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## Factors Contributing to Successful Employment Outcomes for Individuals Who Are Hard-of-Hearing

Sergio Cuevas  
*The University of Texas Rio Grande Valley*

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FACTORS CONTRIBUTING TO SUCCESSFUL EMPLOYMENT OUTCOMES  
FOR INDIVIDUALS WHO ARE HARD-OF-HEARING

A Dissertation

by

SERGIO CUEVAS

Submitted to the Graduate College of  
The University of Texas Rio Grande Valley  
In partial fulfillment of the requirements for the degree of

DOCTOR OF PHILOSOPHY

December 2018

Major Subject: Rehabilitation Counseling



FACTORS CONTRIBUTING TO SUCCESSFUL EMPLOYMENT OUTCOMES  
FOR INDIVIDUALS WHO ARE HARD-OF-HEARING

A Dissertation  
by  
SERGIO CUEVAS

COMMITTEE MEMBERS

Dr. Shawn P. Saladin  
Chair of Committee

Dr. Sandra Hansmann  
Committee Member

Dr. Hansapani Rodrigo  
Committee Member

Dr. Barbara Schoen  
Committee Member

December 2018



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## ABSTRACT

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This study examined the relationship between demographic variables (gender, race and ethnicity, age, level of education, and secondary disability), state-federal vocational rehabilitation (VR) services, and VR employment outcomes among individuals who are hard-of-hearing. This study also explored what VR services contribute to employment outcomes for individuals who are hard-of-hearing. Data from The U.S. Department of Education Rehabilitation Service Administration Case Service Report (RSA-911) fiscal year 2014 was used to focus on individuals who are hard-of-hearing. Binary logistic regression, Chi-square, and Chi-square Automatic Interaction Detector (CHAID) analyses were used to analyze the RSA-911 dataset.





## DEDICATION

I dedicate this dissertation to my amazing wife who guided and supported me towards learning about vocational rehabilitation services, which then lead me to pursue an interest to study and work in the vocational rehabilitation field. Most importantly, she helped me accept and understand my congenital hearing loss. I also want to thank her for being patient and understanding during the times I was occupied with research projects and this dissertation. Also, I dedicate this dissertation to my parents, Amelia and Natividad, who instilled my education drive to never stop learning and that opportunities are endless. I want to dedicate this dissertation to my mother-in-law and sister-in-law who supported me throughout this journey by making sure I remained focused, motivated, and took time to myself. I also want to dedicate this dissertation to my sister, brother-in-law, and my niece, Penelope, to whom I'd like to say that anything is possible when you put your mind to it.



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## CHAPTER I

### INTRODUCTION

The State-Federal Vocational Rehabilitation (VR) Program began in 1920 with the passage of P.L. 66-236, commonly known as the Smith-Fess Act, and since its initiation, employment has remained the primary goal of the VR program (Bradley, 2006; Rubin & Roessler, 1995). The State-Federal VR Program has evolved over time creating the occupation of rehabilitation counseling, and this profession has progressed at a rapid rate (Patterson, Bruyère, Szymanski, & Jenkins, 2005). Under the Department of Education, the Rehabilitation Services Administration (RSA) is the primary agency for implementing VR services, client professional development, employment opportunities and training, and the case service report dataset (RSA-911), which includes information regarding demographic characteristics, type of disability, interventions or services provided, reason for case closure, employment status, and sources of financial support (Dowden, Ethridge, & Brooks, 2016).

Much of the literature on rehabilitation counseling services concerning people with hearing loss, however, focuses on deaf people and members of the Deaf community (Bat-Chava, Deignan, & Martin, 2002). The Deaf population has become relevant as a distinct linguistic minority group, which has caused a large amount of research studies to be conducted to assess the overall social cultural context in which Deaf people live (Nakaji, 2014). There is limited knowledge about issues relevant to rehabilitation counseling services related to individuals who are hard-of-hearing. One possible explanation is most studies to explore rehabilitation outcomes

do not differentiate between types of hearing disabilities or severity of hearing loss, thus failing to capture results pertaining specifically to individuals who are hard-of-hearing (Dalton, 2007; Moore, 2001a).

### **Demographics of Hearing Loss**

As per the National Center for Health Statistics (2015), approximately 37.2 million Americans live with hearing loss. About 2-3 of every 1,000 children in the U.S. are born with hearing loss in one or both ears (Centers for Disease Control and Prevention, 2010). According to the Committee on Accessible and Affordable Hearing Health Care for Adults (2016), hearing loss may develop at any point during the life course, and the onset can be sudden from a variety of causes (e.g., trauma, infection, genetic syndromes, aging, or excessive noise exposure), where one or both ears can be affected.

Different effects of hearing loss can be often attributed to specific factors such as environment, educational level and socioeconomic status (Jaiyeola & Adeyemo, 2018). For example, people with higher educational levels and higher incomes were less likely to have hearing impairment than others (Cruickshanks, Dhar, Dinces, Fifer, Gonzalez, Heiss, Hoffman, Lee, Newhoff, Tocci, Torre, & Tweed, 2015). In addition, occupational stressors, poorer self-rated health, long-term illness, and more symptoms of long-lasting stress are significantly associated with a higher prevalence of hearing problems (Hasson, Theorell, Wallén, Leineweber, & Canlon, 2011). Finally, biological factors, such as gender, may contribute to the probability of having hearing loss. In their study, Cruickshanks et al. (2015) found men were more likely to have a hearing impairment than women. Overall, there are many factors pertaining to an individual being hard-of-hearing, and discussing this population in detail may provide a general understanding of what it entails to live with hearing loss.

## **Individuals who are Hard-of-Hearing**

Individuals who are hard-of-hearing communicate using a combination of strategies based on the individual's remaining degree of hearing ability which may be enhanced by a hearing aid, or an assistive listening device, and supplemented by speech-reading (lip-reading) or other visual means (Stika & Trybus, 2002). Persons who are hard-of-hearing represent roughly 26 million people, or about 93% of all people who have some hearing loss (Stika & Trybus, 2002). Individuals who are hard-of-hearing are a unique, though heterogeneous group, with different needs and existential realities from individuals who are Deaf (Ross, 2005). Through the use of hearing aids, assistive devices, or both, individuals who are hard-of-hearing may be able to function quite well in a hearing environment, such as a work environment (Bat-Chava et al., 2002).

## **Employment Challenges for Individuals who are Hard-of-Hearing**

Individuals who are hard-of-hearing may be employed at a higher rate than those with other disabilities, but they can face challenging employment barriers. One study found people who are hard-of-hearing may be employed at a lower rate than Deaf individuals (Luft, Vierstra, Copeland, & Resh, 2009), and earnings may be lower than those in the general population, so as a result, individuals who have severe to profound hearing impairments were found to be poorer than other Americans (Walter & Dirmyer, 2013).

Another barrier people who are hard-of-hearing may face is obtaining an appropriate job. The service industry is a major field of employment, but this industry may not always be suitable for the hard-of-hearing population. For example, since retail trade involves ongoing employee-customer communication, a simpler job to accommodate for an individual who is hard-of-hearing may be a manufacturing job, where less worker-customer communication occurs (Bowe,



McMahon, Chang, & Louvi, 2005). Specifically, some men who are hard-of-hearing may be found to be in trades, production, transport, or laboring jobs, whereas women with the same disability can be found by small margins in lower level clerical, sales, service work, also, laboring jobs (Hogan, O'Loughlin, Davis, & Kendig, 2009).

Since requests for accommodations related to being hard-of-hearing is the single largest category (Luft et al., 2009), having the proper accommodations at the workplace may reduce employment barriers for people who are hard-of-hearing, but small firms and agencies may be less willing than larger ones to provide such accommodations (Bowe et al., 2005). As a result, although individuals who are hard-of-hearing have the opportunity to communicate at work with proper accommodations, this strategy may be insufficient to guarantee meaningful employment outcomes if employers are not willing to provide these accommodations (Luft et al., 2009).

### **Employment among Individuals who are Hard-of-Hearing and VR Implications**

Several earlier studies have found individuals with hearing loss are less likely to see the need for assistance from VR professionals (Glass & Elliott, 1993; Jennings & Shaw, 2008). While it is true more consumers who are hard-of-hearing who receive job placement services under VR participation may achieve successful case closures than those who do not (Bradley, Geyer, & Ebener, 2013), this validates the need for individuals who are hard-of-hearing to receive quality VR services when seeking employment. Hayward and Schmidt-Davis (2003) found in their study how only 15% of 75,117 consumers with hearing loss obtained job placement services between the years 1995 and 2000, and they discovered consumers with hearing loss may receive subsequent assistive devices (i.e. hearing aid) and relatively less of other services than did persons with other disabilities (Bradley et al., 2013).

Individuals who are hard-of-hearing can benefit from numerous VR services as these services may enhance their quality of life and employment opportunities. As per Bat-Chava et al. (2002), beneficial VR services may include obtaining knowledge and services regarding: (a) properly using assistive listening and alerting devices (Gibler, 1995; Glass & Elliott, 1993; Levitt & Bakke, 1995; M. Moore, 1995; Mowry & Andersen, 1993), (b) job accommodations (Glass, 1990; Glass & Elliott, 1992; Marasovic, 1992; Merker, 1990), (c) effective communication with employers (Kampfe, 1990; Souza & Hoyer, 1996), and (d) overall adjustment to assertiveness at work (Glass & Elliott, 1993; Héту & Getty, 1993). Since untreated hearing loss is estimated to cost \$122 billion in lost wages annually in the U.S. (Jennings & Shaw, 2008; Strom, 2005; The Hearing Review, 2005), obtaining hearing aids and other assistive devices may also assist with reducing auditory limitations, however further VR services can teach individuals who are hard-of-hearing how to self-advocate in the workplace.

VR services may help individuals who are hard-of-hearing develop self-advocacy, obtain information and referral services to community resources, and receive proper education on self-disclosure. Individuals who are hard-of-hearing may benefit from learning how to disclose their disability as some individuals may choose to not disclose their hearing loss to an employer out of fear of stigma or appearing to be incompetent (Hallberg & Carlsson, 1993; Héту & Getty, 1993; Laroche, Garcia, & Barrette, 2000; Punch, Hyde, & Creed, 2004; Stika, 1997). People who are hard-of-hearing historically have faced higher rates of unemployment and underemployment than people who are not hard-of-hearing (Danermark, 2005; Punch, 2016; Punch et al., 2004), so adequate job placement services under VR services may help to increase the employment rates for individuals who are hard-of-hearing. It has become relevant for individuals who are hard-of-

hearing to be served under the VR program as this population continues to be underrepresented in professional occupations (Capella, 2003).

### **Statement of the Problem**

There is limited research related to individuals who are hard-of-hearing as many research studies related to VR services focus on deaf people and members of the Deaf community (Bat-Chava et al., 2002). In addition, there exist complicating factors among individuals who are hard-of-hearing regarding gender, race and ethnicity, age, level of education, and those with a secondary disability. While a full explanation of complicated interactions is beyond the scope of the current study, brief explanations of each category as they relate to the research questions are warranted.

### **Gender-Related Concerns**

In terms of gender, previous studies indicate a slightly higher percentage of females with hearing loss are served under the VR program. Using RSA-911 FY 1996, Moore (2001b) found 50.3% females with hearing loss were served in the VR program compared to 49% males with hearing loss. Boutin and Wilson (2009), using RSA-911 FY 2004, found 54.9% females with hearing loss were served under the VR program compared to 45.1% of males with hearing loss. Finally, Nakaji (2014) used RSA-911 FY 2012 and results indicated 52% of females who are hard-of-hearing were served under the VR program compared to 48% of males who are hard-of-hearing. Despite slightly more women with hearing loss served under the VR program, as previous studies demonstrate, current research is needed to explore if differences among men and women who are hard-of-hearing who receive VR services continue to be present since men are more likely to be hard-of-hearing than women (Cruickshanks et al., 2015).

## **Race and Ethnicity Concerns**

Previous studies also suggest access to VR services is more difficult for racial minorities than for nonminority's (Wilson, 1999; Wilson & Senices, 2005; Wilson, Harley, McCormick, Jolivette, & Jackson, 2001; Wilson, Jackson, & Doughty, 1999). In addition, minorities, in general, had less success in becoming employed under the VR system when compared with White individuals or other racial/ethnic groups (Olney & Kennedy, 2002), possibly due to limited knowledge of rehabilitation services and its benefits and expressing a cultural mistrust of rehabilitation practitioners and potential employers (Moore, Ningning, Eugene-Cross, & Washington, 2016).

## **Age-Related Concerns**

One previous study found younger persons who are hard-of-hearing had less chance of successful employment than older persons who are hard-of-hearing (Lafitte, 1978). A more recent study found an early onset of hearing loss is related to employment difficulties later (Hogan et al., 2009), so if the young hard-of-hearing population is not being properly attended to, this may still be causing concerns for young individuals regarding employment outcomes. The same study by Hogan et al. (2009) also found difficulties being hard-of-hearing may reduce workforce participation for middle and older age groups. As a result, current research is needed to explore VR services and employment outcomes among individuals who are hard-of-hearing from different age groups such as transition age, working age, and older adults.

## **Education-Related Concerns**

There is limited research on the impact of level of education on employment outcomes specifically for individuals who are hard-of-hearing. In one study, Boutin (2010) indicated most consumers who are hard-of-hearing with higher levels of education resulted in being

underemployed. Another study by Boutin and Wilson (2009), found when hard-of-hearing consumers received college and university training as a VR service, as well as job search assistance, job placement assistance, maintenance, rehabilitation technology, and other services, these individuals were more likely to reach a successful employment outcome. Therefore, by identifying if level of education after receiving VR services leads to successful employment outcomes specific to consumers who are hard-of-hearing, this may help address the issue of underemployment for this consumer population.

### **Secondary Disability-Related Concerns**

Previous studies have not explored individuals who are hard-of-hearing with a secondary disability regarding VR services and employment outcomes despite findings revealing a large percentage of people served under the VR program with a documented secondary disability (Nakaji, 2014). One previous study by Hogan et al. (2009) found when the main condition was hearing loss, 66.2% of these individuals were employed full-time, but when the main condition was not hearing loss, only 46.4% were employed full-time. In addition, a different study found individuals who are hard-of-hearing are diagnosed with more physical and mental disorders than the general population, and there are limited population-based studies focused only on individuals who are hard-of-hearing (Dammeyer & Chapman, 2017). Current research is needed to explore VR services and employment outcomes among individuals who are hard-of-hearing who have a secondary disability.

### **Statement of the Purpose**

Exploring relationships between demographic variables (gender, race and ethnicity, age, level of education, and secondary disability), VR services, and employment outcome variables may contribute to the body of knowledge by identifying VR service areas that effectively address

the needs of individuals who are hard-of-hearing. Results from this study may also help reduce concerning problems between VR services and employment outcomes for this population among gender, race and ethnicity, age, level of education, and secondary disability. This study may also help provide current information that may be valuable in possibly increasing the quality of VR services for individuals who are hard-of-hearing with a dual diagnosis to maximize the possibility for a successful employment outcome.

### **Definition of Terms**

The capitalized term Deaf is used to identify a set of shared beliefs, practices, and a common language by a group of people with hearing loss (Goss, 2003; Padden & Ramsey, 1993). The term deaf with a lowercase “d” is used to refer to the audiological condition of having hearing loss (Padden & Humphries, 1988; Woodward, 1972). The Rehabilitation Services Administration, Case Service Report (RSA-911) Reporting Manual uses the following codes to categorize individuals who are Deaf: 03-Deafness, Primary Communication Visual and 04-Deafness, Primary Communication Auditory (Rehabilitation Services Administration, 2013).

The term hard-of-hearing refers to having a hearing disability and is defined by a significant loss in one or both ears causing difficulties to understand speech, especially with the use of hearing aids (Bowe et al., 2005). The RSA-911 Reporting Manual uses the following codes to categorize individuals who are hard-of-hearing: 05-Hearing Loss, Primary Communication Visual, 06-Hearing Loss, Primary Communication Auditory, and 07- Other Hearing Impairments (Tinnitus, Meniere's Disease, hyperacusis, etc.) (Rehabilitation Services Administration, 2013).

## CHAPTER II

### REVIEW OF THE LITERATURE

This literature review investigates race and ethnicity as it is important to understand each of these groups. The groups are presented in the order they appear in the RSA-911 Reporting Manual: White, Black or African American, American Indian and Alaska Native, Asian, Native Hawaiian or Other Pacific Islander, and Hispanic or Latino (Rehabilitation Services Administration, 2013). This literature review expands on each group in greater detail by including demographic information, hearing loss prevalence and its impact on education and employment, and involvement in VR services.

#### **White Individuals in the United States**

This section provides background information about White individuals including projected population, educational background, and socioeconomic status (SES). Also, this section addresses hearing loss prevalence among White individuals, the level of education, earnings, and the use of VR services of these individuals who are hard-of-hearing.

#### **White Population**

The White population currently makes up more than 50% of the nation's total population, but it is projected by 2060, this population may fall from 198 million in 2014 to 182 million in 2060 (Colby & Ortman, 2015). The unemployment rate for the White population in 2016 was 4.3% compared to the overall civilian unemployment rate of 4.9% (U.S. Department of

Labor, 2017). In 2015, the number of White individuals with at least a high school education was 93%, and approximately 36% had obtained a bachelor's degree or higher (Ryan & Bauman, 2016). As of 2013, the general population disability prevalence was 20.6% for White individuals when compared to 29% for Black or African Americans and 25.9% for Hispanics or Latinos (Courtney-Long, Carroll, Zhang, Stevens, Griffin-Blake, Armour, & Campbell, 2015). In summary, White individuals have better SES, education, lower poverty rate, and better access to healthcare, when compared to Black or African Americans and Hispanics or Latinos, so exploring socioeconomic impacts on White individuals with disabilities should be addressed to ensure opportunities to thrive in society, especially those who are hard-of-hearing.

### **White Individuals who are Hard-of-Hearing**

In general, research demonstrates White men are more likely to have hearing loss (64.9%) followed by White women (59.3%), Black or African American men (58.1%), and Black or African American women (55.0%) (Helzner, Cauley, Pratt, Wisniewski, Zmuda, Talbott, Rekeneire, Harris, Rubin, Simonsick, Tyllavsky, & Newman, 2005). In terms of high-frequency hearing loss, White men had a higher prevalence of high-frequency hearing loss when compared to Black or African American men at 15% for men aged 20 to 29 years, 57% for men aged 40 to 49 years, and 93% prevalence for men aged 60 to 69 years (Agrawal, Platz, & Niparko, 2008). Some factors for greater hearing loss prevalence in White men may include higher diastolic blood pressure and occupational noise exposure (Helzner et al., 2005). Due to the high prevalence of hearing loss for White individuals when compared to Black or African Americans, this may help to understand why White individuals who are hard-of-hearing may use hearing aids at a higher rate when compared to Black or African Americans, Hispanics or Latinos, and other groups (35.4% vs. 17.1%) (Bainbridge & Ramachandran, 2014).



Education for White individuals who are hard-of-hearing is a factor when it comes to living independently. Michael and Zidan (2018) explored self-advocacy skills in young students who are hard-of-hearing, and results suggested even though individuals with hearing loss know their success could be driven by their motivation and high levels of self-efficacy, some feel inferior to other students without hearing loss. For White individuals who are hard-of-hearing, being educated on how to self-advocate can assist them in feeling less inferior to their counterparts without hearing loss. Older White adults who had higher education were more likely to have obtained a recent hearing test (Nieman, Marrone, Szanton, Thorpe Jr., & Lin, 2016), which points out differences among young and older individuals with hearing loss. Furthermore, employment can also be seen as another crucial factor for White individuals who are hard-of-hearing when discussing sociodemographics.

Differences between White individuals who are hard-of-hearing and those who are not are noticeable when it comes to opportunities to thrive in the workforce. For example, White male high school graduates without hearing loss earned about \$32,369 compared to \$29,696 for men who had hearing loss. Similarly, Benito, Glassman, and Hiedemann (2016) found White women who are not hard-of-hearing earned \$25,126, and women who are hard-of-hearing earned \$21,340. As gender did not make a difference for White individuals who are hard-of-hearing earning less than those who were not, it brings about the topic of advocating for people with disabilities in general and narrowing the gap between equality in earnings. One way to address this gap is ensuring individuals who are hard-of-hearing are assisted in VR programs and provided appropriate VR services to obtain competitive employment.

## **Involvement in Vocational Rehabilitation Services**

The use of VR services among White individuals generally has been consistent with successful employment outcomes and acceptance rates. Feist-Price (1995) demonstrated White individuals were accepted for rehabilitation services more often than Black or African Americans, were successfully rehabilitated more frequently than their Black or African American counterparts, and they obtained higher paid positions. Despite having higher successful employment outcomes in VR programs, White individuals who are hard-of-hearing are not becoming employed in the best job possible when compared to individuals without hearing loss. Consumers with hearing loss were less likely to be in managerial, professional, paraprofessional, and technical jobs and more likely to be in service and production occupations when compared to the general labor force (Capella, 2003). As a result, when assisting White individuals who are hard-of-hearing, VR counselors should take into consideration exploring jobs leading to a career and future by focusing on the consumer's potential and occupational interests (Capella, 2003).

### **Black or African Americans in the United States**

This section includes background information about Black or African American individuals such as projected population, level of education, and sociodemographic factors. Also, this section focuses on Black or African American individuals who are hard-of-hearing, their health status, and access to education and employment as related to participation in VR services.

### **Black or African American Population**

It is projected between 2014 and 2060, the Black or African American population may increase from 42 million to 60 million (Colby & Ortman, 2015). From a sociodemographic perspective, Black or African Americans with disabilities are more likely to be unemployed and

have less than a high school education than any other group of individuals with disabilities (Alston, Russo, & Miles, 1994; Olney & Kennedy, 2002). In terms of education, between 2000 and 2017, the percentage of Black or African Americans who were the age 25 and older with a high school diploma improved from 78 percent to 87 percent, and about 24 percent had obtained a bachelor's degree as of 2017 (U.S. Census Bureau, 2017b). Black or African Americans were more likely to have disabilities when compared to White individuals due to differences in income, limited access to healthcare, and cultural factors (Ficke, 1992; Krieger, 1999; McNeil, 1993; Olney & Kennedy, 2002). More importantly, it is imperative to understand the status of a Black or African American individual who is hard-of-hearing as a person who is part of a minority group but also who is associated as an individual who is hard-of-hearing (O'Neal, 2012) causing a double minority status.

### **Black or African Americans who are Hard-of-Hearing**

Several studies have found low prevalence of hearing loss for Black or African Americans when compared to White individuals. For example, a study examined prevalence estimates according to hearing loss severity and race, and findings showed Black or African American participants had a higher chance to have normal to mild hearing loss than White individuals (Lin, Thorpe, Gordon-Salant, & Ferrucci, 2011). Most recently, Goman and Lin, (2016) found hearing loss to be much less prevalent for Black or African American individuals than among individuals from other racial/ethnic groups. As a result, low prevalence of hearing loss among Black or African Americans may be a cause as to why older adults from a minority group are less likely to utilize hearing aids than White individuals (Nieman et al., 2016). Health-related factors for hearing loss among Black or African American men were found to include having three times as great a risk of hearing loss due to cardiovascular disease while Black or

African American females were nearly three times as likely to have hearing loss if they were smokers (Helzner et al., 2005).

Overall, despite Black or African American consumers facing several risk factors such as Diabetes, high blood pressure, congestive heart failure, and stroke, as seen in previous research by Arnold, Pasty, Kuller, Burke, Manolio, Fried, Robbins, and Kronmal (2005), one study found this population, in general, to have less hearing problems than White individuals (Pratt, Kuller, Talbott, McHugh-Pemu, Buhari, & Xu, 2009). Another study indicated Black or African Americans with Medicaid and lower general health were negatively associated with hearing testing; on the other hand, there was positive association with high rates of healthcare utilization (Nieman et al., 2016). These findings point out the importance in utilization of healthcare and health status among Black or African Americans who are hard-of-hearing. To obtain healthcare availability, employment for Black or African Americans who are hard-of-hearing may be a factor when compared to individuals who are hard-of-hearing from another race and ethnicity.

In general, people who are hard-of-hearing encounter significantly lower rates of employment and lower wages than those with typical hearing (Neitzel, Swinburn, Hammer, & Eisenberg, 2017). One study compared earnings for people with hearing loss where findings suggested men from racial minority groups, including Black or African Americans, earn considerably less than White individuals with the same educational attainment, age, and marital status (Benito et al., 2016). Black or African American women who are hard-of-hearing earned much less than their White counterparts who are hard-of-hearing (Benito et al., 2016). In relation to these findings regarding employment, Black or African Americans who are hard-of-hearing may face similar low status in education when compared to their White counterparts.

Graduation rates for Black or African American students who are hard-of-hearing and are prepared to transition into postsecondary programs are low when compared to White individuals who are hard-of-hearing (Williamson, 2003). Previous studies examining earnings for people with hearing loss imply these individuals may enjoy greater returns to education than their hard-of-hearing counterparts, after controlling for potential experience, race and ethnicity, and marital status (Benito et al., 2016). These findings suggest Black or African Americans who are hard-of-hearing and educated may benefit from support transitioning to postsecondary settings and support with obtaining employment most reflective of their education. Participation in VR programs may provide the opportunity for Black or African Americans who are hard-of-hearing to obtain these supports.

### **Involvement in Vocational Rehabilitation Services**

Over time, past research has suggested Black or African Americans, in general, have been underrepresented in many areas of the VR system by constantly receiving unequal VR treatment (Atkins & Wright, 1980; Elmore Williams, 2008; Feist-Price, 1995). Currently, although Black or African Americans may be eligible to receive VR services, these individuals may continue to be under identified and underserved by VR programs (Dowden et al., 2016). Vocational rehabilitation services are appropriate resources for helping Black or African Americans with disabilities gain employment, however, they tend to underutilize these resources (Feist-Price, 1995). In reference to Black or African American consumers who are hard-of-hearing, one particular study indicated these individuals experience significantly lower rates of success when compared to White consumers (Moore, 2001b). Perhaps, multicultural competence may need to be a focus for VR counselors to increase the acceptance rates and successful outcomes for Black or African Americans who are hard-of-hearing.

## **American Indians and Alaska Natives in the United States**

This section includes background information about the American Indian and Alaska Native population in the United States, current employment status, and use of healthcare. Furthermore, this section focuses on some causes for hearing loss, employment, education outcomes, also, access to VR services for American Indians and Alaska Natives who are hard-of-hearing.

### **American Indian and Alaska Native Population**

There are approximately 5.2 million American Indian and Alaska Native people in the United States (Norris, Vines, & Hoeffel, 2012). More than 560 federally recognized tribes exist in the U.S. (Minority Nurse Staff, 2013). The Navajo Nation is considered to be the American Indian reservation with the leading total population of 174,000 people, also, the major American Indian and Alaska Native alone-or-in-combination population with 169,000 people (Norris et al., 2012). In most instances, American Indian and Alaska Native individuals who may live on reservations most often choose to relocate to urban environments often to seek better opportunities for education, employment, or housing (Burhansstipanov, 2000; Jacobs-Wingo, Espey, Groom, Phillips, Haverkamp, & Stanley, 2016; Philp, 1985).

American Indian and Alaska Native people can be found employed in management, business, science and arts occupations (27.2%), in service occupations (24.9%), or in sales and office jobs (22.0%). Despite employment opportunities, this population group had 26.2% who lived in poverty in 2016, which was the highest rate of any group (U.S. Census Bureau, 2017a). Most urban American Indian and Alaska Native individuals who experience poverty may drop out early from high school at a much higher rate than their urban, White counterparts (Friesen, Cross, Jivanjee, Thirstrup, Bandurraga, Gowen, & Rountree, 2015; Urban Indian Health

Institute, 2009). Brown and Robinson Kurpius (1997), found approximately 75% to 93% of American Indian and Alaska Native students may end up dropping out of college (Wolf, David, & Butler-Barnes, 2017). The Urban Indian Health Institute (2009) found young American Indian and Alaska Native individuals may face risk factors related to substance abuse and violence at rates double those of young White individuals and attempt suicide nearly three times more often than their White counterparts (Friesen et al., 2015).

Regarding healthcare among American Indian or Alaska Native adults under age 65 years, 32.6% were about twice as likely as Black adults to have public health insurance coverage, but only 48.7% were likely to consider a doctor's office or health maintenance organization (HMO) as their usual place of care when compared to White adults (81.0%), Asian adults (78.7%), and Black adults (73.0%) (Barnes, Powell-Griner, & Adams, 2005). Through the American Indian Rehabilitation Research and Training Center, an assessment conducted from 1997-1998 was able to identify alcohol abuse or dependency was the specific disability requiring the most concentration among American Indians and Alaska Natives (Schacht & Vanderbilt, 1998; Schacht & White, 2003). American Indian and Alaska Native individuals are also more likely to have higher prevalence of death due to heart disease, diabetes, chronic lower respiratory disease, cirrhosis, stroke, pneumonia, kidney disease, and hypertension than all other groups in the United States (Adamsen, Schroeder, LeMire, & Carter, 2018; Perry & Foster, 2010; U. S. Department of Health and Human Services, 2018).

### **American Indian and Alaska Native Individuals who are Hard-of-Hearing**

American Indian and Alaska Native adults (6.4%) are nearly twice as likely as White adults (3.5%) and about four times as likely as Asian adults (1.8%) and Black adults (1.6%) to have hearing difficulties (Barnes et al., 2005). According to the Montana University Affiliated

Rural Institute on Disabilities (1995), 143 tribes were surveyed, and 15% of American Indian and Alaska Native individuals reported being hard-of-hearing. One study explored concurrent hearing and visual impairment prevalence, and results indicated American Indians reported a combination of hearing and visual impairments three times more than Asian and Pacific Islander Americans (6.3% vs. 1.8%) possibly due to limited healthcare access and auditory disorders (Baxter, 1983; Beery, Doyle, Cantekin, Bluestone, & Wiet, 1980; Caban, Lee, Gómez-Marín, Lam, & Zheng, 2005; Wiet, 1979; Zuckerman, Haley, Roubideaux, & Lillie-Blanton, 2004).

According to McShane (1982), results from an early study indicated American Indians may encounter otitis media, a middle ear infection, which can cause many complications, especially for young individuals. McShane (1987) later reported otitis media could cause possible hearing loss (Paradise, 1980), cognitive and psycholinguistic development delays (Kaplan, Fleshman, Bender, Baum, & Clark, 1973; Katz, 1978; Zinkus & Gottlieb, 1980), educational achievement delays (Freeman & Parkins, 1979), reading difficulties, and emotional challenges (Bennett, Ruuska, & Sherman, 1980) for American Indian youth over a period of time. Despite significant findings from earlier studies, one current study found only 8% of American Indian individuals reported hearing aid use (Gellert, Martin, Lapidus, Wosnig, & Becker, 2017), which could be problematic when receiving an education.

Previous research has confirmed American Indian and Alaska Native students who obtain a high school diploma and start attending a public college continue have the largest dropout rate compared to any other student population (Wolf et al., 2017), and being hard-of-hearing poses an additional challenge for these individuals due to the lack of hearing aid use. In 2004, of the American Indian and Alaska Native students ages 6 to 21 who were identified to be receiving special education services, only 0.14% had a hearing impairment (U. S. Department of



Education, 2009). Although this percentage is not large, there are still benefits to providing public health interventions such as hearing screening tests at health fairs and throughout the communities to help reduce hearing loss consequences and educate American Indian and Alaska Native individuals about the impact of long-term hearing loss (Gellert et al., 2017). Being educated about hearing loss and making sure the hearing loss is addressed can have an impact on employment for American Indian and Alaska Native individuals who are hard-of-hearing.

According to Ogunwole (2006), the U.S Census Bureau found the median earnings for American Indian and Alaska Native men and women employed full-time were \$28,900 and \$22,800, respectively, and much lower than those of all men and women, \$37,100 and \$27,200, respectively. In addition to slightly lower earnings than the general population, an American Indian or Alaska Native individual who is hard-of-hearing faces further challenges in the workplace as they may not be aware of the proper accommodations available to them or may have problems retaining employment due to the lack of wearing hearing aids. As a result, the use of VR services among these hard-of-hearing individuals could help address these employment barriers.

### **Involvement in Vocational Rehabilitation Services**

Many American Indian and Alaska Native individuals may encounter lower successful closure rates in VR than White individuals (Wheaton & Hertzfeld, 2002). The extension of VR to American Indians with disabilities is made difficult by cultural, geographical, social, linguistic, and financial problems (D'Alonzo, Giordano, & Oyenque, 1996). In particular, some difficulties for American Indians to proceed with VR services may continue to include: (a) problems with transportation, (b) a cultural gap between consumers and service providers (c) limited employment opportunities on or near reservations, (d) limited commitment to VR due to

self-initiative and perseverance, (e) possible language barriers, and (f) problems with substance abuse (Martin, Frank, Minkler, & Johnson, 1988; Saravanabhavan, 1991). Consequently, VR counselors may want to facilitate access to VR services for American Indians and Alaska Natives by becoming familiar with the barriers these individuals face and working together to reduce these barriers.

### **Asians in the United States**

This section includes background information about Asians in the United States including involvement in the labor force, education attainment, and disability acceptance. This section also focuses on Asians' view of hearing loss, how it impacts education, and VR service experiences.

#### **Asian Population**

There are an estimated 21.4 million Asians in the United States and, approximately, there are 4.9 million Chinese individuals, followed by Asian Indian (4.1 million), Filipino (3.9 million), Vietnamese (2.1 million), Korean (1.8 million) and Japanese (1.5 million) (U. S. Census Bureau, 2016, 2018b). According to Allard (2011), it is common among Asians for males to be working at a higher rate than females, to be foreign born, be married, and have higher educational attainment. Between 2008 to 2010, 65.9% of Asians participated in the labor force, and those 25 years old or older were more likely to be working (Allard, 2011). In terms of income for Asian Americans, the median annual household income is \$73,060, compared to \$53,600 of all other U.S. households (López, Ruiz, & Patten, 2017). In general, Asian Americans are one the most misunderstood groups in higher education (Chang, 2009) due to exclusion from higher education research (Museus & Vue, 2013). About 87.2% of Asians have at least a high school diploma, and about 52.3% have completed a bachelor's degree or higher level of education (U. S. Census Bureau, 2018b). In 2010, the U.S. Census Bureau reported the disability

prevalence for Asian Americans to be 14.5% (Brault, 2012). Asian Americans are one of the populations, the other being Pacific Islanders, with the lowest rate of mental healthcare utilization (Abe-Kim, Takeuchi, Hong, Zane, Sue, Spencer, Appel, Nicdao, & Alegría, 2007; Gómez, 2017).

A survey by Saetermoe, Scattone, and Kim (2001) found Asian Americans with disabilities may also face cultural obstacles in gaining social acceptance and access to disability-related services, and these individuals were more likely to stigmatize physical and mental disabilities (R. L. Wang & Smith, 2016). Furthermore, a previous study suggested information about Asian American children with disabilities has been traditionally not reported possibly due to religious beliefs, fear, shame, lack of understanding, and social stigma indicated (Huer, Saenz, & Doan, 2001; Nguyen & Hughes, 2013).

### **Asian Individuals who are Hard-of-Hearing**

The prevalence of hearing loss for Asian American adults found in a recent study was about 19.5% for those with high-frequency hearing loss, and some of these individuals who used non-English at home, were foreign-born, less educated, and had no insurance had less of a chance to have obtained a hearing test (Choi, Kari, Friedman, and Fisher, 2018). Asian individuals who are hard-of-hearing may also be less likely to utilize hearing aids (5.5%) when compared with White individuals (17.6%) possibly due to not being aware of one's own hearing loss (Choi et al., 2018). Furthermore, deafness can be seen as a disability or problem to be addressed by the family in the Chinese culture, so at times, they may not depend on others for help (Wu & Grant, 1997). One particular study indicated Asian Americans who are hard-of-hearing have the ability to do their own activities of daily living with minimal help from others, are motivated by self-established goals to pursue their own development, and generally display positive attitudes (Arboleda, 2007).

Previous literature implies minority group status and the reinforcement of ambivalence and insecurity from schools, rather than the development of strong cultural identity, make the academic, personal, and social development difficult for hearing minority youth in the United States, such as Asian Americans (Cummins, 1986; Foster & Kinuthia, 2003; Spencer & Markstrom-Adams, 1990). According to the Annual Survey of Deaf and Hard of Hearing Children and Youth for 2009–2010 (Gallaudet Research Institute, 2011), 3.4% of 37,828 students with hearing loss were classified as Asian (Q. Wang, Andrews, Liu, & Liu, 2016). Although the number of hard-of-hearing Asian American students is not increasingly high in the school settings, there is still a need to address this population when dealing with hearing loss and academic achievements.

There are limited studies related to Asian Americans who are hard-of-hearing and employment, one study using RSA-911 FY 1997 found Asian Americans who are deaf appeared to earn higher levels of income compared to African Americans who are deaf (Moore, 2002a). Although the income for deaf Asian Americans may not be reflective of Asian Americans who are hard-of-hearing, we can interpret earnings for Asian Americans as higher than other minority groups especially since Asian American median annual household may at times be higher than all other U.S. households (López et al., 2017).

### **Involvement in Vocational Rehabilitation Services**

The number of Asian Americans with disabilities who are served by the state-federal VR system is disproportionately low compared to all other groups (Hampton, 2000; R. L. Wang & Smith, 2016). For example, in a review of the RSA dataset for FY 2011 through FY 2015, only about 8,235 Asian Americans accessed VR services per year compared with 407,522 White individuals (Millner & Kim, 2017). One possible explanation for this underrepresentation of

Asian Americans in VR may stem from cultural factors such as Asian Americans' shame or overprotection, which may result in not seeking employment opportunities (Weol Soon, Hee Chan, & Starbuck, 2005). Another possible explanation for underutilization of VR services for this group might be collectivist values of group harmony, familial pride, and a strong occupational orientation motivate Asian Americans (Ghosh & Fouad, 2016; Millner & Kim, 2017; Sue & Sue, 2012). When working with Asian American hard-of-hearing individuals in the VR program, it may be beneficial if VR professionals are cognizant of individual acculturation and any assessment and treatment planning which can be used with appropriate traditions and practices in mind (Arboleda, 2007).

### **Native Hawaiians and Other Pacific Islanders in the United States**

This section includes background information about Native Hawaiians and Other Pacific Islanders in the United States, their earnings, level of education, and disability rates. Also, this section focuses on the hearing loss prevalence, the use of hearing aids, and VR services for Native Hawaiians and Other Pacific Islanders who are hard-of-hearing.

#### **Native Hawaiian and Other Pacific Islander Population**

It is estimated there are approximately 1.5 million Native Hawaiian and Other Pacific Islander individuals living in the United States as of 2016 (U. S. Census Bureau, 2018b). The six largest detailed groups of Native Hawaiian and Other Pacific Islander include Native Hawaiian, Samoan, Guamanian or Chamorro, Tongan, Fijian, and Marshallese (Hixson, Hepler, & Kim, 2012). According to the U. S. Department of Health and Human Services (2017), the Native Hawaiian and Pacific Islander household median income was an average of \$60,133 compared to \$61,394 for White households, and the poverty level for Native Hawaiians and Pacific Islanders was higher (17.3%) compared to White individuals (10.4%).

Regarding academics, about 88.2% of Native Hawaiian or Other Pacific Islander individuals have at least a high school diploma, and about 22.3% have completed a bachelor's degree or higher level of education (U.S. Census Bureau, 2018b). In terms of disability, Native Hawaiians and Pacific Islanders possibly have less health problems than the general population, but many risk behavior studies may exclude these individuals, focusing more on White, Black or African Americans, and Hispanic and Latino populations (Sabato, 2016). Among the working age group (ages 16-64) in 2015, there were more insured Native Hawaiians and Pacific Islanders (7.8%) when compared to White individuals (6.3%), and, in general, there were 66.4% of Native Hawaiians and Pacific Islanders with health insurance when compared to 75.8% of White individuals (U. S. Department of Health and Human Services, 2017).

The disability rates for Native Hawaiians and Pacific Islanders have been found to be increased rates of obesity, possibly as a result of genetic factors (Fuller-Thomson, Brennenstuhl, & Hurd, 2011; Grandinetti, Chang, Chen, Fujimoto, Rodriguez, & Curb, 1999), and increased rates of smoking and alcohol consumption (U. S. Department of Health and Human Services, 2017). Another study also found a high mortality rate from heart disease to be twice as high compared to White individuals (Cook, Chung, Ve'e, & Sousa, 2017; Henderson, Haiman, Wilkens, Kolonel, Wan, & Pike, 2007).

### **Native Hawaiian and Other Pacific Islander Individuals who are Hard-of-Hearing**

Native Hawaiian and Other Pacific Islander individuals have a higher prevalence of hearing loss (15%) compared to Asian individuals (11%) and Black or African American individuals (9%) (Centers for Medicare and Medicaid Services, 2017). Among Native Hawaiian or Other Pacific Islander groups, there was a higher prevalence of hearing loss for Native Hawaiian adults (15.5%), followed by Other Pacific Islander adults (14.8%), Guamanian or

Chamorro adults (12.7%), and Samoan adults (12.6%) (Galinsky, Zelaya, Simile, & Barnes, 2017). Native Hawaiian or Other Pacific Islander children with hearing loss face being a member of an indigenous group and socioeconomic status resulting in lower income for their families and less access to medical care for conditions such as middle ear disorder (Pang-Ching & Robb, 1995).

As Pacific Islander individuals may attend doctor's appointments less frequently than other Americans, even in the face of chronic disease (Wergowske & Blanchette, 2001), this may be an indication for not seeing the benefits of wearing hearing aids along with possibly having limited access to healthcare insurance. Similarly, Native Hawaiians' poor health outcomes compared to other groups in Hawaii (Cheng & Ho, 2002) and their choice of traditional medicine instead of Western medicine (Leigh & Jimenez, 2002; Ta & Chen, 2008) may have an influence in not understanding the benefits of wearing hearing aids.

### **Involvement in Vocational Rehabilitation Services**

In general, Native Hawaiian or Other Pacific Islander individuals are less likely to seek VR services and have lower successful outcome rates in VR possibly due to being inclusive, interdependent within family members, and lacking trust in authorities (Weol Soon et al., 2005). Preparation for VR professionals when serving this group of individuals may be helpful so a collaborative relationship is developed and these individuals feel included in their VR experience. Also, this group may be classified as a double minority, so they may experience further challenges which impact equity in service delivery and outcomes (Moore, Wang, & Washington, 2017; Shaw, Chan, & McMahon, 2012).

## **Hispanics and Latinos in the United States**

This section includes background information about Hispanics and Latinos living in the United States and their labor force involvement. Also, this section focuses on hearing loss age of onset, impacts of hearing loss, and the involvement in VR services for Hispanics and Latinos who are hard-of-hearing.

### **Hispanic and Latino Population**

The nation faces a rapid change in demography and diversity largely due to the growing presence of Hispanics and Latinos in the United States (Young & Mattingly, 2016). As per the U.S. Census Bureau (2018a), the U.S. Office of Management and Budget (OMB) refers to Hispanics as any one person of Cuban, Mexican, Puerto Rican, South or Central American or other Spanish culture or origin regardless of race. The civilian noninstitutional population of Hispanics and Latinos was 15.9 million in 1990, 23.9 million in 2000, and the Bureau of Labor Statistics (BLS) projects this group may reach more than 46 million in 2020. In terms of employment, in 2000, there were 16.7 million Hispanics and Latinos in the labor force; by 2010, the Hispanic and Latino labor force numbered 22.7 million, and BLS projects about 9.7 million Hispanics and Latinos may enter the workforce over the 2010–2020 timeframe (Toossi, 2012). With an increase in Hispanics and Latinos in population and the workforce, further attention needs to be placed on them, especially if they are hard-of-hearing.

### **Hispanics and Latinos who are Hard-of-Hearing**

Among Hispanic and Latino adults aged 18 to 74 years, the prevalence of hearing impairment is 15%, increasing sharply after age 45 years, and lower socioeconomic status (SES), noise exposure, and diabetes or prediabetes are associated with this occurrence (Cruickshanks et al., 2015). One of the first studies to explore relationships between insurance status and hearing



loss indicated higher rates of hearing loss among uninsured Hispanics and Latinos possibly due to poor healthcare utilization (D. J. Lee, Gomez-Marin, & Lee, 1996; Feinstein, 1993).

Compared to their White counterparts, Hispanic and Latino older adults are 78% less likely to use hearing aids (Nieman et al., 2016). Some reasons for not using hearing aids may include cost and low awareness of the benefits of using hearing aids (D. Lee, Carlson, Lee, Ray, & Markides, 1991; Goldstein, 1984). On the other hand, Hispanics and Latinos who do use hearing aids may find benefits in their ability to communicate, as well as in social and emotional areas (Mulrow, Tuley, & Aguilar, 1992).

Hispanics and Latinos may experience discrimination and unequal opportunities in many different areas such as educational settings, housing, and employment (Bradley et al., 2013; Cohen, 1990; Cohen, Fischgrund, & Redding, 1990; Walker-Vann, 1998). An individual of Hispanic origin who has a disability is likely to experience discrimination and disparity in services both on the basis of ethnic origin and disability status. When individuals of minority status face some type of hearing loss, the social and psychological impact can be even more evident (Bradley et al., 2013). Previous research found presence of hearing loss in individuals, including Hispanics and Latinos, and more so hearing loss associated with a communication problem, is associated with a slight increase in the likelihood of unemployment and reduced labor force participation (Hogan et al., 2009). Regardless of this, further research needs to be undertaken to identify the barriers experienced by Hispanics and Latinos who are hard-of-hearing in obtaining and retaining employment and to explore, for example, why few people with hearing impairment manage to secure employment in the high-income brackets (Nealon, 2013). One area to consider is level of education among Hispanics and Latinos when considering their financial status.

A Hispanic Community Health Study/Study of Latinos found higher education for Hispanics and Latinos was a determinant of a 30% lower prevalence of hearing impairment (Cruickshanks et al., 2015). One study exploring the socioeconomic impact of hearing loss indicated the odds of Hispanics and Latinos not completing high school compared to White individuals were higher than three and six times, respectively (Emmett & Francis, 2015). Another earlier study by D. J. Lee et al. (1996) indicated the odds of hearing loss were about two times higher among Puerto Ricans with less than 12 years of education when compared those with more than 12 years of education. D. J. Lee et al. (1996) also discovered no similar findings based on the association of education and hearing loss among Cuban-Americans and Mexican-Americans. Overall, sociodemographics may contribute to Hispanics and Latinos turning to VR services, especially those who are hard-of-hearing.

### **Involvement in Vocational Rehabilitation Services**

Moore (2001b) found in a study Hispanic and Latino consumers who are hard-of-hearing possessed a lower rate of success in closures in VR service programs than non-Latinos who are hard-of-hearing. One particular study suggested VR consumers who were not of European descent, such as Hispanics and Latinos, were less likely to receive assistive technology (AT) services, comprehensive assessment, college or university training, occupational or vocational training, augmentative skills training, and miscellaneous training than were other consumers under VR services (Huang, Cheing, Rumrill, Bengtson, Chan, Telzlaff, & Snitker, 2016).

Based on the factors employment, VR services, and the impact of being hard-of-hearing on race and ethnicity, it becomes clear certain groups remain underserved. Thus, the rationale for the current study is supported.

## CHAPTER III

### DATA AND METHODOLOGY

The purpose of this study was to examine the relationship between demographic variables (gender, race and ethnicity, age, level of education, and secondary disability), VR services, and VR employment outcomes among individuals who are hard-of-hearing. This study also explored what VR services contribute to employment outcomes for individuals who are hard-of-hearing.

This chapter is dedicated to describe the data and methodology used for the analysis. The type and number of population used in this study, the dataset and procedures, the research design, variables, and methodology are discussed in depth.

The U.S. Department of Health & Human Services (2016) flowchart was followed to conclude IRB approval was not required for this study since this research used archival data.

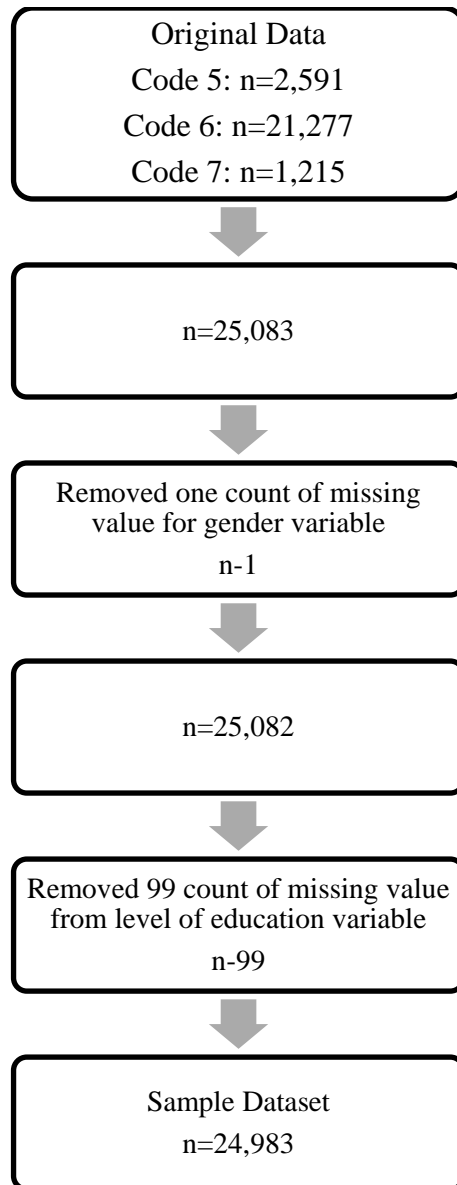
#### **Research Questions**

1. What is the relationship between demographic variables, VR services, and employment outcome variables among individuals who are hard-of-hearing when demographic variables include gender, race and ethnicity, age, level of education, and secondary disability?
2. What VR services contribute to employment outcomes for individuals who are hard-of-hearing?

## **Population and Sample**

Using the U.S. Department of Education Rehabilitation Service Administration Case Service Report (RSA-911) fiscal year (FY) 2014 dataset, of the 548,368 people with a disability participating in VR services, data from 24,983 consumers who are hard-of-hearing whose cases were closed either successfully or unsuccessfully were utilized in this study. Three categories of primary disability from the RSA-911 FY 2014 dataset were used to extract data from individuals who are hard-of-hearing. These categories included Hearing Loss, Primary Communication Visual (Code 5), Hearing Loss, Primary Communication Auditory (Code 6), and Other Hearing Impairments (Code 7). Hearing Loss, Primary Communication Visual is used to categorize a consumer dependent on sign language or lip reading, and Hearing Loss, Primary Communication Auditory is used to categorize a consumer dependent more on sound. Other Hearing Impairment is used to categorize consumers with conditions such as Tinnitus, Meniere's Disease, hyperacusis, among other related conditions (Rehabilitation Services Administration, 2013).

The initial total of potential individuals who are hard-of-hearing in the RSA-911 FY 2014 dataset was 25, 083 in which Code 5 had 2, 591 individuals, Code 6 had 21, 277 individuals, and Code 7 had 1,215 individuals. One count of missing value from gender variable was removed, and the new total count became 25,082. Finally, a 99 count of missing values from level of education variable was removed, and the final total count was 24,983. This process is summarized in Figure 3.1.



*Figure 3.1.* Flowchart of Consumer Selection for the Present Study Population

### **Dataset and Procedures**

The RSA-911 FY 2014 dataset was used. The RSA-911 dataset contains consumer information including demographic characteristics, type and severity of disability, type of financial and public supports, medical supports, services provided, and employment outcome variables for people with disabilities (Dowden et al., 2016).

A training dataset (80%) was developed, also, a testing dataset (20%) to conduct this research. The Statistical Package for Social Sciences (SPSS) 25.0 and RStudio software programs were used to extract and analyze data from the RSA-911 FY 2014 database.

### **Research Design**

The research design utilized was a quantitative data mining design using ex post facto data from the U.S. Department of Education, Rehabilitation Service Administration, Case Service Report (RSA-911) national dataset for consumers with disabilities who participated in state-federal VR services in FY 2014. In the current study, data was extracted for consumers who are hard-of-hearing with a case closed successfully or unsuccessfully following the development of an individualized plan for employment (IPE) to examine the predictive interactive relationship between demographic variables (gender, race and ethnicity, age, level of education, and secondary disability), VR services, and the criterion variable (employment outcome).

### **Independent Variables**

The independent variables for this study included both demographic factors and VR services received by consumers. The demographic variables (gender, race and ethnicity, level of education, age, and secondary disability) as listed in the RSA-911 Reporting Manual (Rehabilitation Services Administration, 2013) are as follows:

#### **Gender**

Gender categories consist of male and female as these were the only two options available in this dataset.

#### **Race**

Race and ethnicity categories consist of White, Black or African American, American Indian or Alaska Native, Asian, Native Hawaiian or Other Pacific Islander, and Ethnicity-Hispanic or Latino.

In this study, race and ethnicity categories were collapsed into four groups: (1) Non-Hispanic White, (2) Non-Hispanic Black, (3) Hispanic, and (4) Other. The group Other included American Indian or Alaska Native, Asian, Native Hawaiian or Other Pacific Islander, and Multiracial groups.

### **Age at Application**

Age at application consists of year, month, and day.

In this study, age at application was categorized into three groups: (1) 14-24, (2) 25-54, and (3) 55+ using information about the age groups in which the onset of hearing loss occurs as per the National Health Interview Survey (2012).

### **Level of Education Attained at Closure**

Level of education attained at closure consists of no formal schooling, elementary education (grades 1-8), secondary education, no high school diploma (grades 9-12), special education certificate of completion/diploma or in attendance, high school graduate or equivalency certificate (GED), post-secondary education, no degree or certificate, post-secondary academic degree, associate degree, bachelor's degree, master's degree, any degree above a Master's-e.g. Ph.D., Ed.D., J.D., vocational/technical certificate or license, occupational credential beyond undergraduate degree work, occupational credential beyond graduate degree work.

In this study, level of education attained at closure was categorized into four groups: (1) No formal schooling, elementary education (grades 1-8), secondary education, no high school diploma (grades 9-12), special education certification of completion/diploma or in attendance, and high school graduate or equivalency certificate (GED), (2) Vocational/technical certificate or license, (3) Post-secondary education, no degree or certificate, post-secondary academic degree,

associate degree, bachelor's degree, and occupational credential beyond undergraduate degree work, and (4) Master's degree, any degree above a master's-e.g. Ph.D., Ed.D., J.D., and occupational credential beyond graduate degree work.

### **Secondary Disability**

A secondary disability is a physical or mental impairment contributing to, although not the primary basis of, the impediment to employment.

Secondary disability, in this study, was categorized into four groups: (1) Mental, (2) Physical, (3) Other, and (4) None. The group Other consisted of any additional Sensory/Communicative Impairment (i.e. Blindness, Hearing Loss, or Communicative Impairments). The group None indicated the consumer did not have a secondary disability.

### **Vocational Rehabilitation Services**

The VR services as listed in the RSA-911 Reporting Manual (Rehabilitation Services Administration, 2013) are as follows:

**Assessment.** Assessment includes services provided and activities performed to determine an individual's eligibility for vocational rehabilitation services, to assign an individual to a priority category of a state vocational rehabilitation agency, which operates under an order of selection, and/or to determine the nature and scope of VR services to be included in the individualized plan for employment. Trial work experiences and extended evaluation are included in this category.

**Diagnosis and treatment of impairments.** Diagnosis and treatment of impairments includes corrective surgery, dentistry, nursing services, drugs and supplies, prosthetics and orthotics, physical therapy, occupational therapy, speech therapy, mental health services, and other medically related rehabilitation services.



**Vocational rehabilitation counseling and guidance.** Vocational rehabilitation counseling and guidance is defined as information and support services to assist an individual exercise informed choice; this service is distinct from the case management relationship between the counselor and the individual during the vocational rehabilitation process.

**Graduate college or university training.** This full-time or part-time academic training may lead to a degree recognized as being beyond a baccalaureate degree, such as a Master of Science, Arts (M.S. or M.A.) or Doctor of Philosophy (Ph.D.) or Doctor of Jurisprudence (J.D.); such training can be provided by a college or university.

**Four-year college or university training.** This training involves full-time or part-time academic training leading to a baccalaureate degree, a certificate, or other recognized educational credential; such training can be provided by a four-year college or university or technical college.

**Junior or community college training.** This training involves full-time or part-time academic training above the high school level leading to an associate degree, a certificate, or other recognized educational credential; such training would be provided by a community college, junior college, or technical college.

**Occupational or vocational training.** This training involves occupational, vocational, or job skill training provided by a community college and/or business, vocational/trade or technical school to prepare students for gainful employment in a recognized occupation.

**On-the-job training.** This training involves training in specific job skills by a prospective employer; generally, the paid trainee may remain in the same or a similar job once successful completion is achieved.

**Apprenticeship training.** This training is a work-based employment and training program which combines hands-on, on-the-job work experience in a skilled occupation with related classroom instruction. It includes supervision and structured mentoring, provides for wage increases as an apprentice's skills increase, is based on an employer-employee relationship, and provides an industry recognized certificate of completion of the program.

**Basic academic remedial or literacy training.** This literacy training or training is provided to remediate basic academic skills needed to function on the job in the competitive labor market.

**Job readiness training.** This training prepares an individual for the world of work (e.g., appropriate work behaviors, getting to work on time, appropriate dress and grooming, increasing productivity).

**Disability-related skills training.** This training includes, but is not limited to, orientation and mobility, rehabilitation teaching, training in the use of low vision aids, Braille, speech reading, sign language, and cognitive training/retraining.

**Miscellaneous training.** This training involves any training not recorded in one of the other categories listed, including GED or high school training leading to a diploma.

**Job search assistance.** Job search assistance involves activities which support and assist an individual in searching for an appropriate job; this service may include help with resume preparation, identifying appropriate job opportunities, developing interview skills, and can include making contacts with companies on behalf of the consumer.

**Job placement assistance.** Job placement assistance involves a referral to a specific job resulting in an interview, whether or not the individual attained the job.

**On-the-job supports-short term.** On-the-job supports-short term services are provided to an individual who has been placed in employment in order to stabilize the placement and enhance job retention; services include short-term job coaching for persons who do not have a supported employment goal consistent with the employment goal on the individualized plan for employment.

**On-the-job supports-supported employment.** On-the-job supports-supported employment services are on-going and help to support and maintain an individual with a most significant disability in supported employment for a period of time generally not to exceed 18 months; services included job coaching for individuals who have supported employment and long-term supports identified on the individualized plan for employment.

**Transportation.** Transportation includes travel and related expenses necessary to enable an applicant or eligible individual to participate in a vocational rehabilitation service; this service also includes adequate training in the use of public transportation vehicles and systems.

**Maintenance.** Maintenance means monetary support for expenses such as food, shelter and clothing that are in excess of the normal expenses of the individual, and that are necessitated by the individual's participation in an assessment for determining eligibility and vocational rehabilitation needs or while receiving services under an individualized plan for employment.

**Rehabilitation technology.** Rehabilitation technology means the systematic application of technologies, engineering methodologies, or scientific principles that meet the needs of, and address the barriers confronted by, individuals with disabilities in areas that include education, rehabilitation, employment, transportation, independent living, other assistive devices including, but not limited to, hearing aids, low vision aids and wheelchairs. Rehabilitation technology

includes rehabilitation engineering, assistive technology devices, and assistive technology services.

**Reader services.** Reader services include, in addition to reading aloud, transcribed printed information into Braille or sound recordings. These services are generally for individuals who are blind or deaf-blind, but may also include individuals unable to read due to serious neurological disorders, specific learning disabilities, or other physical or mental impairments.

**Interpreter services.** Interpreter services include sign language or oral interpretation services for individuals who are deaf or hard-of-hearing. These services also include tactile interpretation services for individuals who are deaf-blind.

**Personal attendant services.** Personal attendant services are personal services performed by an attendant for an individual with a disability including, but not limited to, bathing, feeding, dressing, providing mobility and transportation, in multiple settings such as the home, work, and training facilities/school.

**Technical assistance services.** Technical assistance services include conducting market analyses, developing business plans, and providing resources to individuals in the pursuit of self-employment, telecommuting and small business operation outcomes.

**Information and referral services.** Information and referral services are provided to individuals who may need services from other agencies not available through the vocational rehabilitation program.

**Benefits counseling.** Benefits counseling is provided to a person who is interested in employment but is uncertain of the impact work income may have on any disability benefits and entitlements being received, and/or is not aware of benefits, such as access to healthcare available to support any work attempt. This service involves an analysis of an individual's

financial situation, current benefits, such as SSDI and SSI, and the effect different income levels from employment may have on the individual's future financial situation.

**Customized employment services.** Customized employment services include strategies resulting in the provision of individually negotiated and designed services, supports, and job opportunities for an individual leading to an employment outcome of customized employment, including self-employment. These services include customizing a job description based on current unidentified and unmet needs of the employer and the needs of the employee, developing a set of job duties or tasks, developing a work schedule (including determining hours worked), determining a job location, developing a job arrangement (such as job carving, job sharing, or a split schedule), or determining specifics of supervision.

**Other services.** Other services include all other vocational rehabilitation services which cannot be recorded elsewhere. These services include occupational licenses, tools and equipment, and initial stocks and supplies.

### **Dependent Variable**

The dependent variable for this study was considered to be the VR employment outcome, either successful or unsuccessful VR outcome. This study only considered VR consumers with a successful employment outcome or an unsuccessful employment outcome at the time of case closure. The RSA-911 Reporting Manual (Rehabilitation Services Administration, 2013) considers a "successful rehabilitation" outcome, Status 26, as occurring after VR consumers have been accepted for services, developed and signed a written Individualized Plan for Employment, and obtained and maintained employment for a minimum of 90 days, and an "unsuccessful rehabilitation" outcome, Status 28, as occurring after a consumer has been accepted for and provided with VR services, but was not able to make it to the point of obtaining and maintaining

employment for at least 90 days. Table 3.1 consists of the variable description and how description of analysis was recoded.

Table 3.1

*Description of the Variables*

Variable	Notation	Category	Code
Gender	Gender	Male	Male
		Female	Female
Race and Ethnicity	RaceEthRecode2	Non-Hispanic White	1
		Non-Hispanic Black	2
		Hispanic	3
		Other	4
Age at Application	AgeGroupsRecoded	14-24	1
		25-54	2
		55+	3
Level of Education Attained at Closure	EducationGroupsRecoded	No formal schooling, Elementary education (grades 1-8), Secondary education, no high school diploma (grades 9-12), Special education certificate of completion/diploma or in attendance, High school graduate or equivalency certificate (GED)	1
		Vocational/Technical Certificate or License	2

(continued)

Table 3.1

*Description of the Variables (continued)*

Variable	Notation	Category	Code
		Post-secondary education, no degree or certificate, Post-secondary academic degree, Associate degree, Bachelor's degree, Occupational credential beyond undergraduate degree work	3
		Master's degree, Any degree above a Master's-e.g. Ph.D., Ed.D., J.D., Occupational credential beyond graduate degree work	4
Secondary Disability	SecondaryDisabilityRecorded	Mental	1
		Physical	2
		Other	3
		None	4
Assessment	AssesmentRecode	No	0
		Yes	1
Diagnosis and Treatment of Impairments	DiagnosisRecorded	No	0
		Yes	1
		Missing	2

(continued)

Table 3.1

*Description of the Variables (continued)*

Variable	Notation	Category	Code
Vocational Rehabilitation Counseling and Guidance	CounselingGuidRecoded	No	0
		Yes	1
		Missing	2
Graduate College or University Training	GradCollegeRecoded	No	0
		Yes	1
		Missing	2
Four-Year College or University Training	FourYearCollegeRecoded	No	0
		Yes	1
		Missing	2
Junior or Community College Training	JuniorCollegeRecoded	No	0
		Yes	1
		Missing	2
Occupational or Vocational Training	OccupVocTrainRecoded	No	0
		Yes	1
		Missing	2
On-the-job Training	OJTRecoded	No	0
		Yes	1
		Missing	2

(continued)



Table 3.1

*Description of the Variables (continued)*

Variable	Notation	Category	Code
Apprenticeship Training	AppreRecoded	No	0
		Yes	1
		Missing	2
Basic Academic Remedial or Literacy Training	BasicAcaRecoded	No	0
		Yes	1
		Missing	2
Junior or Community College Training	JuniorCollegeRecoded	No	0
		Yes	1
		Missing	2
Disability-Related Skills Training	DisRelRecoded	No	0
		Yes	1
		Missing	2
Miscellaneous Training	MiscIRecoded	No	0
		Yes	1
		Missing	2
Job Search Assistance	JobSearchRecoded	No	0
		Yes	1
		Missing	2

(continued)

Table 3.1

*Description of the Variables (continued)*

Variable	Notation	Category	Code
Job Placement Assistance	JobPlacementRecoded	No	0
		Yes	1
		Missing	2
On-the-job Supports-Short Term	JobSppShortRecoded	No	0
		Yes	1
		Missing	2
On-the-job Supports-Supported Employment	JobSpptSERecoded	No	0
		Yes	1
		Missing	2
Transportation	TranspRecoded	No	0
		Yes	1
		Missing	2
Maintenance	MaintRecoded	No	0
		Yes	1
		Missing	2
Rehabilitation Technology	RehabSvcRecoded	No	0
		Yes	1
		Missing	2

(continued)

Table 3.1

*Description of the Variables (continued)*

Variable	Notation	Category	Code
Reader Services	ReadSvsRecoded	No	0
		Yes	1
		Missing	2
Interpreter Services	IntSvsRecoded	No	0
		Yes	1
		Missing	2
Personal Attendant Services	PerAttendRecoded	No	0
		Yes	1
		Missing	2
Technical Assistance Services	TechAsstRecoded	No	0
		Yes	1
		Missing	2
Information and Referral Services	InforandRefRecoded	No	0
		Yes	1
		Missing	2
Benefits Counseling	BenCouRecoded	No	0
		Yes	1
		Missing	2

(continued)

Table 3.1

*Description of the Variables (continued)*

Variable	Notation	Category	Code
Customized Employment Services	CustEmSvsRecoded	No	0
		Yes	1
		Missing	2
Other Services	OtherSvcsRecoded	No	0
		Yes	1
		Missing	2
Type of Closure	ClosureRecoded	No	0
		Yes	1
		Missing	2

### Methodology

Three main statistical methods were used for the analysis of this study: a.) Pearson's Chi-square test, b.) Chi-square Automatic Interaction Detector (CHAID), and c.) binary logistic regression. The analysis started with Pearson's Chi-square test (Pearson, 1900). This test helped to investigate whether there exists a significant association between each predictor variable with the response, employment outcome, for the consumers who are hard-of-hearing. This test has been widely used to identify significant associations between two categorical variables, and is more suitable when the response variable is measured at a nominal level. One of the limitations of this test is a large enough sample size is needed to determine the significant associations. More specifically, this test needs to have at least five data points in each category. When this

assumption is not met, Fisher's exact test was used (Fisher, 1922) to determine the significant associations. Fisher's exact test is an alternative for Pearson's Chi-square test when the sample size is small.

Following to that, the CHAID statistical analysis was conducted (Kass, 1980). CHAID is used for prediction, classification, also, for detection of interactions (F. Chan, Wong, Rosenthal, Kundu, & Dutta, 2005; Kosciulek, 2004). CHAID was an appropriate decision tree model for this study where groups of consumers with similar characteristics were selected with same possibility of employment outcome. Through CHAID, some interesting interactions were found among explanatory variables, which helped in identifying the most influential VR services among the consumers who are hard-of-hearing.

During the third stage of the analysis, a binary logistic regression model was constructed to investigate the impact from the demographic variables and the VR services on the response variable, employment outcome (J. Cohen & Cohen, 1983; Moore, 2001a). Binary logistic regression is typically used when the dependent variable is dichotomous and the independent variables are either continuous or categorical. The logistic regression is the most popular multivariable method used in many interdisciplinary studies (Park, 2013; Tetrault, Sauler, Wells, & Concato, 2008). A good binary logistic regression model provides several benefits. Model parameters can be used to determine the strength and the importance of the explanatory variables (demographic variables and VR services) and make inferences about the effect of an explanatory variable on the response while controlling effects of other explanatory variables (Agresti, 2007). Odds ratios can be used to quantify the likelihood of being successfully employed by a set of consumers with certain characteristics relative to another set of consumers who has different

demographic variables and VR services. The alpha level was set at .05 to reduce the probability of Type I error.

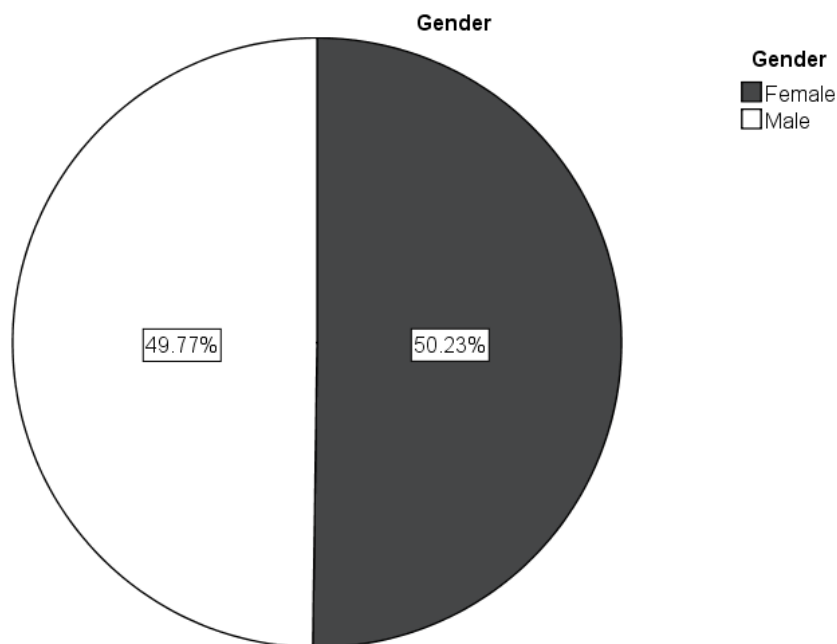
## CHAPTER IV

### ANALYSIS AND RESULTS

In this chapter, in-detailed analysis is presented about the study population and the explanatory variables including their demographic variables and VR services. The analysis begins with the descriptive and the univariate analyses. This is followed by the CHAID and binary logistic regression analyses.

#### **Descriptive and Univariate Analyses**

The study population consisted of 49.8% males and 50.2% females (Figure 4.1).



*Figure 4.1.* Percentages of Consumers by Gender

The majority consumers were Non-Hispanic White (76.7%), and only 3.5% were American Indian or Alaska Native, Asian, Native Hawaiian or Other Pacific Islander, or Multiracial (Figure 4.2).

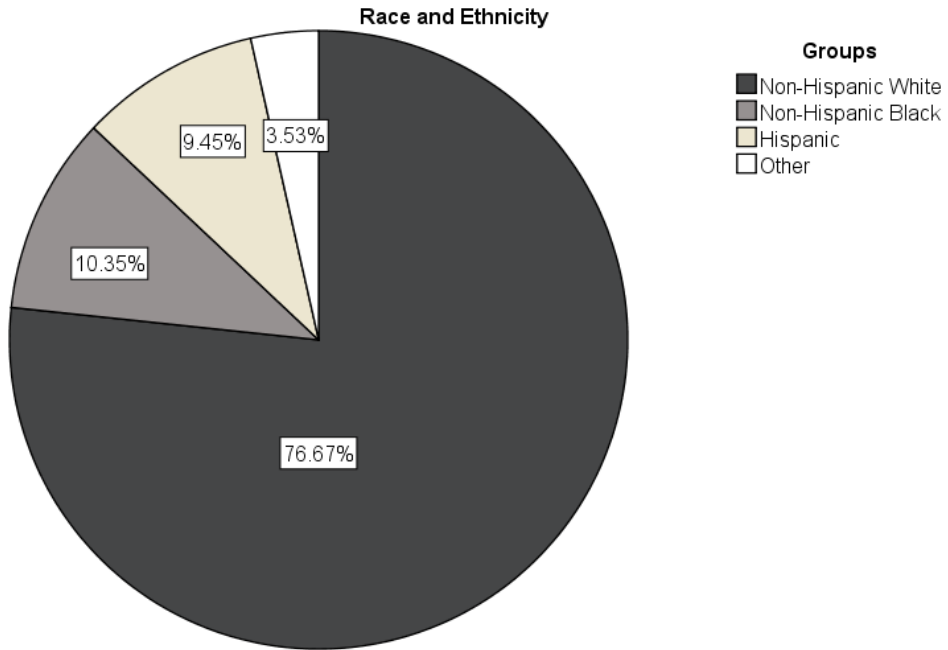


Figure 4.2. Percentages of Consumers by Race and Ethnicity

Most consumers, 45.1%, were ages 25-54, and only 12.4% were ages 14-24 (Figure 4.3).

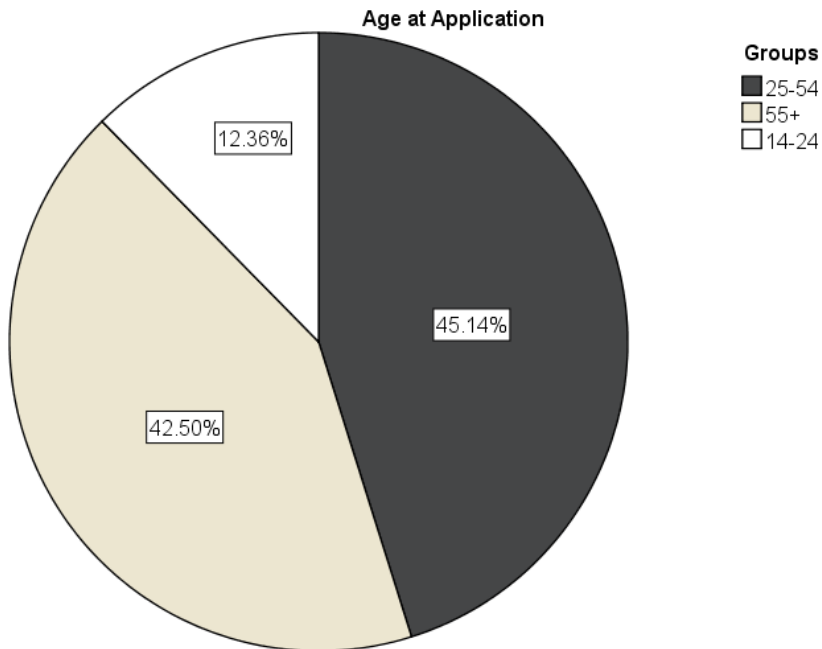


Figure 4.3. Percentages of Consumers by Age at Application



Most consumers (47.8%) had no formal schooling to high school graduate or equivalency certificate (GED), and only 3.9% had a vocational/technical certificate of license (Figure 4.4).

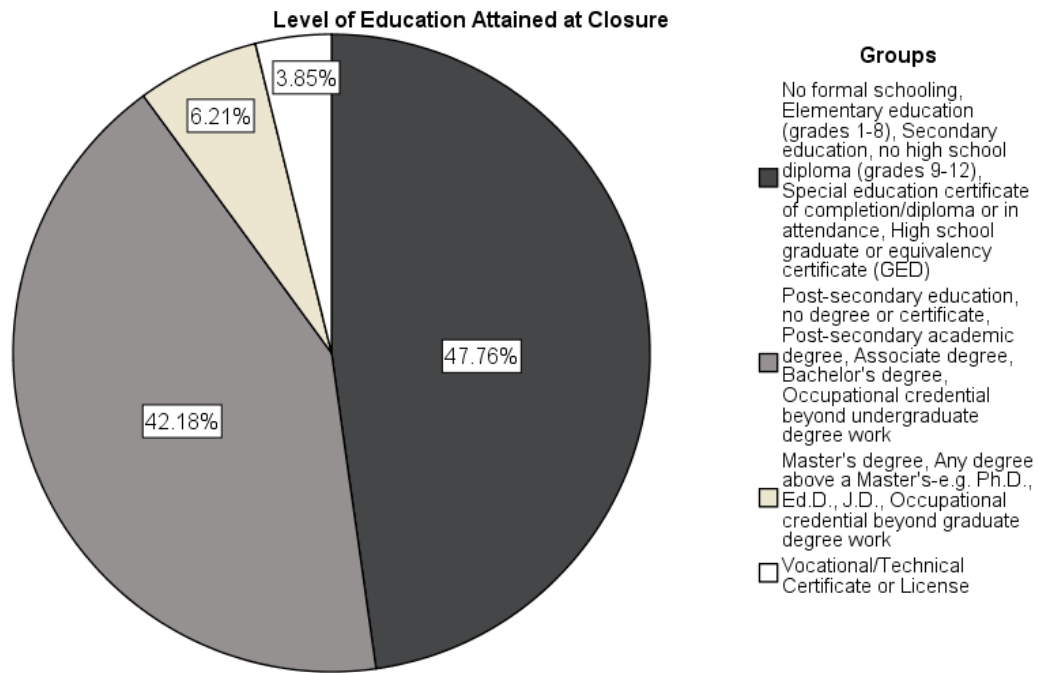


Figure 4.4. Percentages of Consumers by Level of Education Attained at Closure

Most of the consumers, 72.9%, did not have a secondary disability (Figure 4.5).

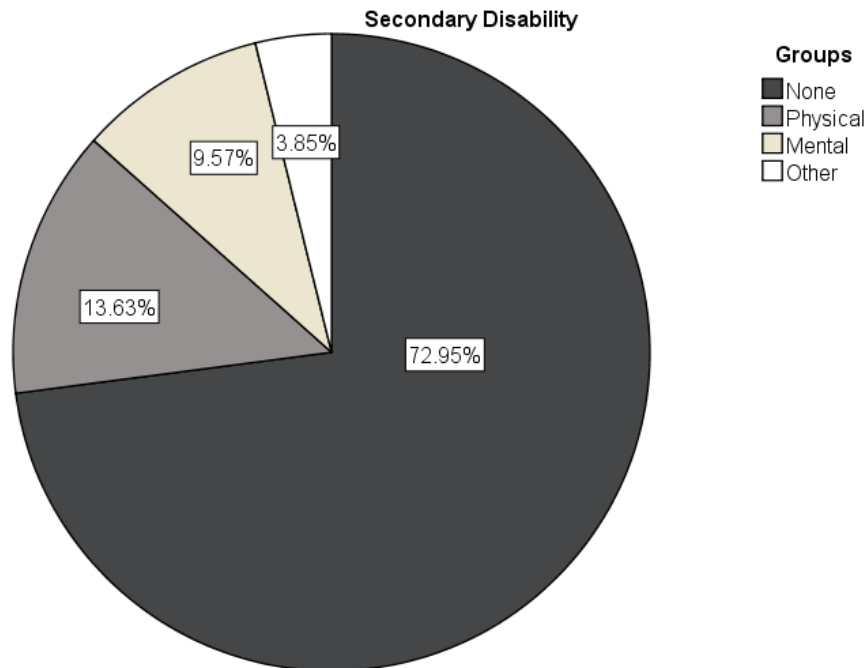


Figure 4.5. Percentages of Consumers by Secondary Disability

The top five VR services consumers who are hard-of-hearing received were assessment (60.3%), vocational rehabilitation counseling and guidance (55.2%), rehabilitation technology (55%), diagnosis and treatment of impairments (51.4%), and information and referral services (17.4%). The five VR services consumers did not receive or least received were apprenticeship training (0%), reader services (0%), personal attendant services (0%), basic academic remedial or literacy training (0.2%), and customized employment services (0.4%). After receiving VR services, 69.7% of consumers reached successful employment outcomes. A summary of the data is shown in Table 4.1.

Regarding gender, the most utilized VR services among males were assessment (59.6%), vocational rehabilitation counseling and guidance (55.5%), rehabilitation technology (55.2%), diagnosis and treatment of impairments (50.8%), and information and referral services (16.8%), and the least utilized VR services were personal attendant services (0.0%), reader services (0.0%), and apprenticeship training (0.0%). Females most utilized assessment (60.9%), rehabilitation technology (54.9%), vocational rehabilitation counseling and guidance (55.5%), diagnosis and treatment of impairments (52.1%), and information and referral services (18.0%), and the least utilized VR services were reader services (0.0%), apprenticeship training (0.0%), and personal attendant services (0.0%).

Among groups categorized by race and ethnicity, VR services most utilized by Non-Hispanic White consumers included assessment (58.7%), rehabilitation technology (57.0%), vocational rehabilitation counseling and guidance (55.6%), diagnosis and treatment of impairments (51.4%), and information and referral services (15.8%) while some of the least used VR services included personal attendant services (0.0%), reader services (0.0%), and apprenticeship training (0.0%). For Non-Hispanic Black consumers, some of the most utilized

VR services included assessment (58.9%), vocational rehabilitation counseling and guidance (46.7%), diagnosis and treatment of impairments (45.4%), rehabilitation technology (43.8%), and information and referral services (16.8%) while some of the least used VR services were reader services (0.0%), apprenticeship training (0.0%), and personal attendant services (0.0%). Hispanic consumers most used VR services included assessment (76.0%), diagnosis and treatment of impairments (63.5%), vocational rehabilitation counseling and guidance (62.6%), rehabilitation technology (55.9%), and information and referral services (29.4%) while a few of the least utilized VR services included reader services (0.0%), apprenticeship training (0.0%), and personal attendant services (0.1%). For consumers in the group Other, some of the more commonly used VR services included assessment (56.2%), vocational rehabilitation counseling and guidance (52.0%), rehabilitation technology (42.5%), diagnosis and treatment of impairments (38.2%), and information and referral services (20%), and they least utilized VR services personal attendant services (0.0%), reader services (0.0%), and apprenticeship training (0.0%).

In terms of age groups, consumers ages 14-24 most commonly utilized VR services such as assessment (62.4%), vocational rehabilitation counseling and guidance (49.8%), diagnosis and treatment of impairments (36.7%), rehabilitation technology (30.4%), and information and referral services (20.9%) while some of the least VR services utilized were apprenticeship training (0.1%), reader services (0.1%), and personal attendant services (0.1%). Consumers ages 25-54 most utilized VR services such as assessment (61.9%), vocational rehabilitation counseling and guidance (55.4%), rehabilitation technology (55.3%), diagnosis and treatment of impairments (54.2%), and information and referral services (19.3%) while the least used VR services included reader services (0.0%), apprenticeship training (0.0%), and personal attendant

services (0.0%). As for consumers age 55+, some of the VR services they most used were rehabilitation technology (62.0%), assessment (57.9%), vocational rehabilitation counseling and guidance (56.5%), diagnosis and treatment of impairments (52.8%), and information and referral services (14.3%) while the least used VR services included personal attendant services (0.0%), reader services (0.0%), and apprenticeship training (0.0%).

Regarding level of education, consumers who had no formal schooling up to a high school graduate or equivalency certificate (GED) most utilized the VR services assessment (58.7%), vocational rehabilitation counseling and guidance (52.2%), rehabilitation technology (51.8%), diagnosis and treatment of impairments (48.9%), and information and referral services (15.2%) while the least utilized VR services included reader services (0.0%), personal attendant services (0.0%), and apprenticeship training (0.0%). Consumers with a vocational/technical certificate or license most utilized VR services such as assessment (70.1%), vocational rehabilitation counseling and guidance (61.1%), rehabilitation technology (60.4%), diagnosis and treatment of impairments (59.3%), and information and referral services (24.7%) while some of the least used VR services included personal attendant services (0.0%), reader services (0.0%), and apprenticeship training (0.1%).

Consumers with a post-secondary education up to a bachelor's degree or occupational credential beyond undergraduate degree work most used VR services assessment (61.4%), vocational rehabilitation counseling and guidance (58.1%), rehabilitation technology (57.5%), diagnosis and treatment of impairments (53.4%), and information and referral services (19.5%) while some of the least used VR services included apprenticeship training (0.0%), personal attendant services (0.0%), and reader services (0.0%). Finally, consumers with a master's degree or beyond most used VR services such as rehabilitation technology (59.4%), assessment

(58.4%), vocational rehabilitation counseling and guidance (54.8%), diagnosis and treatment of impairments (52.5%), and information and referral services (15.3%) while some of the least used VR services included reader services (0.0%), apprenticeship training (0.1%), and personal attendant services (0.1%).

Finally, consumers with a mental secondary disability most utilized assessment (68.5%), diagnosis and treatment of impairments (50.0%), vocational rehabilitation counseling and guidance (49.5%), rehabilitation technology (38.6%), and job placement services (19.6%) as VR services while the least utilized VR services were reader services (0.0%), apprenticeship training (0.0%), and personal attendant services (0.1%). Consumers with a physical disability utilized assessment (63.0%), diagnosis and treatment of impairments (50.4%), vocational rehabilitation counseling and guidance (50.2%), rehabilitation technology (47.4%), and information and referral services (17.1%) as the top VR services, and they least utilized personal attendant services (0.0%), reader services (0.0%), and apprenticeship training (0.0%).

Consumers who had disabilities related to sensory/communicative impairments most utilized assessment (72.7%), vocational rehabilitation counseling and guidance (60.4%), diagnosis and treatment of impairments (57.8%), rehabilitation technology (55.6%), and information and referral services (22.8%) as VR services, and they least received personal attendant services (0.0%), apprenticeship training (0.0%), and reader services (0.1%) as VR services. Consumers without a secondary disability most received VR services that include rehabilitation technology (58.6%), assessment (58.0%), vocational rehabilitation counseling and guidance (56.6%), diagnosis and treatment of impairments (51.5%), and information and referral services (16.9%), and they least received reader services (0.0%), apprenticeship training (0.0%), and personal attendant services (0.0%) as VR services.

Table 4.1

*Summary of the Study Population*

Variable	Category	Count ( <i>n</i> )	Percentage (%)
Gender	Male	<i>n</i> =12,435	49.8%
	Female	<i>n</i> =12,548	50.2%
Race and Ethnicity	Non-Hispanic White	<i>n</i> =19,155	76.7%
	Non-Hispanic Black	<i>n</i> =2,585	10.3%
	Hispanic	<i>n</i> =2,360	9.4%
	Other	<i>n</i> =883	3.5%
Age at Application	14-24	<i>n</i> =3,088	12.4%
	25-54	<i>n</i> =11,277	45.1%
	55+	<i>n</i> =10,618	42.5%
Level of Education Attained at Closure	No formal schooling, Elementary education (grades 1-8), Secondary education, no high school diploma (grades 9-12), Special education certificate of completion/diploma or in attendance, High school graduate or equivalency certificate (GED)	<i>n</i> =11,933	47.8%
	Vocational/Technical Certificate or License	<i>n</i> =962	3.9%

(continued)

Table 4.1

*Summary of the Study Population (continued)*

Variable	Category	Count ( <i>n</i> )	Percentage (%)
	Post-secondary education, no degree or certificate, Post-secondary academic degree, Associate degree, Bachelor's degree, Occupational credential beyond undergraduate degree work	<i>n</i> =10,537	42.2%
	Master's degree, Any degree above a Master's- e.g. Ph.D., Ed.D., J.D., Occupational credential beyond graduate degree work	<i>n</i> =1,551	6.2%
Secondary Disability	Mental	<i>n</i> =2,391	9.6%
	Physical	<i>n</i> =3,406	13.6%
	Other	<i>n</i> =962	3.9%
	None	<i>n</i> =18,224	72.9%
Assessment	No	<i>n</i> =9,930	39.7%
	Yes	<i>n</i> =15,053	60.3%
Diagnosis and Treatment of Impairments	No	<i>n</i> =11,636	46.6%
	Yes	<i>n</i> =12,848	51.4%
	Missing	<i>n</i> =499	2.0%
Vocational Rehabilitation Counseling and Guidance	No	<i>n</i> =9,964	39.9%
	Yes	<i>n</i> =13,796	55.2%
	Missing	<i>n</i> =1,223	4.9%

(continued)

Table 4.1

*Summary of the Study Population (continued)*

Variable	Category	Count ( <i>n</i> )	Percentage (%)
Graduate College or University Training	No	<i>n</i> =23,666	94.7%
	Yes	<i>n</i> =104	.4%
	Missing	<i>n</i> =1,213	4.9%
Four-Year College or University Training	No	<i>n</i> =22,919	91.7%
	Yes	<i>n</i> =850	3.4%
	Missing	<i>n</i> =1,214	4.9%
Junior or Community College Training	No	<i>n</i> =23,432	93.8%
	Yes	<i>n</i> =361	1.4%
	Missing	<i>n</i> =1,190	4.8%
Occupational or Vocational Training	No	<i>n</i> =23,068	92.3%
	Yes	<i>n</i> =700	2.8%
	Missing	<i>n</i> =1,215	4.9%
On-the-job Training	No	<i>n</i> =23,581	94.4%
	Yes	<i>n</i> =156	.6%
	Missing	<i>n</i> =1,246	5.0%
Apprenticeship Training	No	<i>n</i> =23,733	95.0%
	Yes	<i>n</i> =6	.0%
	Missing	<i>n</i> =1,244	5.0%

(continued)



Table 4.1

*Summary of the Study Population (continued)*

Variable	Category	Count ( <i>n</i> )	Percentage (%)
Basic Academic Remedial or Literacy Training	No	<i>n</i> =23,684	94.8%
	Yes	<i>n</i> =58	.2%
	Missing	<i>n</i> =1,241	5.0%
Job Readiness Training	No	<i>n</i> =23,062	92.3%
	Yes	<i>n</i> =679	2.7%
	Missing	<i>n</i> =1,242	5.0%
Disability-Related Skills Training	No	<i>n</i> =23,599	94.5%
	Yes	<i>n</i> =141	.6%
	Missing	<i>n</i> =1,243	5.0%
Miscellaneous Training	No	<i>n</i> =23,132	92.6%
	Yes	<i>n</i> =564	2.3%
	Missing	<i>n</i> =1,287	5.2%
Job Search Assistance	No	<i>n</i> =21,759	87.1%
	Yes	<i>n</i> =2,033	8.1%
	Missing	<i>n</i> =1,191	4.8%
Job Placement Assistance	No	<i>n</i> =21,409	85.7%
	Yes	<i>n</i> =2,483	9.9%
	Missing	<i>n</i> =1,091	4.4%

(continued)

Table 4.1

*Summary of the Study Population (continued)*

Variable	Category	Count ( <i>n</i> )	Percentage (%)
On-the-job Supports-Short Term	No	<i>n</i> =22,965	91.9%
	Yes	<i>n</i> =776	3.1%
	Missing	<i>n</i> =1,242	5.0%
On-the-job Supports-Supported Employment	No	<i>n</i> =23,258	93.1%
	Yes	<i>n</i> =489	2.0%
	Missing	<i>n</i> =1,236	4.9%
Transportation	No	<i>n</i> =22,004	88.1%
	Yes	<i>n</i> =1,853	7.4%
	Missing	<i>n</i> =1,126	4.5%
Maintenance	No	<i>n</i> =22,411	89.7%
	Yes	<i>n</i> =1,378	5.5%
	Missing	<i>n</i> =1,194	4.8%
Rehabilitation Technology	No	<i>n</i> =10,880	43.5%
	Yes	<i>n</i> =13,749	55.0%
	Missing	<i>n</i> =354	1.4%
Reader Services	No	<i>n</i> =23,734	95.0%
	Yes	<i>n</i> =5	.0%
	Missing	<i>n</i> =1,244	5.0%

(continued)

Table 4.1

*Summary of the Study Population (continued)*

Variable	Category	Count ( <i>n</i> )	Percentage (%)
Interpreter Services	No	<i>n</i> =22,952	91.9%
	Yes	<i>n</i> =876	3.5%
	Missing	<i>n</i> =1,155	4.6%
Personal Attendant Services	No	<i>n</i> =23,732	95.0%
	Yes	<i>n</i> =7	.0%
	Missing	<i>n</i> =1,244	5.0%
Technical Assistance Services	No	<i>n</i> =23,580	94.4%
	Yes	<i>n</i> =165	.7%
	Missing	<i>n</i> =1,238	5.0%
Information and Referral Services	No	<i>n</i> =19,495	78.0%
	Yes	<i>n</i> =4,340	17.4%
	Missing	<i>n</i> =1,148	4.6%
Benefits Counseling	No	<i>n</i> =23,555	94.3%
	Yes	<i>n</i> =192	.8%
	Missing	<i>n</i> =1,236	4.9%
Customized Employment Services	No	<i>n</i> =23,690	94.8%
	Yes	<i>n</i> =108	.4%
	Missing	<i>n</i> =1,185	4.7%

(continued)

Table 4.1

*Summary of the Study Population (continued)*

Variable	Category	Count ( <i>n</i> )	Percentage (%)
Other Services	No	<i>n</i> =20,652	82.7%
	Yes	<i>n</i> =3,230	12.9%
	Missing	<i>n</i> =1,101	4.4%
Type of Closure	Not Successful	<i>n</i> =7,578	30.3%
	Successful	<i>n</i> =17,405	69.7%

The dataset contains five consumers' demographic variables also the details of the 28 VR services. All of them were categorical variables with age at application and level of education attained at closure being ordinal categorical. The univariate analysis was carried out using Pearson's Chi-square and the Fisher's exact tests (when the cell counts are small) to find out the significant demographic variables and VR services which contribute to the employment outcome.

Using a Chi-square test, all demographic variables and VR services were significant except gender (*p*-value .084) as associated with a successful employment outcome (Table 4.2).

Table 4.2

*Univariate Analysis Using P-Value*

Variable	<i>p</i> -value
Gender	.084
Race and Ethnicity	<.001
Age at Application	<.001

(continued)

Table 4.2

*Univariate Analysis Using P-Value* (continued)

Variable	<i>p</i> -value
Level of Education Attained at Closure	<.001
Secondary Disability	<.001
Assessment	<.001
Diagnosis and Treatment of Impairments	<.001
Vocational Rehabilitation Counseling and Guidance	<.001
Graduate College or University Training	<.001
Four-Year College or University Training	<.001
Junior or Community College Training	<.001
Occupational or Vocational Training	<.001
On-the-job Training	<.001
Apprenticeship Training	<.001
Basic Academic Remedial or Literacy Training	<.001
Job Readiness Training	<.001
Disability-Related Skills Training	<.001
Miscellaneous Training	<.001
Job Search Assistance	<.001
Job Placement Assistance	<.001
On-the-job Supports-Short term	<.001

(continued)

Table 4.2

*Univariate Analysis Using P-Value (continued)*

Variable	<i>p</i> -value
On-the-job Supports-Supported Employment	<.001
Transportation	<.001
Maintenance	<.001
Rehabilitation Technology	<.001
Reader Services	<.001
Interpreter Services	<.001
Personal Attendant Services	<.001
Technical Assistance Services	<.001
Information and Referral Services	<.001
Benefits Counseling	<.001
Customized Employment Services	<.001
Other Services	<.001

*Note.* For variables apprenticeship training, reader services, and personal attendant services, Fisher's exact test was used as these variables contained <5 consumers. Gender was not significant.

### **CHAID Analysis**

Following the univariate analyses, multivariate analyses were conducted. First, the CHAID analysis was used. The main goal of using CHAID is to find the most influential demographic variables and the VR services contributing to a successful employment outcome among the consumers who are hard-of-hearing.

At the first level, all consumers with successful employment or not were considered. As progress was made down the CHAID tree, the factors with the greatest impact on the likelihood of response were identified, and the overall population was broken down into groups based upon their differing values of this characteristic. The process was repeated to find the predictor variable on each leaf that was most significantly related to the response, branch by branch, until no further factors were found to have a statistically significant effect on the response. An alpha level .05 and Bonferroni corrections were used to account for the multiple testing.

After building several CHAID models using the training dataset, the CHAID model with minibucket (minimum number of observations in each terminal node) 2000 was identified as the best model as it gave a better fit (higher accuracy) and also had a more practical sensation.

The first split of the selected CHAID model was based on whether or not vocational rehabilitation services were utilized by the consumers. In fact, this was the most influential factor in determining the successful employment outcome among the consumers in the study population. As progress was made down in the CHAID tree, several different factors were identified which contributed toward the response outcome. Table 4.3 represents several interactions, which were found through the CHAID model.

Table 4.3

*CHAID Interactions*

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- 1.) If Rehabilitation Technology=0 and Diagnosis and Treatment of Impairments=0 and Job Placement Assistance is either 0 or 2 and Maintenance is either 0 or 2 and Other Services is either 0 or 2 and Secondary Disability=4 and Age at Application=1, then the predicted outcome for this category would be 0, not successfully employed. There were 601 subjects in this category, and the error rate was 18.64%.

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(continued)

Table 4.3

*CHAID Interactions* (continued)

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- 2.) If Rehabilitation Technology=0 and Diagnosis and Treatment of Impairments=0 and Job Placement Assistance is either 0 or 2 and Maintenance is either 0 or 2 and Other Services is either 0 or 2 and Secondary Disability=4 and Age at Application is either 2 or 3 and Level of Education Attained at Closure is either 1 or 3, then the predicted outcome for this category would be 0, not successfully employed. There were 1,939 subjects in this category, and the error rate was 30.17%.
- 3.) If Rehabilitation Technology=0 and Diagnosis and Treatment of Impairments=0 and Job Placement Assistance is either 0 or 2 and Maintenance is either 0 or 2 and Other Services is either 0 or 2 and Secondary Disability=4 and Age at Application is either 2 or 3 and Level of Education is either 2 or 4, then the predicted outcome for this category would be 0, not successfully employed. There were 220 subjects in this category, and the error rate was 18.64%.
- 4.) If Rehabilitation Technology=0 and Diagnosis and Treatment of Impairments=0 and Job Placement Assistance is either 0 or 2 and Maintenance is either 0 or 2 and Other Services is either 0 or 2 and Secondary Disability is either 1 or 3, then the predicted outcome for this category would be 0, not successfully employed. There were 735 subjects in this category, and the error rate was 18.91%.
- 5.) If Rehabilitation Technology=0 and Diagnosis and Treatment of Impairments=0 and Job Placement Assistance is either 0 or 2 and Maintenance is either 0 or 2 and Other Services is either 0 or 2 and Secondary Disability=2, then the predicted outcome for this category would be 0, not successfully employed. There were 782 subjects in this category, and the error rate was 14.96%.
- 6.) If Rehabilitation Technology=0 and Diagnosis and Treatment of Impairments=0 and Job Placement Assistance is either 0 or 2 and Maintenance is either 0 or 2 and Other Services is 1, then the predicted outcome for this category would be 1, successfully employed. There were 185 subjects in this category, and the error rate was 44.32%.
- 7.) If Rehabilitation Technology=0 and Diagnosis and Treatment of Impairments=0 and Job Placement Assistance is either 0 or 2 and Maintenance is 1, then the predicted outcome for this category would be 1, successfully employed. There were 131 subjects in this category, and the error rate was 26.72%.

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(continued)



Table 4.3

*CHAID Interactions* (continued)

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- 8.) If Rehabilitation Technology=0 and Diagnosis and Treatment of Impairments=0 and Job Placement Assistance=1, then the predicted outcome for this category would be 1, successfully employed. There were 419 subjects in this category, and the error rate was 1.26%.
- 9.) If Rehabilitation Technology=0 and Diagnosis and Treatment of Impairments is either 1 or 2 and Age at Application=1, then the predicted outcome for this category would be 1, successfully employed. There were 419 subjects in this category, and the error rate was 39.86%.
- 10.) If Rehabilitation Technology=0 and Diagnosis and Treatment of Impairments is either 1 or 2 and Age at Application=2, then the predicted outcome for this category would be 1, successfully employed. There were 1,742 subjects in this category, and the error rate was 29.22%.
- 11.) If Rehabilitation Technology=0 and Diagnosis and Treatment of Impairments is either 1 or 2 and Age at Application=3, then the predicted outcome for this category would be 1, successfully employed. There were 1,576 subjects in this category, and the error rate was 20.05%.
- 12.) If Rehabilitation Technology=1 and Transportation=0 and Secondary Disability=4 and Age at Application=1, then the predicted outcome for this category would be 1, successfully employed. There were 425 subjects in this category, and the error rate was 23.06%.
- 13.) If Rehabilitation Technology=1 and Transportation=0 and Secondary Disability=4 and Age at Application is either 2 or 3 and Job Search Assistance is either 0 or 2 and Job Placement Assistance is either 0 or 2 and Interpreter Services is either 0 or 2 and Diagnosis and Treatment of Impairments is either 0 or 2 and Maintenance is either 0 or 2 and Race=1, then the predicted outcome for this category would be 1, successfully employed. There were 2,714 subjects in this category, and the error rate was 3.8%.
- 14.) If Rehabilitation Technology=1 and Transportation=0 and Secondary Disability=4 and Age at Application is either 2 or 3 and Job Search Assistance is either 0 or 2 and Job Placement Assistance is either 0 or 2 and Interpreter Services is either 0 or 2 and Diagnosis and Treatment of Impairments is either 0 or 2 and Maintenance is either 0 or 2 and Race is either 2 or 3 or 4, then the predicted outcome for this category would be 1, successfully employed. There were 401 subjects in this category, and the error rate was 7.23%.

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(continued)

Table 4.3

*CHAID Interactions* (continued)

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- 15.) If Rehabilitation Technology=1 and Transportation=0 and Secondary Disability=4 and Age at Application is either 2 or 3 and Job Search Assistance is either 0 or 2 and Job Placement Assistance is either 0 or 2 and Interpreter Services is either 0 or 2 and Diagnosis and Treatment of Impairments is either 0 or 2 and Maintenance=1, then the predicted outcome for this category would be 1, successfully employed. There were 54 subjects in this category, and the error rate was 16.67%.
- 16.) If Rehabilitation Technology=1 and Transportation=0 and Secondary Disability=4 and Age at Application is either 2 or 3 and Job Search Assistance is either 0 or 2 and Job Placement Assistance is either 0 or 2 and Interpreter Services is either 0 or 2 and Diagnosis and Treatment of Impairments=1 and Vocational Rehabilitation Counseling and Guidance is either 0 or 2, then the predicted outcome for this category would be 1, successfully employed. There were 615 subjects in this category, and the error rate was 11.38%.
- 17.) If Rehabilitation Technology=1 and Transportation=0 and Secondary Disability=4 and Age at Application is either 2 or 3 and Job Search Assistance is either 0 or 2 and Job Placement Assistance is either 0 or 2 and Interpreter Services is either 0 or 2 and Diagnosis and Treatment of Impairments=1 and Vocational Rehabilitation Counseling and Guidance=1 and Race is either 1 or 3 and Information and Referral Services is either 0 or 2, then the predicted outcome for this category would be 1, successfully employed. There were 2,003 subjects in this category, and the error rate was 6.29%.
- 18.) If Rehabilitation Technology=1 and Transportation=0 and Secondary Disability=4 and Age at Application is either 2 or 3 and Job Search Assistance is either 0 or 2 and Job Placement Assistance is either 0 or 2 and Interpreter Services is either 0 or 2 and Diagnosis and Treatment of Impairments=1 and Vocational Rehabilitation Counseling and Guidance=1 and Race is either 1 or 3 and Information and Referral Services=1, then the predicted outcome for this category would be 1, successfully employed. There were 784 subjects in this category, and the error rate was 4.21%.
- 19.) If Rehabilitation Technology=1 and Transportation=0 and Secondary Disability=4 and Age at Application is either 2 or 3 and Job Search Assistance is either 0 or 2 and Job Placement Assistance is either 0 or 2 and Interpreter Services is either 0 or 2 and Diagnosis and Treatment of Impairments=1 and Vocational Rehabilitation Counseling and Guidance=1 and Race is either 2 or 4, then the predicted outcome for this category would be 1, successfully employed. There were 253 subjects in this category, and the error rate was 11.86%.

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(continued)

Table 4.3

*CHAID Interactions* (continued)

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- 20.) If Rehabilitation Technology=1 and Transportation=0 and Secondary Disability=4 and Age at Application is either 2 or 3 and Job Search Assistance is either 0 or 2 and Job Placement Assistance is either 0 or 2 and Interpreter Services=1, then the predicted outcome for this category would be 1, successfully employed. There were 80 subjects in this category, and the error rate was 21.25%.
- 21.) If Rehabilitation Technology=1 and Transportation=0 and Secondary Disability=4 and Age at Application is either 2 or 3 and Job Search Assistance is either 0 or 2 and Job Placement Assistance=1, then the predicted employment outcome would be 1, successfully employed. There were 270 subjects in this category, and the error rate was 14.44%.
- 22.) If Rehabilitation Technology=1 and Transportation=0 and Secondary Disability=4 and Age at Application is either 2 or 3 and Job Search Assistance=1, then the predicted employment outcome would be 1, successfully employed. There were 224 subjects in this category, and the error rate was 25%.
- 23.) If Rehabilitation Technology=1 and Transportation=0 and Secondary Disability=1, then the predicted employment outcome would be 1, successfully employed. There were 492 subjects in this category, and the error rate was 21.95%.
- 24.) If Rehabilitation Technology=1 and Transportation=0 and Secondary Disability=2, then the predicted employment outcome would be 1, successfully employed. There were 1,045 subjects in this category, and the error rate was 16.36%.
- 25.) If Rehabilitation Technology=1 and Transportation=0 and Secondary Disability=3, then the predicted employment outcome would be 1, successfully employed. There were 340 subjects in this category, and the error rate was 11.47%.
- 26.) If Rehabilitation Technology=1 and Transportation is either 1 or 2, then the predicted employment outcome would be 1, successfully employed. There were 1,260 subjects in this category, and the error rate was 31.98%.
- 27.) If Rehabilitation Technology=2, then the predicted employment outcome would be 0, not successfully employed. There were 278 subjects in this category, and the error rate was 26.62%.
-

CHAID interactions predict consumers with any level of education attained at closure from any age groups that only received diagnosis and treatment of impairments as a VR service were able to achieve a successful employment outcome. There was also no difference among race and ethnicity, for consumers ages 25-54 or 55+, when the only VR services received were diagnosis and treatment of impairments, vocational rehabilitation counseling and guidance, information and referral services, and rehabilitation technology, as consumers were predicted to achieve a successful employment outcome. If consumers had a mental, physical, or other secondary disability and only received rehabilitation technology as a VR service, they were still predicted to achieve a successful employment outcome, but if they did not receive any VR services, this predicted an unsuccessful employment outcome.

The relative importance of the explanatory variable in the CHAID model was identified based on the level of accuracy, and this is represented in Figure 4.6. One can observe in Figure 4.6 how the variables a.) rehabilitation technology (0.264), b.) diagnosis and treatment of impairments (0.090), c.) job placement assistance (0.016), d.) transportation (0.016), e.) secondary disability (0.010), f.) age at application (0.010), g.) maintenance (0.006), h.) other services (0.005), i.) job search assistance (0.003), j.) race and ethnicity (0.001), k.) vocational rehabilitation counseling and guidance (0.001), l.) level of education attained at closure (0.001), m.) interpreter services (<0.001), and n.) information and referral services (<0.001) contribute in increasing the accuracy of the CHAID model the most.

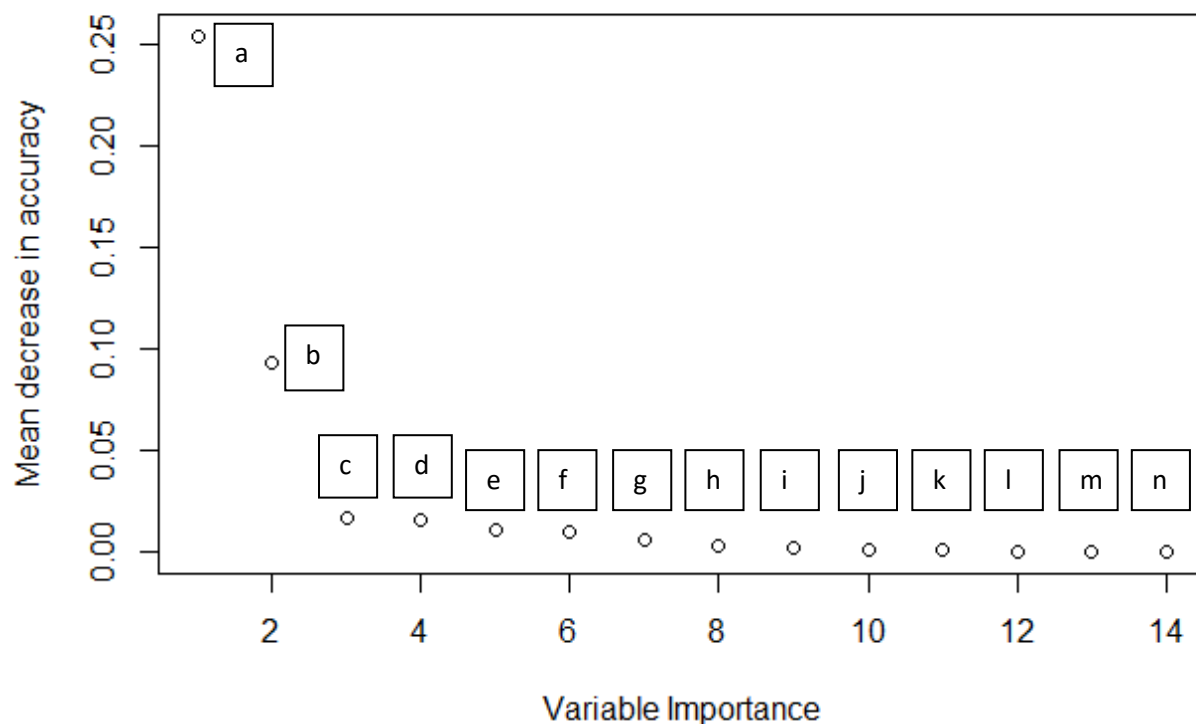


Figure 4.6. Level of Accuracy Plot for CHAID Model

The selected CHAID model was used to do the prediction for the testing dataset. There was 81% accuracy, 57% sensitivity, and 92% specificity found. This means, out of consumers who are hard-of hearing, 81% of them who had a successful employment outcome were correctly identified by the CHAID model. Moreover, out of hard-of hearing consumers who actually had a successful employment outcome, 57% of them were correctly identified by the CHAID model, and out of these consumers who did not have a successful employment outcome, 92% of them were correctly identified by the CHAID model.

### Binary Logistic Regression Analysis

Following to the CHAID analysis, initiation on building a binary logistic regression model to determine the most significant factors contributing toward successful employment outcomes among the consumers who are hard-of-hearing was completed. Another main intention was to quantify their effect and to identify the impact of each factor with its corresponding odds

ratios by controlling for other factors. In fact, the odds ratio identifies the likelihood of successful employment outcome for the individuals with certain consumer characteristics and vocational rehabilitation services compared to those who did not exhibit those consumer characteristics.

Stepwise model selection method was followed based on the Akaike information criterion (Akaike, 1973), also, backward elimination method was followed based on likelihood ratio criterion to develop a binary logistic regression model. The insignificant variables from the main effect model (this is the model which contains the effect from each individual explanatory variable) were first identified and removed from the model before including any interactions effects. The variables removed were gender ( $p$ -value .295), four-year college or university training ( $p$ -value .163), occupational or vocational training ( $p$ -value .241), on-the-job training ( $p$ -value .182), apprenticeship training ( $p$ -value .990), basic academic remedial or literacy training ( $p$ -value .648), disability-related skills training ( $p$ -value .823), reader services ( $p$ -value .761), personal attendant services ( $p$ -value .812), customized employment services ( $p$ -value .077), and technical assistance services ( $p$ -value .050). One of the variables (on-the-job supports-short-term) resulted with higher standard error (27261.347) indicating there might be an effect of multicollinearity associated with this variable. The best solution was to remove this variable from the model.

Once the main effect model with significant individual variables was identified, the interactions were added to the model. Other than being significant, personal knowledge on the area of interest was incorporated in order to identify the most meaningful interactions related with the successful employment outcome. Goodness of fit tests were used including the Omnibus test and the likelihood ratio test to do the model validation. The final model provides Cox &

Snell  $R^2$  (31%) and Nagelkerke  $R^2$  (43%) which explain the amount of variance in the dependent variable explained by the model. Also, the final model ended up providing an accuracy of 82%, sensitivity of 88% and a specificity of 67%. The receiver operating characteristic curve is provided in Figure 4.7. The area under the ROC curve is 0.85, which indicates this was a good classification model.

Table 4.4 shows the summary of the final binary logistic regression model. The significant main effects in the final model included level of education attained at closure, secondary disability, assessment, diagnosis and treatment of impairments, vocational rehabilitation counseling and guidance, information and referral services, junior or community college training, job readiness training, job search assistance, job placement assistance, transportation, maintenance, rehabilitation technology, other services, miscellaneous training, on-the-job supports-supported employment, benefits counseling, interpreter services, race and ethnicity, and age at application.

The following interactions were found to be significant regarding successful outcomes in the final model: secondary disability and diagnosis and treatment of impairments, secondary disability and job placement assistance, secondary disability and age at application, level of education attained at closure and vocational rehabilitation counseling and guidance, level of education attained at closure and rehabilitation technology, level of education attained at closure and age at application, diagnosis and treatment of impairments and age at application, job search assistance and age at application, job placement assistance and age at application, rehabilitation technology and age at application, and rehabilitation technology and race and ethnicity.

Table 4.4

*The Summary of the Binary Logistic Regression Model*

Variable	Estimate	Standard Error	Z value	Pr(> z )
(Intercept)	-1.3642	0.0996	-13.70	< 2e-16 ***
Level of Education Attained at Closure2	0.7148	0.3103	2.30	0.0212 *
Level of Education Attained at Closure3	0.7970	0.1164	6.85	7.47e-12 ***
Level of Education Attained at Closure4	2.4603	0.6597	3.73	0.0001 ***
Secondary Disability1	-0.2163	0.1378	-1.57	0.1164
Secondary Disability2	-0.3672	0.1974	-1.86	0.0628 .
Secondary Disability3	-0.1037	0.2318	-0.45	0.6546
Assessment1	-0.3857	0.0442	-8.73	< 2e-16 ***
Diagnosis and Treatment of Impairments1	1.1479	0.1152	9.97	< 2e-16 ***
Diagnosis and Treatment of Impairments2	1.3780	0.5521	2.50	0.0126 *
Vocational Rehabilitation Counseling and Guidance1	0.3435	0.0627	5.48	4.18e-08 ***
Vocational Rehabilitation Counseling and Guidance2	-2.4225	0.9127	-2.65	0.0079 **
Information and Referral Services1	-0.0224	0.0603	-0.37	0.7109
Information and Referral Services2	-1.2967	0.3491	-3.71	0.0002 ***
Junior or Community College Training1	-0.3549	0.1697	-2.09	0.0365 *
Junior or Community College Training2	-0.7404	0.4865	-1.52	0.1280
Job Readiness Training1	-0.3640	0.1191	-3.06	0.0022 **
Job Readiness Training2	3.7224	1.9191	1.94	0.0524 .
Job Search Assistance1	0.6970	0.1592	4.38	1.19e-05 ***
Job Search Assistance2	-0.3555	0.7764	-0.46	0.6471
Job Placement Assistance1	1.0092	0.1746	5.78	7.50e-09 ***

(continued)



Table 4.4

*The Summary of the Binary Logistic Regression Model (continued)*

Variable	Estimate	Standard Error	Z value	Pr(> z )
Job Placement Assistance2	-0.8137	0.6669	-1.22	0.2224
Transportation1	-0.3304	0.0839	-3.94	8.28e-05 ***
Transportation2	0.6740	0.2699	2.50	0.0125 *
Maintenance1	0.4513	0.0974	4.64	3.57e-06 ***
Maintenance2	0.2267	0.3711	0.61	0.5413
Rehabilitation Technology1	1.5150	0.1320	11.48	< 2e-16 ***
Rehabilitation Technology2	-0.1927	0.5903	-0.33	0.7441
Other Services1	0.3452	0.0683	5.06	4.27e-07 ***
Other Services2	-0.1626	0.2434	-0.67	0.5041
Miscellaneous Training1	-0.3941	0.1248	-3.16	0.0016 **
Miscellaneous Training2	0.3314	0.3404	0.97	0.3303
On-the-job Supports-Supported Employment1	1.7198	0.1403	12.26	< 2e-16 ***
On-the-job Supports-Supported Employment2	0.8832	6.0313	0.15	0.8836
On-the-job Supports-Supported Employment1	1.8549	0.1899	9.77	< 2e-16 ***
On-the-job Supports-Supported Employment2	-4.2705	6.0090	-0.71	0.4773
Benefits Counseling1	-0.3240	0.2169	-1.49	0.1351
Benefits Counseling2	2.8750	1.8477	1.56	0.1197
Interpreter Services1	-0.2454	0.1081	-2.27	0.0232 *
Interpreter Services2	0.3168	0.3255	0.97	0.3304
Race and Ethnicity2	-0.4370	0.0772	-5.66	1.49e-08 ***
Race and Ethnicity3	-0.2250	0.0873	-2.58	0.0100 **
Race and Ethnicity4	-0.1593	0.1157	-1.38	0.1688
Age at Application2	1.1250	0.1081	10.41	< 2e-16 ***
Age at Application3	1.3488	0.1115	12.10	< 2e-16 ***
Secondary Disability1: Diagnosis and Treatment of Impairments1	-0.6295	0.1318	-4.78	1.79e-06 ***
Secondary Disability2: Diagnosis and Treatment of Impairments1	-0.2072	0.1128	-1.84	0.0661 .
Secondary Disability3: Diagnosis and Treatment of Impairments1	0.0838	0.2068	0.41	0.6853
Secondary Disability1: Diagnosis and Treatment of Impairments2	-0.1009	0.5346	-0.19	0.8503

(continued)

Table 4.4

*The Summary of the Binary Logistic Regression Model (continued)*

Variable	Estimate	Standard Error	Z value	Pr(> z )
Secondary Disability2: Diagnosis and Treatment of Impairments2	1.4814	0.4586	3.23	0.0012 **
Secondary Disability3: Diagnosis and Treatment of Impairments2	0.0412	0.8467	0.05	0.9612
Secondary Disability1: Job Placement Assistance1	0.7776	0.1797	4.33	1.51e-05 ***
Secondary Disability2: Job Placement Assistance1	0.3070	0.1804	1.70	0.0888 .
Secondary Disability3: Job Placement Assistance1	-0.2881	0.3004	-0.96	0.3375
Secondary Disability1: Job Placement Assistance2	-0.1396	0.3008	-0.46	0.6425
Secondary Disability2: Job Placement Assistance2	-0.1275	0.2953	-0.43	0.6659
Secondary Disability3: Job Placement Assistance2	-0.3090	0.3633	-0.85	0.3951
Secondary Disability1: Age at Application2	-0.7358	0.1542	-4.77	1.81e-06 ***
Secondary Disability2: Age at Application2	-0.6046	0.2104	-2.87	0.0041 **
Secondary Disability3: Age at Application2	-0.1079	0.2618	-0.41	0.6804
Secondary Disability1: Age at Application3	-0.2796	0.1872	-1.49	0.1352
Secondary Disability2: Age at Application3	-0.4358	0.2108	-2.07	0.0387 *
Secondary Disability3: Age at Application3	-0.3641	0.2716	-1.34	0.1800
Level of Education Attained at Closure2: Vocational Rehabilitation Counseling and Guidance1	0.8199	0.2358	3.48	0.0005 ***
Level of Education Attained at Closure3: Vocational Rehabilitation Counseling and Guidance1	0.1043	0.0826	1.26	0.2067

(continued)

Table 4.4

*The Summary of the Binary Logistic Regression Model (continued)*

Variable	Estimate	Standard Error	Z value	Pr(> z )
Level of Education Attained at Closure4: Vocational Rehabilitation Counseling and Guidance1	0.8572	0.1874	4.57	4.80e-06 ***
Level of Education Attained at Closure2: Vocational Rehabilitation Counseling and Guidance2	0.7739	0.3991	1.94	0.0525 .
Level of Education Attained at Closure3: Vocational Rehabilitation Counseling and Guidance2	0.4354	0.2204	1.98	0.0482 *
Level of Education Attained at Closure4: Vocational Rehabilitation Counseling and Guidance2	0.4905	0.4468	1.10	0.2723
Level of Education Attained at Closure2: Rehabilitation Technology1	0.1070	0.2478	0.43	0.6659
Level of Education Attained at Closure3: Rehabilitation Technology1	-0.1837	0.0871	-2.11	0.0348 *
Level of Education Attained at Closure4: Rehabilitation Technology1	0.6760	0.2122	3.19	0.0014 **

(continued)

Table 4.4

*The Summary of the Binary Logistic Regression Model (continued)*

Variable	Estimate	Standard Error	Z value	Pr(> z )
Level of Education Attained at Closure2: Rehabilitation Technology2	0.3086	0.7669	0.40	0.6874
Level of Education Attained at Closure3: Rehabilitation Technology2	0.4441	0.4252	1.04	0.2963
Level of Education Attained at Closure4: Rehabilitation Technology2	-0.2090	1.0838	-0.19	0.8471
Level of Education Attained at Closure2: Age at Application2	-0.9778	0.3085	-3.17	0.0015 **
Level of Education Attained at Closure3: Age at Application2	-0.7591	0.1205	-6.30	2.96e-10 ***
Level of Education Attained at Closure4: Age at Application2	-2.5274	0.6687	-3.78	0.0002 ***
Level of Education Attained at Closure2: Age at Application3	-1.2941	0.3322	-3.90	9.81e-05 ***
Level of Education Attained at Closure3: Age at Application3	-1.0160	0.1244	-8.17	3.16e-16 ***
Level of Education Attained at Closure4: Age at Application3	-3.2159	0.6652	-4.83	1.34e-06 ***
Diagnosis and Treatment of Impairments1: Age at Application2	-0.1837	0.1247	-1.47	0.1406
Diagnosis and Treatment of Impairments2: Age at Application2	-0.5280	0.5981	-0.88	0.3773

(continued)

Table 4.4

*The Summary of the Binary Logistic Regression Model (continued)*

Variable	Estimate	Standard Error	Z value	Pr(> z )
Diagnosis and Treatment of Impairments1: Age at Application3	0.0445	0.1294	0.34	0.7310
Diagnosis and Treatment of Impairments2: Age at Application3	-0.8807	0.6100	-1.44	0.1488
Job Search Assistance1: Age at Application2	-0.8473	0.1889	-4.49	7.28e-06 ***
Job Search Assistance2: Age at Application2	0.5932	0.7527	0.79	0.4306
Job Search Assistance1: Age at Application3	-1.6156	0.2187	-7.39	1.51e-13 ***
Job Search Assistance2: Age at Application3	0.5855	0.8463	0.69	0.4890
Job Placement Assistance1: Age at Application2	-0.5914	0.1973	-3.00	0.0027 **
Job Placement Assistance2: Age at Application2	-1.0164	0.7839	-1.30	0.1948
Job Placement Assistance1: Age at Application3	-0.9954	0.2223	-4.48	7.53e-06 ***
Job Placement Assistance2: Age at Application3	-1.2790	0.8787	-1.46	0.1455
Rehabilitation Technology1: Age at Application2	0.6626	0.1344	4.93	8.20e-07 ***
Rehabilitation Technology2: Age at Application2	-0.5514	0.6219	-0.89	0.3753

(continued)

Table 4.4

*The Summary of the Binary Logistic Regression Model (continued)*

Variable	Estimate	Standard Error	Z value	Pr(> z )
Rehabilitation Technology1: Age at Application3	0.8105	0.1381	5.87	4.43e-09 ***
Rehabilitation Technology2: Age at Application3	-0.3642	0.6573	-0.55	0.5796
Rehabilitation Technology1: Race and Ethnicity2	-0.1548	0.1275	-1.21	0.2245
Rehabilitation Technology2: Race and Ethnicity2	0.2815	0.4928	0.57	0.5679
Rehabilitation Technology1: Race and Ethnicity3	-0.4281	0.1337	-3.20	0.0014 **
Rehabilitation Technology2: Race and Ethnicity3	-0.7350	0.6449	-1.14	0.2544
Rehabilitation Technology1: Race and Ethnicity4	-0.6414	0.1942	-3.30	0.0010 ***
Rehabilitation Technology2: Race and Ethnicity4	0.2906	0.9425	0.31	0.7578

*Note.* Significant codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1

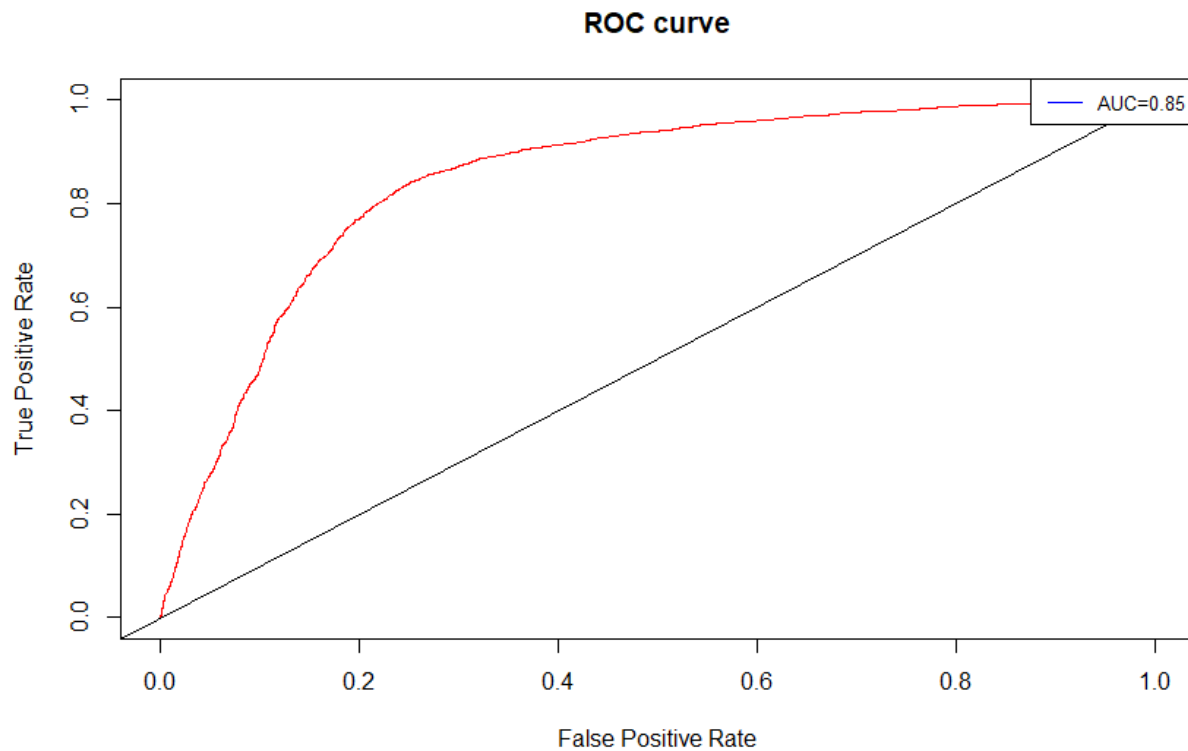


Figure 4.7. The Receiver Operating Characteristic Curve

The reference (base) levels for each explanatory variable are as follows: gender=male, race and ethnicity=Non-Hispanic White, age at application=14-24, level of education attained at closure=no formal schooling, elementary education (grades 1-8), secondary education, no high school diploma (grades 9-12), special education certificate of completion/diploma or in attendance, high school graduate or equivalency certificate (GED), secondary disability=none, assessment=did not receive VR service, diagnosis and treatment of impairments= did not receive VR service, vocational rehabilitation counseling and guidance= did not receive VR service, graduate college or university training= did not receive VR service, four-year college or university training= did not receive VR service, junior or community college training= did not receive VR service, occupational or vocational training= did not receive VR service, on-the-job training= did not receive VR service, apprenticeship training= did not receive VR service, basic

academic remedial or literacy training= did not receive VR service, job readiness training= did not receive VR service, disability-related skills training= did not receive VR service, miscellaneous training= did not receive VR service, job search assistance= did not receive VR service, job placement assistance= did not receive VR service, on-the-job supports-short term= did not receive VR service, on-the-job supports-supported employment= did not receive VR service, transportation= did not receive VR service, maintenance= did not receive VR service, rehabilitation technology= did not receive VR service, reader services= did not receive VR service, interpreter services= did not receive VR service, personal attendant services= did not receive VR service, technical assistance services= did not receive VR service, information and referral services= did not receive VR service, benefits counseling= did not receive VR service, customized employment services= did not receive VR service, other services= did not receive VR service, and type of closure= did not receive VR service.

Table 4.4 helps to identify the strength of the association with each predictor variable with the response. An odds ratio, or  $\exp \beta$ , is calculated for each of the predictor variables in the model, as shown in Table 4.5, with larger numbers (positive or negative) indicating greater likelihood of a particular outcome (successful employment outcome) when certain services are present (Pallant, 2010). An odds ratio greater than one indicates a greater likelihood of successful employment outcome, while an odds ratio less than one indicates a decreased likelihood of attaining successful employment. An odds ratio equal to one indicates individuals are equally likely to be in one of the two groups (i.e., employed or not employed).



Table 4.5

*Estimated Odds Ratio and 95% Confidence Intervals*

Variable	Odds Ratio	95% Confidence Interval	
		Lower	Upper
Level of Education Attained at Closure2	2.0438	1.1125	3.7546
Level of Education Attained at Closure3	2.2190	1.7664	2.7875
Level of Education Attained at Closure4	11.7085	3.2134	4.2661
Secondary Disability1	0.8055	6.1492	1.0552
Secondary Disability2	0.6927	4.7048	1.0198
Secondary Disability3	0.9015	5.7233	1.4200
Assessment1	0.6799	6.2354	7.4145
Diagnosis and Treatment of Impairments1	3.1515	2.5147	3.9495
Diagnosis and Treatment of Impairments2	3.9667	1.3443	1.1705
Vocational Rehabilitation Counseling and Guidance1	1.4099	1.2470	1.5941
Vocational Rehabilitation Counseling and Guidance2	0.0887	1.4826	5.3063
Information and Referral Services1	0.9779	8.6882	1.1006
Information and Referral Services2	0.2734	1.3794	5.4201
Junior or Community College Training1	0.7012	5.0281	9.7792
Junior or Community College Training2	0.4769	1.8380	1.2374
Job Readiness Training1	0.6949	5.5019	8.7758
Job Readiness Training2	41.3634	9.6182	1.7789
Job Search Assistance1	2.0077	1.4696	2.7428
Job Search Assistance2	0.7009	1.5303	3.2097
Job Placement Assistance1	2.7433	1.9482	3.8628
Job Placement Assistance2	0.4432	1.1994	1.6380
Transportation1	0.7187	6.0965	8.4717
Transportation2	1.9621	1.1560	3.3303
Maintenance1	1.5704	1.2975	1.9006
Maintenance2	1.2545	6.0609	2.5965
Rehabilitation Technology1	4.5493	3.5122	5.8926
Rehabilitation Technology2	0.8248	2.5933	2.6230
Other Services1	1.4123	1.2354	1.6145
Other Services2	0.8499	5.2749	1.3695
Miscellaneous Training1	0.6743	5.2794	8.6122
Miscellaneous Training2	1.3929	7.1479	2.7143
On-the-job Supports-Short Term1	5.5831	4.2409	7.3501
On-the-job Supports-Short Term2	2.4185	1.7767	3.2922
On-the-job Supports-Supported Employment1	6.3910	4.4049	9.2727

(continued)

Table 4.5

*Estimated Odds Ratio and 95% Confidence Intervals (continued)*

Variable	Odds Ratio	95% Confidence Interval	
		Lower	Upper
On-the-job Supports-Supported Employment2	0.0140	1.0726	1.8210
Benefits Counseling1	0.7232	4.7279	1.1063
Benefits Counseling2	17.7254	4.7401	6.6283
Interpreter Services1	0.7824	6.3299	9.6709
Interpreter Services2	1.3727	7.2529	2.5980
Race and Ethnicity2	0.6460	5.5531	7.5146
Race and Ethnicity3	0.7985	6.7298	9.4753
Race and Ethnicity4	0.8528	6.7971	1.0699
Age at Application2	3.08011	2.4921	3.8069
Age at Application3	3.8530	3.0966	4.7941
Secondary Disability1:	0.5329	4.1153	6.8995
Diagnosis and Treatment of Impairments1 Secondary Disability2:	0.8128	6.5167	1.0139
Diagnosis and Treatment of Impairments1 Secondary Disability3:	1.0874	7.2510	1.6307
Diagnosis and Treatment of Impairments1 Secondary Disability1:	0.9041	3.1707	2.5778
Diagnosis and Treatment of Impairments2 Secondary Disability2:	4.3989	1.7905	1.0807
Diagnosis and Treatment of Impairments2 Secondary Disability3:	1.0420	1.9823	5.4778
Diagnosis and Treatment of Impairments2 Secondary Disability1:	2.1763	1.5302	3.0952
Job Placement Assistance1 Secondary Disability2:	1.3593	9.5451	1.9357
Job Placement Assistance1 Secondary Disability3:	0.7497	4.1613	1.3507
Job Placement Assistance1 Secondary Disability1:	0.8697	4.8232	1.5681
Job Placement Assistance2 Secondary Disability2:	0.8803	4.9349	1.5703
Job Placement Assistance2 Secondary Disability3:	0.7342	3.6019	1.4966
Job Placement Assistance2 Secondary Disability1:	0.4791	3.5418	6.4813
Age at Application2			

(continued)

Table 4.5

*Estimated Odds Ratio and 95% Confidence Intervals (continued)*

Variable	Odds Ratio	95% Confidence Interval	
		Lower	Upper
Secondary Disability2: Age at Application2	0.5463	3.6172	8.2514
Secondary Disability3: Age at Application2	0.8978	5.3739	1.4998
Secondary Disability1: Age at Application3	0.7561	5.2388	1.0912
Secondary Disability2: Age at Application3	0.6467	4.2782	9.7771
Secondary Disability3: Age at Application3	0.6949	4.0808	1.1831
Level of Education Attained at Closure2: Vocational Rehabilitation Counseling and Guidance1	2.2703	1.4301	3.6041
Level of Education Attained at Closure3: Vocational Rehabilitation Counseling and Guidance1	1.1100	9.4400	1.3052
Level of Education Attained at Closure4: Vocational Rehabilitation Counseling and Guidance1	2.3565	1.6320	3.4025
Level of Education Attained at Closure2: Vocational Rehabilitation Counseling and Guidance2	2.1683	9.9182	4.7402
Level of Education Attained at Closure3: Vocational Rehabilitation Counseling and Guidance2	1.5456	1.0034	2.3808
Level of Education Attained at Closure4: Vocational Rehabilitation Counseling and Guidance2	1.6331	6.8027	3.9203
Level of Education Attained at Closure2: Rehabilitation Technology1	1.1129	6.8473	1.8089
Level of Education Attained at Closure3: Rehabilitation Technology1	0.8322	7.0165	9.8700
Level of Education Attained at Closure4: Rehabilitation Technology1	1.9659	1.2969	2.9790
Level of Education Attained at Closure2: Rehabilitation Technology2	1.3615	3.0283	6.1208

(continued)

Table 4.5

*Estimated Odds Ratio and 95% Confidence Intervals (continued)*

Variable	Odds Ratio	95% Confidence Interval	
		Lower	Upper
Level of Education Attained at Closure3: Rehabilitation Technology2	1.5591	6.7750	3.5877
Level of Education Attained at Closure4: Rehabilitation Technology2	0.8114	9.6977	6.7893
Level of Education Attained at Closure2: Age at Application2	0.3762	2.0550	6.8853
Level of Education Attained at Closure3: Age at Application2	0.4681	3.6962	5.9274
Level of Education Attained at Closure4: Age at Application2	0.0799	2.1538	2.9618
Level of Education Attained at Closure2: Age at Application3	0.2741	1.4295	5.2575
Level of Education Attained at Closure3: Age at Application3	0.3620	2.8371	4.6202
Level of Education Attained at Closure4: Age at Application3	0.0401	1.0891	1.4778
Diagnosis and Treatment of Impairments1 : Age at Application2	0.8322	6.5182	1.0625
Diagnosis and Treatment of Impairments2 : Age at Application2	0.5898	1.8266	1.9045
Diagnosis and Treatment of Impairments1 : Age at Application3	1.0455	8.1125	1.3474
Diagnosis and Treatment of Impairments2 : Age at Application3	0.4145	1.2539	1.3702
Job Search Assistance1: Age at Application2	0.4286	2.9597	6.2063
Job Search Assistance2: Age at Application2	1.8098	4.1390	7.9138

(continued)

Table 4.5

*Estimated Odds Ratio and 95% Confidence Intervals (continued)*

Variable	Odds Ratio	95% Confidence Interval	
		Lower	Upper
Job Search Assistance1: Age at Application3	0.1988	1.2947	3.0518
Job Search Assistance2: Age at Application3	1.7959	3.4194	9.4325
Job Placement Assistance1: Age at Application2	0.5535	3.7600	8.1488
Job Placement Assistance2: Age at Application2	0.3619	7.7861	1.6822
Job Placement Assistance1: Age at Application3	0.3696	2.3905	5.7136
Job Placement Assistance2: Age at Application3	0.2783	4.9729	1.5576
Rehabilitation Technology1: Age at Application2	1.9399	1.4907	2.5245
Rehabilitation Technology2: Age at Application2	0.5762	1.7029	1.9493
Rehabilitation Technology1: Age at Application3	2.2489	1.7155	2.9481
Rehabilitation Technology2: Age at Application3	0.6948	1.9157	2.5198
Rehabilitation Technology1: Race and Ethnicity2	0.8566	6.6718	1.0997
Rehabilitation Technology2: Race and Ethnicity2	1.3251	5.0438	3.4810
Rehabilitation Technology1: Race and Ethnicity3	0.6517	5.0150	8.4700
Rehabilitation Technology2: Race and Ethnicity3	0.4795	1.3548	1.6973
Rehabilitation Technology1: Race and Ethnicity4	0.5266	3.5989	7.7042
Rehabilitation Technology2: Race and Ethnicity4	1.3373	2.1083	8.4824

There were some strong predictors of achieving a successful employment outcome found among consumers who are hard of hearing. Consumers who had a level of education attained at closure of a master's degree or higher and received on-the-job supports-supported employment, on-the-job supports-short term, rehabilitation technology, or diagnosis and treatment of impairments as VR services were predicted to achieve a successful employment outcome when compared to consumers who only had a level of education attained at closure of no formal schooling up to high school graduate or equivalence certificate (GED) and did not receive those VR services.

Furthermore, if a consumer who is hard-of-hearing had a level of education attained at closure of master's degree or higher, the estimated odds of achieving a successful employment outcome is 11.71 times the estimated odds for a consumer who had no formal schooling up to a high school graduate or equivalence certificate (GED) after controlling for other factors in the model. When a consumer who is hard-of-hearing received on-the-job supports-supported employment as a VR service, the estimated odds of achieving a successful employment outcome is 6.39 times the estimated odds for a consumer who did not receive this VR service after controlling for other factors in the model. When a consumer who is hard-of-hearing received on-the-job supports-short term as a VR service, the estimated odds of achieving a successful employment outcome is 5.58 times the estimated odds for a consumer who did not receive this VR service after controlling for other factors in the model. When a consumer who is hard-of-hearing received rehabilitation technology as a VR service, the estimated odds of achieving a successful employment outcome is 4.55 times the estimated odds for a consumer who did not receive this VR service after controlling for other factors in the model. Finally, when a consumer who is hard-of-hearing received diagnosis and treatment of impairments as a VR service, the

estimated odds of achieving a successful employment outcome is 3.15 times the estimated odds for a consumer who did not receive this VR service.

Table 4.6 represents the relative importance of the variables in the logistic regression model. As can be seen from Table 4.6, the most influential factor which impacts the successful employment outcome most is whether the consumers received any vocational rehabilitation services or not.

Table 4.6

*Relative Importance of the Variables in the Logistic Regression Model*

Variable	Relative Variable Importance
On-the-job Supports-Short Term	12.2585
Age at Application <sup>3</sup>	12.0971
Rehabilitation Technology <sup>1</sup>	11.4764
Age at Application <sup>2</sup>	10.4078
Diagnosis and Treatment of Impairments <sup>1</sup>	9.9674
On-the-job Supports-Supported Employment <sup>1</sup>	9.7684
Assessment <sup>1</sup>	8.7307
Level of Education Attained at Closure <sup>3</sup>	6.8483
Job Placement Assistance <sup>1</sup>	5.7794
Race and Ethncity <sup>2</sup>	5.6628
Level of Education Attained at Closure <sup>3</sup> : Age at Application <sup>3</sup>	8.1669
Job Search Assistance <sup>1</sup> : Age at Application <sup>3</sup>	7.3862
Level of Education Attained at Closure <sup>3</sup> : Age at Application <sup>2</sup>	6.3011

(continued)

Table 4.6

*Relative Importance of the Variables in the Logistic Regression Model (Continued)*

Variable	Relative Variable Importance
Rehabilitation Technology1: Age at Application3	5.8674
Rehabilitation Technology1: Age at Application2	4.9306



## CHAPTER V

### DISCUSSION

This chapter provides a discussion of the results of the study in the context of past and current literature. The most noteworthy factors were race and ethnicity, age, secondary disability, and level of education. Still notable, but not as noteworthy, was gender as this was not a significant factor contributing to a successful employment outcome. Vocational rehabilitation services are discussed and how they contributed to successful employment outcomes. This chapter also includes the general and statistical analyses limitations of the study, recommendations for future research, and the concluding statement.

#### **Race and Ethnicity**

An expected outcome in keeping with most previous research, Non-Hispanic Whites (76.7%) comprised the largest group of hard-of-hearing consumers in this study. For example, Boutin (2010) found 87% of White consumers with hearing impairments received VR services in FY 2007. Non-Hispanic White consumers may utilize hearing aids at a higher percentage than minority groups (Bainbridge & Ramachandran, 2014), and this may be why this group seeks and receives VR services more often than minority groups. Non-Hispanic Black consumers who are hard-of-hearing were the second most served group (10.4%) followed by Hispanic consumers who are hard-of-hearing (9.5%). Finally, American Indian or Alaska Native, Asian, Native Hawaiian or Other Pacific Islander, or Multiracial individuals made up the least amount of consumers (3.5%) served in the VR program.

Minority groups who are hard-of-hearing continue to receive VR services at a rate less than Non-Hispanic White consumers who are hard-of-hearing. Previous research on consumers with hearing loss indicates the VR program may not serve its consumers with equality since differences in VR services on the basis of race and ethnicity continue to be found (Boutin, 2006). Since these minority populations are sometimes classified as a double minority, due to the combination of their disability status and status as person from a racial or ethnic minority group, another possibility may be they experience cumulative barriers when seeking VR services (Moore et al., 2017; Shaw et al., 2012). For example, these barriers include limited knowledge of VR services and cultural mistrust of rehabilitation professionals (Moore et al., 2016), problems with transportation and possible language barriers among American Indians (Martin et al., 1988; Saravanabhavan, 1991), and collectivist values of group harmony and familial pride among Asian Americans (Ghosh & Fouad, 2016; Millner & Kim, 2017; Sue & Sue, 2012). Continued underrepresentation of consumers who are hard-of-hearing from minority groups, as found in this study, suggests VR professionals may want to evaluate their multicultural competence when reaching out and working with these individuals to help create a more welcoming perspective of the VR program.

### **Race and Ethnicity and VR Services**

In this study, there were no differences found between race and ethnic groups in terms of some commonly used vocational rehabilitation services. These VR services were assessment, diagnosis and treatment of impairments, vocational rehabilitation counseling and guidance, rehabilitation technology, and information and referral services. Not surprisingly, Non-Hispanic White consumers received rehabilitation technology at a higher rate (57.0%) than all other groups. This finding was expected as previous research indicated this group used hearing aids at

a higher rate (35.4%) than any other minority group (17.1%) (Bainbridge & Ramachandran, 2014), and this continues to be unchanged. It is probable Non-Hispanic White consumers who are hard-of-hearing are already well educated in the benefits of rehabilitation technology.

However, significant results were found between the rates in which each group received these VR services, particularly among Hispanic consumers. It was surprising to find this group received assessment (76%), diagnosis and treatment of impairments (63.5%), vocational rehabilitation counseling and guidance (62.6%), and information and referral services (29.4%) at higher rates than all other groups. Hispanic consumers were also at a close rate (55.9%) to Non-Hispanic White consumers (57%) when receiving rehabilitation technology. Findings regarding Hispanic consumers contradict previous studies specifying consumers from this group were less likely to receive assistive technology (Huang et al., 2016) and may not seek to obtain rehabilitation technology due to low awareness of the benefits of these devices (D. Lee et al., 1991; Goldstein, 1984). It is a possibility Hispanic consumers are becoming better educated on the benefits of VR services, and VR counselors are providing a combination of VR services to this group at a higher rate, specifically rehabilitation technology. Vocational rehabilitation counselors should continue providing a combination of VR services to consumers who are hard-of-hearing, especially Hispanic consumers, so they can address their hearing loss and benefit from the VR program.

Regarding consumers who are hard-of-hearing and American Indian or Alaska Native, Asian, Native Hawaiian or Other Pacific Islander, or Multiracial, they utilized assessment (56.2%), diagnosis and treatment of impairments (38.2%), and rehabilitation technology (42.5%) at slightly lower rates than other groups. It was not a startling outcome for rehabilitation technology to be one of the VR services provided at a lower rate to individuals from these

minority groups as findings in previous studies discovered several indications of this outcome. For example, Gellert et al. (2017) found only 8% of American Indian individuals might end up using hearing aids, and Choi et al. (2018) found only 5.5% of Asian individuals might end up using hearing aids when compared with White individuals (17.6%). As for Native Hawaiian or Other Pacific Islander individuals, Weol Soon et al. (2005) determined these consumers could be inclusive, interdependent within family members, and lacking trust in authorities, so they may not prioritize diagnosis and treatment of their hearing loss or seek information regarding their hearing loss. Vocational rehabilitation counselors should continue attempting to provide information related to hearing loss and the availability of VR services when working with consumers from minority groups.

After examining findings from each group related to the most commonly used VR services, the positive outcome among Hispanic consumers who are hard-of-hearing utilizing VR services at a promising rate should have VR counselors evaluating how consumers from other minority groups could be assisted to achieve similar results. Vocational rehabilitation counselors could make a conscious effort to clarify the benefits of VR services, such as hearing aids and AT devices, while being cognizant of individual acculturation and appropriate traditions and practices when working with these minority groups (Arboleda, 2007).

### **Age**

Another anticipated outcome in this study was the majority of consumers who are hard-of-hearing were from the prime working age group, 25-54, (45.1%) followed by consumers who were in the older age group, 55+, (42.5%). The least number of consumers served were from the transition age group, 14-24, (12.4%). Findings in this study were consistent with previous research in terms of consumers between ages 25-54 being the most served group but differed in

terms of a decline in consumers in the transition age group and increase in consumers in the older age group. Dalton (2007) found 42% consumers who were Deaf or hard-of-hearing between ages 35-54 were the most served group of consumers in his study when compared to 33% of consumers between ages 16-34 and 16% and 9% of consumers between ages 55-64 and 65 years or older, respectively.

While it is significant how consumers in the age group 55+ were found to be assisted at a higher rate in the VR program than previous research indicates, it is also significant how consumers in the transition age group continue to be underserved. This may signify further attention needs to be placed on consumers who are hard-of-hearing in the transition age group. Hogan et al. (2009) suggest early onset of hearing loss among young individuals is related to employment difficulties at a later age. Vocational rehabilitation counselors may decide to increase awareness of potential barriers regarding hearing loss and employment in the near future for these young individuals and how VR services can help.

### **Age and VR Services**

Consumers from each age group received assessment, diagnosis and treatment of impairments, vocational rehabilitation counseling and guidance, rehabilitation technology, and information and referral services as the most commonly used VR services. However, there were significant differences among transition age consumers, ages 14-24, as these consumers utilized some of these VR services at lower rates than consumers from older age groups. For example, only 30.4% of consumers who are hard-of-hearing between the ages of 14-24 received rehabilitation technology when compared to consumers ages 25-54 (55.3%) and 55+ (62.0%). Previous research found when young people with hearing loss expressed high levels of personal adjustment and willingness to use of assistive hearing devices, they also demonstrated a strong

sense of normality clearly influenced by personal perceptions (Kent & Smith, 2006). As a result, it is probable issues with adjustment to hearing loss and the use of hearing aids and assistive technology among young consumers need to be explored by VR counselors through counseling and guidance, also a VR service received at a slightly lower rate (49.8%), for this age group.

Results among consumers in the age group 25-54 and 55+ were expected based on previous studies, especially regarding assessment and diagnosis and treatment of impairments being two of the most frequently utilized VR services. Consumers between the ages 25-54 and 55+ received assessment, 61.9% and 57.9%, respectively, and diagnosis and treatment of impairments, 54.2% and 52.8%, respectively. Previous research indicates the disability employment gap seems to be the largest during middle age (Sevak, Houtenville, Brucker, & O'Neill, 2015), and older consumers who are hard-of-hearing may have trouble with their hearing loss and have problems on the job (Bradley, 2006). These consumers could already be aware of their hearing limitations and the impact this may cause in the workplace, so they see the benefits of the VR program as shown by the results from VR services utilization. It is important for VR counselors to continue to evaluate their perceptions of working with older individuals and the health care, employment, and emerging age-related disability issues these consumers may face to ensure they receive proper treatment of their impairments to reduce disability barriers (Cichy, Leslie, Rumrill, & Koch, 2017).

### **Secondary Disability**

The majority of consumers in this study (72.9%) did not have a secondary disability. An interesting finding was there were only a few consumers with physical (13.6%), mental (9.6%), or other sensory/communicative (3.9%) secondary disabilities despite previous research indicating individuals who are hard-of-hearing were diagnosed with more physical and mental

disorders than the general population (Dammeyer & Chapman, 2017). Some of the more common physical disabilities people with hearing loss encounter can include blindness and cerebral palsy (Dammeyer & Chapman, 2017), and in terms of mental disabilities, Diaz, Landsberger, Povlinski, Sheward, and Sculley (2013) found people with hearing loss faced diagnoses of impulse control, attention deficit disorder, pervasive developmental disorder, and intellectual disability (Dammeyer & Chapman, 2017). Hallam, Ashton, Sherbourne, and Gailey (2006) found people with acquired profound hearing loss also encountered tinnitus (55%) and dizziness and balance problems (30%), but their needs to address these conditions were not being recognized. These findings suggest it is possible a higher number of consumers in this study had a secondary disability, but only a few were identified, possibly because VR counselors tend to place priority on deafness rather than a secondary disability (Nakaji, 2014). When the primary disability is hearing loss and a secondary disability is documented, this may help VR counselors explore if further VR services are needed for this group of consumers.

### **Secondary Disability and VR Services**

A noteworthy finding among consumers who are hard-of-hearing with secondary disabilities of other sensory/communicative impairments was how these consumers utilized the majority of the top VR services more frequently than consumers with a physical, mental, or no secondary disability did. Specifically, consumers who had a secondary disability related to other sensory/communicative impairments received assessment (72.7%), diagnosis and treatment of impairments (57.8%), vocational rehabilitation counseling and guidance (60.4%), and information and referral services (22.8%) at higher rates when compared to consumers with mental or physical secondary disabilities and those without a secondary disability. One previous study found 44.4% of consumers with this type of secondary disability receive assistance from a

VR program (Fish, 2016). As a result, if more consumers with other sensory/communicative impairments as a secondary disability continue to be served by the VR program and receive a combination of VR services, this could help them encounter fewer barriers with employment.

### **Level of Education**

In this study, 47.8% of consumers ranged from having no formal schooling up to a high school graduate or equivalency certificate (GED), and 42.2% of consumers ranged from having post-secondary education to a bachelor's degree or an occupational credential beyond undergraduate degree work. Smaller portions of consumers had a master's degree or beyond (6.2%) or a vocational/technical certificate or license (3.9%). A large number of consumers with some college education or a college degree seemed consistent with findings from previous research as college graduates who have hearing loss may end up being employed in jobs such as computer programming, counseling, teaching, or business management (Boutin, 2009; Schroedel & Geyer, 2000). This is an interesting possibility as it could be consumers who are hard-of-hearing are making progress towards entering professional careers. In addition, consumers who are hard-of-hearing looking into post-secondary opportunities may benefit from discussing career exploration with VR counselors to assess personal levels of motivation, interest in exploring higher education, and self-advocacy skills, as these can play an important role in pursuing higher education (Albertini, Kelly, & Matchett, 2011; Hyde, Nikolarazi, Powell, & Stinson, 2016).

### **Level of Education and VR Services**

There was an interesting outcome regarding level of education pertaining to consumers with a vocational/technical certificate or license and the use of VR services. Consumers who had a vocational/technical certificate or license received assessment (70.1%), diagnosis and treatment and impairments (59.3%), vocational rehabilitation counseling and guidance (61.1%),



rehabilitation technology (60.4%), and information and referral services (24.7%) at higher rates than all other consumers with other levels of education did. One possible conclusion stemming from this outcome is consumers with this level of education are proactively utilizing these specific VR services. Moore (2002b) found in a previous study when consumers with pre-vocational deafness had business and vocational training provided to them, this predicted higher post-VR earnings (Boutin, 2009). In this particular case, consumers may or may not have received vocational training from the VR program, but these consumers are utilizing VR services to their benefit. As a result, VR counselors should closely examine consumers who are hard-of-hearing with other levels of education to improve their utilization of VR services.

### **Gender**

Although interesting, but not as statistically significant, the difference between males (49.8%) and females (50.2%) in this study was minimal. Similar results were found in a previous study where 51% of females who had hearing loss received VR services (Capella, 2003). As a previous study found men to be hard-of-hearing at a higher rate than women (Cruickshanks et al., 2015), it is likely some men who are hard-of-hearing may not be seeking assistance from VR programs. This occurrence could be concerning as another study found men who have disabilities, including those with hearing loss, face greater barriers to employment (O'Neill et al., 2017). As a result, further outreach to men who are hard-of-hearing to utilize VR services could be able to help to increase the amount of these consumers served in the VR program.

Regarding females who are hard-of-hearing, this study indicated they used VR services at close to the same rate as men, which turned out to be different from previous research indicating more females who are hard-of-hearing seek VR services than men (Bradley, 2006). It is plausible the amount of males and females who are hard-of-hearing served in the VR program has become

equal over time. The use of the VR program by females who are hard-of-hearing is crucial so they can continue participating and attaining employment.

### **Gender and VR Services**

In terms of gender, there were no statistically noteworthy differences found among the top VR services received, which included assessment, diagnosis and treatment of impairments, vocational rehabilitation counseling and guidance, rehabilitation technology, and information and referral services. On the other hand, notable findings were found between males and females who are hard-of-hearing regarding females utilizing certain VR services at slightly higher rates than males. For example, 4.0% of females received four-year college or university training compared to 2.8% of males. Another interesting finding was 10.4% of females utilized job placement assistance compared to only 9.5% of males. These results could be reflective of findings from a previous study by Hogan et al. (2009) indicating women with hearing loss faced reduced workforce involvement than men with hearing loss. As a result, it is possible females who are hard-of-hearing received college training more than males to be able to prepare for entering the workforce and job placement services to secure a competitive job. If this is so, then VR counselors may want to keep in mind there could be gender differences when providing VR services to consumers who are hard-of-hearing.

### **Successful Employment Outcomes**

In this study, 69.7% of consumers who are hard-of-hearing reached successful employment outcomes. This successful closure rate is consistent with previous research as Dalton (2007) found 78.4% of consumers who were Deaf or hard-of-hearing reached a successful employment outcome.

The demographic variables most significant towards successful employment outcomes were race and ethnicity, secondary disability, level of education, and age. Previous research indicated older and higher educated consumers with hearing loss were more likely to have successful employment outcomes than consumers who were younger or had attained a lower level of education (Dalton, 2007). It is important to consider determinants of achieving a successful employment outcome include a consumer's age, if they belong to a minority group, if they have a secondary disability, and what level of education they have obtained. As a result, one suggestion is VR counselors may need to be aware of consumers' demographic factors as these factors can help to indicate what VR services may be necessary for them to achieve competitive employment.

The most significant VR services which contributed towards successful employment outcomes included assessment, diagnosis and treatment of impairments, rehabilitation technology, vocational rehabilitation counseling and guidance, information and referral services, job placement assistance, job search assistance, transportation, maintenance, and other services. These VR services turned out to be as expected and similar to previous research as discussed below.

Assessment significantly contributed to a successful employment outcome. Previous research by Moore (2001b) found consumers with hearing loss who received assessment (73%) also resulted in a successful closure. As per the RSA-911 Reporting Manual, this VR service may include audiological evaluations (Rehabilitation Services Administration, 2013), so it is probable assessments are important to identify information about a consumer's hearing loss as it pertains to utilizing additional VR services needed for consumers who are hard-of-hearing to obtain competitive employment.

Diagnosis and treatment of impairments and rehabilitation technology contributed towards successful employment outcomes for consumers. Dalton (2007) found diagnosis and treatment services (86%) and rehabilitation technology (90%) were strong predictors of successful employment outcomes for consumers who are hard-of-hearing. Diagnosis and treatment of impairments may involve audiological consultation appointments and treatment of hearing loss which can assist consumers in reducing their hearing limitations, so it is not surprising this VR service is significant in helping these consumers achieve competitive employment. It is also not surprising rehabilitation technology contributed to a successful outcome in this study as an extensive selection of technological devices have long been offered to help consumers with hearing loss accommodate their limitations (Huang et al., 2016; Rumrill & Luft, 2006).

Vocational rehabilitation counseling and guidance was also consistent with contributing to a successful employment outcome as previous research findings also indicated consumers with hearing loss are more likely to become competitively employed when they received VR counseling and guidance (Dalton, 2007). The positive impact of this VR service on a consumer's successful employment outcome could result from the suggestion the more time and effort a VR counselor provides to consumers who are hard-of-hearing, the more likely consumers remain engaged in the VR process (Moore, 2001b). Information and referral services were similar to a previous study by Boutin and Wilson (2009) in terms of contributing towards a successful employment outcome among consumers with hearing loss. If consumers can benefit from information to assist them with advocacy services, accommodations, or further education about hearing loss, for example, then this may play a role in obtaining employment.

Job placement assistance was consistent with previous research as being significant towards a successful employment outcome. Bradley (2006) found consumers with hearing loss that received placement services resulted in obtaining a successful case closure. Job search assistance was also a contributing VR service towards achieving successful employment outcomes as Boutin and Wilson (2009) in their study. Job placement services focus on referring a consumer to a job, which can result in an interview, and job search assistance focuses on assisting a consumer with searching for employment (Rehabilitation Services Administration, 2013). As a result, consumers who are hard-of-hearing who receive these VR services individually or in combination may find employment.

Maintenance, other services, and transportation were also significant VR services towards a successful employment outcome. Boutin and Wilson (2009), in a previous study, found maintenance and other services were related to consumers with hearing loss more likely to become competitively employed indicating similar results to the findings in this study. It is probable maintenance, or monetary support provided for expenses (Rehabilitation Services Administration, 2013), assisted consumers meet some of their purchasing necessities and make progress towards obtaining employment. Similarly, if consumers were assisted with other services (i.e. tools, equipment, or supplies) (Rehabilitation Services Administration, 2013), this type of assistance may have contributed in consumers securing employment. In another study by Boutin (2009), transportation was found to predict successful competitive employment, which was consistent with the findings in this study. Although one study found transportation resulted in lower rates of successful employment outcomes (80%) compared to 93% if this VR service was not received (Dalton, 2007), it is likely this VR service is still significant towards a

successful employment outcome as it could be of assistance to consumers who are hard-of-hearing with limited transportation.

In addition, if consumers had a master's degree or above, the estimated odds of successful employment outcome is 11.71 times the estimated odds for consumers with a level of education ranging from no formal schooling to having a high school graduate certificate or GED. Also, if consumers received on-the-job supports-supported employment or on-the-job supports-short term, the estimated odds of successful employment outcome is 6.39 times and 5.58 times the estimated odds, respectively, for consumers who did not receive these VR services. Finally, if consumers were provided rehabilitation technology and diagnosis and treatment of impairments, the estimated odds of successful employment outcome is 4.55 and 3.15 times the estimated odds, respectively, for consumers who were not provided these VR services.

There were several interesting combinations of demographic variables and VR services found which predicted successful employment outcomes among consumers. Regarding race and ethnicity, if consumers were Non-Hispanic White, any age between 25-54 or 55+, and only received rehabilitation technology, this was a predictor of a successful employment outcome. A successful employment outcome was also predicted if consumers were Non-Hispanic Black, Hispanic, or American Indian or Alaska Native, Asian, Native Hawaiian or Other Pacific Islander, or Multiracial, between age groups 25-54 or 55+, and received rehabilitation technology. Consumers of any race and ethnicity who were between ages 25-54 or 55+ that received a combination of diagnosis and treatment of impairments, vocational rehabilitation counseling and guidance, and rehabilitation technology as VR services were also predicted to be successfully employed.

Regarding consumers in the transition age group, if consumers who are hard-of-hearing were between ages 14-24 and diagnosis and treatment of impairments treatment was provided to them, then this predicted they would become successfully employed. Similarly, if these individuals received rehabilitation technology, it was predicted they would achieve a successful employment outcome.

More VR services were found to contribute to successful employment outcomes among consumers who were between ages 25-54 or 55+. When consumers who were between ages 25-54 or 55+ received rehabilitation technology and maintenance, or rehabilitation technology and diagnosis and treatment of impairments, or interpreter services and rehabilitation technology, or rehabilitation technology and job placement assistance, or job search assistance and rehabilitation technology, then this predicted a successful employment outcome.

Finally, in terms of secondary disability, if consumers had a mental, physical, or other sensory/communicative impairment and they received rehabilitation technology, then they were predicted to achieve a successful employment outcome. Vocational rehabilitation counselors are encouraged to focus on rehabilitation technology as a VR service should a secondary disability be identified.

### **Limitations of the Study**

This study presented a few limitations to take into consideration. First, only consumers who are hard-of-hearing were taken into consideration, so individuals who are classified as Deaf were not analyzed. Second, only data from FY 2014 was explored, so if results are compared to previous or future years, they may differ. Third, due to low population numbers for American Indian or Alaska Native, Asian, Native Hawaiian or Other Pacific Islander, or Multiracial groups, these consumers were not analyzed individually, and instead they were generalized.

## **Statistical Analyses Limitations**

There were several limitations among Chi-square and CHAID analyses and the use of a binary logistic regression model. When using a Chi-square analysis, the Chi-square test statistic is sensitive to sample size. Also, there should be greater than five data points for each class for the most appropriate use of chi-square, however, this study only consisted of three variables with less than five consumers. Finally, the Chi-square test does not give much information about the strength of the relationship.

Limitations when using CHAID analysis, as indicated by Nisbet, Elder, and Miner (2009), included when multiple splits fragmented the variables' range into smaller subranges, this may result in the algorithm requiring greater amounts of data to get reliable results. Another limitation in using this analysis was since the CHAID tree's multiple splits are difficult to relate to real world conditions, this may cause the tree to seem unrealistically short or long (Nisbet et al., 2009). In this study, the CHAID tree was an appropriate length and provided useful information. Finally, another limitation in using this analysis is real variables are placed into categorical bins prior to analysis, which may not be desired, especially if the idea is to preserve the order in the values (Nisbet et al., 2009).

When using a binary logistic regression model in this study, limitations include this type of model usually requires a large sample size, and inputting a vast amount of variables in this type of model can reduce true associations and cause large standard errors with wide confidence intervals that are not precise, or, on the contrary, it may identify unauthentic associations (Ranganathan, Pramesh, & Aggarwal, 2017). Another limitation is a linear relation needs to exist between the log odds of the dependent variable and the independent variables, and this type of model should have little to no independent variables highly correlating with each other, in other



words, multicollinearity (Ranganathan et al., 2017). In this study, steps were taken to minimize these effects.

### **Recommendations for Future Research**

A recommendation for future research is to replicate this study and conduct a study using multiple years of recent RSA-911 datasets in order to compare contributing factors towards successful employment outcomes among consumers who are hard-of-hearing. This type of study would help address if there are any changes over time regarding the use of VR services and employment outcomes. Particularly, researchers could explore changes among demographic variables such as gender and race and ethnicity as these are indicating variables of changes among men and women using VR services and if consumers from minority groups are being served by the VR program at a higher rate.

Another recommendation includes further exploration of consumers who are hard-of-hearing in the age group 14-24 to identify unique insight on the needs of these consumers when using VR services. In doing so, this may help VR counselors gain useful strategies to use with this group of consumers. This age group has become relevant in recent years as they are a growing generation preparing to enter the workforce. With the introduction of the Workforce Innovation Opportunity Act, VR counselors have the opportunity to provide pre-employment transition services to consumers ages 16-22, which could be an indication of a rise in consumers from this age group participating in the VR program.

A third recommendation would be to conduct a study involving only consumers who are hard-of-hearing and Hispanic. As Hispanics are one of the fastest growing populations in the U.S. population and have not been the focus of many studies concerning VR, a study of this nature can highlight the particular needs of these individuals. Focusing on this population can

also help VR counselors gain a better perspective on effective practices when working with these consumers.

### **Conclusion**

This study was effective in identifying what factors contribute to successful employment outcomes among consumers who are hard-of-hearing after examining there is limited current research involving RSA-911 datasets and this consumer population. Contributing demographic variables and VR services towards achieving a successful employment outcome were identified. The findings from this study resulted in several recommendations for future research including a multi-year study and further exploration of young consumers and Hispanics who are hard-of-hearing which are intended to be of use to VR counselors who work with this consumer population. The information provided from Chi-square, CHAID, and binary logistic regression analyses further highlighted the importance to serve consumers who are hard-of-hearing from minority groups in the VR program. This indication is relevant to VR counselors as they can examine their multicultural competence to promote a welcoming perspective of the VR program to consumers from minority groups and possibly increase the number of these consumers served in the VR program. The suggestion for VR counselors to review, assess, and address secondary disabilities among consumers who are hard-of-hearing was also made clear as there was a minimal amount of consumers with a secondary disability found in this study. Finally, VR counselors and consumers may mutually benefit from a recalibration of focus toward consumers who are hard-of-hearing from the transition age group since early hearing loss intervention obtained by consumers in this age group could assist them to gain self-advocacy skills and reduce employment barriers at an older age.

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## BIOGRAPHICAL SKETCH

Sergio Cuevas obtained a Bachelor of Art in English from The University of Texas-Pan American in 2009. He then proceeded to teach English/Language Arts at McAllen High School for three years. During this time, he graduated with a Master of Science in Rehabilitation Counseling from The University of Texas-Pan American in 2012. He currently earned a Doctor of Philosophy in Rehabilitation Counseling on December 2018 from The University of Texas Rio Grande Valley. He is a vocational rehabilitation counselor since 2013 with Texas Workforce Solutions-Vocational Rehabilitation Services where he assists individuals with disabilities to obtain and maintain employment. In his field of work, Sergio has worked with individuals with mental, physical, communicative, visual disabilities, among other disabilities. He is a subject matter expert in the hard-of-hearing population and the Workers' Compensation population, also, benefits counseling, Autism, and transition services. He can be reached at [sergio.cuevas01@utrgv.edu](mailto:sergio.cuevas01@utrgv.edu).