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SECONDARY DATA ANALYSIS: PREDICTORS OF EMPLOYMENT AMONG YOUNG ADULTS WITH CEREBRAL PALSY

A Dissertation Submitted to Molloy University
The Barbara H. Hagan School of Nursing & Health
Sciences PhD in Nursing

In Partial Fulfillment
of the Requirements for the

Degree Doctor of

Philosophy

by

EDUARDO SANTOS del ROSARIO, MSN, FNP-BC
Jennifer Emilie Mannino, PhD, RN, CNE, Dissertation Supervisor

May 2023

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2023

Molloy University

The dissertation committee of the Barbara H. Hagan School of Nursing and Health Sciences has examined the dissertation titled

SECONDARY DATA ANALYSIS: PREDICTORS OF EMPLOYMENT AMONG
YOUNG ADULTS WITH CELEBRAL PALSY

Presented by EDUARDO DEL ROSARIO

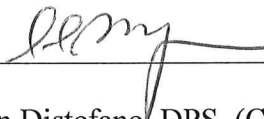
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ABSTRACT

Young adults with cerebral palsy have lower employment rates as compared to young adults in general, as they may be confronted with complex interactions between cognitive delays, physical impairments, activity limitations, participation challenges, and personal and/or societal barriers as they progress to adulthood. These challenges are clear, the solutions, less so. Understanding the predicting factors of employment is vital to future generations of this population. The purpose of this study is to identify predictor variables and examine the relationship of those variables to employment. It has explored existing Rehabilitation Services Administration (RSA-911) data through the lens of the International Classification of Functioning, Disability, and Health (ICF) model to examine the relationship of functioning and disability within the context of personal and environmental factors as predictors of employment among young adults with cerebral palsy. Following a descriptive and cross-sectional design using a secondary analysis of this national data set, binomial logistic regression was applied to analyze employment outcome and predictor variables. Of the study participants ($N = 2,465$), just under a third (30.4%) were employed. Most participants were White (74.7%), males (59.2%), with a reported physical impairment (90.7%), had a private living arrangement (96.5%), and whose primary source of support was from family and friends (54.7%). Significant predictors for employment were age at program exit, participation in career services, participation in support services, and basic skills and literacy. These findings concur with the persistent low employment rate and the need to understand the factors to increase employability. Nursing is strategically positioned to direct outcomes, reduce disparity, and advance equity. To achieve this, nurses are urged to deliver care that incorporates participation in daily activities and society and increase awareness of this pediatric-onset disability as a lifetime condition.

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It is an utter joy to pay reverence to the many people who contributed to my knowledge in Cerebral Palsy (CP) and sustained me to realize my PhD degree. From this point on, I see my career in healthcare differently, with fresher eyes; the concept of my duties has fundamentally changed.

First, the patients and families who allowed me to work alongside them as their nurse practitioner especially during their transition process from pediatric- to an adult-based healthcare system. They imparted immense information about CP that are accountable and unaccountable.

With deepest gratitude to Dr. Michael Sussman of Shriners Children's Portland, Oregon who facilitated my 'formative' clinical training and education in pediatric orthopedics and in particular, treatment and management of CP. He is an erudite and a humanizing pediatric orthopedic surgeon who highlights all the great potentials of each individual and family with this condition. Through the years, Dr. Sussman remained a confidant and committed mentor to me.

Under the leadership of the late Dr. Alfred Grant and Dr. David Feldman's pediatric neuromuscular program at NYU Langone Orthopedic Hospital, I became a much more well-rounded and skilled clinician. Most importantly, they supported the initiation, under my direction, of a healthcare transition program that included pediatric-based collaboration with the adult-based providers within the NYU enterprise and community resources in New York City to increase socialization and participation of teen-agers and young adults with CP e.g., NYC Ballet young adults' movement series, Parson's School of Design adaptive clothing program, and NYC Parks and Recreation. It is at this juncture where I witnessed the positive impacts of social participation and also the struggles of the participants when planning to attend a cultural show. An event that can be attended on a whim for most of us but a week of preparation when one has

a neuromuscular condition, like CP.

Debbie Sala, clinical researcher, and physical therapist at NYU Division of Pediatric Orthopedics, shared and articulated her research knowledge with me. Additionally, she generously gave her time and expertise in research collaborations that led to the publication of my first peer-reviewed article on healthcare transition, in which I was the primary author. This research project directed me to investigate employment predictors among young adults with CP for my dissertation. For this, I will always be indebted to her.

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My mom, my true inspiration and have always been with me – win or lose. My “ate” (older sister in Tagalog) is one of the many reasons I chose to work in my clinical specialty. Eric, the younger and smarter brother always motivated me to aspire. And for my dad – I wish you witnessed the day I received my PhD diploma.

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CHAPTER 1: INTRODUCTION

Background

Prior to the 1960s, people with intellectual and developmental disabilities (IDD) in the United States were shielded in family homes and in private and public institutions (Olney & Kennedy, 2001). In the late 1960s, policy reforms led to deinstitutionalization and improved fiscal funding focused on community-based living for people with IDD. These developments provided special education, daycare services, and facility-based workshops. Moreover, several federal legislations have highlighted the need for enhanced employment and opportunities for individuals with IDD. The federal-level amendments include the Rehabilitation Act of 1986, Americans with Disabilities Act 1990, and the Rehabilitation Act Amendments 1992, and the Developmental Disabilities Assistance and Bill of Rights Act of 2000. The Americans with Disabilities Act is a breakthrough federal law that guards the rights of individuals with IDD by eradicating barriers to participation in daily living and working in America. Specifically, this act forbids employer discrimination of IDD and other individuals with disabilities, embracing all employment-related activities, from opportunities to promotion, wage, benefits, environmental accommodation, and retention (Bureau of Labor Statistics, 2023).

The U.S. Higher Education Opportunity Act of 2008 and the Workforce Innovation and Opportunity Act of 2014 addressed the needs and actions to advance employment outcomes for individuals with IDD. Even with these labor acts in place, employment rates of adults with IDD remains only 15% (Hiersteiner et al., 2016) and less than 50% of employers have prior experience in hiring and working with individuals with IDD since the 1960s (Athamanah et al., 2022). In 2019, the total number of non-institutionalized individuals with a disability was 41.1 million, and an estimated 5.5 million of them were between the ages of 18 to 34 (U.S. Census

Bureau, 2022). Furthermore, there is a higher prevalence of disability among bisexual, transgender, and gender-nonconforming individuals than heterosexual cisgender individuals (Smith-Johnson, 2022; Varadaraj et al., 2021).

Historically and still today, adults with cerebral palsy (CP) have had significantly lower rates of employment. There are multiple factors that may contribute to the employability of an individual with CP, including physical, psychosocial, educational, and financial status (Benner et al., 2017; Crothers et al., 1959; Flippo et al., 2011; Graham et al., 2018; Magill-Evans et al., 2008; Rutkowski et al., 2009; Shrader et al., 2021; Verhoef et al., 2014). Disabilities from CP persist throughout adulthood, thus decreasing employment opportunities (Amalky, 2020; Liptak, 2008), and perpetuating unemployment may be associated with a life-long dependence on disability-related government programs (Benner et al., 2018; Huang et al., 2013; Pettersson & Rodby-Bousquet, 2021). Obtaining and maintaining employment could be challenging for anyone, but the challenges are worse when one has a disability. Young adults with CP face additional factors related to their diagnosis that may impede their ability to obtain employment. These might include personal characteristics, concomitant medical issues, limitations in mobility or communication, lack of accessibility to transportation, and motoric functional impairments (Boucher et al., 2010). Understanding what factors play a role in the attainment of employment for the individuals with CP is important to facilitate the employment of future generations of CP populations.

Problem Statement

Employment not only provides financial security but also a way to express one's individuality and is a means of participating in society. Being employed may also serve to decrease social isolation and stigma in comparison to individuals without disabilities (Blustein,

2008). When they work, people with disabilities can have opportunities for food security, social belonging, intimacy, personal esteem, purpose, and personal growth (Lent & Brown, 2013).

Young adults with CP have lower employment rates as compared to young adults in general (Benner et al., 2018; Pettersson & Rodby-Bousquet, 2021). Although young adults with CP are qualified for a variety of jobs, they often find themselves deprived of opportunities due to the scarcity of suitable employment. Unlike the general population, young adults with CP may be confronted with complex interactions between cognitive delays, physical impairments, activity limitations, participation challenges, and personal and/or societal barriers as they progress to adulthood. These challenges are clear; the solutions, less so.

The increasing population of adults with CP has outnumbered children and youth with CP by 3 to 1 (Alriksson-Schmidt et al., 2016; Brooks et al., 2014). Moreover, the life expectancy of an individual with CP, who can walk with less severe impairments, is similar to the general population (Hemming et al., 2006; Strauss et al., 2008). Individuals with CP favor working in integrated employment settings (Migliore et al., 2007). In addition, non-employed individuals with disabilities have the same opinions regarding the worth of earnings and job security characteristics as the non-disabled equivalents (Ali et al., 2011). If predictors of employment go unrecognized, then qualified adults with CP may miss the opportunities for financial security, socialization, and personal growth. Factors that affect employment and their degree of influence need to be identified to increase the employment rate for this population.

Significance of the Problem to Nursing

Nursing plays a significant role in caring for patients with CP throughout various stages of their lives. Nursing care may be provided in the patient's home, at the hospital bedside, in a clinic, and in the community. The American Nurses Association (2022) trusts all nurses to

deliver compassionate, comprehensive, and person-centered care to every individual and all-encompassing to people with IDD who experience health disparities across practice settings. The nurse's chief obligation is to the patient, whether an individual, family, group, community, or population (Nehring et al., 2022; Winland-Brown et al., 2015). Furthermore, supporting people with IDD through respect, recognition of their uniqueness, and advocacy to achieving their full abilities to become productive citizens in the society are central in the ANA's (American Nurses Association) position statement when nurses are caring for individuals with disabilities (ANA Ethics Advisory Board, 2020). Hence, nursing care for individuals with CP ought to emphasize their individual needs and strong points regardless of the diagnosis. This nursing care must include available opportunities for participation in activities that promote self-management and independence. In view of this, the nurse practitioner (NP), an advanced practice nurse, is integral to the development of self-management (Betz et al., 2020; Betz et al., 2021; Mannino et al., 2022), which can contribute to increasing one's employment potential. Self-management concepts consist of actions leading to the young adult individual's knowledge about CP condition and treatments, observation of their own health status, ability to express their own goals with caregivers and health care providers, and the identification of community services and support encompassing advocates, health insurance, guardianship, and other services that are applicable to their unique needs.

In multiple institutions in the US, pediatric, adult, and family NPs are the case managers or the primary care providers for this group of patients, serving to maintain and monitor their health status. While pediatric NPs are mindful of developmental stages of early life and adult NPs are more acquainted with the middle to final stages of life, family NPs are equipped to provide the continuity of lifelong care for the patient with CP. Furthermore, the pediatric NPs are

involved in optimizing the children and emerging adults' health in preparation for advanced education, vocational and professional training, and process of employment. As the patient reaches the age of adulthood, the adult NPs assume the adult-based health screening and medical treatment responsibilities.

The specialty NPs, who are clinically trained in caring for patients with CP, evaluate, diagnose, and treat conditions associated with CP. This includes assessing the individual's self-care, mobility, communication, and cognitive abilities toward the goal of maximizing their independence to facilitate employment. Based on these evaluations, they determine when referrals to medical specialties (e.g., orthopedic surgery, physiatry, neurology, neurosurgery, and pulmonology) and ancillary services (e.g., social work; physical, occupational, and speech therapy and vocational rehabilitation) are needed. In addition to working closely with the medical teams, the specialty NPs are typically the frontline health providers who are problem solving with the physicians, social workers, rehabilitation teams, school, or employers to address any new medical or psychosocial issues that arise to ensure the patients' continued process to obtain or maintain employment.

As the purpose of this study is to elucidate factors that are important to the attainment of employment, nursing can design their programs to incorporate these findings and ensure that they are adequately addressed in their interactions with patients and families. Across the health care discipline and society, the findings of this research may yield new knowledge and understanding for developing strategies and policies that improve the societal participation of individuals with CP.

Conceptual Framework

This research study uses the International Classification of Functioning, Disability, and Health (ICF) model (Figure 1) to help explore factors that may predict employment among young adults with CP. The ICF is a widely recognized biopsychosocial model that offers a universal language and framework, containing more than 1,400 items comprehensively depicting the individual's aspects in life, to describe and assess the impact of a health condition (disorder or disease) on functioning and disability within the context of personal and environmental factors that may either minimize or maximize the individual's function (World Health Organization, 2007). It is an essential model to use when advancing activity and attaining societal participation among individuals with CP (Rosenbaum & Gorter, 2012). This model comprehensively depicts the individual's aspects in life by five components: body functions and structures, activities, participation, and personal and environmental factors. These five components are interconnected, where functioning and disability are a multi-dimensional occurrence at the physical, personal, and societal level. In all, the ICF model delivers both a comprehensive classification of the features of one's health and function as well as a visual outline that generates these ideas together. In view of this, the World Health Organization (2007) and ICF Research Branch (2022) launched the ICF Core Sets, which are lists of the most pertinent categories for specific health conditions, including multiple sclerosis, traumatic brain injury, stroke, and children and young individuals with CP. The ICF Core Set was developed for practical application in health care settings, which is a minimal standard for the assessment and reporting of functioning and health (Stucki, 2004). It provides a range of critical categories, based on the whole ICF classification, which describes the functioning of an individual with a specific health condition or in a specific health care context.

Prior to 2021, the only available ICF Core Set was applicable to pediatric populations with CP (Schariti et al., 2015; Selb et al., 2015) and did not entirely apply to adult populations with CP. In 2021, the first ICF Core Set for adults with CP was created with essential categories to comprehensively define the functioning profile of an adult with CP (Noten et al., 2021) and be efficiently used in clinical settings. The creation of this specific Core Set was grounded on the adult participants' life experiences with CP and the expert opinions of a multi-disciplinary team of health care professionals and researchers working with this specific population (Limsakul et al., 2020; Noten et al., 2021; Noten et al., 2022). In conclusion, the new ICF Core Set for adults with CP is the extension of ICF Core Set for pediatric population with CP. Specifically, environmental factors and body functions were highlighted in the adult Core Set (Limsakul et al., 2020). The use of available ICF Core Sets offers a lifespan approach for a standardized evaluation of function of any individual with CP and consistent data collection for research.

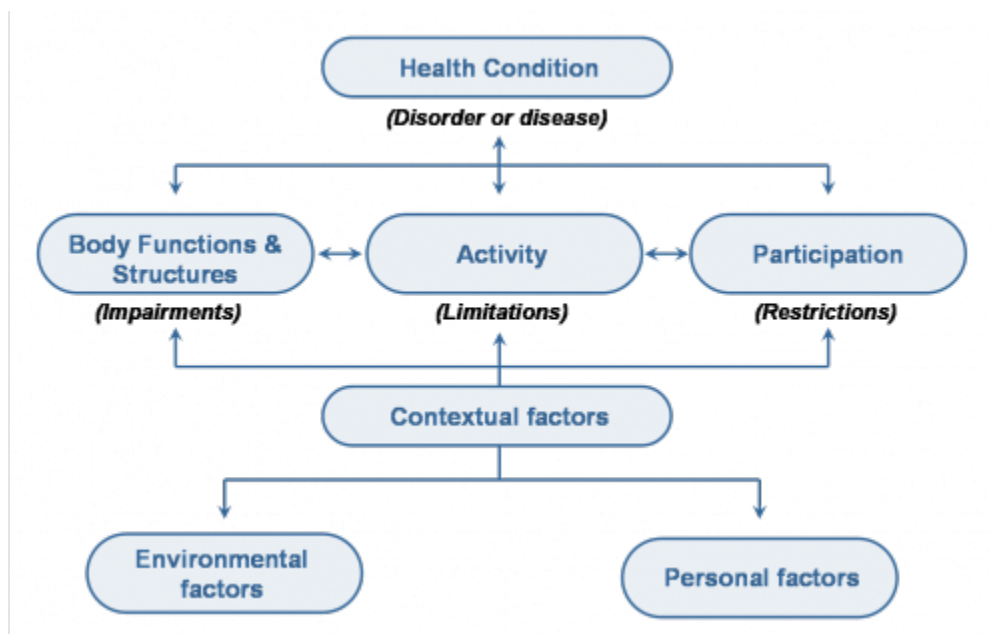


Figure 1 The International Classification of Functioning, Disability, and Health (ICF) (Université catholique de Louvain, 2007)

Significance of the Study: Secondary Data-Analytic Approach

The foundation of this research is to confront the dehumanization that occurs when qualified individuals with CP remain unemployed. To date, a need remains to identify barriers and define successful strategies for hiring qualified individuals with CP. This lack of evidence is likely attributed to the variability of CP's clinical presentation, variety of involved health care providers, non-universal response to current available treatments, low priority on political agenda, and scarcity of literature on adults with CP compared to the more extensive pediatric research.

A secondary data analysis was used to investigate the variables of personal characteristics, vocational rehabilitation (VR) services, barriers to employment, and employment outcome of young adults with CP using the data set of the U.S. Department of Education, Rehabilitation Service Administration Case Service Report, Form 911 (RSA-911). Secondary data analysis is appropriate to use for this study because it offers a significant number of collected data from a difficult-to-access population in the US with a disability or disabilities, including heterogenous characteristics related to vocational services and employment. Data accessibility is straightforward and allows methodological development such as the use of high-level statistics to predict employment and strengthen generalizability to young adults with CP. In 1963, Glaser implied that the use of secondary data analysis offers novel strength to the framework of essential social knowledge. In nursing, Polit and Hungler (1983) presented the use of secondary data analysis as a developing method in research (O'Connor, 2020). Moreover, this method is advantageous when used in settings where participants are elusive (Fielding, 2004), and the use of existing primary data sets for secondary analysis can enable training for novice researchers (Long-Sutehall et al., 2011).

Secondary data analysis is an investigation of collected data gathered by somebody else for purposes other than research, such as official statistics or organizational accounts (Chan et al., 2018; Hox & Boeij, 2005; Johnston, 2014; Peng et al., 2002). It is an empirical exercise that requires research principles and evaluative steps like studies using primary data. Unlike secondary data, primary data are collected for a specific study question utilizing a systematic method tailored for the research query on hand. Like primary analysis of data, secondary analysis of data adds new scientific knowledge but through a different viewpoint and only contrasts in its dependence on existing data. The use of this existing data is a practical approach for researchers due to its accessibility, minimal cost (or cost free), and the absence of data collection burden. The data may come from numerous sources, including public agencies (e.g., archived records, de-identified claims, or data collected by government agencies) or private agencies (e.g., advertising or research-oriented technology applications). A significant advantage of using secondary data is getting real-life behavior data from a large sample size of heterogeneous participants, allowing the use of high-powered statistical tests that can increase the study's generalizability (Chan et al., 2018; Heaton, 1998; Weston et al., 2019). Conversely, disadvantages are the reliability and validity of questionnaires or surveys used to obtain the data (Dale et al., 2008). Considering the appropriate fit of the data to the research question, a secondary data set must be scrutinized for its innate advantages and disadvantages, including biases, data quality related to current research, and the methodological criteria of good scientific practice. It is unacceptable to use the secondary dataset to formulate a hypothesis. Research hypotheses are developed a priori. All said, secondary data analysis tackles new research questions by examining previously collected data.

Purpose of the Study

The purpose of this secondary analysis is to use the ICF model applied to existing RSA-911 2019 data to examine the relationship of functioning and disability within the context of personal and environmental factors as predictors of employment among young adults with CP.

Research Aim

To identify predictors of employment for young adults with CP within the US.

Research Objectives

1. Calculate the employment rate among young adults with CP.
2. Categorize the impairments, limitations, and restrictions of young adults with CP.
3. Identify personal factors that predict employment.
4. Identify vocational rehabilitation services that predict employment.
5. Examine the predictive relationship between employment barriers, personal and environmental factors, and employment outcome among young adults with CP.

Research Questions

1. What is the relationship between individual characteristic variables and employment in young adults with CP?
2. What is the relationship between barrier variables and employment in young adults with CP?
3. What is the relationship between vocational rehabilitation service variables and employment in young adults with CP?

Hypotheses

RQ #1

H₀: Individual characteristic variables have no effect on employment status.

H₁: Individual characteristic variables have a positive effect on employment status.

RQ #2

H₀: Barrier variables have no effect on employment status.

H₁: Barrier variables have a negative effect on employment status.

RQ #3

H₀: Participation in vocational rehabilitation services has no effect on employment status.

H₁: Participation in vocational rehabilitation services has a positive effect on employment status.

Definition of Terms

The following definitions of terms were derived from the RSA-911 codebook (2017).

Age at Exit - Participant's age at exit from a VR services program.

Barriers - Any economic or personal factor that is a hindrance in attaining employment.

Basic Skills Deficient/Low Level of Literacy - An individual whose academic skills are at or below eighth-grade level.

Career Services - A series of services to determine a participant's VR eligibility and allocation to a class of VR program that activates by order of selection and to establish the extent of VR services for Individualized Plan for Employment planning. These are the following services: VR counseling and guidance; job search and/or placement assistance; short-term job supports such as job coaching for those without supported employment goal, consistent with an Individualized Plan for Employment goal; supported employment services encompassing customized employment and services to support and maintain a participant with utmost disability; information and referral services; benefits counseling on work income and disability benefits; customized employment services competitive with integrated employment for a participant with

a considerable disability; and extended services to support and maintain a participant with a considerable disability.

Cognitive Impairment - The participant's primary disability leading to a significant obstacle to employment. This impairment includes cognitive involving learning, thinking, processing information and concentration; psychosocial involving interpersonal and behavioral disorders and difficulty coping; and other mental impairments.

College - Full-time or part-time academic schooling at a 4-yr college, university, or technical college resulting in a baccalaureate degree, a certificate, or other accepted educational qualification.

Cultural Barriers - An individual who perceives self as having personal characteristics that hinder their ability to attain employment.

Disability - Either a physical, sensory, or mental impairment that considerably restricts a single or more of key life events or activities.

Displaced Homemaker - An individual who previously was financially supported by another family member.

Employment - Full-time or part-time employment, self-employment, or supported employment in a competitive integrated employment setting, with a customary rate received by similarly employed individuals without disabilities.

English Language Learner (ELL) - An individual whose ability to communicate in English is limited.

Ethnicity - Self-identify Hispanic or Latino.

Ex-Offender - An individual who had committed a criminal offense or delinquent act.

Exhausting TANF (Temporary Assistance for Needy Family) - Any individual who is within two years of exhausting this benefit.

Foster Care Youth - Presently in foster care or aged out.

Gender - Self-identify as male, female, or do not self-identify gender.

Highest Educational Level Completed - Highest schooling, training, or program for which an individual received a degree or certificate.

Homelessness - No stable or consistent nighttime or living housing arrangement.

Impairment - Sensory, physical, or mental impairments causing significant difficulty getting employed.

Individualized Plan for Employment - A continuous plan to identify employment goals, tailor a set of services for the participant to achieve employment goals, and to record services and goal attainments.

Living Arrangement - Self-report of living situation.

Long-Term Unemployed - Not employed for at least twenty-seven consecutive weeks.

Low Income - An individual with family income less than poverty level, or a foster child under governmental financial support, or a homeless individual, receiving financial and/or nutritional assistance from the government in the last six months prior to application to VR.

Medical Insurance Coverage - Source of healthcare insurance.

Mental Impairment - The participant's primary disability leading to a significant obstacle to employment. This impairment includes cognitive (learning, thinking, processing information, and concentration), psychosocial (interpersonal and behavioral disorders, difficulty coping), and other mental impairments.

Migrant and Seasonal Farmworker - An individual working in an agricultural or fish farming industry who is chronically unemployed or underemployed.

No Medical Insurance - Participant is unqualified for private insurance via one's present job but qualify for private insurance when the participant finishes employment probation.

Physical Impairment - The participant's primary disability leading to a significant obstacle to employment. This impairment includes mobility orthopedic/neurological; manipulation/dexterity orthopedic/neurological; both mobility and manipulation/dexterity orthopedic/neurological; other orthopedic such as inadequate motion; lung damages; and universal bodily debilitation including fatigue, weakness, or pain; and other bodily impairments.

Primary Source of Support - An individual's highest principal source of economic support at application for VR program services.

Public Support - Provision of cash payments by federal, state, and/or local government.

Race - Self-identify as American or Alaska Native, Asian, Black, or African American, Native Hawaiian or Other Pacific Islander, White. If an individual does not self-identify, observer-identification will be substituted. Multi-racial individuals may select more than one race. If an individual fails to self-identify, an observer-identification method is used.

Sensory Impairment - The participant's primary disability leading to a significant obstacle to employment. This impairment includes blindness and other visual impairments; deafness, primary communication visual; deafness, primary communication auditory; hearing loss, primary communication visual; hearing loss, primary communication auditory; and other hearing impairments (tinnitus, Meniere's disease, hyperacusis, etc.); and deaf blindness.

Single Parent - An individual who is primarily responsible for one or more children less than 18 years of age.

Source of Referral - Any individual, agency, or organization who referred the participant to VR.

Supported employment services - Ongoing support services, including customized employment, and other support services needed by a young adult with significant disability to maintain employment.

Support Services – Provide the need or needs of a VR-eligible participant to take part in a VR service under Individualized Plan for Employment, pre-employment program, and during employment. The services range from monetary backing for basic necessities covering transportation, food, shelter, and clothing; rehabilitation technology; personal assistance services; technical assistance services, including self-employment; reader services; interpreter services; and other services that provide funds for occupational licenses, tools and equipment, initial stocks, and supplies.

Training Services - To aid a participant to progress in academic or vocation or to adjust to one's own limits based on impairment. Inclusive of expenses related to tuition, fees, and books only.

Vocational Rehabilitation Services - A sequence of services for individuals with disabilities to enable work entry.

Young Adult - 18 to 30 years old (American Psychology Association, 2022; Center for Disease Control, 2022; U.S. Health and Human Services, 2022; World Health Organization, 2022). The American Academy of Pediatrics (2002) acknowledged the upper age limit as 21 years with concessions in the case of a child with special health care needs. Pediatric care continues through young adulthood, considering the patient's physical and psychosocial needs, the decision of patient and/or family, and the abilities of the pediatric provider to provide these needs (Hardin et

al., 2017). Furthermore, the U.S. Department of Health and Human Services (2022) continue their young adult health care coverage up to 26 years old.

Summary

In conclusion, employment is an essential component of human life and well-being. Being gainfully employed not only provides financial security but it is also a way to express one's individuality, have a level of independence, and participate in society. Conversely, disability frequently influences the individual's employability and work performance. CP impacts an individual's body functioning and activities, which in turn may cause 'disabilities,' impairments, activity limitations, and participation restrictions toward gainful employment. Therefore, effective and tailored transition planning offers a normal developmental structure for constructing essential relationships between individuals with CP, their families, medical and rehabilitation providers, educators, and the community. Programs such as employment preparation, urban skills, social participation, job and/or volunteer courses in partnership with the school, community, and health providers are crucial during the transition period from adolescence to young adulthood. In view of this, the nurse practitioner (a CP expert) is poised to assist the individuals with CP in adapting to their environment, teach self-management skills, and assist entities in accommodating the needs of these individuals.

CHAPTER 2: LITERATURE REVIEW

This literature review explores CP through the lens of the ICF model. It focuses on the impact CP has on functioning and disability and the contextual factors that influence employment outcomes and economic independence among individuals with CP. It describes the health condition of CP, the impact of CP on the individual's body functions and structure, their ability to carry out activities related to personal care, and the negative sequelae CP has had on participation in interpersonal and intergroup activities, specifically participation in employment for young adults and adults in the US. It also explores contextual factors in the environmental and personal spheres that may serve as obstacles and facilitators of employment.

Cerebral Palsy

CP is the most common childhood motor disorder that causes life-long physical activity limitations, including the ability to move, balance, and maintain posture, ranging from minimal to profound. Cerebral refers to the brain, while palsy means weakness. It is a neurodevelopmental condition, not a disease nor a curable medical condition, but rather a clinical picture of a non-progressive brain injury and/or lesion, acquired during the ante-, peri-, or post-natal period, and up to infant age (Bosanquet et al., 2013; Novak et al., 2017, Sadowska et al., 2020). CP is well recognized as a clinical diagnosis, independent of its etiology (Aravamuthan et al., 2022). Clinical presentations vary and may involve different body areas (limbs, trunk, and/or neck and head) and types of involuntary movement impairments and muscle tone disorders, resulting in various levels of functioning and abilities. Nearly 75% of individuals with CP are adults (Access Economics, 2022; Brooks et al., 2014). Advances in science and medicine have dramatically increased the lifespan of individuals with CP, turning their once childhood disorder into an adult chronic medical condition. These advances include improving neurological function

during early development, treatment of associated conditions such as muscle tone and movement disorders, pain, and medical co-morbidities, the utilization of assistive devices and modern technologies to augment motor function, and increased prevention surveillance of secondary musculoskeletal complications (Graham et al. 2016; Novak et al., 2013 & 2020).

Prevalence of CP

The worldwide prevalence of CP is approximately 1.5 to 2 per 1,000 live births, with about 17 million people affected worldwide (Best, 2006; Blair et al., 2018; Graham et al., 2016; Oskou et al., 2013). Data analysis of CP registries and surveillance systems of birth year 1995 identified CP prevalence of 1.6 per 1,000 live births in high-income countries and nearly 3.3 per 1,000 live births in low- to middle-income countries (McIntyre et al., 2022). The low- to middle-income country data presented the disproportionately high cases of severe CP without access to rehabilitation and educational services and a noteworthy ratio of potentially avoidable risk factors, including asphyxia at birth and neonatal infections. In the US, CP is represented approximately 1 in every 345 American children according to 2010 estimates from the Center for Disease Control Autism and Developmental Disabilities Monitoring Network (Center for Disease Control, 2022; Yeargin-Allsopp et al., 2008).

Etiology of CP

In the early 1860s, William J. Little, an English surgeon, provided the first clear description of CP in children and identified premature birth and neonatal asphyxia as crucial underlying factors to a child developing CP (Pakula et al., 2009). This clinical observation led to a major contribution in understanding the etiologies in CP during the 20th century (Graham et al., 2016). A consensus definition of CP was described as a group of permanent developmental disorders of movement and posture, resulting in activity limitations associated with disturbances

in the developing fetal or infant brain (Rosenbaum et al., 2007). More recently, the use of “cerebral palsy spectrum disorder” has been proposed as a more precise term given the heterogeneity of CP’s clinical presentation (Shevell, 2019).

The definite etiology of CP remains inexact. It involves complex factors and varied origins spanning from injury to, or malformation of, the developing brain, or to genetics. Childbirth hypoxia has been generally presumed as the major cause of CP but accounts for less than 10% of CP cases (Ellenberg & Nelson, 2013; Nelson & Ellenberg, 1986); brain malformations and genetic disorders are less common (Bax et al., 2006; MacLennan et al., 2015; Richard et al., 2021). A study of risk factors for CP among term babies in developed countries reported placental abnormalities, major and minor birth defects, low birthweight, meconium aspiration, instrumental/emergency caesarean delivery, birth asphyxia, neonatal seizures, respiratory distress syndrome, hypoglycemia, and neonatal infections (McIntyre et al., 2013). Other risk factors include congenital malformations, genetic susceptibility, hypoxic-ischemic encephalopathy, in utero or perinatal stroke, in vitro fertilization or use of assisted reproductive technology, kernicterus, maternal disorders of clotting, maternal-fetal infections, multiple gestation, neonatal seizures, neonatal sepsis or meningitis, post-neonatal meningitis or traumatic brain injury, and pre-pregnancy obesity (Korzeniewski et al., 2008 & 2019; Michael-Asalu et al., 2019). Prematurity and low birthweight are major risk factors for CP (Correa-Villasenor et al., 2003; Graham et al., 2016).

There are three subtypes of CP: spastic; dyskinetic, including dystonia and/or choreoathetosis; and ataxic (Cans et al., 2007; Rosenbaum et al., 2007). The anatomic distribution of monoplegia, hemiplegia, diplegia, and quadriplegia have been commonly used to describe motor disorder, but all body regions need to be described individually in terms of any

impairments (Rosenbaum et al., 2007). The onset of movement disorders including spasticity, dystonia, choreoathetosis and/or ataxia occur within the first few years of life because of disrupted brain development (Cans et al., 2000). Some of the conditions commonly associated with CP are seizures; secondary musculoskeletal deformities; and impairments in sensation, cognition, and communication.

Given the plasticity of the developing brain, early and timely diagnosis of CP is critical to implementing targeted interventions to optimize cognitive and motor functioning. A diagnosis of CP given between the age of 12 and 24 months was considered relatively late (Velde et al., 2019). A CP registry and surveillance of high-income countries revealed that the diagnosis of CP was given to only 21% of infants by 6 months old and 52% after 1 year old (Australia Cerebral Palsy Register Report, 2018). A final CP diagnosis may necessitate sequential evaluations and extend past the first few years of life, particularly when there are complex clinical presentations and the history is unreliable (Ashwal et al., 2004; Sadowska et al., 2020).

While the diagnostic classification of CP remains homogenous, the differences in physical, mental, and sensory/communicative impairment contribute to vast heterogeneity in activities and participation for individuals with CP. This supports Shevell's (2019) proposition of "cerebral palsy spectrum disorder" as a potentially more precise term. As medical advances provide individuals with CP a more favorable prognosis, so should targeted interventions be identified and implemented to support a fulfilling life.

Economic Considerations

The projected lifetime expenditures for all individuals over 20 years old with CP is approximately \$11.5 billion in direct and indirect costs (Center for Disease Control, 2022). Current literature reported significant correlation between the severity of CP and spending, but

the scale and full scope of the economic impact varies considerably across investigations (Tonmukayakul et al., 2018) and information on cost-effectiveness and sound budget strategies remain vague (Shih et al., 2018). The U.S. government is confronted with considerable federal spending on welfare systems, disability pensions, housing, accessibility accommodations, healthcare, and rehabilitation programs, among others. Likewise, families of individuals with CP have unaccounted economic hardship related to caregiving burden and stress, lost potential earnings, out-of-medical benefit expenses, home modification, custom equipment, and/or homecare assistance (Stabile & Allin, 2012).

Functioning and Disability

The ICF model provides researchers and clinicians with a framework for considering a health condition not in terms of the condition itself, but rather in terms of the impact that condition has on functioning and disability. Body functions and structures, activities, and participation are conceptualized in terms of impairments, limitations, and restrictions caused by the health condition (World Health Organization, 2007).

Impact of CP on Body Functions and Structures

Body functions and structures in the ICF model refer to the operation of the body's anatomy, physiology, and psychology. Impairment in body functions for the CP population mainly involves the neuromuscular system. This impairment includes abnormal muscle tone, muscle weakness, and absence of selective motor control secondary to a non-progressive injury in a developing brain (Scholtes et al., 2006; van Naarden et al., 2016). Spasticity, a common abnormal muscle tone, occurs in up to 90% of CP cases (del Rosario 2020; Kim et al., 2020). The anatomical impairments of the body include joint deformities (i.e., hip subluxation and/or displacement, scoliosis, thumb-in-palm, and/or ankle equinus)

and were associated with the abnormal muscle tone (Ackman et al., 2004; Aiona & Sussman, 2004; De Mattos et al., 2014; Graham et al., 2003; Russman et al., 1997; Sala et al., 1997); and cervical myelopathy secondary to premature degeneration of the cervical spine was associated with neck dyskinesia, a movement disorder (Furuya et al., 2013; Jameson et al., 2010; Monbaliu et al., 2017).

Body functions are directly affected by sensory deficits. The impairment in the somatosensory system includes all peripheral and central components concerned in the conduction and handling of sensory information arising from superficial or cutaneous receptors and/or from the musculoskeletal system. Any deficits in somatosensory are likely to worsen motor impairments in CP (Kurz et al., 2015). Sensory deficits that impact hearing, vision, and sense of touch for individuals with CP may lead to disorders in physiological functioning, such as poor balance, speech impairment, loss of bowel/bladder control, and sleep disturbance (Novak et al., 2012; Odding et al., 2006; Verschuren et al., 2017).

The Gross Motor Function Classification Scale (GMFCS) is the most accepted of all the functional groupings of individuals with CP. Originally, Palisano and colleagues (1997) designed the GMFCS for ages 2 to 12 years. In 2008, Palisano and colleagues expanded and revised the GMFCS to include 12 - to 18-year-olds with descriptors and distinctions in view of their developmental milestones. This scale is a valid and reliable rating method to describe the gross motor function of an individual with CP. The GMFCS ranges from I to V, with each level describing the individual's self-initiated movements and use of assistive devices (i.e., crutches, walkers, or wheelchair for mobility at home and in the community). In 2011, Reid and associates reported that more than half of the population of CP are GMFCS levels I to II. Typically, patients

who are classified as GMFCS levels I to III are considered ambulatory while patients who are classified as GMFCS levels IV to V are considered non-ambulatory.

Intellectual disability (ID) is a neurodevelopmental disorder characterized by significantly below-average intellectual functioning (Besag, 2002). Although approximately 50% of individuals with CP have been identified as having ID (Novak et al., 2012; Reid et.al, 2018), the evidence remains insufficient when evaluating cognition among children with CP. Often when there is severe motor impairment, cognition status is assumed as impaired (Stadskleiv, 2020). ID is often accompanied by epilepsy and is a common comorbidity among individuals with GMFCS levels IV and V who are non-ambulatory (Bertoncelli et al., 2019; Novak et al., 2012). The rate of ID is highest among individuals with cerebral malformations (70%) and lowest among individuals with white matter injuries (Himmelman et al., 2011, 2016). A 13-year longitudinal study found individuals with CP, GMFCS V, and ID ($n = 21$) had poor communication skills that limited their social interactions as compared to individuals with CP and no ID ($n = 100$). These individuals without ID had developed communication and social interactions comparable to normally developing individuals, irrespective of CP and GMFCS level (Tan et al., 2020). An exploration of the lived experience of adults with CP revealed reported issues in mental function impacting language development, increased dependency in performing self-care activities, and non-supportive health professionals and extended family among those with ID ($n = 31$) as compared to those without ID ($n = 7$; Noten et al., 2021). In the aspects of psychology and mental health, adults with CP without ID were found to have an increased risk of developing anxiety and depression when matched with non-CP adults (Smith et al., 2019). Moreover, a prevalence study of mental health disorders among adults ($n = 8.7$ million, including 7,348 with CP), found a greater prevalence of schizophrenia, mood affective

disorders, anxiety, adult personality and behavior disorder, and alcohol and opioid-related conditions among men with CP as compared to those without CP (Whitney et al., 2019).

In addition to problems inherent to CP, aging with CP poses a risk for comorbidity that leads to new clinical challenges. Comorbidity takes place when an individual has more than one condition at the same time, either chronic or long-term. Comorbidity is linked with worse health outcomes, complicated clinical management, and high expenditure for the healthcare system (Valderas et al., 2009). A large-scale study of 18–30-year-olds with CP revealed an increased prevalence of hypertension, stroke, COPD, heart conditions, diabetes, liver disease, and kidney disease, anxiety, and depression (Whitney et al., 2018, 2021). Adults with CP have an increased risk of having non-communicable diseases and increased chance of death due to cancers, chronic obstructive pulmonary disease, stroke, and ischemic heart disease, compared with the general population (Ryan et al., 2018; Whitney et al., 2018). Diabetes, asthma, hypertension, other heart conditions, stroke, emphysema, joint pain, and arthritis were strongly associated with low level of mobility among high functioning individuals with CP (Peterson et al., 2015). In conclusion, adults with CP have been observed at increased risk of these medical conditions related to decreased physical activity and primary care screening.

Impact of CP on Daily Activities

Daily activities in the ICF model refer to the execution of a task or action in daily life that involves personal and self-care activities such as bathing, toileting, dressing, eating, and drinking (World Health Organization, 2007). A systematic review of functioning and disability among adults with CP, using the ICF as a reference and published research between 2000 and 2017, found that activities and participation were studied more frequently than body functions and structures (Benner et al., 2019). In this study, mobility was the most focused ICF domain, which

contains walking, moving around, and changing and maintaining body positions. All these mobility tasks are reflected in the GMFCS.

Adults with CP most frequently reported problems with self-care over time and their difficulty with meal preparation, housework, and dressing were related to mobility difficulties (Benner et al., 2017; Nieuwenhuijsen et al., 2009); gradual weakening in strength and less mobility leading to increased difficulties with performing self-care (Roebroek et al., 2009; Verschuren et al., 2018); and regardless of GMFCS level, needing assistance with activities of daily living (Jacobson et al., 2019). ID associated with CP has been reported to impact performance of daily activities more so than gross motor function (Vos et al., 2013).

Pain is a prevalent secondary condition among adults with CP. Mobility, level of self-care, function, and health-related quality life were found to be adversely affected by pain (Alriksson-Schmidt et al., 2016; Morgan et al., 2014). A study on severe pain found a six-fold risk of pain interfering with daily activities (Rodby-Bosquet et al., 2021). The most reported pain in adults with CP was from those with bony abnormalities and abnormal muscle tone (van der Slot et al., 2012, 2021). In addition, fatigue was observed to regularly co-exist with pain (Benner et al., 2017; van der Slot et al., 2012). Both pain and fatigue were most frequently reported outcomes by young adults with CP (Benner et al., 2019; Jacobson, 2020; Roebroek et al., 2009; Russchen et al., 2014; van der Slot et al., 2021; Van Gorp et al., 2020; Vogtle, 2012). Conversely, pain is underreported in populations with CP who are non-communicative or when pain is reported by their caregiver or proxy only (Rodby-Bosquet et al., 2021).

Impact of CP on Participation

Participation in the ICF model refers to taking part or engaging in a variety of interpersonal and intergroup interactions ranging from education, social relationships, recreation and leisure, and employment (World Health Organization, 2007). The same impairments in body functions and structure for individuals with CP that contributed to limitations in performing activities of daily living also contributed to restrictions in participation. Suitable employment for adults with CP includes job duties that can accommodate motor and/or sensory impairments because each manifestation of CP is different. For example, an individual with CP diplegia (both legs are the major motor impairment) can typically use the upper extremities and should have the physical abilities for jobs using a computer or talking on the phone, whereas an individual with CP monoplegia (whose motor impairment involves only one limb) can move around and perform more active tasks. A recent study on well-being found that a higher unemployment rate at 33% than national levels were associated with lack of advanced education, high utilization of Social Security Disability Insurance, lower levels of physical function, and less community-walking activity (Shrader et al., 2021). Furthermore, a large-scale study on living conditions and social outcomes investigated adults with CP ($n = 1,888$), median age of 25, revealed that only one in six has competitive employment and one in eight adults with CP has a partner and personal assistance as a vital component for independent living (Pettersson et al., 2021).

Remunerative employment and socialization are the two most frequently reported outcome measures of participation among young adults with CP (Benner et al., 2019; Nieuwenhuijsen et al., 2009). Participation restrictions are obstacles that an individual with CP encounters in society. For instance, many adults with CP have indicated difficulties in several participation domains, including employment (Mitchell et al., 2006; Nieuwenhuijsen et al., 2009;

van Gorp et al., 2019), recreation and leisure, and social engagements (van der Slot et al., 2010). Suboptimal social participation of young adults with CP had been associated with epilepsy, speech impairment, and/or special education (Tan et al., 2016); and regardless of GMFCS levels, the majority that lived at home with parents were unemployed and received parental support financially (Jacobson et al., 2019). In addition, ID further challenged the individual's participation in employment (Wehman et al., 2015). ID and level of communication function were inversely proportional to the level of social participation (Jacobson et al., 2019). Most recently, a study on epidemiology of activities and participation among adults with CP from 65 articles ($n = 28,429$) found that of those individuals, on average, only 40% were employed and 30% lived independently (van Gorp et al., 2020). Last, Rozkalne and colleagues (2021) found that low level of function on GFMCS had negative associations with independence in social activities, sexuality, and transportation.

Interdependence with others was found to increase feelings of belonging and acceptance as a key marker of success in adulthood (King et al., 2000). Numerous studies on attitudinal factors reported positive outcomes in adults with CP who have had adult role models with optimistic future expectations of them and supported them to achieve the best of available opportunities, including employment (Carroll et al., 2021; Magill-Evans et al., 2001). Similarly, optimizing patient independence without devaluing parent/caregiver input was identified as one of the most important educational needs for nurses who work with individuals with chronic illness and disabilities (Mannino et al., 2022). Furthermore, higher level of education, active employment, and independent living arrangements were associated with better functional capacity and higher self-esteem (Espin-Tello et al., 2018).

Participation in Employment for Young Adults with CP

Early studies have concluded that job attainment is a top priority for adults with CP and that employment and economic independence are considered the most important life domains related to well-being (Liptak et al., 2008; Stevenson et al., 1997). Consequences from unsatisfying employment outcomes were increased social isolation (Michelsen et al., 2005; Murphy et al., 2000) and decreased psychosocial well-being (Livingston et al., 2007); transportation dependence as a significant barrier; and negative social reactions to disability that limited employment opportunities (Magill-Evans et al., 2008). A study on competitively employed adults with CP identified 22% of this group were at an income level that would end their disability benefits if they receive a promotion or wage increase causing an overall decline in their income (Murphy et al., 2000). In this case, Social Security and Medicaid benefits acted as work disincentive and a barrier to their economic independence.

In 2019, the percentage of population that was employed, also known as the employment–population ratio, was less than 20% for individuals with a disability compared to almost 70% for people without a disability (U.S. Bureau of Labor Statistics, 2022), which translates to 7.8 million individuals with a disability being employed compared to 147 million individuals without a disability being employed. Of these employed full-time, individuals with a disability, age 18 to 64 and living in the community, the annual median earnings were \$39,297 (inflation-adjusted dollars) compared to the same-age individuals without a disability in the community with annual median earnings of \$46,318. Based on the data from the U.S. Census Bureau, the earnings gap, known as the difference between these two populations, in 2019 was \$7,021 (Houtenville et al., 2021). Employment outcomes worsened one year later when in 2020, only 17.9% of individuals with a disability

were employed, down from 19.3% in 2019 (U.S. Bureau of Labor Statistics, 2022).

Contextual Factors that Impact Employment for Adults with CP

Within the ICF model are contextual factors, comprised of environmental and personal, that influence functioning and disability. Environmental factors are beyond a person's control (i.e., family, the healthcare system, government policies). Personal factors are those that are independent of the health condition (i.e., age, race, gender). Early studies on the impact of contextual factors and adults with CP emerged in early 2000 (Kembhavi et al., 2011), leading to increased attention of functioning and disability for the aging population with CP and the development of the ICF Core Sets for adults (Noten et al., 2021). This research investigated the significance of environmental and personal factors that can inhibit or facilitate participation in employment.

Environmental Factors

Environmental factors are external forces that include the physical, social, and attitudinal environment in which people with CP live and conduct their lives (World Health Organization, 2007). Accessibility features including ramps, elevators, wall handles, designated seating, and/or space for wheelchairs or walkers. Other examples of physical factors in the environment include a voice-activated phone or communication device and/or a custom-made motorized wheelchair support in completing skills training or obtaining employment. Without these basic features, employment is negatively affected (Hanes et al., 2019; Murphy et al., 2000).

Individuals with CP are confronted with an assortment of obstacles that include accessible transportation, or the building ramp they cannot take without assistance, or unreceptive co-workers, or the lack of basic skills. In contrast, among the individuals with IDD, including CP, their first employment experiences in high school and positive parental

expectations of post-school employment were significantly associated with positive, competitive employment outcomes (Wehman et al., 2015).

Providing employment possibilities to individuals with disabilities, including CP, has been a major objective of policy makers for more than two decades. The Higher Education Opportunity Act of 2008 and the Workforce Innovation and Opportunity Act of 2014 are significant social factors in the environment of individuals with IDD (Athamanah et al., 2022). These federal agencies direct the advancement of employment outcomes and prohibit employers from discriminating against individuals with disabilities. Despite these Acts, discrimination, an attitudinal factor, remains rampant. Studies relating to employment discrimination have found that there was a 26% less chance of hearing interest from potential employers when the disclosure of a disability was indicated on employment applications (Ameri et al., 2018). In addition, low employment rates of adults with IDD, including CP, are due to employers who perceived a lack of skills among individuals with IDD (Kocman et al., 2017), had limited knowledge regarding disability (Bowman, 2020; Ju et al., 2013), lacked the motivation to employ an individual with IDD or improve the work environment accessibility (Graham et al., 2018; Waisman-Nitzan et al., 2019), worried about poor productivity (Graffam et al., 2002), and had unfavorable attitudes toward individuals with IDD (Scott et al., 2017; Solomon, 2020; Unger, 2002).

Contrary to the studies citing employment discrimination toward adults with IDD, an early study in New York state demonstrated employers' positive attitude toward individuals with disabilities as productive workers when provided with support services (Levy et al., 1993). Key predictors of willingness to hire include employers' perception of work performance, corporate social responsibility, and prior experience hiring employees with a disability (Dean et al., 2022),

and inclusion policies and procedures at workplaces that foster employer engagement (Iwanaga et al., 2021). Promoters of slightly more positive viewpoints of individuals with IDD in the workplace were correlated with employers' education level and age. Younger employers with higher education were associated with increased willingness to hire employees with disabilities (Athamanah et al., 2022).

Personal Factors

Personal factors are characteristics of an individual unrelated to the individual's health condition (World Health Organization, 2007). These factors include but are not limited to age, gender, race, ethnicity, living arrangement, and educational level. Like environmental factors, personal factors can either inhibit or facilitate employment. Studies on gender and educational level of adults with CP reported that males with college education at application for VR services were significant for achieving competitive employment (Huang et al., 2013), while females were less likely to be employed (Magill-Evans et al., 2008).

One study on educational achievement and employment of adults 21 to 35 years matched participants with CP ($n = 819$) to participants without CP ($n = 4,406$). Participants with CP were more likely to have only completed primary and lower secondary school and were less likely to attend college than their peers without CP. In this same study, only 29% of the group with CP were gainfully employed versus 82% of the comparison group (Michelsen et al., 2005). Similarly, an observational study of educational outcomes of adults with CP ($n = 95$) demonstrated that while 79% of the participants completed 12 years or more of education, only 23% of the participants were competitively employed (Mesterman et al., 2010). In these early studies, the personal factor of less education and training was associated with low employment rate. On the contrary, a recent study on a group of young adults with CP, with comparable levels

of education as typically developing adults, found relatively high rates of unemployment, caretaker need, and Social Security Disability Insurance utilization (Shrader et al., 2021).

Role of Nursing to Promote Participation

The transition from adolescence to adulthood is a normal developmental stage. Adolescence is a significant stage in life when the foundation is laid for engagement in future roles and when self-management and participation can be best optimized (Betz & Coine, 2021; del Rosario et al., 2022). Pragmatic programs for adolescents are vital during this transition period, such as medication management; employment-preparation class; and development of urban and social skills, job, and/or volunteer courses in partnership with the school, community, and health providers. Given the regularity and frequent direct contact to patients with CP, nursing plays an instrumental role as the channel between the patient, the educators, and VR teams when transitioning an adolescent to adulthood. However, there is a lack of formal training and education at all levels of nursing to serve this purpose (Betz et al., 2016; Betz et al., 2021; Ladores, 2015; Mannino et al., 2021; Sharma et al., 2014) and a critical need to prepare nurses, especially those in advanced roles (Betz, 1998; Betz & Redcay, 2005; Betz 2013; Betz et al., 2017; Hauser & Dorn, 1999; Higgins & Tong, 2003; Mannino et al., 2022). Incorporating the nursing principles of clinical practice into the transition process of an individual and family, from adolescence to adulthood, can aid in achieving positive participation outcomes.

Summary

CP remains the most common pediatric-onset physical disability. It is a life-long incurable neurodevelopmental condition with profound impacts on the individual, the family, and the community. The diagnosis of CP is a heterogeneous set of conditions involving

permanent motor dysfunction that affects muscle tone, posture, and/or movement. This clinical presentation changes as the individual matures. Presently, there are more adults with CP than pediatrics with CP.

Understanding the manifestation of individuals' impairments and their level of functioning and disability contributes to realizing the effects of CP in adulthood and participation, particularly in employment. Within the ICF model, disability represents the negative attributes of the interface between an individual with CP and the individual's contextual factors counting environmental and personal. Any adjustment or alteration in the environment, and acknowledgement of personal deficiencies or independence, may enhance or diminish the function outcome.

Young adults with CP exhibit decreased independence in all areas of participation. These individuals are confronted with the pervasive existence of a high unemployment rate and obstacles to obtaining and/or maintaining employment since the originating studies in disability and employment. Given the heterogeneity of every CP manifestation, job opportunities with appropriate employment accommodations remain elusive.

To help increase the participation rate in employment among this population, nurses—specifically those in advanced practice roles—have an opportunity to advance the science through nursing research; participation in city, state, and/or federal policy; development of clinical programs using high-evidence data and multi-disciplinary collaboration, including the sectors of business, economics, architecture, engineering, and arts.

CHAPTER 3: METHODOLOGY

This chapter presents the processes in establishing the study's rigor and validity and describes the research purpose, aims, research questions, design, data source, human subjects' protections, variables, and the strategy for statistical analysis.

Purpose

The purpose of this secondary analysis was to use the ICF model applied to existing RSA-911 of 2019 data to examine the relationship of functioning and disability within the context of personal and environmental factors as predictors of employment among young adults with CP.

Research Aim

To identify predictors of employment for young adults with CP within the US.

Research Questions

1. What is the relationship between individual characteristic variables and employment in young adults with CP?
2. What is the relationship between barrier variables and employment in young adults with CP?
3. What is the relationship between vocational rehabilitation service variables and employment in young adults with CP?

Design

The study used a non-experimental, quantitative, descriptive, cross-sectional research design utilizing a secondary analysis of a data set extracted from the U.S. Department of Education Rehabilitation Service Administration Case Service Report (Form 911), also known as RSA-911, of fiscal year 2019. The applicability of the study's research design to RSA-911 data

set was based on data that were collected within a specific time without manipulation of the independent variables (Polit & Beck, 2021). Like other secondary data-analysis studies, the research questions in this study were answered by analyzing the previously collected data in a new manner.

Secondary Data Set: RSA-911

The VR programs in the US are funded by Rehabilitation Services Administration (RSA) and state rehabilitation agencies that deliver employment services to assist individuals with disabilities to reach their vocational goals. This original and comprehensive US-wide vocational program that continuously sponsors the employment and independence of individuals with disabilities collects approximately \$3 billion in annual federal funding (Yin et al., 2023). The collected information of RSA-911 provides data of VR and Supported Employment programs' operation to the Rehabilitation Services Administration for reporting in the Annual Report to the Congress and the President as mandated by sections 13 and 101(a)(10) of the Rehabilitation Act of 1973.

In addition, RSA-911's data offers assessment of VR program via appraisal standards and operations measures as required by section 106 of the Act; section 116 of title I of Workforce Innovation Opportunity Act (WIOA) for principal curricula of the labor force development; section 14(a) of the Act for programs authorized under the Act and fiscal soundness; and section 107 of the Act for program effectiveness. These mandates included a strong focus on transition-age youth, age 14 to 24, as they represent a greater percentage of all VR participants. In view of this, the state VR agencies are front and center in supporting these young adults with disabilities to attain their full potential in the job market (Honeycutt et al., 2015). Furthermore, RSA-911 report impacts their own budget planning, support, and expansion; shares statistics with the

Social Security Administration; and offers research investigators the data on disability, VR services, and employment outcomes.

The RSA-911 is a large data set consisting of information of individuals with disabilities or a disability who received VR services and their employment outcomes. The USC §102(a) (1) of the Rehabilitation Act of 1973 determined the eligibility criteria for each applicant that included (1) a physical or intellectual disability, resulting in a considerable obstacle to employment; (2) VR services that can improve employment results; and (3) VR services that are needed to train for, get into, participate in, or keep gainful employment. Fundamentally, this offers surveillance of all pre-employment transition services by student characteristic, geography, counselor; variations in these services; and expenditures on various kinds of VR services. Thus, each VR agency is required quarterly to submit a report consisting of individuals who received pre-employment transition services; applied with pending VR services; is an active applicant receiving VR benefits; or currently a finished case with mandatory data on employment status and gained competence for the extent of a year post-closure. All VR agencies must carry out methods to safeguard accurate data collection, up-to-date data, financial accountability, and retention. Furthermore, the RSA Commissioner oversees state VR programs to regulate whether a state is compliant with the provisions of the VR portion of the Unified or Combined State Plan. Those states that failed the data-reporting steps and deadlines are up for potential penalties based on audit findings from the Inspector General, State, or Single Audits (RSA-911, 2017, p. 2). All this oversight is adjunct to the RSA's 18-step method to avoid errors in data collection.

Procedure for Obtaining Data Set

Following a June 2021 research committee's approval of the inquiry request to the Rehabilitation Services Administration Office of Special Education and Rehabilitative Services, the signed agreement between the RSA-911 data set office and the student researcher was submitted online. In mid-July 2021, the U.S. Department of Education Rehabilitation Service Administration Data Collection and Analysis Unit authorized the signed agreement, and their statistician transferred the fiscal year 2019 de-identified RSA-911 data set in Microsoft Excel format with the corresponding code book via e-mail. As requested by the student researcher, only data representing participants with CP across the US who have been eligible for and received VR services with an Individualized Plan for Employment and employment outcome were included in the data set. The received de-identified data set contained raw data on participants' demographics, disability, barriers to employment, types of VR intervention services received, age at exit dates, and employment outcomes.

The student researcher transferred all raw data from Microsoft Excel program to Statistical Package for the Social Sciences (SPSS), version 27 (SPSS Statistics, IBM Corporation, NY, USA). The research committee's statistics adviser verified the complete and correct transfer of RSA-911 raw data set of 2019 from Microsoft Excel to SPSS program. In addition, the research committee chair and statistics adviser appraised the RSA-911 federal code book manual and evaluated the empirical evidence through previous secondary data-analysis studies using the RSA-911 data set (Huang et al., 2013; Trenz et al., 2020). After cross-referencing the RSA-911 data set's variables to the study's research questions, the student researcher and research team further examined the data set's definition of employment outcomes and potential predictor variables. Subsequently, the data preparation required the use of SPSS

software's transform step to rename, re-code, and dummy-code the outcome and designated predictor variables as extracted from the RSA-911 data set. In essence, the transform step of SPSS software is the procedure of changing and configuring data into a usable format for statistical analysis.

Sampling Plan

As discussed in the previous chapter, secondary data analysis is a study of collected data gathered by someone else for a wide-ranging purpose that may include documentation, statistics, or surveillance. It is universally acknowledged that a perfect and flawless data set is non-existent. To meet the study's rigor and validity, the research committee's statistics adviser guided the student investigator throughout the data preparation, including the use of RSA-911 codebook as reference, assessment of transferred data, prioritization of study variables, and exercises of SPSS software's transform step, re-naming, and dummy coding. All these are initial steps in preparation for the analysis of secondary data and ensure the study's integrity (Long-Sutehall et al., 2011; O'Connor, 2020).

Of the 4,100 participants with CP across the US, only individuals with age ranging from 18 to 30 at the time of exit and completed VR program with employment outcomes were included in this study. The individuals whose age were less than 18 and more than 30 at the time of exit of their VR program were excluded. After the inclusion and exclusion criteria were met, the data set was assessed for any missing data, unusual entries, and suitability for satisfying the research questions.

Study Variables

Guided by the ICF model and empirical evidence from the review of literature, the study variables were selected accordingly to meet the research questions using a federal data set of VR services with employment outcomes.

Outcome Variable

Each of the employment outcomes, presented in Table 1, was either one of two classes of a dichotomous variable. Using the transform step of SPSS software, all participants with an employment outcome were dummy-coded to yes = 1. These participants, at exit of their VR program, were either employed part-time or full-time in an integrated competitive setting, self-employment, or state-managed business with a salary at or above the minimum wage (Rehabilitation Services Administration, 2017). For those without employment outcome, they were dummy-coded to no = 0. This was considered a failed outcome, as no salary was earned.

Table 1

Outcome Variable

Employment Outcome Variable		Type	
Employment	<ul style="list-style-type: none">• Competitive Integrated Employment (CIE)• Self-Employment• Randolph-Sheppard Business Enterprise Program• State Agency-Managed Business Enterprise Program (BEP)• Supported Employment in Competitive Integrated Employment• Supported Employment on Short-Term Basis• Uncompensated Employment	Dependent	
	Rehabilitation Services Administration. (2017). <i>Employment outcome</i> . https://rsa.ed.gov/sites/default/files/subregulatory/pd-16-04.pdf		

Predictor Variables

The predictor variables were divided into individual characteristics, barriers to employment, and VR services. The individual characteristics' groups and categories are enumerated in Table 2 as raw data. Only the age at exit group was not renamed nor modified. Under the 'highest education level completed' group, the transform step of SPSS software was performed to cluster alike data such as 'secondary school diploma,' 'secondary school equivalency,' and 'certificate of successful completion IEP' into one category, renamed as 'secondary education,' recoded, and dummy-coded to yes = 1 or no = 0. Similarly, the transform step of SPSS was executed to all categories within the following individual characteristic groups:

- living arrangement group was transformed with 'private,' 'community,' or 'other' as new categories.
- impairment group was transformed with 'physical,' 'sensory,' or 'mental' new categories.
- primary support group was transformed with 'own income,' 'family or friends,' 'public,' or 'other' as new categories; and
- medical insurance group was transformed into 'private,' 'public,' or 'no insurance' as new categories.

The sex group was renamed to 'gender' and its categories were re-coded to 1 = female, 0 = male. The race group's categories were renamed individually, maintained the response code 1 = yes, no = 0; and excluded all responses code 9 = did not self-identify; and Hispanic or Latino group was renamed to 'Ethnicity' and re-coded responses to 1 = Hispanic or Latino, 0 = not Hispanic or Latino. Under race group, all responses code 9 = did not identify were clustered into a new category named did not self-identify; and all participants who responded with more than

one race category were renamed to multi-race category. Both categories, such as ‘did not self-identify’ and ‘multi-race,’ were dummy-coded 1 = yes, 0 = no. In terms of impairment, ‘sensory/communicative impairment’ was renamed to ‘sensory impairment’ and its categories were re-coded to 1 = yes, 0 = no. The SPSS software was used to perform the rename, re-code, and dummy-code steps.

Table 2

Predictor Variables

Individual Characteristics		Variable Type
Age	18 to 30 years old	Continuous
Gender	<ul style="list-style-type: none"> • Male • Female 	Nominal
Race	<ul style="list-style-type: none"> • American Indian or Alaska Native • Asian • Black or African American • Native Hawaiian or Other Pacific Islander • White 	Nominal
Ethnicity	<ul style="list-style-type: none"> • Hispanic or Latino 	Nominal
Living Arrangement	<ul style="list-style-type: none"> • Private residence • Community residential facility/group home • Rehabilitation facility • Mental Health Facility • Nursing Home • Correctional Facility • Halfway house • Substance Abuse Treatment Center • Homeless/Shelter • Other 	Nominal
Physical Impairment	<ul style="list-style-type: none"> • Mobility Orthopedic/Neurological Impairments • Manipulation/Dexterity Orthopedic/Neurological Impairments • Both Mobility and Manipulation/Dexterity Orthopedic/Neurological Impairments • Other Orthopedic Impairments (e.g., limited range of motion) • Respiratory Impairments • General Physical Debilitation (e.g., fatigue, weakness, pain, etc.) • Other Physical Impairments (not listed above) 	Nominal

Mental Impairment	<ul style="list-style-type: none"> • Cognitive Impairments (e.g., impairments involving learning, thinking, processing information and concentration) • Psychosocial Impairments (e.g., interpersonal, and behavioral impairments, difficulty coping) • Other Mental Impairments 	Nominal
Sensory/ Communicative Impairment	<ul style="list-style-type: none"> • Blindness • Other Visual Impairments • Deafness, Primary Communication Visual • Deafness, Primary Communication Auditory • Hearing Loss, Primary Communication Visual • Hearing Loss, Primary Communication Auditory • Other Hearing Impairments (Tinnitus, Meniere's Disease, hyperacusis, etc.) • Deaf-Blindness • Communicative Impairments (expressive/receptive) 	Nominal
Primary Source of Support	<ul style="list-style-type: none"> • Personal income (employment earnings, interest, dividends, rent, or retirement including social security). • Family and Friends. • Public support (SSI, SSDI, TANF, etc.) • Other sources (e.g., private disability insurance and private charities) 	Nominal
Medical Insurance Coverage	<ul style="list-style-type: none"> • Medicaid • Medicare • Affordable Care Act • Public insurance from other sources • Private insurance through employer • Not yet eligible for private insurance through employer • Private insurance through other means 	Nominal
Highest Educational Level Completed	<ul style="list-style-type: none"> • Secondary school diploma • Secondary school equivalency • Certificate of attendance/completion successfully completed Individualized Education Program (IEP) • One or more years of postsecondary education • Postsecondary certification, license, or educational certificate (non-degree) • Associate degree • Bachelor's degree • Degree beyond a bachelor's degree 	Nominal

-
- No educational level was completed
-

Rehabilitation Services Administration. (2017). *Individual characteristics*.
<https://rsa.ed.gov/sites/default/files/subregulatory/pd-16-04.pdf>

Each of the barriers to employment group's categories in Table 3, enumerated as raw data, was renamed only for the analysis of data.

Table 3

Barriers to Employment

Barriers to Employment		Variable Type
Barriers to Employment	• Long-term unemployed	Nominal
	• Exhausting TANF within two years	
	• Foster Care Youth	
	• Homeless Individual, Homeless Children and Youths, or Runaway Youth	
	• Ex-Offender	
	• Low Income	
	• English language learner (ELL)	
	• Basic Skills deficient/Low level of literacy	
	• Cultural barriers	
	• Single Parent	
	• Displaced Homemaker	
	• Migrant and Seasonal Farmworker	
Rehabilitation Services Administration. (2017). <i>Barriers to employment</i> . https://rsa.ed.gov/sites/default/files/subregulatory/pd-16-04.pdf		

Finally, the RSA-911 office subdivided the VR services into three groups with multiple categories shown as raw data in Table 4. All the data categories were alike in each VR service group. These categories were clustered renamed, re-coded, and dummy-coded to yes = 1 or no = 0 per SPSS software's transform step:

- training services
- career services
- other services

Similarly, the other services group was renamed to support services and transformed using the SPSS software.

Table 4

Vocational Rehabilitation Services

Vocational Rehabilitation Services		Variable Type
Training Services	<ul style="list-style-type: none"> • Graduate College or University • Four-Year College or University Training • Junior or Community college Training • Occupational or Vocational Training • On-the-Job Training • Registered Apprenticeship Training • Basic Academic Remedial or Literacy Training • Job-Readiness Training • Disability-Related Skills Training • Miscellaneous Training • Randolph-Sheppard Entrepreneurial Training • Customized Training 	Nominal
Career Services	<ul style="list-style-type: none"> • Assessment • Diagnosis and Treatment of Impairments • Vocational Rehabilitation Counseling & Guidance • Job Search Assistance • Job Placement Assistance • Short-Term Job Support • Supported Employment Services • Information and Referral Services • Benefits Counseling • Customized Employment Services • Extended Services 	Nominal
Other Services	<ul style="list-style-type: none"> • Transportation • Maintenance (monetary support) • Rehabilitation Technology • Personal Assistance Services • Technical Assistance Services including self-employment • Reader Services • Interpreter Services • Other Services 	Nominal
Rehabilitation Services Administration. (2017). <i>Training services</i> . https://rsa.ed.gov/sites/default/files/subregulatory/pd-16-04.pdf		

Rehabilitation Services Administration. (2017). *Career services*.
<https://rsa.ed.gov/sites/default/files/subregulatory/pd-16-04.pdf>
 Rehabilitation Services Administration. (2017). *Other services*.
<https://rsa.ed.gov/sites/default/files/subregulatory/pd-16-04.pdf>

Statistical Analysis

The description of the participants and analysis of data were computed using the Statistical Package for the Social Sciences, version 27 (SPSS Statistics, IBM Corporation, NY, USA). Descriptive statistics were used to describe the participants' characteristics, including age, gender, race, ethnicity, living arrangement, impairments, primary support, medical insurance, education level, barriers to employment, VR services, and employment outcome. Binomial logistic regression statistics was applied for the analysis of data to investigate employment outcome and predictor variables—namely, individual characteristics, barriers to employment, and VR services.

Descriptive Statistics

Descriptive statistics condense the raw data in a systematized form by describing the relationship between variables in a study population. It is the initial step when conducting any research and must always be calculated prior to inferential statistical comparisons (Kaur et al., 2018). Descriptive statistics include categorical and continuous variables and provides the calculation of frequencies, central tendency, means, dispersion, and position for all variables to show the distribution within the designated categories (Kaur et al., 2018; Mishra et al., 2019). The categorical variables are discrete or qualitative in nature and grouped as nominal, ordinal, or dichotomous. Nominal variables are simple without fundamental order (e.g., barriers to employment; basis skills deficient, cultural, lack of literacy). Dichotomous variables can have only two categories (e.g., employed or unemployed, female or male). Ordinal variables can be ranked and have greater than two categories without ranking value (e.g., socio-economic status).

On the other hand, continuous variables are numerical or quantitative and grouped as either ratio or interval. Ratio variables are quantified with a true zero point (e.g., weight, intracranial pressure). Unlike ratio variables, interval variables are quantified along a continuum but no true zero point (e.g., dose amount, flow rate).

Binomial Logistic Regression

Binomial logistic regression is a robust method of statistics in predicting the probability that a phenomenon is under one of two categories of a dichotomous-dependent variable based on more than one nominal independent variables (Kalil et al., 2010; Peng et al., 2002). The logit, also known as the natural logarithm of an odds ratio, is the chief mathematical concept of logistic regression (Peng et al., 2002). This statistic is used when the dependent response variable is binary in nature, meaning one or the other (e.g., 1 = yes or 0 = no) and to predict the probability of the outcome variable instead of calculating the value of the response. For this study, the dichotomous dependent variable coded 'employed' equals 1 and 'unemployed equals' 0. This process of coding aids in interpreting the values of the parameter coefficients.

Unlike a simple linear regression, the unstandardized regression slopes represent the predicted change in logits ($Y = 1$; in this case $Y = \text{employed}$) per raw score increase on the predictor. Since logits reflect a non-linear transformation of the probability ($Y = 1$; employed), then we can interpret a positive regression slope as indicating that the probability of $Y = 1$ is increasing as a non-linear function of the predictor. Similarly, we can interpret a negative slope as indicating the probability of $Y = 1$ decreasing as a non-linear function of the predictor. In addition, the percentage change in the dependent variable's odds when the dependent variable equals 1 (i.e., 1 = employed), the study uses the formula: $\text{odds ratio} - 1 \times 100$.

The omnibus tests were used to determine how thorough binomial logistic regression's

analysis was in predicting employment outcome with independent variables. The overall model evaluation and goodness of fit statistics were used to evaluate the appropriateness of logistic regression model for each data analysis. In overall model evaluation, a logistic regression model is considered a better fit to the data if it can show an improvement over the null model (Peng et al., 2002). A null model or intercept-only model is a satisfactory reference point because it does not contain any predictors. To illustrate, the Likelihood Ratio (LR) chi-square test indicates if the statistic model containing the set of predictors represents a significant improvement in fit relative to a null model. An improvement over this reference point is calculated by three inferential statistics tests—namely, the LR, score test, and Wald test (Peng et al., 2002). Furthermore, the goodness of fit statistics calculates the fit of a logistic model against the definite outcomes (i.e., predictors of employment) using two descriptive measures and one inferential test (Peng et al., 2002). The Cox and Snell (1989) and Nagelkerke (1991) are the two descriptive measures where *R*-Square statistic is not exactly calculated for logistic regression models and estimates are calculated instead. Greater pseudo *R* square statistics point toward that more of the variation is described by the model, no greater than 1. Treating these two R^2 indices as add-on to the other is a worthier evaluative guide (Peng et al., 2002). The inferential test, Hosmer–Lemeshow, is a Pearson chi-square statistic computed from a $2 \times g$ table of observed and estimated expected frequencies, and g is the quantity of groups from the estimated probabilities. Furthermore, evaluating logistic regression by cross-tabulating the observed response groups with the predicted response groups suggests that the correspondence between observed outcomes for cases and those expected based on this statistic model.

For each data analysis, calculation results of significant predictor variables and evaluation of binomial logistic regression's effectiveness in analyzing the data are highlighted in a table

format (Peng et al., 2002). The following are legends and definitions used in the table:

- β is the estimated coefficient with.
- SE as the standard error.
- Wald's X^2 is a statistic of the ratio of β to SE , squared. If the Wald statistic $p < .05$, then the parameter is useful to the model.
- df represents degrees of freedom.
- e^β or the odds ratio means the predicted change in odds for a unit increase in the predictor.
- Constant means not interpretable in logistic regression statistic.

Human Subject Protection

The provided RSA-911 data set from 2019 was de-identified. It excluded names, geographical subdivisions, phone numbers, fax numbers, electronic mail addresses, social security numbers, medical record numbers, health plan beneficiary numbers, account numbers, certificate/license numbers, vehicle identifiers and serial numbers (including license plate numbers, device identifiers, and serial numbers), Web Universal Resource Locators (URLs), Internet Protocol (IP) address numbers, biometric identifiers (including finger and voice prints, full face photographic images, and any comparable images), nor any other unique identifier (number, characteristic, or code measures). The institutional review board (IRB) of Molloy University in Rockville Centre, New York provided the exempt approval, #1946925-1, for this research study (Appendix A).

Summary

This research study used a large data set for secondary analysis to define the relationship of predictor variables (i.e., characteristics, barriers to employment, and VR services) to

employment outcomes among young adults with CP. The findings from this research study may add to the body of knowledge in clinical nursing, CP data, and the secondary data analysis domain in research method.

CHAPTER 4: RESULTS

From the RSA-911 data set of fiscal year 2019, among young adults with CP across the US who received VR services, only 750 (30.4%) emerged as employed while 1,715 (69.6%) were unemployed at exit from their VR programs. Building from these results, descriptive statistics were used initially to condense the raw data in a systematized form by describing the relationship between variables in the entire study sample and the employed group, the population of interest. For inferential analysis, a binomial logistic regression was conducted to estimate the effect of hypothesized predictor variables—Individual Characteristics, Barriers to Employment, and Vocational Rehabilitation Services—on the outcome of employment. Employment was operationally defined as full-time or part-time employment, self-employment, or supported employment in a competitive integrated employment setting with a customary rate received by similarly employed individuals without disabilities. The description of all study participants and the subsample employed group is presented first; followed by the inferential analyses of examining the primary outcome of employment with the three research questions, respectively; then the presentation of data analysis and results of employment outcome with all independent variables as predictors. Furthermore, this chapter discusses the evaluation of the binomial logistic regression models' constructed appropriateness of each research question.

Research Questions

1. What is the relationship between individual characteristic variables and employment in young adults with CP?
2. What is the relationship between barrier variables and employment in young adults with CP?
3. What is the relationship between vocational rehabilitation service variables and employment in young adults with CP?

Descriptive Statistics

Individual Characteristics

The secondary sample data included 2,465 individuals with a medical diagnosis of CP who have received VR services under an Individualized Plan for Employment at the time of application and were between the ages of 18 and 30 at exit from VR services program with employment outcome in fiscal year 2019. Of this final sample, there were 1,073 females (43.5%) and 1,392 males (56.5%), with the mean age of 20.6 (range of 18 to 30 years old) at the exit of their VR program. In terms of race, the majority were White, $n = 1,782$ (72.3%); followed by Black, $n = 480$ (19.5%); Hispanic or Latino, $n = 341$ (13.8%); Asian, $n = 63$ (2.6%); Mixture of Race, $n = 62$ (2.5%); Did Not Self Identify, $n = 40$ (1.6%); American Indian/Alaskan Native, $n = 27$ (1.1%); and Hawaiian/Pacific Islander, $n = 11$ (0.4%). The most common living arrangements were in the setting of private, $n = 2,342$ (95%); some in the community, $n = 74$ (2%); and less so in the other, $n = 49$ (1%). Physical impairment, $n = 2,208$ (90.6%), outnumbered the mental impairment, $n = 221$ (9%) and sensory impairment, $n = 36$ (1.5%). The participants' primary source of support was predominantly coming from family and friends, $n = 1,260$ (51.1%); followed by public support, $n = 981$ (39.8%); own income, $n = 139$ (5.6); and others, $n = 77$ (3.1%). Their medical insurance coverage was mostly provided by the public sectors, $n = 1,385$ (56.2%) and private sectors, $n = 847$ (34.4%), while $n = 233$ (9.5%) were without medical insurance. Secondary education, $n = 822$ (33.3%), was the highest level of education completed, shadowed by one or more years of post-secondary education, $n = 173$ (7%); bachelor's degree, $n = 70$ (2.8%); associate degree, $n = 36$ (1.5%); and an equal percentile for certificate or license post-secondary education, $n = 16$ (0.6%); and degree beyond a bachelor's degree, $n = 14$ (0.6); versus the participants with no educational level, $n = 861$ (34.4%). Table 5 displays these

characteristics.

Table 5

Individual Characteristics of the Entire Sample (N = 2,465)

	<i>n</i>	%
Age 18 to 30 (mean = 20.6 years old)		
Gender		
Male	1,392	56.5
Female	1,073	43.5
Race		
American Indian/Alaskan Native	27	1.1
Asian	63	2.6
Black	480	19.5
Hawaiian/Pacific Islander	11	0.4
White	1,782	72.3
Mixture of Race	62	2.5
Did Not Self-Identify	40	1.6
Ethnicity		
Hispanic/Latino	341	13.8
Living Arrangement		
Private	2,342	95
Community	74	3
Other	49	2
Impairment		
Physical	2,208	89.6
Sensory	36	1.5
Mental	221	9
Primary Source of Support		
Own income	139	5.6
Family and friends	1,260	51.1
Public support	981	39.8
Others	77	3.1
Medical Insurance Coverage		
Public	1,385	56.2
Private	847	34.4
No medical insurance	233	9.5
Highest Educational Level Completed		
Secondary education	822	33.3
One or more years of post-secondary education	173	7.0
Certificate or license post-secondary Education	16	0.6
Associate degree	36	1.5

Bachelor's degree	70	2.8
Degree beyond a bachelor's degree	14	0.6
No educational level	861	34.9
Employment - Yes	750	30.4

The most commonly reported barriers to employment for the entire sample were low-income, $n = 998$ (40.5%); and long-term unemployed, $n = 778$ (31.6%); trailed by basic skills deficient/low level of literacy, $n = 576$ (23.4%); English language learner (ELL), $n = 159$ (6.5%); cultural barriers, $n = 104$ (4.2%); foster care youth, $n = 96$ (3.9%); single parent, $n = 44$ (1.8%); ex-offender, $n = 27$ (1.1%); displaced homemaker, $n = 26$ (1.1%); homeless individual/homeless children and youth, or runaway youth, $n = 22$ (0.9%); migrant and seasonal farmworker, $n = 19$ (0.8%); and exhausting TANF (temporary assistance for needy families) within two years, $n = 9$ (0.4%). Table 6 displays the details.

Table 6

Barriers to Employment of Entire Sample (N = 2,465)

	<i>n</i>	%
Long-term unemployed	778	31.6
Exhausting TANF (temporary assistance for needy families) within two years	9	0.4
Foster care youth	96	3.9
Homeless individual, homeless children and youths, or runaway youth	22	0.9
Ex-offender	27	1.1
Low income	998	40.5
English language learner (ELL)	159	6.5
Basic skills deficient/low level of literacy	576	23.4
Cultural barriers	104	4.2
Single parent	44	1.8
Displaced homemaker	26	1.1
Migrant and seasonal farmworker	19	0.8

Note. The number of barriers does not equal sample size due to reports of multiple barriers.

Of the VR services for the entire sample, career services, $n = 1,653$ (67.1%), were the most frequently received, followed by support services, $n = 477$ (19.4%) and least by the training services, $n = 303$ (12.3%). Table 7 displays the details.

Table 7

Vocational Rehabilitation Services of the Entire Sample ($N = 2,465$)

	<i>n</i>	%
Training Services	303	12.3
Career Services	1,653	67.1
Support Services	477	19.4

Note. The number of vocational rehabilitation services does not equal the sample size because a participant can receive multiple services.

Employed Characteristics

Of the employed young adults, the most common age of employment was age 23, $n = 85$ (11.3%); followed by age 22, $n = 73$ (9.7%); and age 21, $n = 72$ (9.6%); tied with age 25, $n = 72$ (9.6%); age 20, $n = 65$ (8.7%); age 24, $n = 65$ (8.7%); age 27, $n = 61$ (8.1%); age 28, $n = 60$ (8%); age 29, $n = 50$ (6.7%); equal frequency of age 19 and 26, $n = 45$ (both 6%); followed closely by age 30, $n = 44$ (5.9%); and the least, age 18, $n = 13$ (1.7%). Table 8 displays the data.

Table 8

Individual Characteristics of Employed: Age at Exit ($N = 750$)

	<i>n</i>	%
Ages		
18	13	1.7
19	45	6.0

20	65	8.7
21	72	9.6
22	73	9.7
23	85	11.3
24	65	8.7
25	72	9.6
26	45	6.0
27	61	8.1
28	60	8.0
29	50	6.7
30	44	5.9

The employed gender included females, $n = 306$ (40.8%), and males, $n = 444$ (59.2%).

Race was reported as predominantly White, $n = 560$ (74.7%); with lower participation among Black, $n = 135$ (18%), and Hispanic or Latino, $n = 84$ (11.2%); followed by Asian, $n = 20$ (2.7%); Mixture of Race, $n = 19$ (2.5%); and Did Not Self-Identify, $n = 9$ (1.2%); and a small fraction of American Indian/Alaskan Native, $n = 5$ (0.7%); and Hawaiian/Pacific Islander, $n = 2$ (0.3%). The most popular living arrangement was private, $n = 724$ (96.5%); and only some reported living in community housing, $n = 15$ (2%); and fewer reported living in other settings, $n = 11$ (1.5%). Among the impairments, physical, $n = 680$ (90.7%), outnumbered all other impairments such as mental, $n = 60$ (8%), and sensory impairment, $n = 10$ (1.3%), in that order.

The employed group's primary source of support chiefly originated from family and friends, $n = 410$ (54.7%); shadowed by public support, $n = 248$ (33.1%); only a few have their own income, $n = 66$ (8.8%); and others, $n = 26$ (3.5%); and their medical insurance coverage was generally from the public sectors, $n = 390$ (52%); and private sectors, $n = 285$ (38%); whereas those without medical insurance was $n = 75$ (10%). The employed group's highest level of education completed was secondary education, $n = 295$ (39.3%); followed by one or more years of post-secondary education, $n = 81$ (10.8%); bachelor's degree, $n = 41$ (5.5%); associate degree, $n = 21$ (2.8%); while the degree beyond a bachelor's degree, $n = 12$ (1.6%), was about the same number

as certificate or license post-secondary education, $n = 9$ (1.2%). In addition, the employed with no educational level completed represented a large group, $n = 291$ (38.8%). Table 9 offers the details.

Table 9

Individual Characteristics of Employed (N = 750)

	<i>n</i>	%
Gender		
Male	444	59.2
Female	306	40.8
Race		
American Indian/Alaskan Native	5	0.7
Asian	20	2.7
Black	135	18
Hawaiian/Pacific Islander	2	0.3
White	560	74.7
Mixture of Race	19	2.5
Did Not Self-Identify	9	1.2
Ethnicity		
Hispanic/Latino	84	11.2
Living Arrangement		
Private	724	96.5
Community	15	2.0
Other	11	1.5
Impairment		
Physical	680	90.7
Sensory	10	1.3
Mental	60	8.0
Primary Source of Support		
Own income	66	8.8
Family and friends	410	54.7
Public support	248	33.1
Others	26	3.5
Medical Insurance Coverage		
Public	390	52
Private	285	38
No medical insurance	75	10
Highest Educational Level Completed		
Secondary education	295	39.3

One or more years of post-secondary education	81	10.8
Certificate or license post-secondary education	9	1.2
Associate degree	21	2.8
Bachelor's degree	41	5.5
Degree beyond a bachelor's degree	12	1.6
No educational level	291	38.8

The employed young adults with barriers to employment are presented in Table 10. The most frequently reported barrier was low income, $n = 368$ (49.1%); followed by long-term unemployment, $n = 276$ (36.8%); and basic skills deficient/low level of literacy, $n = 184$ (24.1%). Barriers of English language learner (ELL), $n = 54$ (7.2%); cultural, $n = 39$ (5.2%); and foster care youth, $n = 36$ (4.8%) were regularly reported. The least reported barriers with employment outcome, in descending order, were single parent, $n = 12$ (1.6%); migrant and seasonal farmworker, $n = 10$ (1.3%); displaced homemaker, $n = 8$ (1.1%); ex-offender, $n = 7$ (0.9%); homeless individual/homeless children and youth, or runaway youth, $n = 6$ (0.8%); and exhausting TANF (temporary assistance for needy families) within two years, $n = 4$ (0.5%).

Table 10

Barriers to Employment of the Employed (N = 750)

	<i>n</i>	%
Long-term unemployed	276	36.8
Exhausting TANF (temporary assistance for needy families) within two years	4	0.5
Foster care youth	36	4.8
Homeless individual, homeless children and youths, or runaway youth	6	0.8
Ex-offender	7	0.9
Low income	368	49.1
English language learner (ELL)	54	7.2
Basic skills deficient/low level of literacy	184	24.5

Cultural barriers	39	5.2
Single parent	12	1.6
Displaced homemaker	8	1.1
Migrant and seasonal farmworker	10	1.3

Note. The number of barriers does not equal the sample size due to reports of multiple barriers of participants.

For the employed young adults who received VR services (Table 11), the variable career services, $n = 634$ (84.5%), was most frequently received; followed by support services, $n = 233$ (31.1%); and the least reported were training services, $n = 133$ (17.7%).

Table 11

Vocational Rehabilitation Services of the Employed (N = 750)

	<i>n</i>	%
Training Services	133	17.7
Career Services	634	84.5
Support Services	233	31.1

Note. The number of vocational rehabilitation services does not equal the sample size because a participant can receive multiple services.

Binomial Logistic Regression

Research Question 1

What is the relationship between individual characteristic variables and employment in young adults with CP?

The logistic regression analysis of the Individual Characteristics (Table 12) estimated two significant variables of age at exit and ethnicity. Age at exit was estimated as a positive log odds, indicating a movement from lower to higher values, and thus the probability of employment outcome increases as age at exit increases. In contrast, ethnicity (defined as Hispanic or non-Hispanic) had a negative log odds, indicating an inverse relationship. Hispanic was coded as 1, and non-Hispanic was coded as 0; therefore, as ethnicity moves from lower to higher values (0 to

1), the probability of employment decreased. This demonstrates that if a participant identifies as either Hispanic or Latino, then employment is less likely than for non-Hispanic participants.

The following are the percentage changes for each of these significant dependent variable's odds:

- Age at Exit = $1.112 - 1 = 0.112 * 100 = 11.2\%$
- Ethnicity = $0.727 - 1 = -0.273 * 100 = -27.3\%$

The interpretations of these findings are:

- every unit increase in the age at exit is associated with an 11.2% increase in the odds of getting employed; and
- every unit increase in ethnicity (i.e., if self-identified as Hispanic or Latino) is associated with a 27.3% decrease in the odds of getting employed.

The non-significant individual characteristics variables were gender, race, living arrangement, impairment, primary source of support, medical insurance coverage, and highest educational level completed.

The LR for the model containing individual characteristics was $\chi^2 (2) = 119.788, p < .001$, which denotes a significant improvement in fit relative to a null model that did not contain any predictors. The Hosmer–Lemeshow (H-L) results $X^2 = 9.544$ and $p = .299$ showed no significant differences between observed and expected frequencies across various deciles of probabilities. This non-significant result is a gauge of a rationally well-fitting model. Only 6.7% of the variance is explained by the model, an approximation, as calculated by Nagelkerke *R*-Square. Finally, in the cross-tabulation of 1,715 unemployed cases, 96.8% were correctly predicted unemployed based on the model, and its specificity was 96.8%, whereas the predicted response groups revealed that of the 750 cases that were employed, 6.4% were correctly

predicted by the model and its sensitivity of 6.4%. Overall, observed group membership on employment was correctly predicted at a rate of 69.3%.

Table 12

Binominal Logistic Regression of Individual Characteristics Variables for Employment

Predictors	β	$SE\ \beta$	Wald's χ^2	df	p	e^β
Constant	-3.855	47.628	0.007	1	.935	0.021
Age at Exit	0.106	0.014	59.099	1	< .001	1.112
Ethnicity	-0.319	0.141	5.133	1	.023	0.727
Test			χ^2	df	p	
Overall model evaluation						
Likelihood ratio test			119.788	19	< .001	
Goodness-of-fit test						
Hosmer & Lemeshow			9.544	8	.299	
<i>Note.</i> $p < .05$ was considered significant. All calculation results used four decimal places for statistical accuracy.						

Research Question 2

What is the relationship between barrier to employment variables and employment in young adults with CP?

The logistic regression analysis of the barriers to employment (see Table 13) found only basic skills deficient/low level of literacy as a significant predictor, having a negative log odds indicating an inverse relationship between the outcome variable and predictor variables. As the basic skills deficient/low level of literacy variable moves from lower to higher values—in this case indicating the presence of deficiency of basic skills/low literacy—the probability of employment decreases.

The following is the percentage change for this significant dependent variable's odds:

- Barrier of Basic Skills Deficient/Low Level of Literacy = $0.529 - 1 = -0.471 * 100$
= -47.1%

In other words, every unit increase in barrier basic skills deficient (presence of deficiency in basic skills and low literacy) is associated with a -47.1% decrease in the odds of getting employed.

The non-significant barriers to employment variables were long-term unemployed, exhausting TANF (temporary assistance for needy families) within two years, foster care youth, homeless individual, homeless children and youths, or runaway youth, ex-offender, low income, English language learner (ELL), cultural barriers, single parent, displaced homemaker, and migrant and seasonal farmworker.

The LR of $\chi^2(2) = 21.058, p = .050$, evaluated the model's overall appropriateness. In other words, the statistic model containing the set of barriers to employment variables did not have a significant improvement in fit relative to a null model that did not contain any predictor variables. The Hosmer–Lemeshow (H-L) results $X^2 = 7.374$ and $p = .288$ showed no significant differences between observed and expected frequencies across various deciles of probabilities. This non-significant result is a gauge of a rationally well-fitting model. Only 4.8% of the variance is explained by the model, an approximation, as calculated by Nagelkerke *R*-Square. Finally, in the cross-tabulation of 364 unemployed cases, 98.4% correctly predicted unemployed based on the model, and its specificity is 98.4%, whereas among the predicted response groups revealing 219 cases that were employed, 2.3% were correctly predicted by the model and its sensitivity of 2.3%. Overall, observed group membership on employment was correctly predicted at a rate of 62.3%.

Table 13

Binomial Logistic Regression of Barriers to Employment Variables for Employment

Predictors	β	$SE\ \beta$	Wald's χ^2	df	p	e^β
Constant	-0.274	0.136	4.059	1	.044	0.761
Basic Skills Deficient/Low Level of Literacy	-0.636	0.219	8.465	1	.004	0.529
Test			χ^2	df	p	
Overall model evaluation						
Likelihood ratio test			21.058	12	.050	
Goodness-of-fit test						
Hosmer–Lemeshow			7.374	6	.288	
<i>Note.</i> $p < .05$ was considered significant. All calculation results used four decimal places for statistical accuracy.						

Research Question 3

What is the relationship between vocational rehabilitation service variables and employment in young adults with CP?

The logistic regression of VR services (Table 14) identified that career services and support services were significant predictor variables, indicating that as there is movement from lower to higher values on career services and support services, the probability of employment outcome increases.

Per odds ratio calculation:

- Career Services = $3.206 - 1 = 2.206 * 100 = 220.6\%$
- Support Services = $2.107 - 1 = 1.107 * 100 = 110.7\%$

In other words, every unit increase in career services (coded as 0 = did not receive career services and 1 = did receive career services) is associated with a 220% increase in the odds of getting employed. Support services were coded the same (0 = did not receive services and 1 = did receive services), and similarly, there was an association of a 110.7% increase in the odds of getting employed for every unit increase in support services. The non-significant VR service variable was training services.

The LR is $\chi^2(2) = 215.530, p < .001$, are the evaluation results of the model's overall appropriateness. In other words, the statistic model containing the set of VR variables means a significant improvement in fit relative to a null model that did not contain any predictor variables. The Hosmer–Lemeshow (H-L) results, $\chi^2 = 10.592$ and $p = .032$, showed no significant differences between observed and expected frequencies across various deciles of probabilities. This non-significant result is a gauge of a rationally well-fitting model. Only 11.8% of the variance is explained by the model, an approximation, as calculated by Nagelkerke *R*-Square. Finally, out of the cross-tabulation of observed 1,715 unemployed cases, 88.3% correctly predicted the unemployed based on the model, and its specificity was 88.3%, whereas the predicted response groups revealed that out of 750 cases that were employed, 28.5% were correctly predicted by the model and its sensitivity was 28.5%. Overall, observed group membership on employment was correctly predicted at a rate of 70.1%.

Table 14

Binomial Logistic Regression of Vocational Rehabilitation Services Variables for Employment

Predictors	β	<i>SE</i> β	Wald's χ^2	<i>df</i>	<i>p</i>	e^β
Constant	-1.871	0.102	339.621	1	< .001	0.154

Career Services	1.165	0.115	102.004	1	< .001	3.206
Support Services	0.745	0.110	45.704	1	< .001	2.107
<hr/>						
Test			χ^2	df	p	
<hr/>						
Overall model evaluation						
Likelihood ratio test			215.530	3	< .001	
Goodness-of-fit test						
Hosmer–Lemeshow			10.592	4	.032	
<hr/>						
<i>Note.</i> $p < .05$ was considered significant. All calculation results used four decimal places for statistical accuracy.						

Independent Variables

When all independent variables were entered into the analysis (see Table 15), the cultural barrier, career services, and support services were found to be significant predictor variables of employment outcome. These predictor variables that emerged as positive log odds indicate that as there is movement from lower to higher values on cultural barrier, career services, and support services, the probability of employment outcome increases. In contrast, the significant predictor variable of barrier basic skills deficient emerged as negative log odds. In short, there was an inverse relationship between the outcome variable and this predictor variable. For instance, as the barrier of basic skills deficient/low level of literacy variable moves from lower to higher values, the probability of employment decreases among young adults with CP.

In this set of variables, the significant predictors' odds ratio calculation are as follows:

- Cultural Barrier = $2.330 - 1 = 1.33 * 100 = 133\%$
- Career Service = $2.179 - 1 = 1.179 * 100 = 117.9\%$
- Support Service = $1.923 - 1 = 0.923 * 100 = 92.3\%$
- Barrier Basic Skills Deficient/Low Level of Literacy = $0.534 - 1 = -46.6 * 100 = -46.6\%$

Therefore, the interpretations of the calculated odds ratio for each predictor variable are as follows:

- Every unit increase in the cultural barrier variable is associated with a 133% increase in the odds of getting employed.
- Every unit increase in the career service variable is associated with a 117.9% increase in the odds of getting employed.
- Every unit increase in the support service variable is associated with a 92.3% increase in the odds of getting employed.
- Every unit increase in the barrier basic skills deficient/low level of literacy variable is associated with a -46.6% decrease in the odds of getting employed.

The non-significant independent variables were the following: age, gender, race, ethnicity, living arrangement, impairments, primary source of support, medical insurance coverage, highest educational level completed, barriers to employment of the long-term unemployed, exhausting TANF (temporary assistance for needy families) within two years, foster care youth, homeless individual, homeless children and youths (or runaway youths), ex-offender, low income, English language learner (ELL), single parent, displaced homemaker, and migrant and seasonal farmworker, and VR services of training service.

The LR of $\chi^2(2) = 111.856$, $p < .001$, indicated the model's overall appropriateness. In other words, the statistic model containing the set of all predictor variables denotes a significant improvement in fit relative to a null model that did not contain any predictors. The Hosmer–Lemeshow (H-L) results, $\chi^2 = 6.929$ and $p = .544$, showed no significant differences between observed and expected frequencies across various deciles of probabilities. This non-significant result is an indicator of a well-fitting model. Only 23.8% of the variance is explained by the

model, an approximation, as calculated by Nagelkerke *R*-Square. Finally, of the cross-tabulation of 364 unemployed cases, 90.4% were correctly predicted unemployed based on the model, and its specificity was 90.4%, whereas the predicted response groups revealed that out of 219 cases that were employed, 42.53% were correctly predicted by the model and its sensitivity was 42.5%. Overall, observed group membership on employment was correctly predicted at a rate of 72.4%.

Table 15

Binomial Logistic Regression of All Independent Variables for Employment

Predictors	β	<i>SE B</i>	Wald's χ^2	<i>df</i>	<i>p</i>	e^β
Constant	4.861	3674.192	0.000	1	.999	129.159
Cultural Barrier	2.091	0.846	4.130	1	.042	2.330
Career Service	0.779	0.238	10.664	1	.001	2.179
Support Service	0.711	0.236	7.466	1	.003	1.923
Basic Skills						
Deficient/Low Level of Literacy	-0.627	0.251	6.227	1	.013	0.534
Test			χ^2	<i>df</i>	<i>p</i>	
Overall model evaluation						
Likelihood ratio test			111.86	40	< .001	
Goodness-of-fit test						
Hosmer–Lemeshow			6.929	8	.544	

Note. $p < .05$ was considered significant. All calculation results used four decimal places for statistical accuracy.

Summary of Findings

The descriptive statistics calculation revealed the employment and unemployment rates of young adults with CP in the fiscal year 2019. Additionally, the frequencies and percentage of

all study participants' and employed adults' individual characteristics, barriers to employment, and VR services received were computed. Of all the study participants ($N = 2,465$), only 30.4% ($n = 750$) were employed versus 69.6% ($n = 1,715$) that were unemployed at the exit from their VR programs. Notable results among all participants' individual characteristics were as follows:

1. The majority were White (self-identified or counselor's best valuation of the participant's race), and the most common impairment was physical.
2. More than half were male (self-identified gender), the medical insurance was frequently public (e.g., Medicaid, Medicare, state, or federal affordable care act exchange; or public coverage via other sources), and an individual's highest principal source of economic support was mostly coming from family and friends.
3. At least a third of them declared secondary education as the highest education level (highest schooling, training, or program for which an individual received a degree or certificate). This was almost evenly balanced to the number of those who reported no level of education.

Correspondingly, the remarkable predictor variables among the employed individuals were:

1. Individual characteristics - more than a tenth of the employed were age 23; more than half were male and White with physical impairment, private living arrangement (self-report of living situation), family and friends as primary source of support, public medical insurance; and just less than half had reported having at least a secondary education.
2. Barriers to employment (any economic or personal factor that is a hindrance in attaining employment) - almost half reported low income (an individual with family income less than poverty level, or a foster child under governmental financial support, or a homeless

individual, receiving financial and/or nutritional assistance from the government in the last six months prior to application to VR), at least a third was long-term unemployment (not employed for at least 27 consecutive weeks), and about a quarter with basic skills deficient/low level of literacy (an individual whose academic skills are at or below 8th-grade level).

3. VR services (a sequence of services for individuals with disabilities to enable work entry) - career services (a series of services to determine a participant's VR eligibility and allocation to a class of VR program that activates by order of selection; and to establish the extent of VR services for Individualized Plan for Employment planning) were the most reported services received. The second most reported service received was support services (provide the need or needs of a VR-eligible participant to take part in a VR service under Individualized Plan for Employment, pre-employment program, and during employment). The third most frequently reported service received was training services (to aid a participant to progress in academic or vocation or to adjust to own limits based on impairment).

Using binomial logistic regression, the analysis identified the following significant predictors of employment.

1. Among the individual characteristic's variables, the age at exit (participant's age in years at completed date of VR program) and ethnicity (self-identify Hispanic or Latino) were found significant. As the participants mature by age, their employability increases. However, ethnicity (i.e., being Hispanic or Latino) has an inverse relationship with employment outcome in that employability is decreased.
2. Among the barriers to employment variables, basic skills deficient/low level of literacy

(academic skills of less than eighth-grade level) was found significant, with an inverse relationship with employment outcome. This indicates that with the presence of deficiency of basic skills/low literacy, the probability of employment decreases.

3. Among VR service variables, career services and support services were found significant. This indicates that for participants who received these types of services from the VR program, chances of employment increased.
4. Among all independent variables, barriers to employment—cultural (an individual who perceives self as having personal characteristics that hinder their ability to attain employment), career services, and support services were found significant. This means cultural barrier and receives career and support services are associated with increased employment. However, basic skills deficient/low level of literacy, also found significant, has an inverse relationship with employment outcome. This indicates that with the presence of deficiency of basic skills/low literacy, the probability of employment decreases.

CHAPTER 5: DISCUSSION

The purpose of this study was to advance the knowledge in research methodology and clinical practice pertaining to adults with CP and employment outcomes. The findings presented the employment rate in fiscal year 2019, along with the analysis of its relationship to predictor variables. Like the numerous research studies on adults with disabilities, including CP, the association of employment outcome and ICF model's body structure and function, activities, participation, personal, and environmental factors have been investigated using the same national data set (Berry et al., 2000; Berzyak et al., 2023; Butterworth et al., 1999; Corthell et al., 1992; Dutta et al., 2008; Gilmore et al., 2000; Huang et al., 2013; Kaya et al., 2022; Tansey et al., 2023; Tansey et al., 2016; Trenz et al., 2020). Unlike these previous research investigations, this study provides the preliminary findings on specific predictor variables' effect on employment within one year prior to the Covid-19 pandemic. This study's conclusions concur with the persistent dismal low employment rate of this population and the need that exists to understand predictors of employment to increase their employability.

Discussion

In this chapter, the significant findings are presented using the study's conceptual framework, the ICF Model. The outcome variable, employment, is situated under participation, while career services and support services fall under the ICF model's concept of environmental factors, Age at exit, ethnicity, barriers of cultural and basic skills deficient/low level of literacy are considered personal factors that may impact participation.

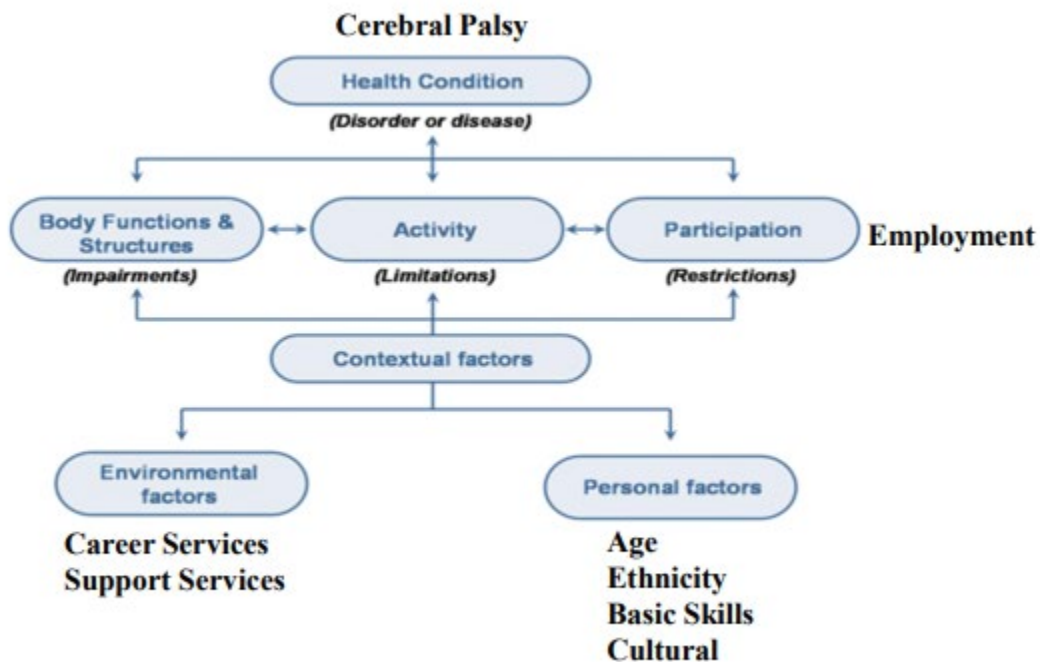


Figure 2 Application of Study Findings to the ICF Model (Université catholique de Louvain, 2007)

Participation

The VR program's chief method of helping the participants attain their employment goals is by providing VR services. A participant in a VR program can receive more than one VR service even after employment. Regarding ICF, VR services assist in decreasing restrictions in employment participation.

Environmental Factors

The employed group in this study was associated with having received VR services—specifically, career services and support services. The results imply that as more career and support services are provided, employability increases. Career services provide comprehensive VR program interventions associated with a participant's needs when seeking and maintaining employment. Comparably, support services are concrete provisions, including monetary backing, technology, personal assistance, and unique services to sustain a participant in a VR program and

to get and/or hold employment. In this research, counseling on work income and disability benefits within career services was provided to participants who were unclear of employment's financial effect on their disability aids and entitlements and/or who were uninformed of this service. For more than a decade, studies on work income and disability benefits counseling have been associated with increased employment rate among individuals with IDD (Delin et al., 2012; Hartman et al., 2015; Kaya et al., 2022; Leahy et al., 2014). Furthermore, a study on transition-age VR group of SSI benefits' recipients who were provided work income and disability benefits counseling service found a significant increase in work activity and job prospects compared to the non-counseled group (Schlegelmich et al., 2019). Similarly, an earlier study identified improved employability when participants receive job-search assistance, job-placement assistance, and on-the-job support services among individuals with traumatic brain injury (Catalano et al., 2006). The current study's findings regarding support services' effect on employed low-income adults agree with a recent study on VR participant women (low-income and TANF-recipient) who received VR maintenance services like food, clothing, and shelter and who demonstrated improved employment outcomes (Trenz et al., 2020). Equally, Inge and colleagues (2017) reported that the most provided VR services associated with employment involved assessment, VR counseling and guidance, job-placement assistance, on-the-job supports, and diagnosis and treatment in fiscal years 2011, 2012, and 2013. Meanwhile, Huang and team (2013) observed the identical significant association of VR services—namely, on-the-job training, job-placement assistance, on-the-job support, maintenance services, and rehabilitation technology. Both studies investigated significant VR services and employment outcomes of adults with CP and used the RSA-911 data set. Unlike these studies, the study's VR

services were divided into three: training, career, and support, without investigating each of their specific services.

Personal Factors

The individual characteristics explored in this study fall under the ICF model's personal factor. These are defined as the individual's description unrelated to the individual's health condition. Participants' age at the conclusion of the program and ethnicity were significant to their employment outcome. In this study, employment outcomes increased for VR participants who were slightly older at their program completion. Participants in their early 20s were more often employed than their younger counterparts. In contrast to this result, Yin et al. (2023) identified a younger age group, of less than 18 years, being more likely to gain employment after receiving varied VR services in the state of Maine.

A reported ethnicity of Hispanic/Latino was associated with decreased employment. Although this study's design, data source, and research questions cannot address why there was a low rate of employment among this group, these phenomena are common. A similar conclusion was identified by Trainor et al. (2016), supporting the lopsided employment outcome among Hispanic English learners with disabilities as compared to Whites. Moreover, Latinos with disabilities have reported inadequate mode or absence of transportation, hardship with communicating the English language, less education, and adverse attitudes to employees with disabilities as major obstacles for them to work (Hernandez et al., 2006). Overall, this study's employment rate revealed that Whites gained employment approximately three times that of all other groups combined (Black, Hispanic/Latino, Asian, Hawaiian/Pacific Islander, and Alaska Native). Prior studies have reported a comparable racial gap. White individuals with or without

CP are employed most often among employment data (Hasnain et al., 2009; Huang et al., 2013; Inge et al., 2017; U.S. Labor Market, 2019).

Dissimilar to the labor market's workforce in 2019, this study's employed group were much less educated. Data representing the number of participants completing a secondary education were comparable to those reporting no education completed. The questions remain as to why only a very few adults with CP achieve college education given the available assistance of training services covered by the VR program and what factors contribute to low participation rate in VR program among non-White races.

Under the personal factors of the ICF model, being deficient in basic skills and having low levels of literacy, as well as reporting cultural barriers, were significant predictors to employment. However, each of these barriers had a distinct predictor relationship with employment outcome. When all independent variables were analyzed, the variables for basic skills deficiency, low levels of literacy, and cultural barriers emerged as significant. On the other hand, only the variable for basic skills deficiency and low levels of literacy was significant when all barriers to employment were analyzed to answer Research Question 2.

The analysis of all independent variables implies that as basic skills deficiency and low levels of literacy (i.e., skills are at or less than eighth-grade level) increased, there was an associated decrease in the odds of getting employed. Conversely, as the report of cultural barriers increased (i.e., perceives self as having personal characteristics that hinder their ability to attain employment), there was an associated increase in the odds of getting employed. Although the former analysis is logical, the result of latter analysis is incompatible with the definition because cultural barrier, as defined in the RSA-911, is a hindrance to attaining employment. Now, the study's analyses and design are incapable of investigating these further.

To address the significant barriers to employment, a similar investigation on job placement and barriers to work were exceptionally considerable for Latino people with disabilities and worse when one is an ex-convict (Dowden et al., 2016). Furthermore, VR participants with lesser affinity with the U.S. culture, particularly English language learner and low educational attainment, grappled more with job placement than the greater affinity with the U.S. culture group (Velcroff et al., 2010). Altogether, these previous studies showed negative employment outcomes when VR participants have barriers to employment.

Limitations

Given the lack of a U.S. CP registry and surveillance, studies on employment outcome among individuals with disabilities were not specific to CP but at best inclusive of them. In view of this, the RSA-911 secondary data set was used to investigate the relationship between employment outcome and predictor variables of young adults with CP who received VR services. Using a secondary data set can potentiate misgivings regarding the data gatherer's competence, quality control, or intentions, despite being a federally mandated data collection by state VR agencies with an internal system to guarantee the accuracy and validity.

In addition, the results of the study were based on quantitative data deprived of qualitative data that could have provided the breadth and scale of each predictor variable or what employment means to a young adult with CP. A major weak point for the significant findings' generalizability was that not all individuals with CP in every state were included in the data set. For instance, the RSA-911 data set lacked information among VR-eligible participants from private institutions, including education and healthcare systems, who did not rely on state VR funding. Furthermore, the heterogeneity of CP presentation intensified by the personal characteristics and the environment make the generalizability of this study difficult. All

considered, only the SPSS program was used to perform the calculation of the study's data analysis. To replicate the study's validity with the same data analysis, another statistical program, such as *R* or Stata, may be considered.

Impact of a Pandemic Era

The timing of data collection (fiscal year 2019) related to employment outcome and predictor variables is a noteworthy limitation because so much have had happened since then. To be specific, fiscal year 2020 was the period of the Covid-19 pandemic and BLM (Black Lives Matter) movement that brought enduring changes across the U.S. labor market, for better or for worse. Only 17.9% of individuals with a disability were employed in 2020 compared to 19.3% in 2019 (U.S. Bureau of Labor Statistics, 2022). Since 2020, a new category of where an employee can do their work emerged with an intense online dependence to perform tasks and organize meetings due to the pandemic restrictions. For example, an employee can work from home or remotely that may be other than home, or hybrid, which is a combination of work at home and/or office of varying proportions. During the BLM movement, approximately 15 million to 26 million people across the US joined the demonstration over the death of George Floyd and others in weeks of June (Buchanan et al., 2020). This led to an increased acceptance of others, including those different from ourselves. Being different from the majority in terms of race, sexual orientation, and/or abilities does not equate to having limited opportunities. Since the BLM movement, diversity and inclusion have been a major priority in the labor market, including film, academic, and finance industries that were homogenously dominated by Caucasian males in leadership positions prior to BLM.

Future Research

To further explore the significant factors that improved employment among this set of VR participants, a future study, using the same data set, may account for all VR services provided and the sum of services each participant received and describe their individual characteristics. Questions to consider may include as follows: Which of the frequently provided VR services is associated with employment? For each impairment of CP, what VR and number of services resulted in employment? For each impairment of CP, what VR and number of services and individual characteristics resulted in employment? For each impairment of CP, what VR and number of services and barriers to employment resulted in employment?

These research questions aim to reach an enhanced insight of associations between VR services and employment. Subsequently, the results can advance policy development to further improve the delivery of effective VR services to help increase the employment rate among these adults.

Even though there are a multitude of extraordinary non-economic gains from being employed, these unaccountable gains remain difficult to measure. Previous studies have shown that employment among individuals with disabilities is associated with less need for public support (Donahue, 2023). Considering the limitations of this study, future research might explore if employment rate increased overall with any significant change or differences among individual characteristics' predictor variables as well as the relationship of employment outcome between the barriers to employment and VR services. In addition, specific individual characteristics (e.g., female, secondary education, bachelor's degree, physical impairment), barriers to employment (e.g., low income, basic skills deficient), and VR services (e.g., transportation services, employment, and benefits counseling) with employment outcomes (e.g., type of jobs). A logical

replication of this study would use the RSA-911 data set from fiscal year 2023 and compare the results to RSA-911 from fiscal year 2019 study's significant findings. The findings from the proposed study can aid in developing local pre-employment programs that involve healthcare, education, policy makers, and business sectors in the community. Unlike the proposed study, the data for future research can be extracted from the results of a pre-employment program with fewer participants but a more specific set of young adults with CP in a certain setting. The future study can measure the employment outcome and predictor variables that includes qualitative data from the program's participants. For example, youth and young adults with CP pre-employment training program through a university hospital in New York City can be provided by an interdisciplinary team that includes nursing, medicine, rehabilitation, and social work teams. The end goal is to connect these individuals with CP to local business sectors who are available and willing to employ them, full-time and part-time. The pre-employment program participants and team can partner with policy makers, such as the Mayor's Office for People with Disabilities, to better understand and address the needs of employment-eligible individuals with CP. Altogether, this can create initiatives to maintain employment and request for long-term commitment and support from everyone involved.

Implications

The first recommendation of The Future of Nursing 2030 (2023) called on all U.S. nursing organizations to develop a collective plan for advancing social determinants of health and accomplish health equity with clear objectives throughout the nursing practice, education, leadership, and health policy engagement. The Healthy People 2030 (2023) declared employment is a significant social determinant of health. In view of this, the nursing profession's roles, with innate versatility, in the healthcare system strategically position nurses to impact the

medical and psychosocial factors that can steer the direction of health outcomes, health disparity, and health care equity. To support the above aims, nursing care to all individuals, with or without chronic medical conditions or CP, demands to incorporate every chance for participation in daily activities and the society that will promote self-management and independence. More importantly, there should be a mandate on education at all levels of nursing regarding pediatric-onset disability as a lifetime condition. This education is a key area for training the future generation of nurses who will provide the interventions to these individuals in achieving a better participation in life activities and the society. At the public level, nursing has a historic opportunity to advance the development of policies on employment among CP or disability population through research.

In clinical practice, the NPs with a specialization in caring for CP or other neuromuscular conditions may apply the results of this study when the goal is increasing employability that includes the assessment of barriers to literacy or basic skills training; timely referral to a VR program; and the education of patients and/or parents and caregivers regarding schooling, training, community resources, and transition from pediatric to adulthood. The goal of specialty NP is to partner with other healthcare team members to provide care and altogether create opportunities for these individuals to increase factors that will uplift their function and capabilities to self-manage and become independent.

The PhD-prepared nurses as principal investigators can generate data through research rooted in humanization to modify or eradicate factors or policies that restrict or limit employment opportunities among individuals with CP or any disability. To accomplish this authentic knowledge in nursing, data can be produced from a methodical approach in pursuit of full humanity and can be communicated within the healthcare system and among policy makers.

When humanization is achieved, Freire's (2018) cultural revolution belief as living praxis should be considered to develop a permanent dialogue between leaders and people. It includes recognizing the world of oppression and improving concrete conditions, and the transformed reality belongs to all people embracing the oppressor and the oppressed.

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APPENDIX A: INSTITUTIONAL REVIEW BOARD APPROVAL

From: **Patricia Eckardt** <no-reply@irbnet.org>
Date: Thu, Nov 3, 2022 at 1:07 PM
Subject: IRBNet Board Action
To: Dawn DiStefano <ddistefano@molloy.edu>, Jennifer Mannino
<jmannino@molloy.edu>, Patricia Eckardt <peckardt@molloy.edu>, Eduardo del Rosario
<edelrosario@lions.molloy.edu>

Please note that Molloy University IRB has taken the following action on IRBNet:

Project Title: [1946925-1] SECONDARY DATA ANALYSIS: PREDICTORS OF EMPLOYMENT
AMONG YOUNG ADULTS WITH CEREBRAL PALSY
Principal Investigator: Eduardo del Rosario, PhD (c), MSN, FNP-BC

Submission Type: New Project
Date Submitted: October 5, 2022

Action: APPROVED
Effective Date: November 3, 2022
Review Type: Exempt Review

Should you have any questions you may contact Patricia Eckardt at peckardt@molloy.edu.

Thank you,
The IRBNet Support Team

www.irbnet.org