to those who did not.

VR expenditures for services. This variable is the main outcome for Aim 2. The RSA-911 reports all expenditures for services purchased/provided by the VR Agency for each individual per quarter. Expenditures covering services provided in all four service categories was totaled for each individual. Costs of services expended by the VR Agency are reported in dollar amounts and treated as a continuous variable.

Employment. Employment will serve the main outcome for Aim 3 of this study. The RSA-911 reports each applicant's hourly wage and hours worked each week at time of exit. This

study created a variable reporting weekly wage of each individuals by multiplying their hourly wage with their hour worked each week. If the individual is unemployed, the wage earned was zero dollars.

2.2.5 Data Analysis

R Studio (version 2021.09.02) was used to conduct all analyses (R Core Team, 2021). In cases of missing data, list-wise deletion was implemented. Any applicant that was missing responses to the included demographic variables and/or outcome variables will be excluded from the final analysis for each aim. The final sample size for this study was 50,949 applicants, after accounting for 2,931 applicants with missing data (5.8% of the dataset) that were not included due to using list-wise deletion techniques. Since less than 10% of the dataset was eliminated due to missing data, no imputation methods were utilized (Jakobsen et al., 2017; Langkamp et al., 2010).

Aim 1: Education Services Received

A multivariable binomial logistic regression was used to determine which demographic characteristics predict the receipt of services that support improved employment through educational opportunities, controlling for the state's employment rate. Bivariate analyses were conducted to compare all demographic independent variables to the dependent variable. A t-test was conducted to compare the mean age between the binomial outcome variable of those who did received education services and those who did not. Chi-square tests of independence assessed all other categorical demographic variables with those who did and did not receive education services. Multi-collinearity was assessed using Chi-square test of independence between all predictor variables, none was detected.

Model evaluation and specification. Individual simple binomial logistic regression analyses between each demographic variable and the outcome were first assessed to determine which variables would be added into the full model, including the interaction terms. Hierarchical regression methods were used to build the final model. The first model included only the control variable of state unemployment rate. The second model included all demographic variables (age, sex, ethnicity, race, and severity of disability) that were significant in the simple regression analyses. The third model included the interaction variables that were significant in the simple regression analyses. Any variables with parameter estimates that didn't meet the a priori α=0.05 were then excluded in a new model. This model was then compared to the full model using model fit statistics, including AIC, to determine the model that best fits the data. The model with the lower AIC was chosen as the final model. Odds ratio and confidence intervals will be reported from the final model for each demographic predictor.

Aim 2: VR Expenditures for Services Provided

A multiple linear regression was used to determine which demographic characteristics predict the cost expended by the VR Agency for services the applicant received, controlling for the state's employment rate. Demographic predictors included age, sex, race, ethnicity, and severity of disability, as well as the three interaction terms. State unemployment was included in the analysis as control variable. Weekly wage was also included as a control variable, since income is one consideration in determining expenses covered by the VR Agency. Pearson correlation, t-tests, and ANOVAs were conducted to assess the bivariate relationship between the continuous outcome of expenditures and the demographic predictor variables. Chi-square tests of independence assessed for multi-collinearity among demographic predictor variables.

The outcome of expenditures from the VR Agency is continuous, however contained a large number of 0's, meaning no expenditures were reported for the applicant. A sensitivity analysis was conducted to test for difference in the demographic predictors between those who did and did not receive expenditures for services. A binomial logistic regression showed that there were statistically significant differences in all demographic characteristics except Sex between those who did and did not have service expenditures from their VR Agency. Therefore, the linear regression only included individuals who had over $0 expenditures for services reported by the VR Agency. Results from the final model of the logistic regression performed for the sensitivity analysis comparing applicants who did $0 of expenditures from their VR agency to those who had > $0 for the sensitivity analysis is reported in Table 2.2.

Model evaluation and specification. Simple linear regression with each demographic predictor and the number of dollars expended for services was used to determine the full statistical model, including interaction terms. The model building processes followed hierarchical regressions methods to select the final model. First, the control variables of state unemployment rate and weekly age was ran. Second, the demographics characteristics were added. The full model added the interaction terms that were significant in the bivariate regressions. Subsequent models were run, excluding any variables with parameter estimates that did not meet an a priori α=0.05 then compared using a nested F-test. The R-squared of the each model is reported to state the percent of the variance of expenditures for services that is explained by the included predictor variables. Parameter estimates, standard errors and p-values for each value will also be reported. Semi-partial correlations for the demographic

characteristics in the final model (excluding interaction terms) will be reported to understand the unique contribution in the explanation of the variance (R-squared).

The assumptions of linear regression were tested on the final model. Residuals were analyzed to assess for the assumptions of normality, homoscedasticity, and linearity, all assumptions were held. Multicollinearity between variables was measured using tolerance.

Aim 3: Weekly Wage at exit

A multiple linear regression was used to assess the relationship between the demographic characteristics, including interaction terms, and the individual with IDD's wage at time of exit from their VR Agency. The analysis included age, sex, race, ethnicity, severity of disability, and three interaction terms as the demographic predictors, with state unemployment rates as a control variable. Bivariate analyses with the linear outcome were conducted using Pearson correlation, t-tests, and ANOVAs. Chi-square tests of independence assessed for multi-collinearity among demographic predictor variables.

The outcome of weekly wage is continuous, however, contained a large number of 0's, meaning the individual did not have a job that paid them a wage each week. A sensitivity analysis was conducted to test for differences in the demographic predictors between those who did and did not earn a weekly wage. A binomial logistic regression comparing the two groups revealed that there are differences in the predictor variables between those who do and do not earn a weekly wage. Therefore, the linear regression only included individuals who earned > $0 weekly wage. Results from the final model for the logistic regression for the sensitivity analysis is reported are reported in Table 2.3.

Model evaluation and specification. Simple linear regressions between each demographic predictor and each interaction with the applicant's weekly wage in dollars was conducted to inform variables used in model building. Those that had a relationship at an a priori α=0.05 or lower were included in the process. A hierarchal modeling approach were first run a model with the control variables of state unemployment rate, second with the demographic characteristics, and the full model with the interaction terms. Subsequent models were run, excluding any variables with parameter estimates that did not have a statistically significant relationship with the outcome. This model was then compared to the full model using a nested F-test. The R-squared and parameter estimates of the final model are reported. The unique contribution of each demographic characteristic in explaining the variance in Weekly Wage will be reported in the results using semi-partial correlations.

The assumptions of linear regression were tested on the final model. Residuals were analyzed to assess for the assumptions of normality, homoscedasticity, and linearity, all assumptions were held. Multicollinearity between variables was measured using tolerance. No variable had a tolerance under 0.40 (disability severity), therefore no threat to multicollinearity was detected.

2.3 Results

All applicants identified as having an intellectual or developmental disability, 84.54% of the applicants identified as having a most significant disability, 14.41% identified has having a significant disability, while 1.05% identified as not having a significant disability. The majority of the sample identified as being male (57.17%), White (66.14%), and/or not Hispanic (90.79%). The full descriptive results from the sample can be found in Table 2.1.

2.3.1 Research Question 1: Education Services

Approximately three percent of applicants (1,307) received services focused on advancing education to support employment outcomes, with the range being from 0-5 services. Bi-variate analyses of the predictor showed there were statistically significant differences between those who did and did not receive services in mean age, sex, race, and severity of disability. Ethnicity was not found to have different proportions of those who identified has Hispanic and those who did not.

The final model included all demographic predictor variables, except Ethnicity. No interaction terms were found to be significant in simple logistic regression models, therefore were not included. Younger applicants, female applicants, applicants who identified as Black and as having no significant disability had higher odds of receiving education-based services. The odds for females to receive education services were 1.26 (95% CI[1.12, 1.4]) times as high has the odds for males. Black applicants had 1.66 (95% CI[1.48, 1.85]) times the odds of white applicants. Those with no significant disability had 3.85 (95% CI[2.78, 5.22]) times the odds as someone with a most significant disability to receive education services. The full results of the model can be found in Table 2.2.

2.3.2 Research Question 2: Costs expended by VR Agency

Approximately 40% of applicants had no costs covered by their VR Agency for services received ($0 expended). Of those who received cost expenditures from the VR agency, the median costs expended by the VR agency was $2834.00 (IQR: $4566). The sensitivity analysis using a logistic regression to compare demographic variables between those who had no costs expended by their agency to those who had at least $1 expended, controlling for state and

Table 2.1. Demographic Descriptives Results of Predictor Variables by Outcome Category

			Received Education Services				Costs Expended by VR				Weekly Wage			
	(n=50,949)		***No (n=49,642)***		***Yes (n=1,307)***		***$0 (n=20,155)***		***≥ $1 (n=30,794)***		***$0/week (n=22,624)***		***≥ $1/Week (n=28,325)***	
	Mean(SD)		*Mean(SD)*		*Mean(SD)*		*Mean(SD)*		*Mean(SD)*		*Mean(SD)*		*Mean(SD)*	
Age	35.64 (11.37)		35.71 (11.39)		***33.14 (10.24)		35.24 (11.31)		***35.90 (11.40)		35.65 (11.55)		35.63 (11.23)	
	n	%	*n*	%	*n*	%	*n*	%	*n*	%	*n*	%	*n*	%
Gender					***				***				***	
Male	29,071	0.57	28,407	0.57	664	0.51	11,267	0.56	17,804	0.58	12,511	0.55	16,560	0.58
Female	21,878	0.43	21,235	0.43	643	0.49	8,888	0.44	12,990	0.42	10,113	0.45	11,765	0.42
Race					***				***				***	
White	35,093	0.69	34,401	0.69	692	0.53	13,165	0.65	21,298	0.71	14,847	0.66	20,246	0.71
Black	15,856	0.31	15,241	0.31	615	0.47	6,990	0.35	8,866	0.29	7,777	0.34	8,079	0.29
Ethnicity									***				***	
Not Hispanic	46,512	0.91	45,312	0.91	1200	0.92	18,134	0.90	21,928	0.71	20,462	0.90	26,050	0.92
Hispanic	4,437	0.09	4,330	0.09	107	0.08	2,021	0.10	8,866	0.29	2,162	0.10	2,275	0.08
Severity of Disability					***				***				***	
Most Significant Disability	43,047	0.84	42,145	0.85	902	0.69	16,567	0.82	26,480	0.86	19,353	0.86	23,694	0.84
Significant Disability	7,363	0.14	7,005	0.14	358	0.27	3,307	0.16	4,056	0.13	3,078	0.14	4,285	0.15
Not Significant Disability	539	0.01	492	0.01	47	0.04	281	0.01	258	0.01	193	0.01	346	0.01
State Region					***				***				***	
Q1	9,082	0.18	8,927	0.18	155	0.13	3,654	0.18	5,428	0.24	3,671	0.16	5,411	0.25
Q2	11,060	0.22	10,590	0.21	470	0.39	4,665	0.23	6,395	0.28	5,321	0.24	5,739	0.27
Q3	19,238	0.38	18,664	0.38	574	0.48	7,992	0.40	11,246	0.49	8,737	0.39	10,501	0.49
Q4	11,569	0.23	11,461	0.23	108	0.08	3,844	0.19	7,725	0.25	4,895	0.22	6,674	0.24

Note. Bivariate analyses of each demographic predictor was conducted comparing across categories of the outcome variables for each research question. Asterisks indicate a statistically significant difference across groups in the outcome variable. * indicates p-value of <.05; ** indicates p-value of <.001; *** indicates p-value of <.0001

Table 2.2. Regression Results Comparing Demographic Variables between VR Applicants Who Did and Did Not have Service Expenditures Covered by VR (n = 50,949)

Variable	Estimates	SE	Statistic	p-value	OR	95% CI
Intercept	-0.07	0.04	-1.77	0.08	0.93	[0.86, 1.01]
Age	0.00	0.00	5.71	0.00	1.00	[1.00, 1.01]
Sex						
Male	*reference*					
Female	-0.01	0.02	-0.52	0.60	0.99	[0.95, 1.03]
Race						
White	*reference*					
Black	-0.29	0.02	-13.91	0.00	0.75	[0.72, 0.78]
Ethnicity						
Not Hispanic	*reference*					
Hispanic	-0.38	0.03	-11.06	0.00	0.68	[0.64, 0.73]
Severity of Disability						
Most Significant Disability	*reference*					
Significant Disability	-0.41	0.03	-15.05	0.00	0.66	[0.63, 0.70]
No Significant Disability	-0.92	0.10	-9.65	0.00	0.40	[0.33, 0.48]
State (by Unemployment Rates)						
Quartile 1	*reference*					
Quartile 2	-0.01	0.03	-0.21	0.83	0.99	[0.94, 1.05]
Quartile 3	0.01	0.03	0.47	0.64	1.01	[0.96, 1.07]
Quartile 4	0.35	0.03	11.73	0.00	1.42	[1.34, 1.51]
Weekly Wage	0.00	0.00	53.20	0.00	1.00	[1.00, 1.00]
Model Statistics						
df	50938.00					
AIC	64338.000					

Note: SE = standard error; OR = odds ratio; CI = confidence intervals

weekly wage earned, showed statistically significant differences between the two groups in all variables except sex. Applicants who were White, not Hispanic, and identified as having most significant disabilities had greater odds of having any cost expenditures covered by the VR agency. The full results of the sensitivity analysis can be found in Table 2.3.

The final model looked at demographic predictors in only those who did receive costs for services expended by their VR agency (>$0). The final model equation was:

$$
\begin{aligned}
Y_{Cost\ expended} = {} & 2523.61 - 146.12\, X_{race} - 3.06\, X_{ethnicity} \\
& - 1452.51\, X_{Significant\ Disability} \\
& - 3808.08\, X_{No\ Significant\ Disability} + 644.70\, X_{StateQ2} \\
& + 3948.40\, X_{StateQ3} + 2256.50\, X_{StateQ4} + 3.16\, X_{WeeklyWage} \\
& - 1041.04\, X_{Black} * X_{Significant\ Disability} \\
& - 665.01\, X_{Black} X_{No\ Significant\ Disability} \\
& - 1679.32\, X_{Hispanic} X_{Significant\ Disability} \\
& + 542.55\, X_{Hispanic} X_{No\ Significant\ Disability}
\end{aligned}
$$

Race and ethnicity did not have a statistically significant relationship with the VR expenditures in the final model, however were included because both variables showed statistically significant relationships when accounting for their interaction with severity of disability. Applicants who were White, not Hispanic, and had a most significant disability received, on average, higher expenditures than their peers.

In White applicants, those with a most significant disability received $3808.08 more, on average, than their White peers with no significant disability. Black applicants with a most significant disability received an average of received $146.12 less expenditures from their VR agencies than their white counterparts with a most significant disability. The difference in expenditures between White and Black applicants increased as severity decreased, with black

Table 2.3. Sensitivity Analysis Regression Results Comparing Demographic Variables between VR Applicants Who Did and Did Not have Service Expenditures Covered by VR (n = 50,949)

Variable	Estimates	SE	Statistic	p-value	OR	95% CI
Intercept	-0.07	0.04	-1.77	0.08	0.93	[0.86, 1.01]
Age	0.00	0.00	5.71	0.00	1.00	[1.00, 1.01]
Sex						
Male	*reference*					
Female	-0.01	0.02	-0.52	0.60	0.99	[0.95, 1.03]
Race						
White	*reference*					
Black	-0.29	0.02	-13.91	0.00	0.75	[0.72, 0.78]
Ethnicity						
Not Hispanic	*reference*					
Hispanic	-0.38	0.03	-11.06	0.00	0.68	[0.64, 0.73]
Severity of Disability						
Most Significant Disability	*reference*					
Significant Disability	-0.41	0.03	-15.05	0.00	0.66	[0.63, 0.70]
No Significant Disability	-0.92	0.10	-9.65	0.00	0.40	[0.33, 0.48]
State (by Unemployment Rates)						
Quartile 1	*reference*					
Quartile 2	-0.01	0.03	-0.21	0.83	0.99	[0.94, 1.05]
Quartile 3	0.01	0.03	0.47	0.64	1.01	[0.96, 1.07]
Quartile 4	0.35	0.03	11.73	0.00	1.42	[1.34, 1.51]
Weekly Wage	0.00	0.00	53.20	0.00	1.00	[1.00, 1.00]
Model Statistics						
df	50938.00					
AIC	64338.000					

Note: SE = standard error; OR = odds ratio; CI = confidence intervals

applicants with a significant disability receiving an average $1041.04 less than their white counterparts with a significant disability.

This same pattern occurred when accounting for the interaction between disability severity and ethnicity. Non-Hispanic applicants with a most significant disability received an average of $304.06 more in expenditures from the VR agency than Hispanic applicants. Non-Hispanic applicants with a significant disability received an average of $1452.51 less than non-

Table 2.4. Linear Regression Results of Assessing Applicant Demographic Predictors to Amount of Service Expenditures Covered by VR Agency for Services (n = 50,949)

Linear Regression Results of Assessing Applicant Demographic Predictors to Amount of Service Expenditures Covered by VR Agency for Services

	Basic Model				Co-variate Model				Interaction Model			
Variable	Estimate	SE	Statistic	p-value	Estimate	SE	Statistic	p-value	Estimate	SE	Statistic	p-value
Intercept	2362.51	106.06	22.28	<.0001	2770.14	177.19	15.63	<.0001	2,696.44	177.76	15.17	<.0001
Age					-3.10	3.65	-0.85	0.40	-3.07	3.65	-0.84	0.40
Gender												
Male	*reference*				*reference*				*reference*			
Female					-132.93	83.92	-1.58	0.11	-129.91	83.90	-1.55	0.12
Race												
White	*reference*				*reference*				*reference*			
Black					-300.75	94.42	-3.19	0.001	-146.97	102.58	-1.43	0.15
Ethnicity												
Not Hispanic	*reference*				*reference*				*reference*			
Hispanic					-543.54	158.58	-3.43	<.0001	-322.16	171.95	-1.87	0.06
Severity of Disability												
Most Significant Disability	*reference*				*reference*				*reference*			
Significant Disability					-1,985.88	124.33	-15.97	<.0001	-1,445.52	167.41	-8.63	<.0001
No Significant Disability					-4,024.26	456.92	-8.81	<.0001	-3,794.08	677.59	-5.60	<.0001
State Unemployment Rates												
Quartile 1	*reference*				*reference*				*reference*			
Quartile 2	644.52	134.57	4.79	<.0001	629.85	134.75	4.67	<.0001	643.00	134.74	4.77	<.0001
Quartile 3	3,729.80	120.97	30.83	<.0001	3,915.27	122.70	31.91	<.0001	3,944.96	122.84	32.11	<.0001
Quartile 4	2,264.83	129.13	17.54	<.0001	2,242.64	128.76	17.42	<.0001	2,253.68	128.76	17.50	<.0001
Weekly Wage	2.32	0.28	8.30	<.0001	3.15	0.28	11.13	<.0001	3.13	0.28	11.05	<.0001

Race*Severity						
White * Significant Disability	*reference*	*reference*	*reference*			
Black * Significant Disability			-1,038.67	258.80	-4.01	<.0001
White * No Significant Disability	*reference*	*reference*	*reference*			
Black * No Significant Disability			-683.41	951.34	-0.72	0.47
Ethnicity*Severity						
Not Hispanic * Significant Disability	*reference*	*reference*	*reference*			
Hispanic * Significant Disability			-1,673.98	258.80	-4.01	<.0001
Not Hispanic * No Significant Disability	*reference*	*reference*	*reference*			
Hispanic * No Significant Disability			-523.62	951.34	-0.72	0.47
Model Statistics						
Residual SE	7,290	7,250	7,247			
df	30,789	30,783	30,779			
Adjusted R^2	0.043	0.054	0.055			
F-statistic	348.8	176.60	128.10			
p-value	<.0001	<.0001	<.0001			

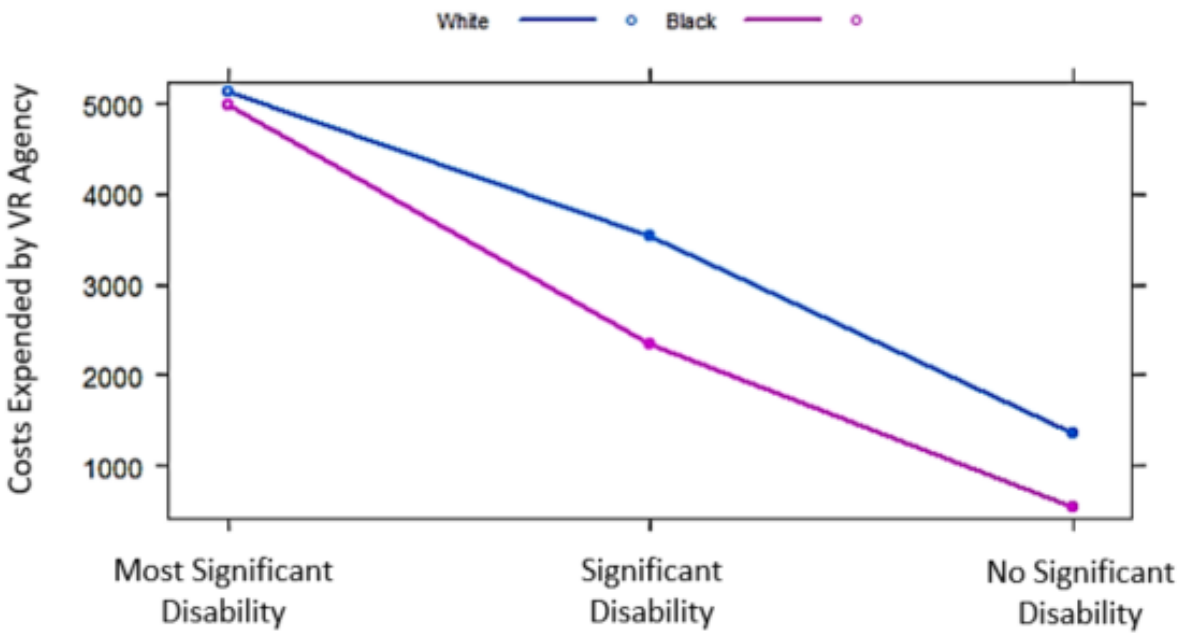

Figure 2.3. Graph of Interaction between Race and Severity of Disability Costs Expended by VR Agency

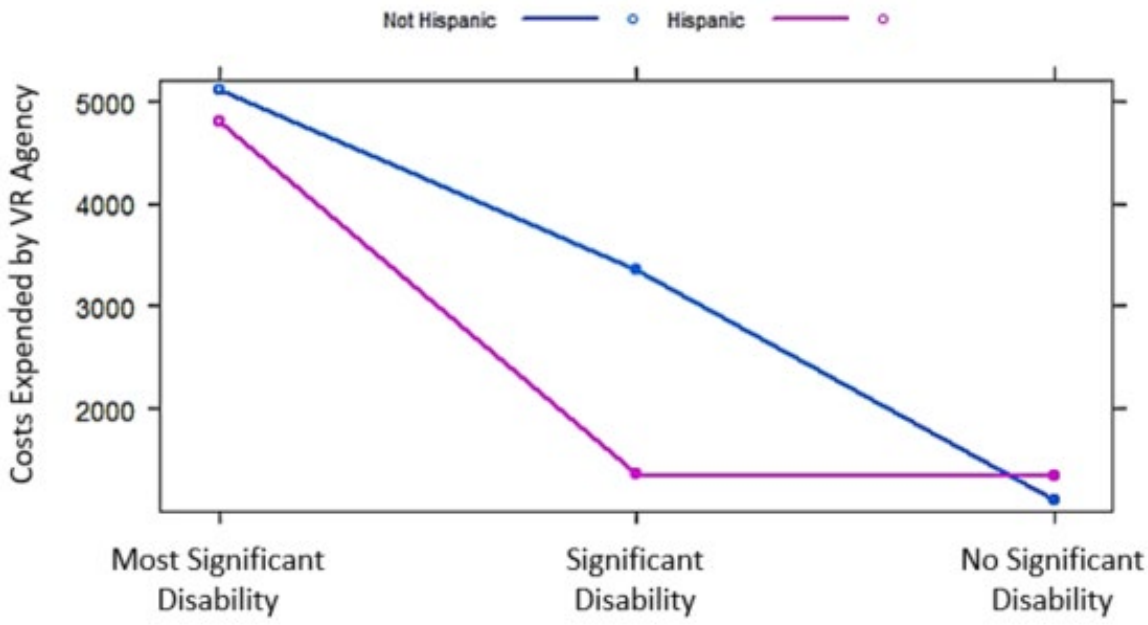

Figure 2.4. Graph of Interaction between Ethnicity and Severity of Disability Costs Expended by VR Agency

Hispanic applicants with a most significant disability. Whereas, Hispanic applicants with a significant disability received an average of $1679.32 less expenditures from their VR agency than white applicants with a significant disability. Graphs of the interactions results can be seen in Figure 2.3.

Interestingly, there was a positive relationship between weekly wage and the outcome. For every dollar expended for the applicant's services, they earned an average $3.16 more in weekly wage at exit. The model explained approximately 5.5% of the variance in outcome, with 1.2% of that being from the demographic variables and their interaction terms, controlling for state employment rate and weekly wage earned.

2.3.3 Research Question 3: Weekly Wage at Exit

Approximately 54% of the sample earned $1 or more in weekly wage at exit. The sensitivity analysis showed statistically significant differences in all demographic predictors between those who did (>$0) and did not (=$0) earn a weekly wage, controlling for state unemployment rate. The logistic regression model showed that White males had higher odds of earning a weekly wage than their peers. An interaction between severity of disability and ethnicity was found. Those who had a most significant disability and identified as Hispanic had lower odds of earning a weekly wage than applicants who had a most significant disability and were white (OR: 0.75; 95% CI [0.72, 0.78]). However, in those with a significant disability, applicants who were Hispanic had higher odds of earning a weekly wage (OR: 1.27; 95% CI[1.07, 1.51]). The full results of the sensitivity analysis can be found in Table 2.5.

The main analysis for this question included only those who earned a weekly wage (>$0). The mean wage earned each week by the sample was $220.37 (SD: $147.53). The final model equation was:

$$
\begin{aligned}
Y_{Weekly\ Wage} = {} & 185.11 - 17.30\ X_{Sex} + 37.79\ X_{race} + 38.79 X_{\ ethnicity} \\
& - 99.95\ X_{Significant\ Disability} \\
& - 175.34\ X_{No\ Significant\ Disability} + 8.722\ X_{StateQ2} \\
& + 35.575\ X_{StateQ3} - 0.48\ X_{StateQ4} - 37.10\ X_{Black} \\
& * X_{Significant\ Disability} \\
& - 89.96\ X_{Black} * X_{No\ Significant\ Disability} \\
& - 28.48\ X_{Hispanic} * X_{Significant\ Disability} \\
& - 14.06\ X_{Hispanic} * X_{No\ Significant\ Disability}
\end{aligned}
$$

Two interaction terms were included in the final model, one between disability severity and sex, the other between disability severity and race.

Hispanic applicants, on average, earned $52.77 more each week than White applicants. The interaction terms allows us to see that the average weekly wage varies based on severity of disability in both the race and sex demographic variables. Applicants who were Black and had a most significant disability earned on average $37.79 *more* than White applicants with a most significant disability. However, as severity of disability decreased the relationship changed. Black applicants with a significant disability earned an average $37.10 *less* than White applicants with a significant disability, and Black applicants with no significant disability earned an average $89.96 *less* than then White applicants with no significant disability. Female applicants made an average weekly wage less than males across all disability severity levels. Females with a most significant disability earned $17.30 less than males each week. However, this difference increased to an average of $28.48 less earned each week in females compared to males.

Table 2.5. Sensitivity Analysis Regression Results Comparing Demographic Variables between VR Applicants with a Weekly Wage at $0 compared to applicants with a Weekly Wage >$0 (n = 50,949)

Variable	Estimates	SE	Statistic	p-value	OR	95% CI
Intercept	0.54	0.04	14.58	<.0001	1.72	[1.60, 1.86]
Age	0.00	0.00	-2.07	0.039	1.00	[1.00, 1.00]
Gender						
Male	*reference*					
Female	-0.13	0.02	-7.00	<.0001	0.88	[0.85, 0.91]
Race						
White	*reference*					
Black	-0.29	0.02	-14.53	<.0001	0.75	[0.72, 0.78]
Ethnicity						
Not Hispanic	*reference*					
Hispanic	-0.32	0.04	-8.89	<.0001	0.73	[0.68, 0.78]
Severity of Disability						
Most Significant Disability	*reference*					
Significant Disability	0.16	0.03	5.79	<.0001	1.17	[1.11, 1.23]
No Significant Disability	0.43	0.09	4.53	<.0001	1.53	[1.28, 1.85]
State Unemployment Rates						
Quartile 1	*reference*					
Quartile 2	-0.26	0.03	-8.97	<.0001	0.77	[0.73, 0.82]
Quartile 3	-0.14	0.03	-5.30	<.0001	0.87	[0.82, 0.92]
Quartile 4	-0.04	0.03	-1.34	0.181	0.96	[0.91, 1.02]
Ethnicity						
Not Hispanic * Significant Disability	*reference*					
Hispanic * Significant Disability	0.24	0.09	2.73	0.006	1.27	[1.07, 1.51]
Not Hispanic * No Significant Disability	*reference*					
Hispanic * No Significant Disability	0.44	0.36	1.22	0.222	1.55	[0.78, 3.25]
Model Statistics						
df	50,937.00					
AIC	69,509.000					

Note. SE = standard error; OR = odds ratio; CI = confidence intervals

Table 2.6. Linear Regression Results Assessing Demographic Characteristics that Predictors Weekly Wage in VR Applicants who earned >$0 (n = 50,949)

	Basic Model				Co-variate Model				Interaction Model			
Variable	Estimate	SE	Statistic	p-value	Estimate	SE	Statistic	p-value	Estimate	SE	Statistic	p-value
Intercept	198.32	1.98	100.22	<.0001	189.68	3.44	55.10	<.0001	185.50	3.46	53.62	<.0001
Age					0.00	0.08	0.02	0.98	-0.01	0.07	-0.14	0.89
Sex												
Male	*reference*				*reference*				*reference*			
Female					-22.05	1.70	-12.97	<.0001	-17.30	1.86	-9.32	<.0001
Race												
White	*reference*				*reference*				*reference*			
Black					29.83	1.92	15.50	<.0001	37.78	2.12	17.86	<.0001
Ethnicity												
Not Hispanic	*reference*				*reference*				*reference*			
Hispanic					53.89	3.18	16.96	<.0001	52.72	3.17	16.62	<.0001
Severity of Disability												
Most Significant Disability	*reference*				*reference*				*reference*			
Significant Disability					74.16	2.36	31.37	<.0001	99.96	3.54	28.23	<.0001
No Significant Disability					129.34	7.68	16.85	<.0001	175.36	12.04	14.57	<.0001
State Unemployment Rates												
Quartile 1	*reference*				*reference*				*reference*			
Quartile 2	12.51	2.76	4.53	<.0001	8.15	2.69	3.03	0.002	8.72	2.68	3.25	0.001
Quartile 3	52.75	2.44	21.66	<.0001	34.35	2.42	14.18	<.0001	35.57	2.42	14.70	<.0001
Quartile 4	-0.17	2.66	-0.06	0.95	-1.00	2.59	-0.39	0.70	-0.48	2.58	-0.18	0.85
Race*Severity												
White * Significant Disability	*reference*				*reference*				*reference*			

Black * Significant Disability			-28.48	4.72	-6.04	<.0001
White * No Significant Disability	*reference*	*reference*	*reference*			
Black * No Significant Disability			-14.07	15.57	-0.90	0.37
Sex*Severity						
Male * Significant Disability	*reference*	*reference*	*reference*			
Female * Significant Disability			-37.11	4.88	-7.61	<.0001
Male * No Significant Disability	*reference*	*reference*	*reference*			
Female * No Significant Disability			-89.99	15.29	-5.89	<.0001
Model Statistics						
Residual SE	145.6	140.80	140.50			
df	28,321	28,315	28,311			
Adjusted R^2	0.026	0.089	0.093			
F-statistic	257.1	307.80	224.00			
p-value	<.0001	<.0001	<.0001			

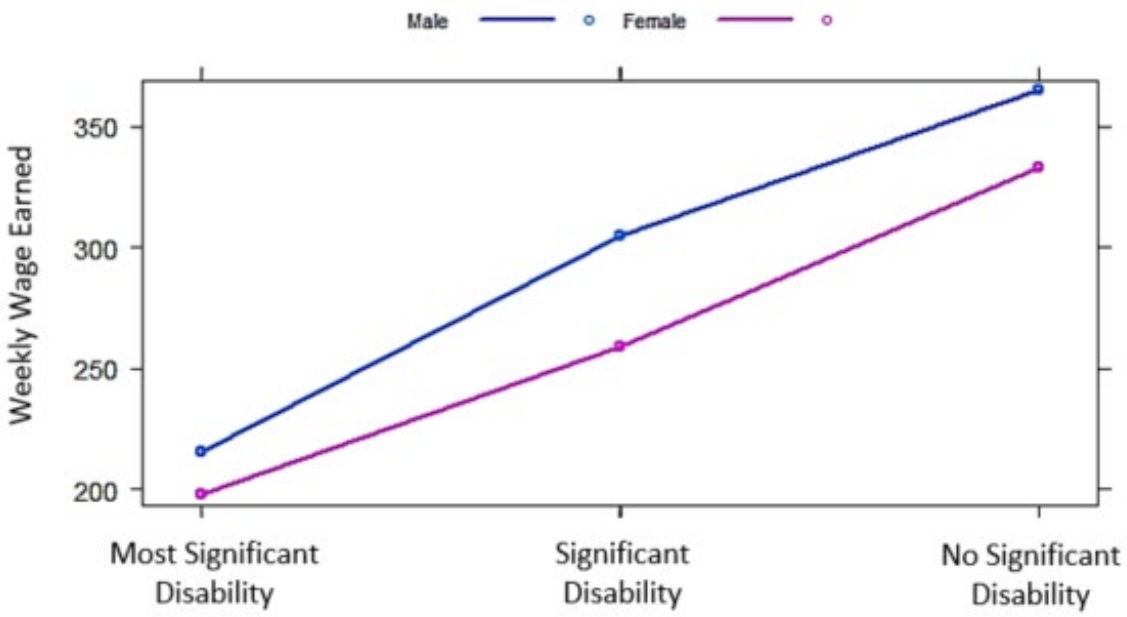

Figure 2.5. Graph of Interaction between Sex and Severity of Disability by Weekly Wage Earned

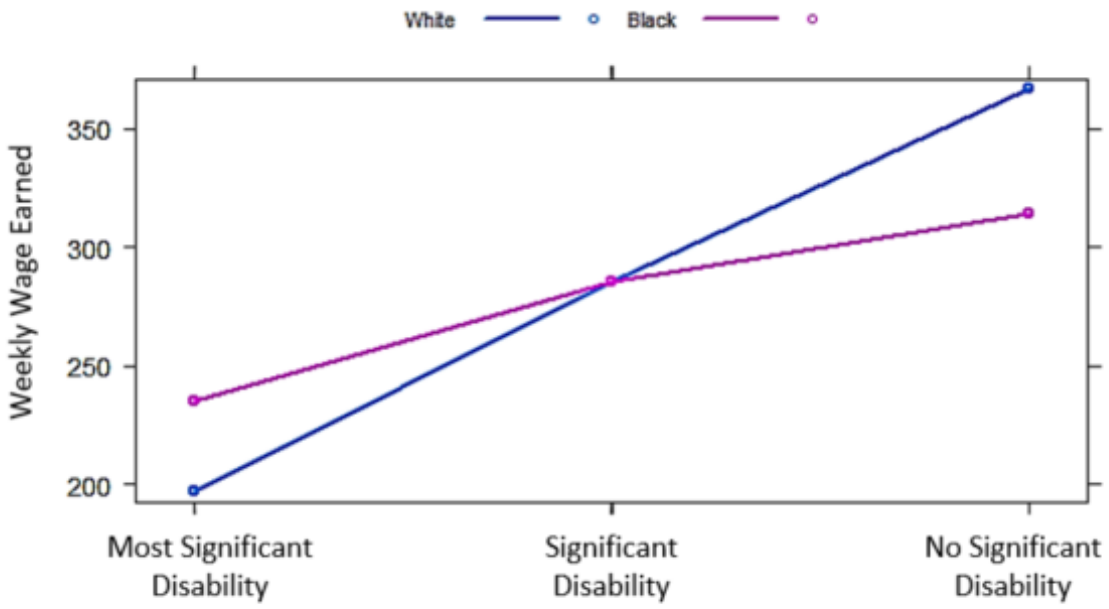

Figure 2.6. Graph of Interaction between Race and Severity of Disability by Weekly Wage Earned

The final model explained 9.3% of the variation in the outcome of weekly wage at exit for VR applicants. The state unemployment rate alone, accounted for 2.6% of the variance, therefore, demographic predictors and their interaction terms explain approximately 6.7% of the overall variance in weekly wage.

2.4 Discussion

This study assessed for social inequities in the VR process for individuals with IDD who completed the eligibility process, including receiving an individualized plan, and able to receive services. Social inequities were examined by evaluating if applicants' demographic characteristics predicted the receipt of services and outcomes associated with participating in VR services. The first analysis found that demographics did significantly predict who received education-based services. The second research question found that demographic characteristics predicted the dollar amount expended by the VR agency for services to support applicant employment outcomes. The third research question found demographic characteristics to predict both if the applicant was employed, as well as their wage earned. Multiple analyses also revealed differences in the outcomes of the demographic variables based on the severity of disability by the same applicant, highlighting the complex relationship that exists between intersecting identities that needs to be considered.

First, the results showed that demographic characteristics did predict if applicants received services that supported improved education. Women and Black applicants had higher odds of receiving services. This follows shifting trends in postsecondary enrollment; as of 2015, over 40% of students in American colleges and universities did not fit the traditional college student of the past and did not identify as a White, Non-Hispanic male between the ages of 18-

22 years old (Hittepole, 2019). Enrollment in colleges and universities by women has not only increased over the last 20 years, but has surpassed enrollment by males (Irwin et al., 2021). Enrollment in college and university programs by Black students increased by approximately 75% in the last 20 years, however, most of those improvements were made prior to 2010.

Applicants with IDD who identified as having the most significant disability had lower odds of receiving services to improve employment outcomes through education. This result aligned with the hypothesis of the study. Applicants with no significant disability were 3.8 times more likely to receive education-based services through their VR agency compared to those with a most significant disability, while applicants with a significant disability were 2.2 times more likely. Applicants with a most significant disability totaled 84% of those receiving services. Postsecondary education is an influential service that provides opportunities for students to develop career-specific skills and demonstrate to employers that they are trained in and ready for their given trade or job. Education services, in this study, included supports for any type of postsecondary education including non-degree certificates, 2-year degrees, and beyond. With education being a major contributor to improving not only employment outcomes, but other factors that improve health and independence, services that support individuals of all abilities and with a range of disability severity need to be developed and offered within the VR system.

The second question showed that demographic characteristics predict both if an applicant had any service costs covered by their VR agency, as well as predicting the average total expenditures applicants received. When looking at White applicants, the amount of expenditures decreased as severity of disability decreased. This finding aligns with the hypothesis that those with a most severe disability would receive higher expenditures to

support increased supports in employment. Women had an average $129.92 less expenditures covered, following a similar pattern of less expenditures covered as the severity decreases.

The interaction terms for both race and ethnicity revealed that as severity of the applicant's IDD decreased, the difference in the level of expenditures received increased. Black applicants received an average of $129.91 less than White applicants with a most significant disability and $1,038.67 less than White applicants with a significant disability. Hispanic applicants with a most significant disability received an average of $322.16 less than White applicants with a most significant disability. Again, this expenditure difference increased as disability severity decreased. Hispanic applicants with a significant disability had an average of $1679.32 less than non-Hispanic applicants with the same disability status. These differences between severity of disability across race and ethnicity highlight potential social inequities within service distribution within the VR process.

The final model for this analysis controlled for weekly wage. This was added to the model to best adjust for decisions made within the VR agency that could influence their decision on service expenditures covered. Interestingly, it was found that higher weekly wages were associated with higher expenditures covered by the VR agency. Weekly wage, for this study, used the wage and hours reported at exit. Therefore, this finding could reflect that individuals who received service expenditures may have improved wages at exit. However, future studies need to further identify if the higher wage reported at exit is a result of having service costs expended thus improving wage at exit, or if wage is a predictor to receiving service expenditures.

The third and final question for this analysis assessed if weekly wage was predicted by demographic characteristics. Findings suggest that sex, race, ethnicity, and severity of disability predicted whether or not an applicant would be employed and the amount of weekly wage earned. Females were both less likely to have employment that paid a wage and earned $17.30 less than males. In white applicants, the less severe the disability the more the applicant earned, with applicants with no significant disability earning and average $175.40 more each week. The interaction terms in the analysis once again revealed that race and ethnicity vary based on severity of disability. Applicants who were black and had a most significant disability earned an average of $37.78 a week more than White applicants with a most significant disability. However, this relationship changes as severity increases with Black applicants with a significant disability earning $28.48 less than white applicants with the same severity of disability. This pattern is also reflected in weekly wage by the relationship between disability severity and ethnicity. Hispanic applicants with a most significant disability earn $52.73 more, while Hispanic applicants with a significant disability earn $37.11 less and those with no significant disability earn $89.99 less than white applicants with the same level of disability. These findings reflect national statistics that show Black and Hispanic Americans both have higher unemployment rates, as well as earn less than White and Non-Hispanic Americans (US Bureau of Labor Statistics, 2018). However, applicants that identified as either Black or Hispanic and had a most significant disability earned a higher average wage than white applicants. This outcome could be an indication that effect of race decreases as disability severity increases. However, it could also indicate differences in the sample of VR applicants versus the population. A better understanding of the starting wages of applicants at the intersection of

race and severity of disability, as well as the intersection of ethnicity and severity of disability, is needed to determine if findings can be attributed to compounded disparities due to intersectional identities or if the VR process naturally excludes a section of the target population that could utilize and be supported by VR services.

2.4.1 Limitations

This study comes with limitations that should be considered when interpreting and applying the findings. First, the study used the RSA-911 dataset to assess for social inequities within VR service delivery. This dataset uses application and other service records for each applicant, often completed by an employee within the VR agency. This analysis is relying on the complete and accurate completion of these reports.

Due to sample size, some of the variables included in the study had to be condensed in order to support accurate statistical tests that hold the necessary assumptions. One example is in reporting race. The RSA-911 reports multiple race identities within their dataset. However, the analysis had a number of categorical variables that did not uphold large of cell sizes after cross-tabulation with race. Therefore, this study was only able to reference the race categories of Black and White. Other studies need to assess potential inequities that could exist in other race identities, especially at the intersection of disability severity. The RSA-911 does not measure gender and only asks applicants to identify their sex using dichotomous male/female option. Both the way this question is worded and the response options provided do not allow for the examination of social inequities in VR services based on gender identity. Future studies need to examine the experiences of individuals with IDD at the intersections of different gender identities, along with potential social inequities that they experience.

2.4.2 Implications

This study found that social inequities exist within the VR system for individuals with IDD. Demographic characteristics predicted both receipt of education services, as well as service expenditures covered by the VR agency. Demographic characteristics also predicted if applicants with IDD were employed and if they earned a wage at exit from their VR agency. Future research needs to assess the reason for these differences. Qualitative studies assessing the VR process for bias could improve understanding of these outcomes, including experiences of individuals with IDD who have applied and/or received services through their VR agency. Bias in the application process could cause VR employees to identify severity of disability different between groups of people, leading to some of the differences. Bias could also be introduced in the services requested and/or received by the applicant. Additionally, further studies assessing differences across groups starting wage at application could improve understanding if the sample of VR applicants represents the population, and who may be missing.

This study only examined applicants who were considered those who finished the eligibility section and received the individual employment plan needed to receive services. This approach was appropriate for this study, as it examined the services offered by VR for social inequities. However, the population of VR applicants that did not receive an individualized employment plan and therefore were unable to retain services needs to be examined for social inequities. Comparing applicants who did and did not receive services could improve understanding of who is not being reached or supported in the VR process. Intervention-generated inequities begin with interventions that are developed to close a disparity gap, however often unintentionally excluding a population from services (White et al., 2009). These

populations are often segments of the intended population that already receive the fewest social supports. This study highlighted areas for potential inequities within service provision in the VR system. Future studies need to assess for social inequities within those who do not receive any services from their VR agency.

This study also emphasized the need to consider intersectional relationships in disability research. This study included interaction terms early in the model building process to assess if differences existed in sex, race, and ethnicity based on severity of disability. Future studies should explore these intersections, especially in terms of employment and education in individuals with IDD, to improve a full understanding of these relationships. Next steps could include methods such as multilevel regression or a intersectional mediation analysis have been proposed as statistical analyses to improve the understanding of these complex relationships (Bauer et al., 2021).

Finally, other factors that influence service delivery and outcomes of VR need to be explored. This analysis controlled for state unemployment rate, as it is has been found to be linked to outcomes in VR in numerous studies (M. A. Alsaman & Lee, 2017; Chan et al., 2014). However, VR services can vary across state, influenced by state policy funding, political priorities, and social expectations. A better understanding of what state level factors influence outcome from the VR agency, as well as possible inequities is needed.

3 MANUSCRIPT 2

EXAMINATION OF SOCIAL INEQUITIES IN NON-SERVICE RECIPIENTS OF VOCATIONAL REHABILITATION SERVICES AMONG ADULTS WITH INTELLECTUAL AND DEVELOPMENTAL DISABILITIES.

3.1 Introduction

Intervention generated inequities occur when an intervention creates new or widens existing differences in the targeted outcome across different groups of people (Lorenc et al., 2013; White et al., 2009). These inequities can be the result from multiple stages of the implementation process, including the fidelity of services or inclusion of all people in service provision, leading to differences in how the intervention is received (White et al., 2009). Social factors that can lead to bias and intervention generated inequities include demographic characteristics (i.e., race, ethnicity, gender identity, and disability), as well as socioeconomic characteristics (i.e., employment status, occupation, income, education level) (White et al., 2009; Williams et al., 2008a). People with intellectual and developmental disabilities (IDD) have been historically excluded and segregated from the rest of society, placed in institutions to live and separate classrooms to learn. Because of this approach, structures and supports to aid in improved quality of life and independence have been developed without consideration for the approximate 7.38 million people living with IDD in the US (*Residential Information Systems Project*, 2020). Evidence of this can be seen in disparities that exist in employment for people with IDD.

The employment rate for people with IDD is 30.4%, less than half of the rate of people without IDD (78.6%) (Paul et al., 2020). Additionally, people with IDD make an average wage that is significantly less than the population, with laws allowing business and organizations to

pay less than the minimum wage to people with IDD (Cheeseman Day & Taylor, 2019; Kimbrough, 2021). Focus groups of people with IDD in a study by Khayatzadeh-Mahani and colleagues (2020) identified 3 barriers to employment: 1) employers' knowledge, capacity, attitudes and management practices to support their employment; 2) a late introduction to the concept of work and vocational training for people with IDD; and 3) stigma leading to prejudice and negative perceptions of the capability of people with IDD. Programs and services have been developed to target the second barrier cited, aiding individuals with IDD in preparing for and obtaining competitive employment, including Vocational Rehabilitation.

Vocational Rehabilitation (VR) services are offered through state agencies in the United States with a goal of improving employment outcomes for individuals with disabilities. A variety of services are offered, ranging from pre-employment services, education based services, and services related to identifying and obtaining the needed accommodations and supports to be successful in a job. VR services have demonstrated improved employment outcomes for individuals with IDD who participated, with employment rates within those receiving services almost double the national employment rate for people with IDD (50% vs 30%) (Dutta et al., 2008; Rosenthal, 2015). However, differences in outcomes after receiving VR services between demographic characteristics have been found, with women and participants of color having lower outcomes (Alsaman & Lee, 2017; Grossi et al., 2020; Nord & Hepperlen, 2016). This demonstrates potential for social inequity in the response to VR services. However, literature assessing for potential social inequity in the provision of services offered through VR agencies is still needed.

There are multiple steps to the VR application process prior to being able to receive services. First, applicants must establish eligibility, including the application and a trial work experience, and often includes time spent on an order of selection waiting list (*The Application Process*, n.d.). The applicants then develop an individualized plan that includes their employment goals, alongside their VR Agency, to outline services they could receive that support their goals. Previous literature, including Chapter 2 of this dissertation, have assessed who is receiving services through VR agencies and outcomes related to those services. In these studies, only applicants who completed an individualized plan for employment were considered in analysis. However, this excludes the individuals who identified that they needed supports to improve employment, however, did not complete the application, eligibility, or receive an individualized plan.

As a service that is provided and funded through the state and federal government, these institutional services and supports could carry social and economic bias that lead to intervention generated inequities. The Bay Area Regional Health Inequities Initiative developed a framework outlining the importance of upstream approaches when trying to improve health outcomes (*The BARHII Framework*, n.d.). This framework acknowledges the role social inequities can have when interacting with institutional supports that were developed to improve living conditions and health outcomes. Chapter 2 of this dissertation highlighted differences in both provision of services and wage earned for applicants who received services through their VR agency. However, it excluded assessing for social inequities in those who applied for services, but did not complete the eligibility process. Inequities in interventions should be assessed not only by who receives what services, but also by who expresses interest

but does not receive services. Therefore, the purpose of this paper is to examine for social and economic inequities in applicants for VR services with IDD who did not move past eligibility screening to complete an individualized employment plan.

1) To what extent do demographic characteristics predict reason for exit for those who did not receive services from their VR agency?

   Hypothesis: There are no demographic differences in reason for exit in applicants who did not receive services from their VR agency.

2) To what extent do demographic characteristics predict who received VR services and who did not?

   Hypothesis: There are no demographic differences in applicants who did and did not receive services.

3) Are there differences in factors of economic stability (education, SSI, SSDI, wage) between those who did and did not receive services?

   Hypothesis: There are no differences in factors of economic stability between applicants who did and did not receive services.

3.2 Methods

3.2.1 Dataset

The current study utilized cross-sectional data from the Rehabilitation Services Administration's Case Service Report (RSA-911) dataset sponsored by the Office of Special Education and Rehabilitation Services Administration in the Department of Education (*Case Service Report (RSA-911)*, 2021) available for public access. The dataset reports all applicants to VR agencies in the United States that exited within that program year. The dataset reports data

for each individual from their application through their closure date, including personal and demographic data and services. This study used datasets collected during the program years 2017-2019. An Institutional Review Board approved this study as non-human subjects research. The approval letter from the IRB can be found in Appendix 1.

3.2.2 Sample

The analytic sample of this study included 60,980 individuals that identified as having an intellectual disability who were between the ages of 22 and 65 years old. In the RSA-911, applicants identify a primary and secondary disability, where applicable (*Case Service Report (RSA-911)*, 2021). The applicant then reports the type of impairment and source of impairment for each disability identified. They are given 3 options for type of impairment (sensory/communicative, physical, and mental). They then identify the source of impairment from a list of 37 potential diagnoses. Only participants that have reported intellectual disability as their source of impairment for either their primary or secondary disability were included in this study. This study was also delimited to individuals between 22 – 65 years old. Individuals 21 and under were excluded from the study because they are still provided services and support under the Individuals with Disabilities Education Act (IDEA). Once they age out available services and supports shift. This study wanted to capture outcomes from individuals receiving services after they were no longer supported by IDEA.

The aim of this study was to assess who was applying, but did not make it the stage where they could receive services, meaning they exited the program in the application stage, eligibility stage, assessment stage, and/or while on the waitlist and never developed and individualized plan for employment. This group will be referred to as the *Non-Service*

Recipients. The sample for research question 1 will only include those who exited prior to be able to receive services (Non-Service Recipients; n = 10,034 applicants). Research questions 2 and 3 will compare Non-Service Recipients to those who exited after (Service Recipients). Therefore, all applicants from the dataset will remain in the dataset for research questions 2 and 3 (n = 60,980).

3.2.3 Dependent Variables

Reason for exit. The RSA-911 includes a question that reports the reason an applicant exits the VR process (Question XVII.B). This question has 19 answer options. These 19 options were then condensed into 6 categories for analysis. These categories include: a) no longer interested; b) unable to locate; c) additional supports needed; d) ineligible; e) life circumstances; and e) other. Appendix ___ outlines what answer options were combined for each category.

Service recipient status. The RSA-911 also includes a question that reports the type of exit, stating where in the VR process did the person exit, with 9 options. This question was used to determine if the applicant exited as a *Service Recipient*, after they received an individualized employment plan, or as a *Non-Service Recipient*, before receiving the individualized employment plan. Appendix 2 outlines what answers options were combined for each category.

3.2.4 Independent Variables

This study seeks to better understand who exited prior to being able to receive services. The independent variables for research question 1 and 2 of this study are demographic characteristics to assess the extent to which they predict whether someone does or does not complete the eligibility process and waitlist (Service Recipients vs Non-Service Recipients).

Demographic characteristics include age, sex, race, ethnicity, and severity of disability. State unemployment rate will be included as a control variable. Research question 3 assesses if there are differences in economic stability factors measured through education level, employment, and Social Security Income or Social Security Disability Insurance between those who exited prior to being able to receive services and those who did not, controlling for the applicants' demographic characteristics and state unemployment rate.

Age. Age was determined using the person's year of birth and the date of their application.

Sex. The *sex* of the applicant was measured using a binary male or female option.

Race. *Race* was measured by a series of questions asking individuals if they identified as American Indian or Alaska Native; Asian; Black or African American; Native Hawaiian or other Pacific Islander; White; and/or Other. Sample sizes for multiple race categories was small, creating cell sizes too small to compare across the multiple categorical co-variates and provide statistically reliable results. Therefore, this study only included applicants who identified in the White and Black race categories.

Ethnicity. Applicants identified their *ethnicity* through one question asking if they identified as Hispanic or Latino, with a yes/no response.

Severity of disability. *Severity of disability* was measured using an ordinal classification on a scale of 0 (no significant disability), 1 (significantly disabled), and 2 (most significantly disabled). The category of *most significantly disabled* was used as the reference category.

State employment rate. There are differences between states that could influence the VR agencies and their outcomes. The state unemployment rate has shown to be one

consideration that influences these outcomes (M. A. Alsaman & Lee, 2017; Honeycutt et al., 2015; Sannicandro et al., 2018). Therefore, states were divided into four quantiles based on their employment rates in 2018. Appendix 3 outlines which states, and their subsequent employment rates, were represented in each quartile.

Interaction terms. This study aims to better understand how demographic characteristics may predict services received and/or outcomes through VR. Disability severity is often a predictor of access and participation in interventions and services which could interact with social inequities as a result of sex, ethnicity, and race (Hassiotis, 2020). Interaction terms help us understand how individual differences in one demographic characteristic may vary based on their identity with another demographic characteristic (Bauer et al., 2021). Therefore, this study is intentionally including interaction terms between disability severity and sex, ethnicity, and race.

Employment. The RSA-911 reports each applicant's hourly wage and hours worked each week at the time of their application. This study created a variable reporting weekly wage of each individual by multiplying their hourly wage with their hours worked each week. If the individual was unemployed, the wage earned was zero dollars.

Education. This variable was be treated as a categorical, ordinal variable. There were multiple questions regarding education included on in the RSA-911 dataset assessing if and when individuals participated in and or completed different levels of education (RSA Questions IX.F.1-17). Categories included in the application were: (a) completed secondary school diploma or equivalent, (b) completed some postsecondary education, (c) attained a non-degree certificate, (d) attained an associate's degree, (e) attained a bachelor's degree, or (f) attained a

degree beyond a bachelor's degree. For this study, the education categories *some postsecondary education*, *Associates* degree, *Bachelor's* degree, and *Graduate* Degree were combined into one category called *Postsecondary*. Combining the categories was needed to ensure sample sizes large enough to detect a true effect in the final model.

Social Security Income (SSI). In this study, the variable for SSI will be treated as a dichotomous categorical variable stating if the applicant did or did not receive SSI each month. This study will use the applicants' responses at the time they applied for VR services.

Social Security Disability Insurance (SSDI). Similar to the SSI variable, the variable for SSDI will be treated as a dichotomous categorical variable stating if the applicant did or did not receive SSDI each month. This study used the responses to this variable at time of their application of the RSA-911 dataset.

3.2.5 Data Analysis

R Studio (version 2021.09.02) was used to conduct all analyses (R Core Team, 2021). List-wise deletion was used to treat missing data, meaning applicants that had missing responses in any of the predictors, co-variates, or outcomes variables were excluded from the analysis. The analytic sample for this study was 60,980 applicants, after accounting for the 13% of applicants that were excluded due to missing data. Since the amount missing is close to 10%, no additional methods for missing data were utilized (Jakobsen et al., 2017; Langkamp et al., 2010).

Research Question 1: Reason for Exit

Multinomial logistic regression was used to determine which demographic characteristics predict the reason for exit in non-service recipients. Bivariate analyses were conducted to compare all demographic independent variables to the dependent variable. An

ANOVA was conducted to compare the mean age across all categories of reason for exit. Chi-square tests of independence assessed all other categorical demographic variables with those who did and did not receive education services. Multi-collinearity was assessed using Chi-square test of independence between all predictor variables, none was detected.

Model evaluation and specification. Individual simple multinomial logistic regression analyses between each demographic variable and the outcome were first assessed to determine which variables would be added into the full model, including the interaction terms. Multinomial logistic regression provides an equation for each outcome category, compared to the reference category. The reference category in the outcome of exit reason in this study is *No Longer Interested*, which includes individuals who "actively choose not to participate or continue in their VR program at this time" (*Case Service Report (RSA-911)*, 2021).

Hierarchical regression methods were used to build the final model. The first model included all demographic variables (age, sex, ethnicity, race, and severity of disability) that were significant in the simple regression analyses. The second model included the interaction variables that were significant in the simple regression analyses. Any variables with parameter estimates that did not meet the *a priori* α=0.05 were dropped, and a new model tested. This model was compared to the full model using model fit statistics, including AIC, to determine the model that best fits the data. Odds ratio and confidence intervals were reported from the final model for each demographic predictor.

Research Question 2: Compare Demographics between Service Recipients and Non-Service Recipients

A multivariable binomial logistic regression was used to determine if demographic differences predict if applicants were Service Recipients or Non-Service Recipients, controlling for the state's employment rate. Bivariate analyses were conducted to assess the relationship between each demographic independent variables and the dependent variable. A t-test was conducted to compare the mean age between the binomial outcome variable of Service Recipient status. Chi-square tests of independence assessed all other categorical demographic variables with those who were and were not service recipients. Multi-collinearity was assessed using Chi-square test of independence between all predictor variables, none was detected.

Model evaluation and specification. Individual simple binomial logistic regression analyses between each demographic variable and the outcome were first assessed to determine which variables would be added into the full model, including the interaction terms. Hierarchical regression methods were used to build the final model. The first model included only the control variable of state unemployment rate. The second model included all demographic variables (age, sex, ethnicity, race, and severity of disability) that were significant in the simple regression analyses. The third model included the interaction variables that were significant in the simple regression analyses. Any variables with parameter estimates that did not meet the a priori $\alpha=0.05$ were dropped, and a new model excluding those variables was tested. This model was then compared to the full model using model fit statistics, including AIC, to determine the model that best fits the data. Odds ratio and confidence intervals were reported from the final model for each demographic predictor.

Research Question 3: Compare Economic Predictors between Services Recipients and Non-Service Recipients

A multivariable binomial logistic regression was used to determine if economic characteristics predict if applicants were Service Recipients or Non-Service Recipients, controlling for the applicants' demographic characteristics and state unemployment rate. Bivariate analyses were conducted to individually assess all economic predictors' relationship with the dependent variable. T-tests were conducted to compare the mean Weekly Wage between the two groups. Chi-square tests of independence test to see if there were differences in education level, SSI and/or SSDI between those who were and were not service recipients. Multi-collinearity was assessed using Chi-square test of independence between all predictor variables, none was detected.

Model evaluation and specification. Individual simple binomial logistic regression analyses between each economic factor and the outcome were first assessed to determine which variables would be added into the full model, including the interaction terms. Hierarchical regression methods were used to build the final model, adding on to the model built in Question 2. The economic factors will be added to the final model in Question 2, therefore controlling for demographic characteristics and state unemployment rate. Any variables with parameter estimates that don't meet the a priori α=0.05 were dropped, and a new model excluding those variables was tested. This model was then compared to the full model using model fit statistics, including AIC, to determine the model that best fits the data. Results of the final model can be seen in Table 3.5, including odds ratios and confidence intervals.

3.3 Results

The average age of applicants was 35.6 years old and approximately 57% of applicants were male. Sixty nine percent of the sample was white (31% Black) and 9% identified as Hispanic (91% not Hispanic). The majority of applicants identified as having a most significant disability (83%). Out of the entire sample of applicants, 16.5% did not complete the requirements and therefore did not receive services. There were statistically significant differences in Pearson Chi-square tests in both race ($X^2 = 34.06$; $p<.0001$) and severity of disability ($X^2 = 78.78$; $p<.0001$) when comparing those who did and did not receive services. A complete report of the descriptive statistics can be found in Table 3.1.

3.3.1 Research Question 1: Demographic Predictors for Exit Reason

This analysis assessed if demographic characteristics predicted the applicants' reasons for exit in the sample of applicants who did not receive services. There were 10,035 applicants included in the sample for this study. From the 6 possible responses, the most common reason for exit was that the applicant was "No longer interested" in receiving services (n = 4,960; 49.4%) and the second most common reason was that the VR agency was "Unable to locate" the applicant (n = 2,304; 23.0%). Bivariate analyses showed that there were statistically significant differences in the distribution of the exit reason across all demographic variables. Demographic descriptive statistics by exit reason can be seen in Table 3.2.

The multinomial logistic regression conducted in this analysis provides an equation for each exit reason, comparing it to the reference an exit reason reference category. The exit reason category "No longer interested" served as the reference group for the outcome. This

Table 3.1. Demographic Descriptives based on Service Receipt

Variables	**ALL Applicants**		**Service Recipient**			
	(n =60,980)		***No (n=10,034)***		***Yes (n=50,946)***	
Age [mean (SD)]	35.6 (11.4)		35.5 (11.5)		35.6 (11.4)	
Gender						
Male	34,807	0.57	5739	0.57	29,068	0.57
Female	26,173	0.43	4295	0.43	21,878	0.43
Race					***	
White	41,855	0.69	6763	0.67	35,092	0.69
Black	19,125	0.31	3271	0.33	15,854	0.31
Ethnicity						
Not Hispanic	55,704	0.91	9,195	0.92	46,509	0.91
Hispanic	5,276	0.09	839	0.08	4,437	0.09
Severity of Disability					***	
Most Significant Disability	50,734	0.83	7,690	0.77	43,044	0.84
Significant Disability	9,041	0.15	1,678	0.17	7,363	0.14
Not Significant Disability	1,205	0.02	666	0.07	539	0.01
State Region					***	
Q1	11,064	0.18	1,982	0.20	9,082	0.23
Q2	13,406	0.22	2,346	0.23	11,060	0.28
Q3	21,570	0.35	2,335	0.23	19,235	0.49
Q4	14,940	0.24	3,371	0.34	11,569	0.23
Weekly Wage [mean (SD)]	102.47 (149.02)		0.70 (15.59)		122.52 (155.21)	
Social Security Income Recipient					***	
No	33,204	0.54	4,984	0.50	28,040	0.55
Yes	27,956	0.46	5,050	0.50	22,906	0.45
Social Security Disability Insurance Recipient					***	
No	40,088	0.66	6,972	0.69	33,116	0.65
Yes	20,892	0.34	3,062	0.31	17,830	0.35
Education Level					***	
Secondary	34,062	0.56	389	0.04	33,673	0.66
Some Postsecondary	2,534	0.04	79	0.01	2,455	0.05
Non-Degree Certificate	1,179	0.02	5	0.00	1,174	0.02
Associate's Degree	382	0.01	2	0.00	380	0.01
Bachelor's Degree	266	0.004	2	0.000	264	0.005
Graduate Degree	64	0.001	0	0.000	64	0.001
None	22,493	0.37	9,557	0.95	12,936	0.25

Note. Bivariate analyses of each demographic predictor was conducted comparing across categories of the outcome variables for each research question. Asterisks indicate bi-variate analysis resulted in a statistically significant difference across groups in the outcome variable.

* indicates p-value of <.05; ** indicates p-value of <.001; *** indicates p-value of <.0001

Table 3.2. Demographic Descriptives of Predictor Variables by Exit Reason in Sample of Non-Service Recipients (n = 10,034)

Variable	**Exit Reason**											
	No longer interested (n=4,960)		***Unable to locate (n=2,304)***		***Additional supports needed (n=611)***		***Ineligible (n=381)***		***Life circumstances (n=284)***		***Other (n=1494)***	
	Mean	*SD*	*Mean(SD)*		*Mean(SD)*		*Mean(SD)*		*Mean(SD)*		*Mean(SD)*	
Age (in years)* **	35.9 (11.6)		34.3 (10.9)		35.2 (11.8)		35.8 (11.8)		37.9 (12.3)		35.6 (11.6)	
	n	%	*n*	%	*n*	%	*n*	%	*n*	%	*n*	%
Sex*												
Male	2,752	0.55	1,324	0.57	366	0.60	235	0.62	175	0.62	887	0.59
Female	2,208	0.45	980	0.43	245	0.40	146	0.38	109	0.38	607	0.41
Race* **												
White	3,406	0.69	1,375	0.60	492	0.81	288	0.76	193	0.68	1,009	0.68
Black	1,554	0.31	929	0.40	119	0.19	93	0.24	91	0.32	485	0.32
Ethnicity*												
Not Hispanic	4,590	0.93	2,093	0.91	543	0.89	342	0.90	267	0.94	1360	0.91
Hispanic	370	0.07	211	0.09	68	0.11	39	0.10	17	0.06	134	0.09
Severity of Disability* **												
Most Significant Disability	3,810	0.77	1,808	0.78	430	0.70	309	0.81	221	0.78	221	0.78
Significant Disability	945	0.19	427	0.19	47	0.08	65	0.17	50	0.18	50	0.18
Not Significant Disability	205	0.04	69	0.03	134	0.22	7	0.02	13	0.05	13	0.05
State Region* **												
Q1	1,136	0.23	397	0.17	81	0.13	83	0.22	53	0.19	232	0.16
Q2	1,294	0.26	585	0.25	75	0.12	86	0.23	56	0.20	250	0.17
Q3	908	0.18	687	0.30	209	0.34	126	0.33	33	0.12	372	0.25
Q4	1,622	0.33	635	0.28	246	0.40	86	0.23	142	0.50	640	0.43

Note. Bivariate analyses of each demographic predictor was conducted comparing across categories of the outcome variables for each research question. Asterisks indicate bi-variate analysis resulted in a statistically significant difference across groups in the outcome variable. Indicates p-value of bi-variate associations: *<.05; ** <.001; *** <.0001

exit category was selected due to it having the largest sample, as well as it being the once category where the applicant choose to withdraw from the application process. The full results for the multinomial regression can be found in Table 3.3.

For each additional year of age, odds of exiting due to being *unable to locate* are lower when compared to the odds of exiting due to being no longer interested, and higher odds for exiting because of *life circumstances.* Females had higher odds of exiting due to being *no longer interested* than all other exit reasons, when compared to males.

Black applicants had the lowest odds of exiting due to the *need for additional supports* versus being *no longer interested* across all severity of disability, compared to White applicants. Applicants who identified as Black and as having a most significant disability had the highest odds of exiting due to being *unable to locate* (OR: 1.5; p<.0001) than being *no longer interested*, compared to White applicants. However, Black applicants with a significant disability had lower odds of exiting due to being *unable to locate* versus being *no longer interested*, than White applicants with a significant disability (OR: 0.7; p=.021).

Severity of disability had an interesting relationship with the exit categories. When compared to those with a most significant disability, applicants with a significant disability had lower odds of needing additional supports (OR: 0.5; p <.0001) versus no longer interested in services. Whereas those with no significant disability had higher odds of exiting due to a need for additional supports (OR: 6. 4; p<.0001).

3.3.2 Research Question 2: Demographics Predictors for Service Receipt

This question assessed the demographics characteristics that predict if the applicant exited as a service recipient (completed eligibility and received an individualized plan) or as a

non-service recipient. There were 10,034 applicants in the non-service recipient category and 50,946 in the service recipient category.

The final model showed that applicants w identified as white, non-Hispanic, and having a most significant disability had higher odds of receiving services. However, the interaction term between race and severity of disability showed there were differences in the outcome for race, based on their identified severity of disability. The complete model and parameter estimates can be found in Table 3.4 Hispanic applicants had 0.83 lower odds of receiving services than non-Hispanic applicants. Black applicants with a most significant disability had 0.82 odds of receiving services, compared to White applicants with a most significant disability. However, this relationship changes with the severity of disability. Black applicants with a significant disability had 1.14 higher odds of receiving services than White applicants with the same severity of disability. White applicants with a significant disability had 0.70 lower odds of receiving services than White applicants with a most significant disability.

The model building process demonstrated that the demographic characteristics contributed to a model that better explained the variance of the outcome. This was demonstrated in the model goodness of fit measures, including the residual deviance and the AIC. The model including the race*severity of disability interaction term had the best (lowest) goodness of fit measures (Deviance: 47633; AIC: 47657).

3.3.3 Research Question 3: Economic Factors Predicting Service Receipt

Question three assessed if factors associated with economic stability (wage, education, SSI, SSDI) predicted who received services through their VR agency, controlling for the demographic predictors in question two. Wage, education, and receipt of SSDI were statistically

Table 3.3. Multinomial Regression Results Assessing Variables that Predict Exit Reason for Applicants in the Sample of Non-Service Recipients (n = 60,980)

Variable	No longer interested (n=4960)	Unable to locate (n=2304)			Additional supports needed (n=611)			Ineligible (n=381)			Life circumstances (n=284)			Other (n=1494)		
		OR	SE	P-Value	OR	SE	P-Value	OR	SE	P-Value	OR	SE	P-Value	OR	SE	P-Value
Intercept	*Reference Category*	0.485	0.107	0.000	0.108	0.187	0.000	0.089	0.215	0.000	0.300	0.255	0.000	0.228	0.126	0.000
Age (in years)		0.989	0.002	0.000	0.994	0.004	0.132	0.999	0.005	0.747	1.014	0.005	0.007	0.999	0.003	0.624
Sex																
Male		*reference*			*reference*			*reference*			*reference*			*reference*		
Female		0.899	0.052	0.039	0.819	0.090	0.026	0.770	0.110	0.017	0.780	0.126	0.048	0.845	0.061	0.006
Race																
White		*reference*			*reference*			*reference*			*reference*			*reference*		
Black		1.526	0.062	0.000	0.540	0.132	0.000	0.788	0.140	0.088	1.139	0.151	0.390	1.229	0.074	0.006
Ethnicity																
Not Hispanic		*reference*			*reference*			*reference*			*reference*			*reference*		
Hispanic		1.226	0.107	0.057	1.243	0.167	0.193	1.278	0.200	0.219	0.936	0.297	0.824	1.176	0.127	0.203
Severity of Disability																
Most Significant Disability		*reference*			*reference*			*reference*			*reference*			*reference*		
Significant Disability		1.032	0.093	0.734	0.492	0.203	0.000	1.057	0.176	0.751	1.011	0.212	0.959	0.518	0.138	0.000
Not Significant Disability		0.749	0.196	0.141	6.354	0.162	0.000	0.715	0.433	0.439	0.850	0.343	0.636	4.299	0.129	0.000
State Region																
Q1		*reference*			*reference*			*reference*			*reference*			*reference*		
Q2		1.221	0.078	0.010	0.973	0.167	0.870	0.976	0.161	0.881	0.935	0.198	0.733	0.991	0.101	0.928
Q3		2.038	0.078	0.000	3.499	0.140	0.000	2.009	0.150	0.000	0.801	0.228	0.329	2.012	0.096	0.000
Q4		1.099	0.077	0.218	1.389	0.145	0.023	0.794	0.162	0.155	1.956	0.168	0.000	1.470	0.091	0.000
Race*Severity																
White * Significant Disability		*reference*			*reference*			*reference*			*reference*			*reference*		
Black * Significant Disability		0.730	0.137	0.021	0.644	0.409	0.282	0.609	0.326	0.128	0.820	0.339	0.559	0.855	0.204	0.442
White * No Significant Disability		*reference*			*reference*			*reference*			*reference*			*reference*		
Black * No Significant Disability		1.282	0.297	0.404	*1.282*	0.293	0.396	0.483	1.101	0.509	0.470	0.801	0.346	0.586	0.235	0.023
Ethnicity*Severity																
Not Hispanic * Significant Disability		*reference*			*reference*			*reference*			*reference*			*reference*		
Hispanic * Significant Disability		0.999	0.230	0.998	1.394	0.423	0.431	0.612	0.494	0.320	0.873	0.684	0.843	1.607	0.299	0.113
Not Hispanic * No Significant Disability		*reference*			*reference*			*reference*			*reference*			*reference*		
Hispanic * No Significant Disability		*0.677*	0.593	0.511	*0.512*	0.500	0.180	*0.000*	0.000	0.000	1.060	1.117	0.959	*0.713*	0.391	0.388
Model Statistics																
Residual Deviance		26379														
AIC		26470														

Note. SE = standard error; OR = odds ratio; CI = confidence intervals

Table 3.4. Model Building for the Binomial Logistic Regression Results Assessing Predictors of Applicant's Service Recipient Status (n = 60,980)

	Interaction Model					Economic Factors Model				
Variable	Estimate	SE	p-value	OR	95% CI	Estimate	SE	p-value	OR	95% CI
Intercept	1.845	0.050	0.000	6.327	[5.74, 6.97]	3.571	0.078	0.000	35.550	[30.55, 41.44]
Age	0.002	0.001	0.095	1.000	[1.00, 1.00]	0.017	0.001	0.000	1.017	[1.01, 1.02]
Gender										
Male	*reference*					*reference*				
Female	0.006	0.024	0.790	1.000	[0.96, 1.05]	-0.067	0.029	0.020	0.935	[0.88, 0.99]
Race										
White	*reference*					*reference*				
Black	-0.205	0.029	0.000	0.815	[0.77, 086]	0.177	0.034	0.000	1.194	[1.12, 1.28]
Ethnicity										
Not Hispanic	*reference*					*reference*				
Hispanic	-0.188	0.043	0.000	0.829	[0.76, 0.90]	0.053	0.052	0.302	1.055	[0.95, 1.17]
Severity of Disability										
Most Significant Disability	*reference*					*reference*				
Significant Disability	-0.358	0.041	0.000	0.699	[0.65, 0.76]	-0.459	0.052	0.000	0.632	[0.57, 0.70]
No Significant Disability	-0.306	0.165	0.063	0.736	[0.54, 1.03]	-1.020	0.234	0.000	0.360	[0.23, 0.57]
State (by Unemployment Rates)										
Quartile 1	*reference*					*reference*				
Quartile 2	-0.086	0.037	0.022	0.918	[0.72, 0.83]	0.330	0.045	0.000	1.391	[1.27, 1.52]
Quartile 3	0.372	0.037	0.000	1.451	[1.35, 1.56]	0.501	0.043	0.000	1.651	[1.52, 1.80]
Quartile 4	-0.262	0.036	0.000	0.770	[0.72, 0.83]	-0.283	0.044	0.000	0.754	[0.69, 0.82]
Race*Severity										
White * Significant Disability	*reference*					*reference*				
Black * Significant Disability	0.126	0.064	0.048	1.135	[1.00, 1.29]	0.154	0.078	0.048	1.167	[1.00, 1.36]
White * No Significant Disability	*reference*					*reference*				

Black * No Significant Disability	0.431	0.248	0.083	1.538	[0.95, 2.52]	0.804	0.319	0.012	2.234	[1.20, 4.19]
Weekly Wage						0.020	0.001	0.000	1.020	[1.02, 1.02]
Social Security Income Recipient										
No	*reference*					*reference*				
Yes						0.029	0.030	0.321	1.030	[0.97, 1.09]
Social Security Disability Insurance Recipient										
No	*reference*					*reference*				
Yes						0.113	0.033	0.001	1.120	[1.05, 1.20]
Education Level										
Secondary	*reference*					*reference*				
Postsecondary						-0.599	0.120	0.000	0.549	[0.44, 0.70]
None						-4.041	0.054	0.000	0.018	[0.02, 0.02]
Model Statistics										
Residual Deviance	47,633					24,633				
df	59,282					60,957				
AIC	47,657					24,679				

Note: SE = standard error; OR = odds ratio; CI = confidence intervals

significant predictors of receiving services. Adding economic variables to the model improved goodness of fit statistics from the model with only demographic characteristics (Deviance: 24633; AIC: 24679). The complete results from the model can be found in Table 3.4.

Applicants that earned a wage had higher odds of receiving services than individuals who did not earn a wage at the time of application. In fact, their odds of receiving services increased an average of 1.020 for every $1 increase in wage earned each week by the applicant. Those who received SSDI each month at application had a 1.12 increased odds of receiving services than those who did not receive SSDI. Education was also a significant predictor of an individual receiving services from their VR agency. Applicants with a secondary degree or certificate, but no postsecondary education, had the highest odds of receiving services. When compared to applicants with a secondary degree, individuals who applied that had any postsecondary education had lower odds of receiving services (OR: 0.55; 95% CI [0.44, 0.70]). Similarly, applicants with no secondary education (the *none* education category) had lower odds of receiving services than individuals with a secondary degree and no postsecondary education (OR: 0.02; 95% CI [0.02, 0.02]).

Demographic characteristics maintained their relationship with applicants' status of service receipt at their VR agency. When controlling for education, wage, and SSI/SSDI, Black applicants had higher odds of receiving services, across all categories of severity of disability, than White applicants. Additionally, adding economic factors to the model resulted in a statistically significant relationship between sex and service receipt, with females having a slightly lower odds of receiving services than males.

3.4 Discussion

This study aimed to improve understanding of individuals with IDD who applied for services to support improved employment at the state VR agency but did not receive services. Analyses showed that demographic characteristics predicted reason for exit among those who did not receive services. Findings also suggest that demographic characteristics predicted whether applicants did or did not receive services. Finally, findings suggest that factors associated with economic stability for individuals with IDD, such as wage earned, education, and receipt of SSI or SSDI for financial support were predictors on if they did or did not receive services from their VR Agency. These findings indicate social and economic inequities that could exist within the VR system.

In this study, I found social and economic inequities among applicants who do not receive services through the VR agency. In the model only looking at demographic characteristics, there are inequities in who received services based on race and ethnicity. Black applicants and Hispanic applicants had lower odds of receiving services than White applicants and non-Hispanic applicants. Other studies have found differences in employment outcomes, based on race and ethnicity (M. Alsaman & Lee, 2017; Nord & Hepperlen, 2016). This finding contributes to the understanding of these inequities by finding differences in VR service provision based on race and ethnicity.

However, the final model of this study, which explored factors of economic stability to assess for differences in who received and did not receive VR services, reversed the direction of the odds of receiving services in some demographic groups. Accounting for applicant wage earned, receipt of Social Security benefits (SSI and/or SSDI), and education level, females had

lower odds than males to receive services and Black applicants had lower odds at all levels of severity of disability. This finding highlights the need to consider socioeconomic factors when assessing programs and services for inequities.

One interesting finding in the final model was in the interaction between race and severity of disability. For White applicants, odds of receiving services decreased as the severity of disability decreased. Therefore, White applicants with a most significant disability had the highest odds of receiving services, compared to those with a significant disability or no significant disability. This result may demonstrate some equity within VR services, since the population with the lowest national rates of employment and higher needs for supports has higher odds of receiving services. However, this relationship is reversed for Black applicants. Black applicants with no significant disability have higher odds of receiving services than Black applicants with a most severe disability, demonstrating a potential area of inequity within service provision in VR agencies (White et al., 2009).

Inequities due to socioeconomic factors were also discovered. Applicants who earned higher wages, received SSDI benefits, and had a secondary degree all had higher odds of receiving VR services. VR services aim to improve employment outcomes, however, this study found that for each additional dollar the applicant earned at time of application, their odds of receiving services increased. This means that individuals with IDD that already made a wage were more likely to receive services to improve their employment outcomes, once again highlighting an inequity in VR service provision that may not best support their overall goal and widen the gap in the inequity faced in employment. Similarly, applicants with no secondary education had much lower odds of receiving VR services than applicants with a secondary

degree. Employment outcomes for individuals with IDD who have a high school degree are significantly higher than those without, including status and income (Paul et al., 2020). This highlights yet another inequity in service provision at state VR agencies.

This study also examined if demographic characteristics predicted the reason for exit in applicants that exited the application and eligibility process prior to receiving the individualized plan required to receive VR services. Females were more likely to exit the process due to being no longer interested, compared to other reasons for exits. No longer interested was the only option in the exit choices that was phrased as a decision by the applicant. Females were also found in Chapter 2 to be less likely to receive services and other studies have found females to have lower employment outcomes after receiving VR services (M. A. Alsaman & Lee, 2017; Nord & Hepperlen, 2016). Lower employment rates and lower wages earned for females is an inequity that can be found nationally in the US (Jajtner et al., 2020). The VR system needs to examine why less females are applying for VR services, why females are leaving due to being *no longer interested,* and why their employment outcomes from VR services is lower than males.

The reason for exit from the VR process prior to the individualized employment plan for Black applicants was dependent on the severity level of disability. Black applicants with a most significant disability had the highest odds of exited due to being *unable to locate*, whereas Black applicants with a significant disability were less likely to exit due to being *unable to locate*. A better understanding of the methods taken to follow-up with applicants is needed to understand this finding.

Overall, applicants exited the VR process most often due to being *no longer interested* at 49.4%. When looking at the entire sample of this study (*n* = 60,980), 8.1% exited without

receiving services because they were no longer interested The second most common reason for exit was 23.0% of applicants were *unable to locate*. In order to ensure social inequities are not being perpetuated in the VR system, a better understanding of why applicants become no longer interested after applying and fail to follow-up or provide a way to be located is needed. Future studies need to evaluate the retention of applicants and assess the processes that lead to these exit reasons.

3.4.1 Limitations

As in all studies, there are limitations in this study that should be taken into consideration when interpreting and applying the findings. This study takes a cross-sectional approach to assess who is applying for and receiving VR services, using a publicly available dataset called the RSA-911. The RSA-911 is a compilation of the service records for each applicant from their application, through services receipt, through exit. This analysis is relying on a complete and accurate reporting of applicant information and service experience, which are completed by an employee within the VR agency.

Some variables in this study had to be condensed, in order to maintain cell sizes that could maintain the assumptions for the appropriate statistical analysis. For this reason, the race category only included the White and Black categories. All other race categories were too small to fully assess all predictor variables with the outcome. Future studies need to assess for social inequity in applicants who don't receive services in other race identities, especially at the intersection of disability severity.

Additionally, this study used the question on the RSA-911 that asks about the sex of the applicant using a dichotomous male/female option. There is not a question that asks about

gender identity. Future studies need to examine experiences of individuals with IDD with different gender identities, assessing for potential social inequities.

3.4.2 Implications

Effectiveness of an intervention is often measured by examining the outcomes of those who received the services, specifically the number of improved outcomes and the level of that improvement. Although this is an appropriate measure, it leaves out the impact at the community level, including those who did not receive them. This study examined for inequities in applicants who applied to VR services, but did not finish the eligibility stage in order to receive services. Inequities between social and economic factors were discovered. Black applicants with less significant disabilities had better odds of receiving services, as did males. Applicants who earned a wage at application and had a secondary degree were also more likely to receive services than those without a wage and those with no secondary degree. The inequities highlighted in the results need to be further examined to determine why they exist and possibilities for mitigation.

Potential areas to explore would first be to determine if there are marginalized populations, particularly at intersectional identities, that are not being fully represented in the applications for services compared to the population. If this is found, improved recruitment and retention needs to be explored in areas underrepresented in the application pool. Additionally, improving understanding of why individuals choose to leave the application process or why they are no longer able to be located would be needed, to determine potential adjustments in recruitment, services offered, and cultural humility. This is especially important in populations that experience inequities in employment and in VR processes

Second, studies need to further assess the processes of service provision within the VR system. The VR processes might contain bias that deters or prevents individuals from accessing services. Qualitative interviews with the applicants, both those who did and did not receive services, could help to further understand their experiences in the process. Qualitative interviews with service providers could also reveal organization biases that could result in underutilization of services by certain groups, including low support and resources, as well as budget constraints. For example, the study found that those who earn higher wages have higher odds of receiving services. If budgets are low, individuals with a history of employment would have a better chance of employment at exit with potentially lower costs. Such practices are examples of service provision focusing on sectors of the target population that have smaller disparities, therefore contributing to inequities at the population level.

4 MANUSCRIPT 3

EXAMINING PATHWAYS OF ECONOMIC STABILITY IN INDIVIDUALS WITH INTELLECTUAL AND DEVELOPMENTAL DISABILITY: A MEDIATION ANALYSIS OF EDUCATION, EMPLOYMENT, SOCIAL SECURITY BENEFITS

4.1 Introduction

Over a quarter of people with disabilities live below the poverty line, almost 2.3 times that of individuals without disabilities (Paul et al., 2020). This rate increases for individuals with cognitive and intellectual disabilities. Around 33% of adults with cognitive disabilities living in non-institutional settings live below the poverty line (Paul et al., 2020). Economic stability is considered an upstream social determinant of health, therefore is highly associated with numerous health outcomes, as well as improved independence and quality of life (Bharmal et al., 2015). There are several factors that contribute to economic stability, including income, education, family wealth, and social class (Braveman et al., 2005). Evidence suggests that multiple factors should be considered to fully account for the various aspects that contribute to economic stability due to the unique contributions of each measures and the complex relationship that often exists between the factors (Lahelma et al., 2004). This study examined the relationship between wage earned, receipt of Social Security Income (SSI) and Social Security Disability Insurance (SSDI), 3 factors that support economic stability in individuals with intellectual and developmental disabilities (IDD) who applied for Vocational Rehabilitation services.

4.1.1 Employment and Wage Earned

Employment status and income earned are commonly used factors to measure economic stability. People with IDD face extreme disparities in both measures. People with IDD are employed at less than half the rate (30.4%) than people without IDD (78.6%; Paul et al., 2020). Additionally, in those who are employed, people with IDD earn 66 cents to every dollar earned by someone without a disability (Cheeseman Day & Taylor, 2019), with 44 states allowing for people with IDD to be paid below the federal minimum wage (Kimbrough, 2021). People with IDD have cited numerous barriers to employment. Using focus groups consisting of multiple stakeholders, including individuals with IDD, family members, and employers, Khayatzadeh-Mahani and colleagues (2019) identified three main barriers to employment for people with IDD: 1) knowledge, capacity, attitudes, and management of employers; 2) a late introduction to to pre-employment activities that prepare for the workforce; and 3) stigma and limited expectations of the abilities. These three themes demonstrate the barriers to work faced by people with IDD at the individual, institutional, and societal level that are associated with their economic stability. Employment can improve economic stability. Economic stability can not only improve quality of life for individuals with IDD, but provide opportunity for improved autonomy and independence.

4.1.2 Social Security Benefits

Social Security Income (SSI) and Social Security Disability Insurance (SSDI) are federal and state social assistance programs designed to supplement income for individuals, including individuals with IDD (*Introduction to Social Security Disability Benefits, Work Incentives and Employment Support Programs*, n.d.). SSI is designed to provide supplemental income for

individuals with limited resources who are aging or have disabilities to help cover the costs of food, housing, transportation, and other costs of daily living. SSI payments are decided based on federal guidelines and consider the individuals earned and unearned income. SSDI is a supplemental insurance program. Eligibility for SSDI is determined by the work history of the individuals or the work history of a family member in which they are a dependent, therefore, current earned and unearned income is not considered (*Introduction to Social Security Disability Benefits, Work Incentives and Employment Support Programs*, n.d.).

Individuals with IDD are also more likely to rely on public supports, such as social security income (SSI) and social security disability insurance (SSDI), for financial stability (Migliore et al., 2009). In fact, individuals with IDD make up about 14% of all SSI and SSDI beneficiaries (Livermore et al., 2017). Mean hourly wages for beneficiaries with IDD are less than other beneficiaries, with individuals with IDD earning an average of $5.54 an hour compared to $9.18 an hour. Half of individuals with IDD using SSI or SSDI are paid below minimum wage (Livermore et al., 2017).

Social Security benefits have a complex relationship with work and employment. Individuals with IDD are almost two times more likely to have current or recent work experience compared to other beneficiaries and more likely to have recently used employment services (Migliore et al., 2009). This demonstrates that many individuals with IDD are able and willing to work. However, Nord & Nye-Lenegerman (2015) found that receiving public benefits might limit access to participating in the workforce and restrict hours worked. This demonstrates that the relationship between SSI/SSDI and weekly wage is complex. A better

understanding of this relationship could help ensure supports are developed to lead to long-term economic stability and independence for individuals with IDD.

4.1.3 Education

There is a strong correlation between academic degrees and the ability to secure employment that provides a living wage (Moon et al., 2011; Ryan, 2011). There is also a strong inverse relationship between education and enrollment in SSI and SSDI; individuals with higher education levels make up a lower percentage of those receiving social security benefits (Poterba et al., 2017). Additionally, only 2.2% of individuals with IDD that are beneficiaries of SSI and SSDI have a degree beyond a secondary (high school) degree (Livermore et al., 2017). Although earning a postsecondary degree is associated with job security, wages earned, and use of public supports in individuals with IDD, a large disparity exists in participation in these programs.

Individuals with disabilities are almost half as likely to obtain a degree beyond high school, compared to those without a disability (Paul et al., 2020). Individuals with IDD are even less likely than those with other types disabilities to participate in postsecondary education opportunities (Grigal & Dwyre, 2010). Postsecondary education opportunities can be defined as any education an individual participates after secondary school, including degree programs, such as an associates, bachelors, or graduate education, as well as non-degree and certificate programs. Recent trends show that opportunities for participation in postsecondary opportunities are increasing in part because of the reauthorization of the Higher Education Opportunity Act in 2008 (HEOA), which supported the development of networks and funding to support efforts in postsecondary education for people with IDD (Vinoski Thomas et al., 2020).

Postsecondary education has been shown to improve multiple outcomes, including employment rate, wages earned, and independent living (Migliore et al., 2009, Moon et al., 2011; Ryan et al., 2019; Zafft et al., 2004). However, past studies have only assessed the difference between no postsecondary education and having any postsecondary education. There is a need to gain a better understanding on the effect different levels of postsecondary education have on employment. Additionally, literature has demonstrated a relationship between education and public supports like SSI and SSDI (Dutta et al., 2008; G. A. Livermore et al., 2017b; Prince et al., 2018). However, little has been explored about the relationship between all three variables: Education, employment and receipt of SSI or SSDI supports. Specifically, we do not know to what extent employment may explain the relationship between education and public support use.

4.1.4 Vocational Rehabilitation Services

The Vocational Rehabilitation (VR) program provides support and services to individuals with disability with a goal of improving employment outcomes in the United States. It is state and federally funded, with service offered through state agencies. Participating in VR services as shown to improve employment rates and wages for individuals with IDD (Dutta et al., 2008; Nord & Hepperlen, 2016; Rosenthal, 2015). Not only is improved economic stability through employment the main goal of VR services, but factors associated with economic stability can lead to bias and inequities within interventions (White et al., 2009). Therefore, it is important to understand the relationship between the factors of economic stability in applicants for VR services with IDD in order to better assess the mechanisms that could lead to more improved outcomes within VR.

The purpose of this study is to improve understanding of the relationship between factors of economic stability in individuals with IDD who applied for services with their state VR agency. A secondary data analysis will assess the three aims of the study:

1) What is the relationship between different types of postsecondary education and employment among people with IDD?

   Hypothesis: Participation in postsecondary education will improve employment outcomes for people with IDD, compared to those who did not participate in postsecondary education.

2) What is the relationship between different types of postsecondary education and the receipt of SSI or SSDI received among people with IDD?

   Hypothesis: There is a relationship between participation in different levels of postsecondary education and the receipt of SSI or SSDI among people with IDD.

3) Does employment mediate the relationship between types of education and the receipt of SSI or SSDI received among people with IDD?

   Hypothesis: Employment will mediate the full effect found between education and receipt of SSI and SSDI received by people with IDD

4.2 Methods

4.2.1 Dataset

This cross-sectional, secondary data analysis uses the Rehabilitation Services Administration's Case Service Report (RSA-911) publicly available dataset from the program years 2017-2019 (*Case Service Report (RSA-911)*, 2021). The RSA-911 is sponsored by the Office of Special Education and Rehabilitation Services Administration in the United States

Department of Education and reports all applicants who have exited within that program year. It reports data from the application through their closure date, including personal and demographic data and services received. This study combines the datasets from program years 2017-2019, which includes 1,495,099 cases. This study has been approved by the Georgia State Institutional Review Board (IRB) as non-human subjects research. Appendix 1 has a copy of the approval letter from the IRB.

4.2.2 Sample

The analytic sample of this study was delimited to 58,485 applicants who have an intellectual disability and are 22 years old and over at the time of application. In the RSA-911, applicants identify a primary and secondary disability, where applicable, and the type of impairment and source of impairment for both. The type of impairment is grouped into 3 categories (sensory/communicative, physical, and mental), with specific impairments identified within each. The specific impairments are chosen from a list of 37 potential diagnoses (plus "other") that identify the source of impairment. Only participants that have reported intellectual disability as their source of impairment for either their primary or secondary disability will be included in this study. The analytic sample will also be delimited to individuals between 22 - 65 years old, excluding individuals who would still be covered under the Individuals with Disabilities Education Act at time of application (21 and under) or nearly retirement age.

4.2.3 Variables

Predictor and Outcome Variables

***Education*.** This variable is the main predictor variable in all three research questions and will be treated as a categorical, ordinal variable. There are multiple questions regarding education included on in the RSA-911 dataset assessing if and when individuals participated in and or completed different levels of education (RSA Questions IX.F.1-17). These questions are updated until the individual exits. This study created a categorical variable based on the responses to these questions. Categories include: (a) completed secondary school diploma or equivalent, (b) completed some postsecondary education, (c) attained a non-degree certificate, (d) attained an associate's degree, (e) attained a bachelor's degree, or (f) attained a degree beyond a bachelor's degree.

Employment. This variable was used as the outcome variable in research question one and the mediating variable in research question three. Employment was calculated by multiplying the applicant's weekly wage at exit with their weekly hours worked, creating a weekly wage variable. If the applicant marked unemployed at exit, the weekly wage was set at $0. For those who may not have received services, therefore, did not complete the exit survey, the individual's weekly wage was calculated from their responses at application. This variable had a large number of 0's, meaning a large number of individuals who do not receive a wage or were unemployed.

Social Security Income (SSI). In this study, the variable of SSI will be treated as a dichotomous categorical variable stating if the applicant did or did not receive SSI each month. This study will use the responses to this variable in the exit portion of the RSA-911 dataset. For those who did receive services, therefore may not have completed the exit survey, the individual's SSI status was calculated from their response at application.

Social Security Disability Insurance (SSDI). Similar to the SSI variable, the variable of SSDI will be treated as a dichotomous categorical variable stating if the applicant did or did not receive SSDI each month. This study will use the responses to this variable in the exit portion of the RSA-911 dataset. For those who did not receive services, therefore may not have completed the exit survey, the individual's SSDI was calculated from their response at application.

Covariates

Multiple co-variates will be considered in the analysis of all three research questions in efforts to help account for individual factors that could influence the analysis.

Demographic Characteristics. Demographics covariates considered include age, sex, race, ethnicity and severity of disability. *Age* is determined using the person's year of birth and the date of their application. The *sex* of the applicant is measured using a binary male or female option. *Race* is measured by asking individuals if they identified as American Indian or Alaska Native; Asian; Black or African American; Native Hawaiian or other Pacific Islander; and/or White. Applicants were also asked to identify their *ethnicity* (i.e., if they identified as Hispanic or Latino) within this same question. Individuals were given the option to select more than one response. To maintain independence, a separate category will be created for those who identified as more than one race. *Severity of disability* is measured using an ordinal classification on a scale of 0 (no significant disability), 1 (significantly disabled), and 2 (most significantly disabled).

Interaction terms. This study aims to better understand how demographic characteristics may predict services received and/or outcomes through VR. Disability severity is

often a predictor of access and participation in interventions and services which could interact with social inequities as a result of sex, ethnicity, and race (Hassiotis, 2020). Interaction terms who how individual differences in one demographic characteristic may vary based on their identity with another demographic characteristic (Bauer et al., 2021). Therefore, this study is intentionally including interaction terms between Disability severity and sex, ethnicity, and race.

State employment rate. There are differences between states that could influence the VR agencies and their outcomes. The state unemployment rate has shown to be one considerations that influences these outcomes (M. A. Alsaman & Lee, 2017; Honeycutt et al., 2015; Sannicandro et al., 2018). Therefore, states were divided into four quantiles based on their employment rates in 2018. (see Appendix 3).

4.2.4 Data Analysis

R Studio (version 2021.09.02) was used to conduct all analyses (R Core Team, 2021). Sensitivity analyses (n = 58485) conducted during the analysis for research questions 1 and 2 revealed differences in outcomes based on if applicants were employed (weekly wage >$0) and those who were unemployed (weekly wage = $0). Therefore, this study chose to assess the mediated relationships between education level, week wage, and receipt of SSI/SSDI in individuals who earned more than $0 each week. This decision was made in efforts to report results that more clearly outline the complex relationship and the significance that can be associated with improved wages, as opposed to only employment status. Therefore, the sample of this study of applicants who exited their VR Agency in 2017-2019, identified as having an

intellectual disability, were between the ages of 22-65, and were employed *and receiving a wage* was 29,920.

In cases of missing data, list-wise deletion was implemented. Missing data from any variable in this analysis (e.g., education, employment, and/or the public support) were excluded from analysis. The remaining sample, excluding variables with missing data, is 27,090, eliminating approximately 9.1% of observations. The level of missing data was below 10%, therefore, no additional missing data methods were utilized in this study (Jakobsen et al., 2017; Langkamp et al., 2010).

Research Question 1: Education and Employment

The current literature has established a relationship between education and employment for people with IDD, however the differences in different levels of postsecondary education needs to be explored. A multiple linear regression analysis was used to assess the relationship between applicant education level and their wage at time of exit from their VR Agency. The analysis included demographic variables (e.g., age, sex, race, ethnicity, severity of disability, and three interaction terms) and their state unemployment rate as a control variables. An ANOVA assessed the bivariate relationship between weekly wage and education level. Bivariate analyses with the linear outcome and control variables was conducted using Pearson correlation, t-tests, and ANOVAs. Chi-square tests of independence assessed for multi-collinearity among demographic predictor variables.

The outcome of weekly wage is continuous, however, contained a large number of 0's, meaning the individual did not have a job that paid them a wage each week. Therefore, a sensitivity analysis was conducted testing for a differences in the predictor and control

variables between those who did (>$0) and did not ($0) earn a weekly wage. A binomial logistic regression comparing the two groups revealed that there are differences between the two groups. As a result, the final analysis only included individuals who earned > $0 weekly wage, leaving a sample size of 27,090 applicants. Results from the final model of the logistic regression for the sensitivity analysis is reported in Table 4.4.

Model evaluation and specification. Simple linear regressions between education level and each control variables were conducted to help inform variables used in model building. Interaction terms that had a significant relationship at an a priori α=0.05 or lower in the simple regression models were included in the modeling process. Hierarchal modeling was used to determine the final model. The first model included only state employment rate. The second model added demographic variables. Interaction terms from the demographic variables were added in the third model. In the fourth model, the main predictor of education level was added. Subsequent models were run, excluding any variables with parameter estimates that did not have a statistically significant relationship with the outcome. This model was then compared to the full model using a nested F-test. The R-squared and parameter estimates of the final model are reported.

The assumptions of linear regression were tested on the final model. Residuals were analyzed to assess for the assumptions of normality, homoscedasticity, and linearity, all assumptions were held. Multicollinearity between variables was measured using tolerance. No variable had a tolerance under 0.40 (disability severity), therefore no threat to multicollinearity was detected.

Research Question 2: Education and SSI/SSDI

Two multivariable binomial logistic regressions were used to answer the second research question by examining the relationship between different levels education and receipt of SSI support and receipt of SSDI support, controlling for demographic co-variates and the state employment rate. Chi-square tests of independence was conducted to assess the bivariate relationships between education level and if they did or did not receive SSI and SSDI. A t-test was conducted to compare the mean age between the binomial outcome variable of those who did receive SSI support and SSDI support and those who did not. Chi-square tests of independence assessed all other categorical demographic control variables. Multi-collinearity was assessed using Chi-square test of independence between all predictor variables, none was detected.

The final model from this question was used to conduct the mediation analysis in research question 3. Therefore, a sensitivity analysis was conducted to compare the outcomes of if the applicants were recipients of SSI or SSDI supports each month based on if they were employed and received a wage each week or not. If there was a difference, in SSI/SSDI outcomes than the final model would not accurately represent the needed model for the mediation analysis. The results show that there was a difference in SSI and SSDI between the two employment groups. Therefore, the dataset for this research questions was delimited to the 27,090 applicants who were employed and did receive a weekly wage.

Model evaluation and specification. Individual simple binomial logistic regression analyses between education level and SSI/SSDI receipt to better understand associations. Individual binomial regressions were also conducted with each of the control variables, including interaction terms. Interaction terms that had a significant relationship at an a priori

α=0.05 or lower in the simple regression models were included in the modeling process. Modeling building used hierarchical regression methods. The first model included only the state employment rate. The second model added all demographic co-variates. The third model added interaction terms. The fourth model adds education level. Any variables with parameter estimates that don't meet the a priori α=0.05 were dropped, and a new model excluding those variables was tested. This model was then compared to the full model using model fit statistics, including AIC, to determine the model that best fits the data. Results of the final model can be seen in Table __, including odds ratios and confidence intervals.

Research Question 3: Mediation Analysis

The final research question assesses the relationship between the three variables of education, employment, and receipt of SSI and receipt of SSDI. We know that all three variables are associated with each other, however, we don't fully understand their complex relationships. Therefore, a mediation analysis determines how much the association between education level and receipt of SSI and of SSDI is explained through their association with wage. Through this analysis, there are two different outcomes including SSI and SSDI, therefore two mediation analyses will be conducted and reported. The Imai and colleagues (Imai, Tingley, et al., 2010) approach using the mediate package in R Studio was used to evaluate these potential mediating effects. The Imai, Keele, & Tingley (2010) approach has an improved ability to detect a mediation effect. It also has the ability to accommodate a variety of variable types, including non-linear and non-parametric measures.

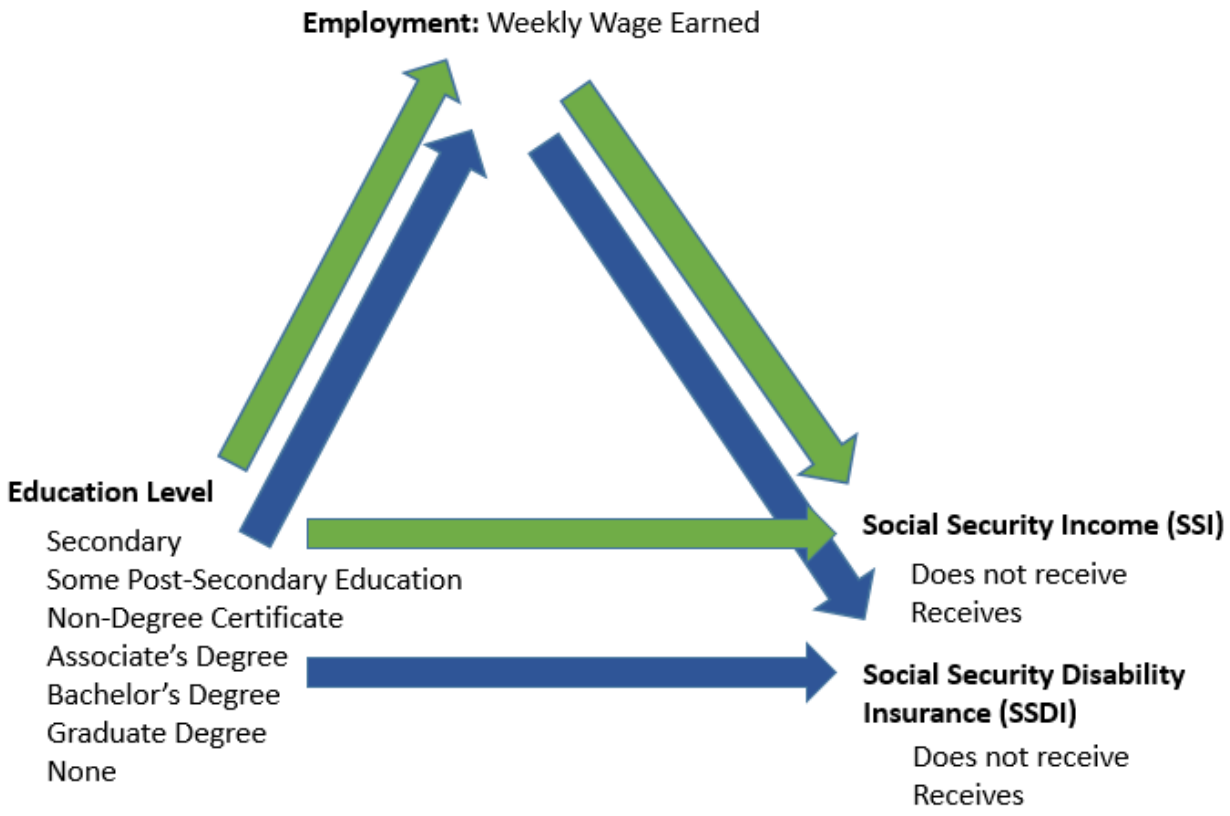

Figure 4.1. Conceptual Graph of the Mediation Pathways for Economic Stability

Model evaluation and specification. Results from research questions 1 and 2 in this study will inform the final models for the mediation analysis. Due to the findings in sensitivity analysis in research question 1 that identified differences in the predictors and control variables between those who did and not receive a weekly wage (are unemployed), this analysis uses the sample that only includes those who are employed. Therefore, the results examine the relationship between education, wage earned, and receipt of SSI/SSDI in those who are employed and receive a wage each week. The final model from research question 1 was used as the mediator model in the analysis, including the control variables (demographic co-variates, interaction terms, and state employment rate). The final model from research question 2 was

used as the outcome model in the analysis, also including the control variables (demographic co-variates, interaction terms, and state employment rate).

The main predictor variable in the mediation analysis is a categorical variables with 7 ordinal levels. The mediation analysis using the Imai and colleagues (Imai, Keele, et al., 2010) only compares two levels. Therefore, 6 separate mediation analyses will be conducted, comparing each level to the reference category for education of those who have completed *Secondary School.* All mediation analyses were conducted using non-parametric bootstrapping at the standard 1000 resamples (Tingley et al., 2014). Parameter estimates, 95% confidence intervals, and p-values from the final analysis will be reported for the average casual mediation effect (ACME), average direct effect (ADE), total effect, and proportion of the effect that was explained through the mediator.

The mediation analysis framework developed by Imai and colleagues (2010) includes consideration of the sequential ignorability assumption. Sequential ignorability applied to the mediation analysis in this study states that: a) Education level is independent of all possible values of the mediating (Weekly Wage) and outcome (SSI or SSDI) variables, and b) the observed values of Weekly Wage are independent of the outcome (SSI or SSDI), controlling for the included co-variates (demographics, interaction terms, and state employment rates). There is no direct way to test for the sequential ignorability assumption. However, Imai, Keele, and Yamamoto (2010) developed sensitivity analyses to “assess the sensitivity of one’s empirical findings to the possible existence of confounders”, validating the assumption and the results of the mediation. This helps us to assess changes in the strength of the mediated effect if other cofounding variables were entered into the model.

Table 4.1. Demographic Descriptives: All recipients and by wage (n = 58,485)

Variables	**ALL Service Recipients**		**Week Wage**			
	(n = 58,485)		***No (n=31,395)***		***Yes (n=27,090)***	
	Mean(SD)		*Mean(SD)*		*Mean(SD)*	
Age	35.56 (11.38)		35.54 (11.53)		35.58 (11.21)	
	n	%	*n*	%	*n*	%
Sex			***			
Male	33,413	0.57	17,578	0.56	15,835	0.58
Female	25,072	0.43	13,817	0.44	11,255	0.42
Race			***			
White	40,467	0.69	20,926	0.67	19,541	0.72
Black	18,018	0.31	10,469	0.33	7,549	0.28
Ethnicity			***			
Not Hispanic	53,339	0.91	28,465	0.91	24,874	0.92
Hispanic	5,146	0.09	2,930	0.09	2,216	0.08
Severity of Disability			***			
Most Significant Disability	48,559	0.83	25,928	0.83	22,631	0.84
Significant Disability	8,715	0.15	4,602	0.15	4113	0.01
Not Significant Disability	1,211	0.02	865	0.03	346	0.15
State Region			***			
Q1	10,968	0.19	5,581	0.18	5,387	0.20
Q2	12,620	0.22	7,299	0.23	5,321	0.20
Q3	20,214	0.35	10,410	0.33	9,804	0.36
Q4	14,683	0.25	8,105	0.26	6,578	0.24
SSI			***			
No	38,145	0.54	15,521	0.49	16,857	0.62
Yes	32,282	0.46	15,874	0.51	10,233	0.38
SSDI			***			
No	47,267	0.67	21,792	0.69	17,176	0.63
Yes	23,160	0.33	9,603	0.31	9,914	0.37
Education Level			***			
Secondary	36,139	0.51	14,149	0.45	18,314	0.68
Some Postsecondary	2,760	0.04	1,014	0.03	1349	0.05
Non-Degree Certificate	1,271	0.02	501	0.02	650	0.02
Associate's Degree	413	0.01	129	0.00	243	0.01
Bachelor's Degree	301	0.004	83	0.003	170	0.006
Graduate Degree	68	0.001	17	0.001	46	0.002
None	29,475	0.42	15,502	0.49	6,318	0.23

Note. [+] Average mean weekly wage calculated using sample of applicants who earned a wage >$0 each week

4.3 Results

The sample for this study was 58,485 individuals with IDD who applied to receive services from their state VR agency and exited the program in the years 2017-2019. In the whole sample, 57% of applicants were male, 69% identified as White, 91% identified as being non-Hispanic, and 83% of applicants had a most significant disability. Over half of the applicants (53.7%) earned a weekly wage, indicating they had some type of paid employment. There were statistically significant differences in sex, race, ethnicity, and severity of disability when comparing those who did and not have paid employment. Full descriptive results can be seen in Tables 4.1, including a breakdown of demographics between those who did and did not have paid employment.

4.3.1 Research question 1

A sensitivity analysis comparing the demographic characteristics between those who did and did not earn a wage using a logistic regression, controlling for state, showed statistically significant differences between the two groups. Therefore, only those who earned a wage were used in the mediation analysis, to allow for more a better fitting model and improved specification of the results. Table 4.3 outlines the full results from the sensitivity analysis.

The average weekly wage in the final sample used in the analysis, excluding all applicants who earned $0, was $222.79 ($249.14). Sixty eight percent of wage earners had earned a secondary degree, with approximately 4% having earned a postsecondary certificate or degree and 5% having completed some postsecondary education (yet no degree or

Table 4.2. Demographic Descriptives Across Weekly Wage and Education Level in Applicants who Earned a Wage (n = 27090)

Variables		Weekly Wage+	Education													
			Secondary (n=18,314)		***Some Postsecondary (n=1,349)***		***Non-Degree Certificate (n=650)***		***Associate's Degree (n=243)***		***Bachelor's Degree (n=170)***		***Graduate Degree (n=46)***		***None (n=,6318)***	
		Mean(SD)	*Mean(SD)*		*Mean(SD)*		*Mean(SD)*		*Mean(SD)*		*Mean(SD)*		*Mean(SD)*		*Mean(SD)*	
Age			34.89 (10.84)		33.50 (10.48)		34.30 (10.69)		36.23 (10.68)		36.24 (11.14)		41.70 (12.53)		38.07 (12.06)	
		mean (SD)	*n=*	*%*	*n=*	*%*	*n=*	*%*	*n=*	*%*	*n=*	*%*	*n=*	*%*	*n=*	*%*
Sex		***	***													
	Male	*232.07 (156.02)*	10741	0.59	706	0.52	349	0.54	119	0.49	90	0.53	20	0.43	3810	0.60
	Female	209.72 (137.83)	7573	0.41	643	0.48	301	0.46	124	0.51	80	0.47	26	0.57	2508	0.40
Race		***	***													
	White	211.61 (149.18)	13598	0.74	931	0.69	515	0.79	189	0.78	127	0.75	28	0.61	4153	0.66
	Black	251.71 (145.11)	4716	0.26	418	0.31	135	0.21	54	0.22	43	0.25	18	0.39	2165	0.34
Ethnicity		***	***													
	Not Hispanic	217.99 (145.99)	16908	0.92	1190	0.88	553	0.85	225	0.93	153	0.90	40	0.87	5805	0.92
	Hispanic	276.64 (171.86)	1406	0.08	159	0.12	97	0.15	18	0.07	17	0.10	6	0.13	513	0.08
Severity of Disability		***	***													
	Most Significant Disability	208.12 (135.65)	15426	0.84	991	0.73	523	0.80	182	0.75	101	0.59	26	0.57	5382	0.85
	Significant Disability	292.29 (186.90)	220	0.01	33	0.02	15	0.02	6	0.02	7	0.04	2	0.04	63	0.01
	Not Significant Disability	356.71 (183.00)	2668	0.15	325	0.24	112	0.17	55	0.23	62	0.36	18	0.39	873	0.14
State Region		***	***													
	Q1	198.20 (154.23)	3894	0.21	232	0.17	121	0.19	66	0.27	32	0.19	22	0.48	1020	0.16
	Q2	214.93 (132.22)	3283	0.18	238	0.18	80	0.12	34	0.14	23	0.14	2	0.04	1661	0.26
	Q3	256.77 (159.25)	6632	0.36	566	0.42	314	0.48	87	0.36	93	0.55	13	0.28	2099	0.33
	Q4	198.62 (131.68)	4505	0.25	313	0.23	135	0.21	56	0.23	22	0.13	9	0.20	1538	0.24
SSI		***														
	No	252.44 (162.40	11121	0.50	974	0.53	433	0.49	201	0.58	156	0.58	44	0.67	3928	0.52

	Yes	173.94 (107.73)	7193	0.32	375	0.23	217	0.28	42	0.14	14	0.07	2	0.04	2390	0.30
SSDI		***														
	No	251.34 (164.86)	11196	0.38	990	0.42	473	0.42	170	0.41	146	0.46	39	0.46	4162	0.40
	Yes	173.32 (99.15)	7118	0.28	359	0.21	177	0.20	73	0.26	24	0.13	7	0.15	2156	0.25
Education Level		***														
	Secondary	210.09 (137.11)														
	Some Postsecondary	278.33 (177.70)														
	Non-Degree Certificate	285.51 (179.79)														
	Associate's Degree	324.13 (193.91)														
	Bachelor's Degree	437.75 (306.92)														
	Graduate Degree	650.39 (462.24)														
	None	228.50 (144.25)														

Note. [+] Average mean weekly wage calculated using sample of applicants who earned a wage >$0 each week

certificate). A table of mean wages across all categories of demographic characteristics and education, not controlling for all other variables, can be found in Table 4.2. Table 4.2 also outlines the mean wages earned when assessing sex, race, and ethnicity by severity of disability.

The final model equation assessing if demographic characteristics predicted wage earned by VR applicants with IDD was:

$$
\begin{aligned}
Y_{Week\ Wage} = {} & 175.77 - 0.03\ X_{age} - 18.62\ X_{sex} + 39.73\ X_{race} + 52.46\ X_{ethnicity} \\
& - 98.19\ X_{Significant\ Disability} - 162.28\ X_{No\ Significant\ Disability} \\
& + 13.33\ X_{StateQ2} + 40.69\ X_{StateQ3} + 0.94\ X_{StateQ4} \\
& - 32.84\ X_{Female} X_{No\ Significant\ Disability} \\
& - 22.92\ X_{Female} X_{No\ Significant\ Disability} \\
& - 37.08\ X_{Black} X_{No\ Significant\ Disability} \\
& - 86.34\ X_{Black} X_{No\ Significant\ Disability} \\
& - 23.45\ X_{Hispanic} X_{Significant\ Disability} \\
& + 10.16\ X_{Hispanic} X_{No\ Significant\ Disability} \\
& + 56.26\ X_{Some\ PS} + 67.23\ X_{ND\ Cert} + 37.08\ X_{Associates} \\
& + 86.34\ X_{Bachelors} + 23.45\ X_{Graduate} + 16.08\ X_{Graduate}
\end{aligned}
$$

Education, at all levels, was found to be a statistically significant predictor of weekly wage earned. All demographic co-variates, except age, were found to have statistically significant relationships with wage earned. All three interaction terms (Sex*Severity of Disability, Race*Severity of Disability, Ethnicity*Severity of Disability) assessed in the simple models was

included, each maintaining their significant relationships when controlling for all other variables. Full results of the final model are in Table 4.4.

All levels of education had a statistically significant association with the outcome of weekly wage earned. As level of education increased, so did the average weekly wage earned except when comparing applicants with a secondary degree or certificate and those without a secondary degree or certificate. Applicants with a non-degree certificate earned an average $67.23 more than applicants with a secondary degree. Earning a Bachelor's degree improved weekly wages for applicants by $201.83, while a graduate degree led to a $425.14 average increase in wage for applicants. Applicants who did not earn a secondary degree earned an average of $16.08 more than those with a secondary degree. However, these results should be interpreted with caution, as it may be a result of incomplete reporting on the application process.

Females across all disability severity levels, on average, earned less each week that males. Those with a most significant disability made an average of $18.62 less, while applicants with a significant disability made $32.84 less and those with no significant disability made $22.92 less, when controlling for all other variables. The pattern in wage earned for Black and Hispanic applicants wasn't as clear. Black applicants who had a most significant disability earned an average of $39.73 more than White applicants with a most significant disability, while Black applicants with a significant disability and no significant disability on average earned less than White applicants with the same severity. This pattern was echoed in Hispanic applicants, where Hispanic applicants with a most significant disability earned an average of

Table 4.3. Sensitivity Analysis Comparing VR Applicants Who Did and Did Not Earn a Wage

Variable	Estimates	SE	Statistic	p-value	OR	95% CI
Intercept	0.309	0.036	8.589	0.000	1.350	[1.27, 1.46]
Age	0.004	0.001	4.748	0.000	1.000	[1.00, 1.01]
Gender						
Male	*reference*					
Female	-0.130	0.017	-7.418	0.000	0.880	[0.85, 0.91]
Race						
White	*reference*					
Black	-0.213	0.022	-9.908	0.000	0.810	[0.77, 0.84]
Ethnicity						
Not Hispanic	*reference*					
Hispanic	-0.260	0.035	-7.480	0.000	0.770	[0.72, 0.83]
Severity of Disability						
Most Significant Disability	*reference*					
Significant Disability	-0.810	0.094	-8.604	0.000	0.440	[0.37, 0.53]
No Significant Disability	0.013	0.033	0.386	0.699	1.010	[0.95, 1.08]
State (by Unemployment Rates)						
Quartile 1	*reference*					
Quartile 2	-0.139	0.028	-5.037	0.000	0.870	[0.82, 0.92]
Quartile 3	0.014	0.025	0.541	0.589	1.010	[0.96, 1.07]
Quartile 4	-0.086	0.027	-3.238	0.001	0.920	[0.87, 0.97]
Education Level						
Secondary	*reference*					
Some Postsecondary	0.058	0.043	1.337	0.181	1.060	[0.97, 1.15]
Non-Degree Certificate	0.010	0.061	0.168	0.867	1.010	[0.90, 1.15]
Associate's Degree	0.369	0.110	3.356	0.001	1.450	[1.17, 1.80]
Bachelor's Degree	0.446	0.135	3.302	0.001	1.560	[1.20, 2.04]
Graduate Degree	0.734	0.285	2.574	0.010	2.080	[1.21, 3.74]
None	-1.130	0.019	-59.619	0.000	0.320	[0.31, 0.34]
Race*Severity						
White*Significant Disability	*reference*					
Black*Significant Disability	0.581	0.139	4.193	0.000	1.790	[1.36, 2.35]
White*No Significant Disability	*reference*					
Black*No Significant Disability	0.064	0.051	1.254	0.210	1.070	[0.96, 1.18]
Ethnicity*Severity						
Not Hispanic*Significant Disability	*reference*					
Hispanic*Significant Disability	0.585	0.259	2.263	0.024	1.790	[1.07, 2.96]
Not Hispanic*No Significant Disability	*reference*					
Hispanic*No Significant Disability	0.141	0.084	1.667	0.095	1.150	[0.98, 1.36]
Model Statistics						
df	5,846					
AIC	76,078					

Note: SE = standard error; OR = odds ratio; CI = confidence intervals

Table 4.4. Linear Regression Results for the Relationship between Education Level and Weekly Wage Earned, Controlling for Demographic Characteristics and State Employment Rate

	Basic Model				Co-variate Model			
Variable	Estimate	SE	Statistic	p-value	Estimate	SE	Statistic	p-value
Intercept					187.587	3.534	53.074	0.000
Age					0.047	0.078	0.611	0.541
Gender								
Male					*reference*			
Female					-22.279	1.752	-12.715	0.000
Race								
White					*reference*			
Black					32.703	1.994	16.401	0.000
Ethnicity								
Not Hispanic					*reference*			
Hispanic					53.108	3.251	16.336	0.000
Severity of Disability								
Most Significant Disability					*reference*			
Significant Disability					74.394	2.433	30.579	0.000
No Significant Disability					124.316	7.747	16.046	0.000
State (by Unemployment Rates)								
Quartile 1	*reference*				*reference*			
Quartile 2	16.722	2.837	5.893	0.000	11.703	2.765	4.233	0.000
Quartile 3	58.571	2.490	23.524	0.000	39.500	2.475	15.960	0.000
Quartile 4	0.422	2.698	0.156	0.876	-0.673	2.621	-0.257	0.797
Sex*Severity								
Male * Significant Disability								
Female * Significant Disability								
Male * No Significant Disability								
Female * No Significant Disability								
Race*Severity								
White * Significant Disability								
Black * Significant Disability								
White * No Significant Disability								
Black * No Significant Disability								
Ethnicity*Severity								
Not Hispanic * Significant Disability								

Hispanic * Significant Disability		
Not Hispanic * No Significant Disability		
Hispanic * No Significant Disability		
Education Level		
Secondary		
Some Post-Secondary		
Non-Degree Certificate		
Associate's Degree		
Bachelor's Degree		
Graduate Degree		
None		
Model Statistics		
Residual SE	146.8	142.0
df	27,086	27,080
Adjusted R^2	0.031	0.093
F-statistic	290.0	311.4
p-value	<.0001	<.0001

Table 4.3 Cont'd. Interaction and Final Models.

	Interaction Model				Final Model			
Variable	Estimate	SE	Statistic	p-value	Estimate	SE	Statistic	p-value
Intercept	183.007	3.557	51.444	0.000	175.773	3.494	50.306	0.000
Age	0.034	0.077	0.445	0.656	-0.029	0.076	-0.384	0.701
Gender								
Male	*reference*				*reference*			
Female	-17.476	1.914	-9.130	0.000	-18.619	1.874	-9.936	0.000
Race								
White	*reference*				*reference*			
Black	40.951	2.198	18.630	0.000	39.730	2.157	18.416	0.000
Ethnicity								
Not Hispanic	*reference*				*reference*			
Hispanic	55.692	3.585	15.534	0.000	52.462	3.512	14.936	0.000
Severity of Disability								
Most Significant Disability	*reference*				*reference*			
Significant Disability	102.661	3.808	26.960	0.000	98.188	3.730	26.325	0.000
No Significant Disability	169.236	13.058	12.960	0.000	162.275	12.779	12.699	0.000
State (by Unemployment Rates)								
Quartile 1	*reference*				*reference*			

Quartile 2	12.314	2.759	4.462	0.000	13.331	2.710	4.918	0.000
Quartile 3	40.882	2.474	16.527	0.000	40.693	2.422	16.799	0.000
Quartile 4	-0.125	2.616	-0.048	0.962	0.940	2.561	0.367	0.714
Sex*Severity								
Male * Significant Disability	*reference*				*reference*			
Female * Significant Disability	-28.924	4.859	-5.952	0.000	-32.844	4.756	-6.906	0.000
Male * No Significant Disability	*reference*				*reference*			
Female * No Significant Disability	-13.154	15.752	-0.835	0.404	-22.924	15.414	-1.487	0.137
Race*Severity								
White * Significant Disability	*reference*				*reference*			
Black * Significant Disability	-39.027	5.144	-7.587	0.000	-37.083	5.034	-7.367	0.000
White * No Significant Disability	*reference*				*reference*			
Black * No Significant Disability	-91.547	15.948	-5.740	0.000	-86.342	15.606	-5.533	0.000
Ethnicity*Severity								
Not Hispanic * Significant Disability	*reference*				*reference*			
Hispanic * Significant Disability	-22.522	8.363	-2.693	0.007	-23.453	8.185	-2.865	0.004
Not Hispanic * No Significant Disability	*reference*				*reference*			
Hispanic * No Significant Disability	15.878	29.237	0.543	0.587	10.157	28.614	0.355	0.723
Education Level								
Secondary					*reference*			
Some Post-Secondary					56.255	3.925	14.334	0.000
Non-Degree Certificate					67.230	5.542	12.131	0.000
Associate's Degree					110.601	8.959	12.346	0.000
Bachelor's Degree					201.825	10.704	18.854	0.000
Graduate Degree					425.139	20.502	20.737	0.000
None					16.079	2.055	7.824	0.000
Model Statistics								
Residual SE	141.7				138.6			
df	27,074				27,068			
Adjusted R^2	0.098				0.136			
F-statistic	196.5				204.7			
p-value	<.0001				<.0001			

$52.46 more than non-Hispanic applicants with a most significant disability. However, Hispanic applicants with a significant disability earned $23.45 less each week than White applicants, when controlling for all other variables.

The final linear regression model explained 13.6% of the variance that occurs in weekly wage earned by individuals with IDD who were applicants for VR services (p<.001). The final model, including education level, explained 3.8% more of the variation than the model with the demographic characteristics, controlling for state employment rate. Looking at the progression of the hierarchical model building process, demographic characteristics explained at least 6.7% of the variance with the interaction between severity of disability and the demographics explaining at least 0.5% more.

4.3.2 Research question 2

Two separate analyses were conducted to answer this research questions, one assessing the relationships between education level and receipt of SSI and the second assessing the relationship between education level and SSDI. A sensitivity analysis was conducted using Chi-square tests of independence to check for differences in if applicants received SSI and if applicants received SSDI across those who earned a weekly wage and those who did not. The results confirmed the use of the subset sample of only individuals who earned a weekly wage in the analysis, finding statistically significant differences in receipt of both SSI and SSDI ([SSI: χ^2 = 961.8; df = 1; p < .0001][SSDI: χ^2 = 235.87; df = 1; p < .0001]).

Bivariate descriptive analyses for both the SSI and SSDI outcomes resulted in statistically significant differences in the distribution of if they received public support across levels of education level ([SSI: χ^2 = 961.8; df = 1; p < .0001][SSDI: χ^2 = 235.87; df = 1; p < .0001]). There

Table 4.5. Demographic Descriptives for Applicants across Status of SSI and SSDI in Applicants who Earned a Wage (n = 27,090)

Variables	**SSI**				**SSDI**			
	No (n=16,857)		***Yes (n=10,233)***		***No (n=17,176)***		***Yes (n=9,914)***	
	Mean(SD)		*Mean(SD)*		*Mean(SD)*		*Mean(SD)*	
Age	37.46 (11.48)		***32.49 (10.01)		33.77 (10.87)		***38.72 (11.09)	
	n	%	*n*	%	*n*	%	*n*	%
Sex	***				***			
Male	9,994	0.59	5,841	0.57	9,882	0.58	5,953	0.60
Female	6,863	0.41	4,392	0.43	7,294	0.42	3,961	0.40
Race	***				***			
White	12,233	0.73	7,308	0.71	11,761	0.68	7,780	0.78
Black	4,624	0.27	2,925	0.29	5,415	0.32	2,134	0.22
Ethnicity	***				***			
Not Hispanic	15,576	0.92	9,298	0.91	15,409	0.90	9,465	0.95
Hispanic	1,281	0.08	935	0.09	1,767	0.10	449	0.05
Severity of Disability	***				***			
Most Significant Disability	13,297	0.79	9,334	0.91	13,747	0.80	8,884	0.90
Significant Disability	3,228	0.19	885	0.09	420	0.02	1,024	0.10
Not Significant Disability	332	0.02	14	0.00	3,089	0.18	6	0.00
State Region					***			
Q1	3,330	0.20	2,057	0.20	2,968	0.17	2,419	0.24
Q2	3,273	0.19	2,048	0.20	3,420	0.20	1,901	0.19
Q3	6,105	0.36	3,699	0.36	7,427	0.43	2,377	0.24
Q4	4,149	0.25	2,429	0.24	3,361	0.20	3,217	0.32
SSI					***			
No					9,443	0.56	7,733	0.76
Yes					7,414	0.44	2,500	0.24

were also statistically significant differences in all demographic characteristics between those who did and did not receive SSI and those who did and did not receive SSDI.

SSI model results

In the final model for the SSI outcome, all levels of education had a statistically significant relationship with status of SSI receipt. All levels of education, except a graduate degree, showed lower odds of receiving SSI than those who had earned a secondary degree or certificate. Having a Bachelor's degree showed the lowest odds of receiving SSI each month (OR: 0.78; 95% CI [0.73, 0.83]). Applicants with a graduate degree had slightly higher odds of receiving SSI than those with a secondary degree (OR: 1.01; 95% CI [1.00, 1.02]).

All demographic characteristics explained a statistically significant amount of the variance in the model. For each year older in age, the applicant's odds of receiving SSI decreased by 0.90 (95% CI [0.87, 0.92]). Black applicants had slightly higher odds of receiving SSI (OR: 1.02; 95% CI [1.01, 1.04]), with the interaction term between race and severity of disability not maintaining significance in the final model. Therefore, there is not enough evidence to say there were differences in SSI receipt in Black applicants across different severity of disability. Applicants who identified as Hispanic and had a most significant disability had 1.02 (95% CI [1.01, 1.03]) than non-Hispanic applicants of receiving SSI each month. However, Hispanic applicants with a significant disability had lower odds of receiving SSI each month than white applicants with a significant disability (OR: 0.91; 95% CI [0.86, 0.95]).

SSDI model results

In the final model for the SSDI outcome, all levels of education had statistically significant lower odds of receiving SSDI each month than those with a secondary education.

Table 4.6. Logistic Regression Results of Relationship between Education and Receipt of SSI

	Estimate	SE	Statistic	p-value	*OR*	*95% CI*
Intercept	0.73	0.01	62.62	0.00	2.08	[2.03, 2.13]
Age	-0.01	0.00	-35.53	0.00	0.90	[0.87, 0.92]
Gender						
Male	*reference*					
Female	0.02	0.01	4.27	0.00	1.02	[1.01, 1.04]
Race						
White	*reference*					
Black	0.02	0.01	2.76	0.01	1.02	[1.01, 1.03]
Ethnicity						
Not Hispanic	*reference*					
Hispanic	0.05	0.01	3.83	0.00	1.05	[1.02, 1.07]
Severity of Disability						
Most Significant Disability	*reference*					
Significant Disability	-0.18	0.01	-17.06	0.00	0.83	[0.82, 0.85]
No Significant Disability	-0.33	0.04	-8.89	0.00	0.72	[0.67, 0.77]
State (by Unemployment Rates)						
Quartile 1	*reference*					
Quartile 2	-0.01	0.01	-1.10	0.27	0.83	[0.82, 0.85]
Quartile 3	0.00	0.01	0.17	0.87	0.99	[0.97, 1.01]
Quartile 4	-0.02	0.01	-2.89	0.00	1.00	[0.99, 1.02]
Race*Severity						
White * Significant Disability	*reference*					
Black * Significant Disability	0.01	0.02	0.72	0.47	0.94	[0.85, 1.04]
White * No Significant Disability	*reference*					
Black * No Significant Disability	-0.06	0.05	-1.21	0.23	1.01	[0.98, 1.05]
Ethnicity*Severity						
Not Hispanic * Significant Disability	*reference*					
Hispanic * Significant Disability	-0.10	0.03	-3.65	0.00	0.91	[0.75, 1.10]
Not Hispanic *No Significant Disability	*reference*					
Hispanic * No Significant Disability	-0.09	0.10	-0.99	0.32	0.90	[0.86, 0.95]
Education Level						
Secondary	*reference*					
Some Postsecondary	-0.11	0.01	-8.25	0.00	0.90	[0.87, 0.92]
Non-Degree Certificate	-0.06	0.02	-3.19	0.00	0.94	[0.91, 0.98]
Associate's Degree	-0.19	0.03	-6.34	0.00	0.83	[0.78, 0.88]
Bachelor's Degree	-0.25	0.04	-6.98	0.00	0.78	[0.73, 0.83]
Graduate Degree	-0.24	0.07	-3.48	0.00	1.01	[0.99, 1.02]
None	0.01	0.01	1.60	0.11	0.99	[0.99, 0.99]
Model Statistics						
Residual Deviance	35,857					
df	27,070					
AIC	3,5429					

Table 4.7. Logistic Regression Results of Relationship between Education and Receipt of SSDI

	Estimate	*SE*	*Statistic*	*p-value*	*OR*	*95% CI*
Intercept	0.201	0.011	17.646	0.000	1.220	[1.20, 1.25]
Age	0.009	0.000	35.479	0.000	1.009	[1.01, 1.01]]
Gender						
Male	*reference*					
Female	-0.024	0.006	-4.217	0.000	0.977	[0.97, 0.99]
Race						
White	*reference*					
Black	-0.088	0.007	-12.477	0.000	0.916	[0.90, 0.93]
Ethnicity						
Not Hispanic	*reference*					
Hispanic	-0.126	0.011	-10.943	0.000	0.882	[0.86, 0.90]
Severity of Disability						
Most Significant Disability	*reference*					
Significant Disability	-0.143	0.010	-13.806	0.000	0.690	[0.64, 0.74]
No Significant Disability	-0.371	0.036	-10.184	0.000	0.867	[0.85, 0.88]
State (by Unemployment Rates)						
Quartile 1	*reference*					
Quartile 2	-0.071	0.009	-8.028	0.000	0.931	[0.92, 0.95]
Quartile 3	-0.160	0.008	-20.168	0.000	0.852	[0.84, 0.87]
Quartile 4	0.045	0.008	5.376	0.000	1.046	[1.03, 1.06]
Race*Severity						
White * Significant Disability	*reference*					
Black * Significant Disability	0.070	0.016	4.228	0.000	1.183	[1.07, 1.31]
White * No Significant Disability	*reference*					
Black * No Significant Disability	0.168	0.051	3.302	0.001	1.072	[1.04, 1.11]
Ethnicity*Severity						
Not Hispanic * Significant Disability	*reference*					
Hispanic * Significant Disability	0.072	0.027	2.677	0.007	1.216	[1.01, 1.46]
Not Hispanic * No Significant Disability	*reference*					
Hispanic * No Significant Disability	0.196	0.093	2.102	0.036	1.074	[1.02, 1.13]
Education Level						
Secondary	*reference*					
Some Postsecondary	-0.077	0.013	-6.009	0.000	0.926	[0.90, 0.95]
Non-Degree Certificate	-0.082	0.018	-4.506	0.000	0.922	[0.89. 0.95]
Associate's Degree	-0.088	0.029	-3.017	0.003	0.915	[0.86, 0.96]
Bachelor's Degree	-0.188	0.035	-5.373	0.000	0.829	[0.77, 0.89]
Graduate Degree	-0.265	0.067	-3.961	0.000	0.769	[0.67, 0.87]
None	-0.069	0.007	-10.287	0.000	0.933	[0.92, 0.95]
Model Statistics						
Residual Deviance	35,557					
df	27,070					
AIC	34,004					

Overall the trend in the outcome was as level of education increased, the odds of receiving SSDI decreased. Applicants with a graduate degree had the lowest odds of receiving SSDI (OR: 0.769; 95% CI [0.67, 0.87]). Applicants who did not have a secondary degree or certificate also had lower odd of receiving SSI than those with a secondary degree (OR: 0.933; 95% CI [0.92, 0.95]), which was different than the pattern demonstrated.

lower odds of receiving SSDI each month than males (95% CI [0.97, 0.99]). Black applicants with a significant disability had 0.92 lower odds of receiving SSDI than White applicants with a significant disability. However, when compared to White applicants with less severe disability, Black applicants had higher odds of receiving SSDI. A similar pattern occurred when comparing Hispanic applicants to non-Hispanic applicants. Hispanic applicants with a most severe disability had 0.88 lower odds of receiving SSDI, while Hispanic applicants with less severe disabilities had higher odds that White applicants at the same level of disability, controlling for all other variables.

4.3.3 Research Question 3: Mediation

This research question examined the relationships between level of education and receipt of SSI or SSDI as mediated by wage earned by applicants with IDD to receive services from their state VR agency. Separated analyses were conducted and for SSI and SSDI. The final models reported in questions 1 and 2 served as the model equations in the mediation analyses. Within the analysis for each outcome, separate analyses were conducted comparing the different levels of education to the reference level of applicants who earned a Secondary degree or certificate. Table 4.8 and Figure 4.1 outlines the full results of the mediation analyses for SSI. The results for the SSDI mediation analyses can be found in Table 4.9 and Figure 4.2.

The mediated effect refers to the amount of the effect of the relationship between education and SSI receipt can be explained through the applicant's weekly wage. The direct effect refers to the amount of the effect that is explained solely by the relationship between education and receipt of SSI. The total effect outlines how much of the variation in SSI receipt status explained through the direct and mediated effect combined.

SSI

Weekly wage was found to have a statistically significant mediating effect between level of education and receipt of SSI in all 6 analyses that compared each level of education to having a secondary degree or certificate. All mediating effects had negative relationships with SSI receipt, meaning that higher wages were associated with lower odds of receiving SSI. A similar relationship between level of education and SSI receipt was found in almost all analysis (except those who did not earn a secondary degree or certificate), showing that higher levels of education are associated with lower odds of receiving SSI. The largest amount of variation that was explained through the mediated effect was found when comparing applicants with who had earned a graduate degree, compared to applicants who had earned a secondary degree or certificate (ACME: -0.338; 95% CI [-0.44, -0.24]). However, the analysis that showed the highest amount of variation explained by both the mediated and direct effect was when comparing those with a Bachelor's degree to those with a Secondary degree or certificate.

SSDI

Weekly wage also had a statistically significant negative mediating effect on the relationship between education and receipt of SSDI for all analyses. Therefore, as wage increased, odds of receiving SSDI decreased. As level of education increased, the amount of

Table 4.8. Results of Mediation Analysis for assessing the Mediated effect of Weekly Wage on Receipt of SSI by Level of Education

Some Postsecondary vs Secondary Degree or Certificate

	Estimate	*CI*	*p-value*
mediated effect	-0.447	[-0.53, -0.04]	<.0001
direct effect	-0.641	[-0.87, -0.04]	<.0001
total effect	-0.109	[-0.13, -0.08]	<.0001
proportion of effect	0.411	[0.32, 0.54]	<.0001

Non-Degree Certificate vs Secondary Degree or Certificate

	Estimate	*CI*	*p-value*
ACME	-0.053	[-0.64, -0.04]	<.0001
direct effect	-0.006	[-0.04, 0.03]	0.75
total effect	-0.059	[-0.09, -0.02]	<.0001
proportion of effect	0.898	[0.56, 2.49]	<.0001

Associate's Degree vs Secondary Degree or Certificate

	Estimate	*CI*	*p-value*
ACME	-0.088	[-0.11, -0.07]	<.0001
direct effect	-0.104	[-0.15, -0.05]	<.0001
total effect	-0.191	[-0.24, -0.14]	<.0001
proportion of effect	0.459	[0.34, 0.64]	<.0001

Bachelor's Degree vs Secondary Degree or Certificate

	Estimate	*CI*	*p-value*
ACME	-0.160	[-0.20, -0.13]	<.0001
direct effect	-0.091	[-0.14, -0.04]	<.0001
total effect	-0.252	[-0.30, -0.21]	<.0001
proportion of effect	0.637	[0.48, 0.82]	<.0001

Graduate Degree vs Secondary Degree or Certificate

	Estimate	*CI*	*p-value*
ACME	-0.338	[-0.44, -0.24]	<.0001
direct effect	0.096	[-0.02, 0.23]	0.098
total effect	-0.242	[-0.31, -0.16]	<.0001
proportion of effect	0.779	[0.93, 2.18]	<.0001

None vs Secondary Degree or Certificate

	Estimate	*CI*	*p-value*
ACME	-0.013	[-0.02, -0.01]	<.0001
direct effect	0.024	[0.01, 0.04]	<.0001
total effect	0.011	[0.00, 0.02]	0.12
proportion of effect	0.351	[-13.04, 7.98]	0.12

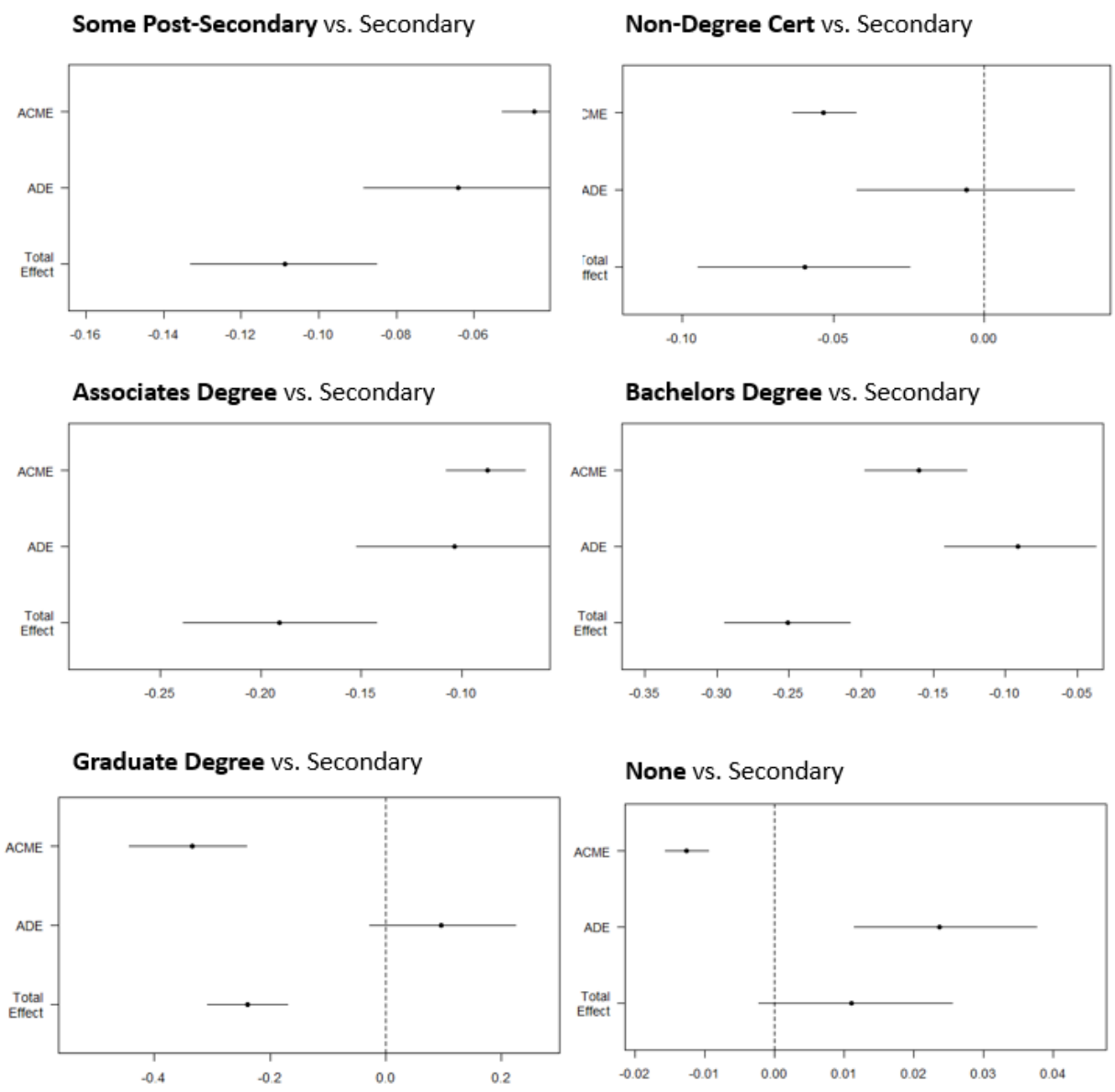

Figure 4.2. Graphs of Mediation Results for SSI, comparing all education levels to Secondary

Table 4.9. Results of Mediation Analysis for assessing the Mediated effect of Weekly Wage on Receipt of SSDI by Level of Education

Some Postsecondary vs Secondary Degree or Certificate

	Estimate	*CI*	*p-value*
mediated effect	-0.036	[-0.04, -0.03]	<.0001
direct effect	-0.042	[-0.07, -0.02]	<.0001
total effect	-0.077	[-0.10, -0.05]	<.0001
proportion of effect	0.462	[0.34, 0.67]	<.0001

Non-Degree Certificate vs Secondary Degree or Certificate

	Estimate	*CI*	*p-value*
mediated effect	-0.043	[-0.05, -0.03]	<.0001
direct effect	-0.039	[-0.07, -0.01]	0.024
total effect	-0.082	[-0.11, -0.05]	<.0001
proportion of effect	0.521	[0.36, 0.89]	<.0001

Associate's Degree vs Secondary Degree or Certificate

	Estimate	*CI*	*p-value*
mediated effect	-0.070	[-0.09, -0.05]	<.0001
direct effect	-0.019	[-0.07, 0.04]	0.462
total effect	-0.089	[-0.14, -0.03]	<.0001
proportion of effect	0.788	[0.48, 2.27]	<.0001

Bachelor's Degree vs Secondary Degree or Certificate

	Estimate	*CI*	*p-value*
mediated effect	-0.128	[-0.16, -0.10]	<.0001
direct effect	-0.061	[-0.12, 0.0]	0.04
total effect	-0.189	[-0.24, -0.14]	<.0001
proportion of effect	0.678	[0.49, 0.97]	<.0001

Graduate Degree vs Secondary Degree or Certificate

	Estimate	*CI*	*p-value*
mediated effect	-0.269	[-0.35, -0.18]	<.0001
direct effect	0.002	[-0.11, 0.13]	0.096
total effect	-0.267	[-0.38, -0.14]	<.0001
proportion of effect	0.993	[0.68, 1.71]	<.0001

None vs Secondary Degree or Certificate

	Estimate	*CI*	*p-value*
mediated effect	-0.010	[-0.01, -0.01]	<.0001
direct effect	-0.059	[-0.07, -0.05]	<.0001
total effect	-0.069	[-0.08, -0.06]	<.0001
proportion of effect	0.147	[0.11, 0.19]	<.0001

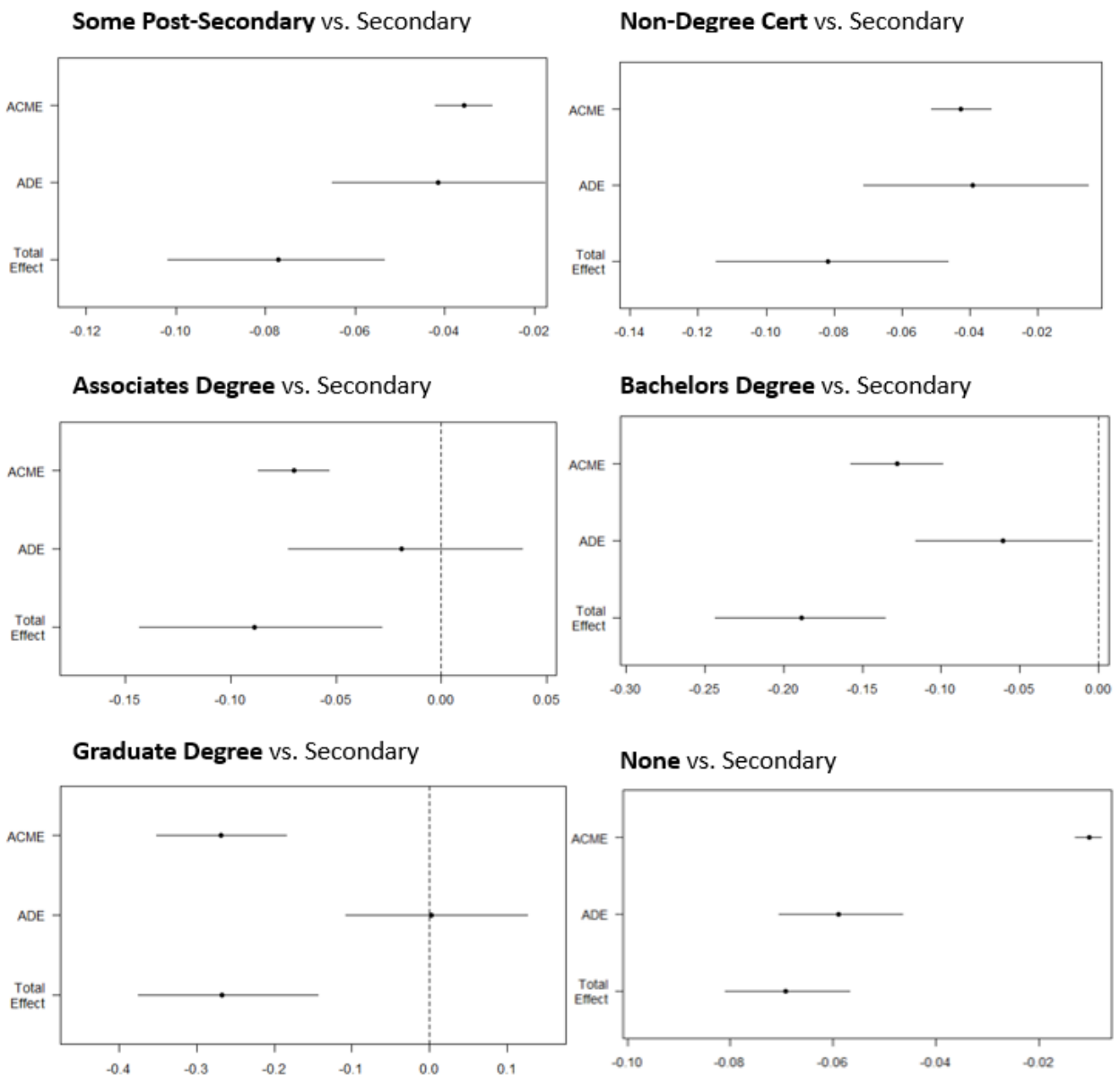

Figure 4.3. Graphs of Mediation Results for SSDI, comparing all education levels to Secondary

variation explained through weekly wage also increased, with those who earned a graduate degree have the largest mediated effect of -0.27 (95% CI [-0.35, -0.18]) and no secondary education as the lowest mediated effect of -0.010 (95% CI [-0.01, -0.01]). In fact, the direct effect of education on receipt of SSDI became not statistically significant once adding the mediated effect of weekly wage in analysis comparing those who had a secondary education to those with any postsecondary degree or certificate (non-degree, Associate's, Bachelor's, graduate) reflecting that as education level increases, more of the relationship with SSDI is explained by wage.

4.4 Discussion

This study further examined the relationship between education, employment, and Social Security benefits in individuals with IDD, controlling for demographic characteristics. As factors of economic stability, improved understanding of the pathways and complex relationship between these factors could support improved outcomes related to economic stability, whereas people with IDD face extreme disparities. Level of education was associated with both employment status and wage earned, with higher levels of education positively correlated to wage earned. Level of education also predicted if the individuals' received SSI and SSDI. Wage earned mediated the relationship between education and receipt of SSI/SSDI across all education levels, demonstrating the complex relationship between these factors for economic stability.

This study shows mean wage earned by education level obtained. Although the odds of earning a wage versus not earning a wage increases with education level, the mean wage associated with the level of education did not follow the same pattern. Applicants with IDD who

had any level of postsecondary education earned more than those with a Secondary degree. However, those with a non-degree certificate and those with an Associate's degree earned a weekly wage around $2 less than someone with some postsecondary education. Although this is a surprising finding, there may be outside factors to consider. For example, individuals who with a non-degree certificate or Associate's may still be taking classes and pursuing additional education, therefore limiting their potential for weekly wage.

Additionally, complex relationships have been found between Social Security benefits and wage that could be impacting results. There has been some indication that Social Security benefits may restrict hours worked, in order for the individual to maintain the needed support and still meet the eligibility requirements (Nord & Nye-Lengerman, 2015). This study also found that level of education was negatively associated with receipt of both SSI and SSDI, therefore higher education led to decreased odds of receiving SSI or SSDI. Eligibility for SSI includes earned and unearned income, meaning that once the individual meets a certain level of income, they are no longer able to receive the supplemental support. Wage earned demonstrated a plateau between those who have some postsecondary education, those who have a non-degree certificate, and those with an Associate's degree, which was followed by a large increase for those who earned a Bachelor's or graduate degrees. This plateau could reflect the point where increased wage and benefits (health insurance, etc.) associated with higher levels of education begins to offset the benefits from staying enrolled in SSI.

This study also established that a complex relationship exists between the economic stability factors of level of education, wage earned, and receipt of Social Security benefits. Furthermore, higher level of education and higher wages predicted lower odds of receiving SSI

or SSDI. In general, the mediating effect wage had on the relationship between level of education and receipt of SSI or SSDI. Weekly wage earned explained a significant level of the effect between education and Social Security benefits, however the level of effect and the proportion of the effect explained by weekly wage varied by level of education.

Overall, the results showed that the total effect explained through the mediated relationship of all three variables increased with each level of education. Wage explained had an increased mediated effect between education and SSI/SSDI at higher levels of education obtained. Wage also explained a higher proportion of the total effect, with higher levels of education. Therefore, as education increases, wage earned becomes a more important predictor. While at lower levels of education, variables are more equally important to consider. The findings of this study point out the need to start considering level of postsecondary education when discussing employment and economic stability outcomes for people with IDD. Opportunities to participate in postsecondary education are continuing to improve for people with IDD through policies such as The Higher Education Opportunity Act of 2008, which first defined inclusive education and helped establish networks of inclusive education opportunities for individuals with IDD (Vinoski Thomas et al., 2020). As opportunities increase, understanding differences between the different levels and types will allow interventions to appropriately support participants at all levels and evaluation for social bias in service provision. Having more information on the outcomes of education, as related to other factors of economic stability, will also allow for individuals with IDD more autonomy and self-determination to make life decisions that best suit them and their situation.

4.4.1 Limitations

There are limitations to this study that should be considered when interpreting and applying the results. First, the results of the mediation analysis should be applied for explanatory purposes, rather than causa inferencesl. Although mediation analyses are often used to establish causality, this study used a mediation for an explanatory approach; therefore caution needs to be taken with any considerations of causation. Mediation for explanation allows us to better understand the relationships between variables and potential underlying mechanisms, opposed to a mediation by design approach helps ensure any confounding variables are controlled, allowing for a better environment to detect causality (Fairchild & McDaniel, 2017). The use of a cross-sectional dataset also limits causal inferences.

This study assessed economic stability using an individual's education level, weekly wage earned, and receipt of Social Security benefits. However, it is important to recognize that they three variables alone may not fully represent the construct of economic stability. These three variables are centered on economic factors on the individual level, excluding supports that could exist on interpersonal or community levels. For example, household income earned by parents or other family members or family wealth were not included. Future studies should assess how factors on different systems levels may interact.

4.4.2 Implications

This study assessed how different levels of education were associated with wage earned and social security benefits. Most studies assessing education within a sample of individuals with IDD simply compare those who did and did not participate postsecondary education, finding more positive outcomes in those who had completed some postsecondary education

versus none. Similarly, past studies for individuals with IDD often focus on employment status instead of wage earned, whereas this study focused on the level of wage earned. These decisions allow for a baseline understanding of mean weekly wage earned by varying levels of education, controlling for demographics. Moving forward, research needs to match the growing demand for advanced education opportunities and competitive wages and include these levels within their studies. Future studies should assess economic stability using education level and wage earned to populations and interventions outside of VR applicants with IDD.

A complex relationship was found between education, wage earned, and receipt of social benefits. Wage was found to have an indirect effect on the relationship between education and SSI/SSDI, with the level of that effect increasing as education level increased. Factors of SES have been shown to have confounding effects (Lahelma et al., 2004), which this study supports. There are several factors that could be considered measures of economic stability, this study used three controlling for the social components of demographic characteristics. Future studies to introduce economic factors, that include intrapersonal and community level.

In addition to an improved understanding of the combination of factors that best explain economic stability in people with IDD, a better understanding is needed of how these factors work together to improve outcomes for people with IDD. This study found an interesting pattern in the receipt of SSI and SSDI, as it relates to level of education and wage. Wage appeared to plateau in those with postsecondary education at an Associate's degree and below, and wage had a higher mediated effect on the odds of SSI/SSDI receipt at higher levels of education. Further analysis of this pathway could help find a balance of these economic

factors that supports independence from Social Security benefits when possible, the best ways to properly support individuals during that transition, and/or support development of sustainable long-term support plan with improved independence for people with IDD. Better understanding of these factors of economic stability could lead to improved interventions that allow for increased independence and improved health outcomes.

Finally, improved understanding of the underlying mechanisms between factors of economic stability in people with IDD will allow us to assess interventions for socioeconomic, racial, and ethnic inequities. All interventions are capable of creating intervention generated inequities. Socioeconomic factors and demographic characteristics are the most common sources of intervention generated inequities, as a result of differences in the provision of services and/or how the services are received and interpreted by different populations (Lorenc et al., 2013; White et al., 2009). Chapters 2 and 3 of this study found inequities in both demographic and socioeconomic factors within the VR system in regard to who received services, what services were received. Future research should assess social inequities within interventions targeted at improving employment or other factors associated with economic stability.

5 SUMMARY AND FUTURE DIRECTIONS

Many systems and structures were built excluding people with IDD, including education and employment; therefore, numerous programs and services have been developed to improve their inclusion and, therefore, their outcomes. VR is one example of a state and federal service program designed to offer services to improve employment outcomes for people with disabilities. As a institutional support, VR could house inequities in service delivery which could widen the gap in existing inequities by not creating supports that are effective or accessible in the populations with the highest disparities. It is important to not only assess the overall outcomes for these interventions, to detect for inequities, but also the outcomes by population group and the processes in which the services are offered. This dissertation began the process of assessing social and economic inequities within the state and federally funded VR program, to determine the role demographic or socioeconomic factors had in participation.

Factors associated with economic stability are associated with improved long-term health outcomes (Thornton et al., 2016). People with IDD face extreme disparities in areas related to economic stability, including lower employment rates, lower wages earned, lower levels of education, less opportunities in higher education, limited availability of affordable housing (Fiorati & Elui, 2015; Frier et al., 2018). However, economic stability is not just a disparity that exists for people with IDD. Disparities in economic stability also occur when comparing the outcome based on race, ethnicity, gender, sexual orientation, and other characteristics (Hassiotis, 2020; Noonan et al., 2016; O'Hara, 2004). This dissertation aimed to improve current understanding of the relationship between factors that support improved economic stability in people with IDD who were applicants for VR services.

5.1 Main findings Chapter 2

Chapter 2 of this dissertation used the RSA-911 dataset to examine for social inequities in service provision and employment outcomes from VR services among applicants with IDD. This study focused only on those who completed eligibility, including completed an individualized employment plan. Only 3% of applicants received services that supported improved education. It found that female applicants, Black applicants, and applicants with lower severity of disability had higher odds of receiving education services. It also found that demographic predictors predicted the amount of services costs were expended (paid for) through the VR agency and the applicant's weekly wage at exit. Female applicants, Black applicants, and Hispanic applicants are less likely to have costs expended by the agency and if they did, received a lower average amount of expenses covered. Similar inequities were reflected when assessing how demographic characteristics predict weekly wage earned. Female applicants, Black applicants, and Hispanic applicants were less likely to earn a wage and earned lower wages, on average. However, the outcome varied for Black and Hispanic applicants by severity of disability, with those with a most significant disability earning more than their White and non-Hispanic counterparts.

Chapter 2 focused on applicants in the VR process who received services, finding social inequities in both the provision of services (education services and expenditures) and the main outcome of the VR (employment as wages earned). The findings demonstrated the need for an evaluation of VR to understand why these inequities exist. It also demonstrated the importance of included interaction terms when assessing for inequities across intersecting identities that experience disparities.

5.2 Main findings Chapter 3

Chapter 3 of this dissertation examined social and economic inequities within those who applied for VR services with their state agency, but exited prior to completing eligibility, including an individualized employment plan, to quality for receiving services. This study was aimed to understand if demographic characteristics and variables related to economic stability predict if the applicant would or would not receive services. The results found social inequities both in demographic predictors of service receipt and in economic predictors of service receipt. Female applicants were less likely to receive services than males, while Black applicants had higher odds than White applicants. However, within Black applicants, odds of a Black applicant with no significant disability receiving services was double the odds of receiving services (compared to a White applicant) than a Black applicant with a most significant disability. Additionally, weekly wage and education both predicted service receipt, with applicants earning higher wages and having a secondary degree having better odds of receiving services.

This study applied a similar examination as chapter 2 to those who did not receive services. The findings demonstrated that certain populations of people have higher odds of receiving services. It also demonstrated that VR services, which aim to improve employment outcomes, inequitably supports applicants who earn higher wages. Further studies need to further this finding by assessing the processes to discover why these inequities exist. Reinforcing findings from chapter 2, including the interaction between disability severity and demographic variables helped to understand the results, and how outcomes within a population can vary based on disability status.

5.3 Main findings Chapter 4

Chapter 4 of this dissertation aimed to improve understanding of the relationship between factors of economic stability in individuals with IDD, including education level, weekly wage, and receipt of SSI/SSDI. Economic stability is a foundational social determinant of health and a main goal of the VR system. The results demonstrated that education level predicted if applicants earned a weekly wage and the amount of wage earned, with higher levels of education associated with improved outcomes. Higher levels of education also predicted lower odds of the applicant receiving both SSI and SSDI. Finally, the study found that some of the effect in the relationship between education level and receipt of Social Security benefits can be explained indirectly through weekly wage. The mediating (indirect) effect explained a higher proportion of the effect as level of education increased.

This chapter focused on improving the understanding of factors associated with economic stability, and our understanding of how these variable work together to support individuals with IDD. This study was one of few to assess outcomes related to employment and economic stability in people with IDD comparing across different levels of education and using wages earned instead of employment status. It found some large differences between the different types of postsecondary education that are often grouped into one category. It also found differences in average weekly wages for individual with IDD across different levels of education and different demographic backgrounds, including intersections of multiple identities. Finally, it provided more information on how factors of economic stability work together, showing the relationships are complex and can differ based on level of education and amount of wages earned. As numerous interventions aim to improve economic stability in

people with IDD, or factors associated with it, the relationship between these variables could help improve development, implementation, and evaluation.

5.4 Overall Findings

Overall, there were four main lessons learned in the findings from the three studies for this dissertation.

1. Findings from this study found **social inequities exist in the state and federal VR program** when assessing demographic and socioeconomic characteristics of applicants with IDD. More needs to be done to understand and prevent these inequities from occurring.
2. This series of studies showed that outcomes for various demographic groups varied based on the severity of disability. **Consideration of intersecting identities** is important to consider when doing research or developing interventions that support health outcomes for people with IDD.
3. This study assessed **wages earned and education level**, a shift from most studies in research focused on individuals with IDD where dichotomous categories of employed versus not employed and/or no postsecondary versus postsecondary are used. As opportunities to participate in education and employment for people with IDD improve, research and practice need to match these expectations and help demonstrate the importance for expanded opportunities for people with IDD.
4. **Economic stability is a complex relationship** between multiple factors, with level of education influencing the size of the total and mediated effect with Social Security benefits and wage earned. More research is needed to better understand this

relationship, especially considering other economic factors, to improve evaluation of interventions that aim to improve economic stability for people with IDD.

5.5 Implications

5.5.1 Social inequities in Vocation Rehabilitation Services

Implications for research. This study identified multiple inequities in the VR systems. Future research needs to determine why these inequities exist. Future studies need to identify why these inequities exist. Some differences in intervention service delivery be can intentional and a result of the intervention focused on populations that are experiencing disparities. For example, the VR process provides services that support improved employment. This study showed that people with more significant disabilities received more expenditures than those with a less severe disability. This is an example of the intervention focusing their resources on the population with higher needs. However, it also found that Black applicants had less expenditures covered by their VR agencies. This is an inequity that could perpetuate the current national outcomes for people with disabilities, which show that Black Americans with disabilities earn less per hour than White Americans with disabilities (Goodman et al., 2019). Future studies need to establish a framework to identify and measure these inequities. Qualitative studies that highlight the experiences of people with IDD from diverse backgrounds who applied to VR are recommended to understand what might contribute to these inequities.

Additional exploration is into the role the state plays in these social inequities is recommended in order to best understand these inequities. Numerous differences exist between states in how VR services are offered. Therefore, an examination of these inequities by state would identify if this problem exists within individual states, or if attention should be

focused on the federal level. Additionally, this study only controlled for state unemployment rates. States vary on many other levels that could be important to consider when assessing for inequities, including state-level policies and funding. Future research needs to examine how social inequities vary across state, and how other factors at the state level might support improved outcomes and decreased inequities.

Finally, this study included the receipt of SSI and SSDI as a factor of economic stability, including how it predicted receipt of services and its relationship with wage and education. Like VR, SSI and SSDI are federal funding streams that are implemented at the and state level that are designed to provide financial supports. Future studies need to assess enrollment in these programs for social inequities, as they are also institutional supports that could contain social and economic bias and inequitable distribution.

Implications for Practice. The results of this study suggest a need for a process evaluation of the VR system and/or needs assessment for individuals with IDD who would qualify from VR services but never apply. In order to get a complete understanding of both the effectiveness and any inequities within the VR system, it is important to understand who is not even being included in this state and federally funded program. A needs assessment of individuals who qualify for services would help understand why individuals who qualify for services may not apply.

Second, findings for this dissertation showed that 16.7% of applicants did not complete eligibility to receive services. The most common reasons for applicants to leave was that they were no longer interested (49.4%) or could not be reached (23.0%). An evaluation could focus on learning why people exited without services, which could help identify how to improve the

existing inequities. Third, a process evaluation could use qualitative interviews with employees with the VR system as well as applicants in all stages. Learning from both experiences might allow for some insight on where bias might be entering the VR process.

5.5.2 Consideration of intersecting identities

Implications for research*.* In this study, interaction terms between severity of disability and sex, race, and ethnicity were used to improve the analysis and understanding of the role demographics play in VR services received. Including the interaction terms not only improved the fit of the models, but it also exposed inequities within sex, race, and ethnicity that were different at differing levels of severity of disability. In some situations, the severity of disability changed the direction of the effect. For example, Manuscript 1 found that Black applicants with a most significant disability earned $37.78 higher average income than White applicants with a most significant disability. However, the effect changed direction in Black applicants with a significant disability, who earned an average $28.48 less per week than White applicants with a significant disability. When the interaction term was not included, the results only stated that all Black applicants earned an average of $29.83 more than all White applicants. This improved level of detail on this social inequity can help research and practice work towards a better understanding of the inequities that exist. Currently, interaction terms are not often discussed with the literature looking at employment and education for people with IDD (Qian et al., 2018) (Qian et al, 2018). With disability being an inclusive minority group, it is important that future research begins to include ways to measure and report data and outcomes based on intersecting identities, including additional methods that go beyond the capabilities of interaction terms within a regression model (Bauer et al., 2021; Gkiouleka et al., 2018).

Implications for Practice. Similarly, those working with individuals with IDD and/or developing and implementing interventions to improve employment and education outcomes need to align their practices with the multi-faceted population they are serving. Additionally, policies that aiming to support outcomes in employment and economic stability for people with disabilities need to consider inequities that exist at the different intersections, ensuring that policies and potential funding that follows is not supporting programs that are widening the gap between inequities that already exist (Gkiouleka et al., 2018; White et al., 2009).

5.5.3 Wage earned and education level

Implications for research. Most studies assessing education in individuals with IDD, either as a predictor or and outcome variable, make comparisons across if they did or did not have any postsecondary education (Qian et al, 2018). This is often done due to sample size, which could contain cell counts that are too small to reliable run the statistical method. The same thing often occurs in employment, which often categorizes if they are employed or not, and if they are paid over minimum wage or not (Qian et al., 2018). However, these dichotomous categories allow for a wide range of variance in the variable. Due to this current study, we can now say that in a sample of applicants to VR with IDD, those who had a non-degree certificate make an average of $75.42 more a week than someone with IDD who only had a secondary degree. More so, someone with IDD who has a bachelor's degree earns an average of $152.24 more than someone with a non-degree certificate. This information now leverages more information to advocate for improved education opportunities beyond non-degree certificates for individuals with IDD. Similarly, these outcomes can be used to compare to other populations and detect differences in outcomes between people with IDD and people

without IDD. Research focusing on improving education and employment with people with IDD need to align their research outcomes, specifically how variables are decided and divided, to match our goals and expectations as a field. In order to receive funding to support more advanced education opportunities, we need data to demonstrate this need.

Implications for Practice. Similarly, interventions developed to improve education and employment outcomes for people with IDD are increasing, due in part to policies such as The Workforce Innovation and Opportunity Act of 2014, the Employment First Initiative, and The Higher Education Opportunity Act of 2008 (Wehman et al., 2018). The first two policies placed an emphasis from the federal and state levels, respectively, on competitive employment for people with disabilities that pays a fair wage. The Higher education act first defined inclusive education in postsecondary institution and created a coordinating center to support improvements in postsecondary education for people with IDD. From this, inclusive postsecondary education programs have been developed all over the US (Vinoski Thomas et al., 2020). However, evidence-based research and studies that evaluate efficacy and long-term outcomes are needed (Wehman et al., 2018). Existing and developing interventions need to improve the reporting and data collection methods of their programs, allowing for evidence that these interventions work and funding should continue.

5.5.4 Economic stability is a complex relationship

Implications for research. This dissertation found a significant mediated relationship between education, receipt of Social Security benefits, and employment. All three of these factors represent economic stability at the individual level. However, people with IDD are more likely to be dependent on their families into adulthood (Woodman et al., 2014). Additionally,

people with disabilities face barriers on the community and societal level in regards to inclusion and expectations that result from a history in the US of being excluded and under supported (Simplican et al., 2015). Future studies should continue to examine the factors that influence economic stability for individuals IDD, including factors at different levels of the socioecological model. These pathways should then be explored to inform practice of mechanism that may lead to improve outcomes in economic stability for people with IDD.

Implications for Practice. This relationship between the three potential outcomes of VR is complex. This should be considered when developing programs and evaluating programs. For example, this study found that higher levels of education and higher wages lead to lower odds of receiving SSI and SSDI. It also found that mean wage stayed steady in applicants who had some postsecondary, a non-degree certificate, or an Associate's degree, then had a larger increase for those who had earned a Bachelor's degree. If a program was developed to improve employment wages for individuals with IDD, but only focused on postsecondary education, their outcomes may be limited because of the SSI. SSI has limits on earned income in order to maintain benefits each month. If the perceived benefits of earning more earned income, and thus losing the benefit, are lower than the perceived benefits of more hours at their job, they may choose not to increase hours in fear of losing a stable income. This shows the importance of considering the multiple factors of economic stability in interventions that are aiming to improve these outcomes.

5.5.5 Conclusion

The results of this study contributes to the existing literature in employment and education for people with IDD. It identifies social inequities within the VR system, demonstrates

the need for intersectional considerations in disability research, provides data on education level and wage earned for people with IDD, and improves understanding of the relationship and importance of including wage, education, and receipt of Social Security benefits when examining or building an intervention for people with IDD. It is important that research and practice work together to continue to advance the development of equitable, research driven interventions supporting improved economic stability in people with IDD.

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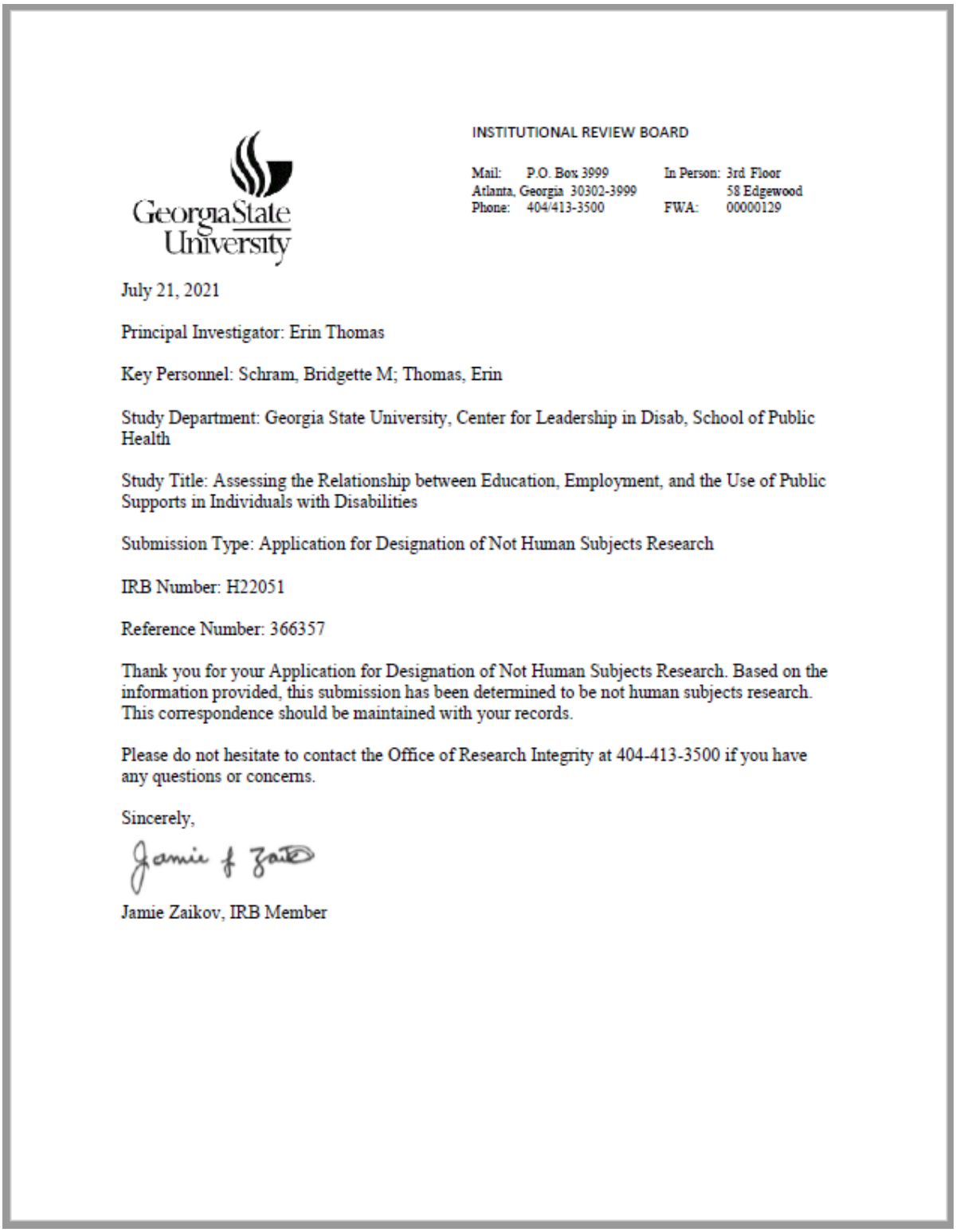
6 APPENDIX

6.1 IRB Letter



Georgia State University

INSTITUTIONAL REVIEW BOARD

Mail: P.O. Box 3999 In Person: 3rd Floor
Atlanta, Georgia 30302-3999 58 Edgewood
Phone: 404/413-3500 FWA: 00000129

July 21, 2021

Principal Investigator: Erin Thomas

Key Personnel: Schram, Bridgette M; Thomas, Erin

Study Department: Georgia State University, Center for Leadership in Disab, School of Public Health

Study Title: Assessing the Relationship between Education, Employment, and the Use of Public Supports in Individuals with Disabilities

Submission Type: Application for Designation of Not Human Subjects Research

IRB Number: H22051

Reference Number: 366357

Thank you for your Application for Designation of Not Human Subjects Research. Based on the information provided, this submission has been determined to be not human subjects research. This correspondence should be maintained with your records.

Please do not hesitate to contact the Office of Research Integrity at 404-413-3500 if you have any questions or concerns.

Sincerely,

Jamie Zaikov, IRB Member

6.2 Matrix of RSA-911 Questions and Measures used for Study Analysis

Appendix 1. Crosswalk of Variables in Study with Questions in the RSA-911 Dataset

Variable in Manuscripts	*RSA-911 Question*	
Week Wage		
*(Hours worked * Hourly wage)*		
Manuscript 1 & 3	**XVII.D.4**	Hourly Wage at Exit
	XVII.D.5	Hours Worked in a Week at Exit
		If above was NA, then:
	IX.C.3	Hourly Wage at Initial IPE
	IX.C.4	Hours Worked in a Week at Initial IPE
Manuscript 2	**IX.C.3**	Hourly Wage at Initial IPE
	IX.C.4	Hours Worked in a Week at Initial IPE
Education Level		
Secondary	**IX.F.3.1**	Highest Educational Level Completed
	IX.F.3.1	Individual attained a secondary school diploma.
	IX.F.3.2	Individual attained a secondary school equivalency.
	IX.F.3.3	Individual has a disability and attained a certificate of attendance/completion as a result of successfully completing an Individualized Education Program (IEP).
Some Post-Second	**IX.F.3.4**	Individual completed one or more years of postsecondary education.
	IX.F.11	Enrolled in Postsecondary Education or career or technical training
	IX.F.13	Completed Some Postsecondary Education, No Degree or Certificate
	IX.G.1	Enrolled in a Career or Technical Training Program, Not Leading to a Recognized Credential
	IX.G.2	Enrolled in a Career or Technical Training Program, Leading to a Recognized Credential
ND cert	**IX.F.3.5**	Individual attained a postsecondary certification, license, or educational certificate (non-degree).
	IX.G.5	Date Attained Other Recognized Credential
Associate	**IX.F.3.6**	Individual attained an Associate's Degree.
	IX.F.14	Date Attained Associate Degree
Bachelor	**IX.F.3.7**	Individual attained a Bachelor's Degree.
	IX.F.15	Date Attained Bachelor's Degree
Graduate	**IX.F.3.8**	Individual attained a degree beyond a Bachelor's Degree.
	IX.F.16	Date Attained Master's Degree
	IX.F.17	Date Attained Graduate Degree

None	**IX.F.3.9**	No educational level was completed.
Social Security Income (SSI)		
Manuscript 2	**IV.G.2**	SSI at Application
Manuscript 3	**XVII.E.2**	SSI at exit
		If above was NA, then:
	IV.G.2	SSI at Application
Social Security Disability Insurance (SSDI)		
Manuscript 2	**IV.G.1**	SSDI at Application
Manuscript 3	**XVII.E.1**	SSDI at exit
		If above was NA, then:
	IV.G.2	SSDI at Application
Age	**IV.B**	
Sex	**IV.C.1**	
Male	**1**	Male
Female	**2**	Female
Race		
White	**IV.C.6**	White
Black	**IV.C.4**	Black
Ethnicity	**IV.C.7**	
Not Hispanic	**0**	Not Hispanic
Hispanic	**1**	Hispanic
Severity of Disability	**VII.C**	
Most Significant Disability	**1**	Most Significant Disability
Significant Disability	**2**	Significant Disability
No Significant Disability	**3**	No Significant Disability
Type of Exit		
No; Did Not Receive Services	**0**	Individual exited as an applicant, prior to eligibility determination or trial work
	1	Individual exited during or after a trial work experience.
	2	Individual exited after eligibility, but from an order of selection waiting list.
	3	Individual exited after eligibility, but prior to a signed IPE.
Yes; Received Services	**4**	Individual exited after an IPE without an employment outcome.
	5	Individual exited after an IPE in noncompetitive and/or nonintegrated employment.
	6	Individual exited after an IPE in competitive and integrated employment or supported employment.
	7	Individual exited as an applicant after being determined ineligible for VR services

	8	Potentially eligible individual exited after receiving pre-employment transition services and has not applied for VR services
Reason for Program Exit	**Question XVII.B**	
Life Circumstance	**1**	Individual is No Longer Available for Services Due to Residence in an Institutional Setting Other Than a Prison or Jail: Individual entered an institution other than a prison or jail, and will be unavailable to participate in a VR program for an indefinite or considerable period of time. This category of institution includes hospitals, nursing homes, and residential treatment centers.
	2	Health/Medical: Individual is receiving medical treatment that is expected to last longer than 90 days and precludes entry into unsubsidized employment or continued participation in the program.
	3	Death of Individual
	4	Reserve Forces Called to Active Duty: Individual is a member of the National Guard or other reserve military unit of the armed forces and is called to active duty for at least 90 days.
	5	Foster Care: Individual is in the foster care system as defined in 45 CFR 1355.20(a), and has moved from the area as part of such a program or system (youth individuals only).
	7	Criminal Offender: Individual entered a correctional institution (e.g., prison, jail, reformatory, work farm, detention center) or other institution designed for confinement or rehabilitation of criminal offenders (section 225 of WIOA).
Ineligible	**8**	No Disabling Condition: Individual is not eligible for VR services because no physical or mental impairment exists.
	9	No Impediment to Employment: Individual is not eligible for VR services because their physical or mental impairment does not constitute a substantial impediment to employment.
	10	Does Not Require VR Service: Individual does not require VR services to prepare for, enter into, engage in, or retain gainful employment consistent with his or her strengths, resources, priorities, concerns, abilities, capabilities, and informed choice.

Additional Supports Needed	**11**	Disability Too Significant to Benefit from Services: - Individual whose mental and/or physical disability and resulting functional limitations are so significant that the individual cannot benefit from VR services. Also use this code for eligible individuals who later acquire additional disabilities and/or functional limitations that are so significant that the individual cannot continue to benefit from VR services.
	12	No Long Term Source of Extended Services Available: Individual who would have benefited from the provision of VR and supported employment services but was determined ineligible because a long term source of extended services is not available, AND is not anticipated to be available. This code is used at the initial eligibility determination only.
	13	Transferred to Another Agency: Individual needs services that are more appropriately obtained elsewhere. Transfer to another agency indicates that appropriate referral information is forwarded to the other agency so that agency may provide services more effectively. Include individuals transferred to other VR agencies.
	16	Extended Services Not Available: Individual has received VR services but requires long term extended services for which no long term source of funding is available. This code is used only for individuals who have received VR services.
Unable to Locate	**17**	Unable to Locate or Contact: Individual has relocated or left the State without a forwarding address, or when the individual has not responded to repeated attempts to contact the individual by mail, telephone, text or e-mail.
No Longer Interested	**18**	No Longer Interested in Receiving Services or Further Services: Individuals who actively choose not to participate or continue in their VR program at this time. Also use this code to indicate when an individual's actions make it impossible to begin or continue a VR program. Examples would include repeated failures to keep appointments for assessment, counseling, or other services.
	15	Extended Employment: Individuals who received services and were placed in a non-integrated or sheltered setting for a public or private nonprofit agency or organization that provides compensation in accordance with the Fair Labor Standards Act (34 CFR 361.5(c)(18)).

Other	**19**	All Other Reasons: This code is used for all other reasons not included in code values 1 through 18.
not used; n=0 in the sample	**14**	Achieved Competitive Integrated Employment Outcome: Applicable only to Type of Exit (XVII.B) code value 6 (Individual exited after an IPE in competitive and integrated employment, or supported employment).
Education Services		
NO education Services		
≥ 1 education service	XII.A.1	Graduate College or University, Service Provided by VR Agency Staff
	XII.A.2	Graduate College or University, Service Provided through VR Agency Purchase
	XII.A.3	Graduate College or University, Comparable Service Provider
	XII.B.1	Four-Year College or University Training, Service Provided by VR Agency Staff
	XII.B.2	Four-Year College or University Training, Service Provided Through VR Agency Purchase
	XII.B.3	Four-Year College or University Training, Service Provided by Comparable Services and Benefits Providers
	XII.C.1	Junior or Community College Training, Service Provided by VR Agency Staff
	XII.C.2	Junior or Community College Training, Service Provided Through VR Agency Purchase
	XII.C.3	Four-Year College or University Training, Service Provided by Comparable Services and Benefits Providers
	XII.D.1	Occupational or Vocational Training, Service Provided by VR Agency Staff (in-house)
	XII.D.2	Occupational or Vocational Training, Service Provided Through VR Agency Purchase
	XII.D.3	Occupational or Vocational Training, Service Provided by Comparable Services and Benefits Providers
	XII.G.1	Basic Academic Remedial or Literacy Training, Service Provided by VR Agency Staff (in-house)
	XII.G.2	Basic Academic Remedial or Literacy Training, Service Provided Through VR Agency Purchase
	XII.G.3	Basic Academic Remedial or Literacy Training, Service Provided by Comparable Services and Benefits Providers
Services Expended		
	XII.A.2.2	Graduate College or University, Amount of VR Title I Funds Expended

Reported in $$ amount; combined total of any of the variables	XII.A.2.3	Graduate College or University, Amount of SE Title VI Funds Expended
	XII.B.2.2	Four-Year College or University Training, Amount of VR Funds Expended for Service (Title I)
	XII.B.2.3	Four-Year College or University Training, Amount of SE Funds Expended for Service (Title VI)
	XII.C.2.2	Four-Year College or University Training, Amount of VR Funds Expended for Service (Title I)
	XII.C.2.3	Four-Year College or University Training, Amount of SE Funds Expended for Service (Title VI)
	XII.D.2.2	Occupational or Vocational Training, Amount of VR Funds Expended for Service (Title I)
	XII.D.2.3	Occupational or Vocational Training, Amount of SE Funds Expended for Service (Title VI)
	XII.E.2.2	On The Job Training, Amount of VR Funds Expended for Service (Title I)
	XII.E.2.3	On The Job Training, Amount of SE Funds Expended for Service (Title VI)
	XII.F.2.2	Registered Apprenticeship Training, Amount of VR Funds Expended for Service (Title I)
	XII.F.2.3	Registered Apprenticeship Training, Amount of SE Funds Expended for Service (Title VI)
	XII.G.2.2	Basic Academic Remedial or Literacy Training, Amount of VR Funds Expended for Service (Title I)
	XII.G.2.3	Basic Academic Remedial or Literacy Training, Amount of SE Funds Expended for Service (Title VI)
	XII.H.2.2	Job Readiness Training, Service, Amount of VR Funds Expended for Service (Title I)
	XII.H.2.3	Job Readiness Training, Service, Amount of SE Funds Expended for Service (Title VI)
	XII.I.2.2	Disability Related Skills Training, Amount of VR Funds Expended for Service (Title I)
	XII.I.2.3	Disability Related Skills Training, Amount of SE Funds Expended for Service (Title VI)
	XII.J.2.2	Miscellaneous Training, Amount of VR Funds Expended for Service (Title I)
	XII.J.2.3	Miscellaneous Training, Amount of SE Funds Expended for Service (Title VI)
	XII.K.2.2	Randolph-Sheppard Entrepreneurial Training, Amount of VR Funds Expended for Service (Title I)
	XII.K.2.3	Randolph-Sheppard Entrepreneurial Training, Amount of SE Funds Expended for Service (Title VI)
	XII.L.2.2	Customized Training, Amount of VR Funds Expended for Service (Title I)

XII.L.2.3	Customized Training, Amount of SE Funds Expended for Service (Title VI)
XIII.A.2.2	Assessment, Amount of VR Funds Expended for Service (Title I)
XIII.A.2.3	Assessment, Amount of SE Funds Expended for Service (Title VI)
XIII.B.2.2	Diagnosis and Treatment of Impairments, Amount of VR Funds Expended for Service (Title I)
XIII.B.2.3	Diagnosis and Treatment of Impairments, Amount of SE Funds Expended for Service (Title VI)
XIII.C.2.2	Vocational Rehabilitation Counseling and Guidance, Amount of VR Funds Expended for Service (Title I)
XIII.C.2.3	Vocational Rehabilitation Counseling and Guidance, Amount of SE Funds Expended for Service (Title VI)
XIII.D.2.2	Job Search Assistance, Amount of VR Funds Expended for Service (Title I)
XIII.D.2.3	Job Search Assistance, Amount of SE Funds Expended for Service (Title VI)
XIII.E.2.2	Job Placement Assistance, Amount of VR Funds Expended for Service (Title I)
XIII.E.2.3	Job Placement Assistance, Amount of SE Funds Expended for Service (Title VI)
XIII.F.2.4	Short Term Job Supports, Amount of VR Funds Expended for Service (Title I)
XIII.F.2.5	Short Term Job Supports, Amount of SE Funds Expended for Service (Title VI)
XIII.G.2.4	Supported Employment Services, Amount of VR Funds Expended for Service (Title I)
XIII.G.2.5	Supported Employment Services, Amount of SE Funds Expended for Service (Title VI)
XIII.H.2.4	Information and Referral Services, Amount of VR Funds Expended for Service (Title I)
XIII.H.2.5	Information and Referral Services, Amount of SE Funds Expended for Service (Title VI)
XIII.I.2.4	Benefits Counseling, Amount of VR Funds Expended for Service (Title I)
XIII.I.2.5	Benefits Counseling, Amount of SE Funds Expended for Service (Title VI)
XIII.J.2.4	Customized Employment Services, Amount of VR Funds Expended for Service (Title I)
XIII.J.2.5	Customized Employment Services, Amount of SE Funds Expended for Service (Title VI)
XIII.K.2.4	Extended Services, Amount of VR Funds Expended for Service (Title I)
XIII.K.2.5	Extended Services, Amount of SE Funds Expended for Service (Title VI)

XIV.A.2.2	Transportation, Amount of VR Funds Expended for Service (Title I)
XIV.A.2.3	Transportation, Amount of SE Funds Expended for Service (Title VI)
XIV.B.2.2	Maintenance, Amount of VR Funds Expended for Service (Title I)
XIV.B.2.3	Maintenance, Amount of SE Funds Expended for Service (Title VI)
XIV.C.2.2	Rehabilitation Technology, Amount of VR Funds Expended for Service (Title I)
XIV.C.2.3	Rehabilitation Technology, Amount of SE Funds Expended for Service (Title VI)
XIV.D.2.2	Personal Assistance Services, Amount of VR Funds Expended for Service (Title I)
XIV.D.2.3	Personal Assistance Services, Amount of SE Funds Expended for Service (Title VI)
XIV.E.2.2	Technical Assistance Services Including Self-Employment, Amount of VR Funds Expended for Service (Title I)
XIV.E.2.3	Technical Assistance Services Including Self-Employment, Amount of SE Funds Expended for Service (Title VI)
XIV.F.2.4	Reader Services, Amount of VR Funds Expended for Service (Title I)
XIV.F.2.5	Reader Services, Amount of SE Funds Expended for Service (Title VI)
XIV.G.2.4	Interpreter Services, Amount of VR Funds Expended for Service (Title I)
XIV.G.2.5	Interpreter Services, Amount of SE Funds Expended for Service (Title VI)
XIV.H.2.4	Other Services, Amount of VR Funds Expended for Service (Title I)
XIV.H.2.5	Other Services, Amount of SE Funds Expended for Service (Title VI)

6.3 Table of State Unemployment Rates

State Unemployment Rates by State by Quartile

		Rate	*Ranking*
National Average		3.9	
Quartile 1	Hawaii	2.4	1
	North Dakota	2.5	2
	Iowa, New Hampshire, Vermont	2.6	3
	Idaho	2.8	6
	Nebraska, South Dakota, Utah, Virginia	2.9	7
	Colorado, Minnesota, Wisconsin	3.0	11
Quartile 2	Maine	3.1	14
	Missouri	3.2	15
	Kansas, Oklahoma	3.3	16
	Indiana, Massachusetts, South Carolina	3.4	18
	Tennessee	3.5	21
	Florida	3.6	22
	Arkansas, Delaware	3.7	23
	Maryland, Montana	3.8	25
Quartile 3	Alabama, Connecticut, Texas	3.9	27
	Georgia, New Jersey, North Carolina, Oregon, Wyoming	4.0	30
	New York, Rhode Island	4.1	35
	Kentucky, Michigan	4.2	37
	California	4.3	39
Quartile 4	Illinois, Nevada, Pennsylvania, Washington	4.4	40
	Ohio	4.5	44
	Arizona, Louisiana	4.8	45
	New Mexico	4.9	47
	Mississippi	5.0	48
	West Virginia	5.2	49
	District of Columbia	5.7	50
	Alaska	5.9	50