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EFFECTIVENESS OF THE STATE VOCATIONAL REHABILITATION PROGRAM FOR CONSUMERS WITH HEARING IMPAIRMENTS

A Thesis in

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ABSTRACT

The purpose of the state federal vocational rehabilitation (VR) program is to assist consumers with disabilities to secure and maintain competitive employment. Consumers with hearing impairments have barriers to employment that are unique to the functional limitations imposed by disability and society. The purpose of this study was to examine the outcomes of the VR program for people with hearing loss. Specifically, the study explored the effectiveness of the VR program on consumers who are deaf and hard of hearing with regard to amount of public assistance, VR service delivery, type of occupation, earnings, and the number of hours on the job. Also, characteristics of consumers, such as previous collegiate experience and secondary disabilities, were examined in relation to outcomes. Significant differences were found indicating relationships between (a) public assistance, degree of hearing loss, and the reception of college and university training, (b) VR services and competitive employment, (c) type of occupation and degree of hearing loss, (d) earnings, degree of hearing loss, and the reception of college and university training, (e) number of hours worked, degree of hearing loss, and the reception of college and university training, (f) previous collegiate experience and competitive employment, and (g) secondary disabilities and competitive employment. Implications for practitioners and rehabilitation counselor educators are included.

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Chapter 1

INTRODUCTION

A central resource for people with severe or significant disabilities wanting to become employed or maintain employment is the state federal vocational rehabilitation (VR) program (Jenkins, Patterson, & Szymanski, 1992; Lane, Hoffmeister, & Bahan, 1996; Spitznagel, 2002). The VR program was established by federal legislation more than 80 years ago and is currently located in the Rehabilitation Services Administration (RSA), a branch of the Department of Education. Offices of the VR program can be found across every state and some territories of the United States (RSA, 2004a). Consumers of VR services are individuals with significant disabilities who (a) have physical or mental impairments that limit functioning, (b) are expected to require an extended amount of vocational rehabilitation, and (c) have disabilities from a pre-selected list (RSA). More than half a million consumers receive VR services and have their cases closed each year by the VR program (Spitznagel; RSA, 1998). Examples of services offered in the VR program include assessment, counseling, college or university training, interpreters, and job-related services (RSA). People with disabilities across the nation have access to vocational assistance through a well-established program.

The psychosocial impact of disability can affect several aspects of people's lives, especially how others treat people with disabilities based on inappropriate perceptions (Cook, 1992). Many people associate disability as a condition that makes those with disabilities different. As a result, people with disabilities may be devalued, become stigmatized, and treated as inferior. For example, people with disabilities have a much

different experience than people without disabilities with regard to rates of employment. Although the national unemployment rate as of May 2006 is 4.6% (U.S. Department of Labor, 2006), the highest yearly average unemployment rate reached during the past 40 years was only 9.7% (1982; U.S. Department of Labor, Bureau of Labor Statistics, 2003). However, in a comparison of people with and without disabilities, the rate at which people with disabilities (35%) are working is much less than the rate at which people without disabilities (78%) are working (Taylor, 2004). The gap between working groups has improved since 1998, however, at that time only 29% of people with disabilities were working compared to 79% of people without disabilities. Overall, people with disabilities experience lower incomes than people without disabilities (Atkinson & Hackett, 1998), architectural barriers (Brodwin & Orange, 2002), and impediments to vocational possibilities.

Within this large group of people with disabilities are persons with hearing impairments. Individuals with hearing impairments, who communicate aurally, that is, through residual hearing, are referred to as *hard of hearing* (Marschark, 1997), whereas, those who rely on visual communication methods, such as a signed language, are referred to as *deaf* (Lane et al., 1996). Individuals who are deaf or hard of hearing are a part of the larger population of people with disabilities.

Similar to the larger group of individuals with disabilities, people with hearing impairments also experience negative consequences of having disabilities. Deaf adults have collectively described a lifetime of alienation by people with hearing (Foster, 1989). For example, communication with family members, teachers and students, and coworkers is absent since not much effort on the part of those with hearing is placed into learning

the language of the deaf. As a result, many people with deafness have feelings of powerlessness and a longing to belong within social settings. For people with partial hearing loss, the consequences begin early in life. Children who are hard of hearing may find it difficult to achieve academically (Marschark, 1997). Reasons for the academic difficulty stem from a potential delayed diagnosis, parents of children who are hard of hearing unaware that their children qualify for educational support services, and students with mild hearing loss may not accept support services if they already identify with the hearing population (Marschark). For people with hearing loss, barriers to communication and academic potential may inadvertently lead to alienation and underachievement.

As a subgroup of people with disabilities, those with hearing impairments fare only slightly better than people with other disabilities on employment rates. According to the National Longitudinal Transition Study, only 44% of deaf participants were employed 5 years after completing secondary school (D'Amico & Blackorby, 1992). Even controlling for intelligence with individuals with hearing impairments reveals surprising results. For instance, up to 30% of intellectually gifted deaf and hard of hearing individuals are unemployed (Vernon & LaFalce-Landers, 1993). Unemployment seems to be common for not only people with disabilities but also people with hearing loss.

People with hearing loss, if qualified to receive cash benefits payable under Social Security Disability Insurance (SSDI) and Supplemental Security Income (SSI), two programs administered by the Social Security Administration, may have disincentives to becoming employed (Walter, Clarcq, & Thompson, 2002). In fact, Walter et al. stated that the cash benefits available to qualified people who are deaf and hard of hearing prevents long-term employment outcomes even for deaf and hard of hearing college

graduates. Despite a potential dependency on public assistance programs by those who are deaf and hard of hearing, Walter et al. found that obtaining a college degree results in a substantial economic gain. Therefore, deaf and hard of hearing college graduates may choose well-paying jobs or continue to receive federal cash benefits. These choices may have consequences for consumers of the vocational rehabilitation program.

Investigators often design studies to answer research questions concerning the effectiveness of the VR program. The VR outcome for consumers with disabilities receiving federal public assistance was the topic of one study (Gilmore, Bose, & Hart, 2001). Gilmore et al. used VR data to conclude that consumers who received postsecondary education services were less likely than consumers who did not receive postsecondary education services to be receiving cash benefits in the form of SSDI and SSI. Walter et al. (2002) supported the findings of Gilmore et al. despite not using VR data. Individuals with hearing impairments receiving SSI or SSDI were less likely to receive public assistance after obtaining a bachelor's degree. Acquiring college or university training seems to be related to reducing the frequency of individuals with hearing impairments receiving funds from the Social Security Administration. However, no evidence exists on the extent the amount of public assistance is changed once consumers who are deaf and hard of hearing become employed and their cases are closed by the VR program.

Some studies may be designed with a narrowed consumer population with disabilities for research on the VR program, such as people who are deaf and hard of hearing. Studies have been conducted with consumers with hearing impairments in order to determine effective VR services (Moore, 2001b, 2001c). Moore (2001b) studied VR

data and was able to predict successful closure of deaf and hard of hearing VR cases when consumers received postsecondary education, on-the-job training, and job placement services. The reception of VR services was not equivalent for consumers across degrees of hearing loss. Thus, consumers who are deaf were found more likely to receive postsecondary education, on-the-job, and job placement services than consumers who are hard of hearing (Moore, 2001b). Despite the inequity in service delivery, deaf and hard of hearing consumers had similar rates of competitive employment when both groups received college or university training. In a separate study, Moore (2001c) used a chi-square analysis to conclude that other VR services, such as assessment, counseling and guidance, restoration, and job placement were related to the closure status of deaf and hard of hearing consumers. Job placement appears to be a VR service that is consistently associated with successful closure for consumers with hearing loss. However, no evidence exists of which VR services are effective given those consumers who are deaf and hard of hearing received college or university training.

Consumers with hearing impairments may be compared against consumers with other types of disabilities when evaluating VR outcomes. Capella (2003) explored the differences of the types of jobs obtained between consumers with hearing loss and consumers with other types of disabilities within the VR program. Once again, VR data was used to determine that consumers with hearing loss were more likely to be employed in clerical and administrative support and less likely to be employed in service occupations than consumers with other disabilities. In addition, consumers with hearing loss were more likely than consumers with other disabilities to be employed in homemaker, unpaid family worker, vending stand clerks or operators, in extended

employment, or in self-employed occupations (Capella). Although not using VR data, Welsh and Walter (1988) found that deaf individuals are more likely to work in professional occupations only after receiving a college degree. Also not using VR data but controlling for postsecondary education, Schroedel and Geyer (2000) found that deaf alumni were more likely to hold professional positions over their hard of hearing colleagues. Professional occupations seem to be elusive for consumers with hearing impairments unless they graduate from college. However, a professional position may still be difficult to secure even after receiving a bachelor's degree for those who are hard of hearing. No evidence exists on the types of occupations deaf and hard of hearing consumers obtained after they either received or did not receive college or university training as a VR service.

Investigators may study phenomena associated with consumers with a specific type of hearing loss and in comparison with consumers with other types of disabilities (Capella, 2003; Moore, 2002c). Moore used VR data when investigating factors that impact earnings for consumers with deafness. Although male consumers were found to earn more than females, consumers who received college or university training, business or vocational training, and job placement services were more likely to earn more than consumers who did not receive these services. In a comparison between VR consumers with hearing impairments and VR consumers with other types of disabilities, Capella found that consumers with hearing impairments have similar earnings to those of consumers with all other types of disabilities. Although within group differences with regard to earnings seem apparent for consumers with deafness, earnings of people with various degrees of hearing loss are no different than earnings of people with other types

of disabilities. However, no evidence exists on the earnings of deaf and hard of hearing consumers who either received or did not receive college or university training.

Other investigators may research outside the VR program but consider factors that are related to employment and vocational rehabilitation. For example, an investigation was conducted in which the number of hours worked was examined for deaf and hearing groups (Bullis, Bull, Johnson, & Peters, 1995). More specifically, Bullis et al. considered the type of secondary school attended (i.e., mainstream, residential) within comparisons. The investigators reported that males of both hearing statuses worked longer hours than females, however, deaf women from residential schools worked the longest hours over any other subgroup. Although not statistically significant, deaf males and females from both mainstream and residential schools worked longer hours than hearing males and females (Bullis et al.). However, no evidence exists of the number of hours worked for deaf and hard of hearing consumers who either received or did not receive college or university training.

Theoretical research may lead investigators to document the structure of theory that serves to explain phenomena related to people with disabilities and VR services. For instance, certain characteristics of individuals with disabilities may influence the extent to which success is achieved in postsecondary environments. Tinto (1987) suggested that attributes acquired prior to entering higher education impacts the student's ability to integrate into postsecondary settings. Students who do not initially adjust to college may decide not to persist with their academic studies. Examples of pre-entry attributes include skills, abilities, and prior schooling (Tinto). Disability can have an impact on skills and abilities through limitations to functioning (Lynch, 2002). However, no evidence exists

on the type of case closure in the VR program for deaf and hard of hearing consumers who received college or university training either prior to or while receiving VR services. This outcome was also true for persons with hearing impairments that were considered to have secondary disabilities. Knowledge of any relationships between previous collegiate experience or secondary disabilities and case closure status could be beneficial for counselors and consumers as they plan VR services.

Purpose of the Study

The focus of the present study is to examine issues surrounding postsecondary experience and VR outcomes for a subpopulation of consumers with primary and secondary disabilities. The purpose of the study is to determine, for consumers with hearing impairments, (a) any changes in public assistance, (b) effectiveness of VR services, (c) types of jobs, (d) earnings, (e) number of hours worked, (f) impact of previous college experiences on securing competitive employment, and (g) impact of secondary disabilities on securing competitive employment. Knowledge gained from the study may help individuals who are deaf and hard of hearing in their efforts to persist through college, become employed, and reduce their dependency on public assistance programs.

Significance of the Problem

Throughout the literature on vocational rehabilitation, there is insufficient evidence regarding the extent to which the state federal VR program contributes to the economic savings of two key public assistance programs of the Social Security Administration. A need exists for such research because the Disability Insurance (DI) Trust Fund, one of two funds in which people with disabilities including those with

hearing impairments as well as retired workers and their families and the survivors of deceased workers receive monthly cash benefits through the SSI and SSDI programs (Board of Trustees of the Federal OASDI Trust Funds, 2004; hereafter, "Board of Trustees"), is predicted to deplete by 2029. In the short-term, trust fund costs are expected to exceed taxable income by 2018. A longer-term outlook involves a $3.7 trillion obligation of the trust funds over the next 75-year performance that will not be able to be met. Research on the VR program and SSA's program is needed since SSA's funding source is becoming depleted.

Existing research evidence fails to answer questions surrounding the value of the VR program in relation to the types of occupations, earnings, and quantity of employed hours that deaf and hard of hearing consumers obtain at the conclusion of the VR process. People with hearing impairments who are not yet consumers as well as personnel at the VR program would most likely be interested in learning the extent that professional jobs, amount of earnings, and hours worked are possible outcomes of the VR program for this group. Therefore, to what extent does VR services assist consumers with hearing impairments in obtaining employment? In addition, to what extent does VR services assist consumers with hearing impairments in obtaining greater wages? Finally, to what extent does VR services assist consumers with hearing impairments in obtaining full-time employment?

Little evidence exists on the characteristics that deaf and hard of hearing consumers bring with them to the VR program that might affect their performance in VR services. Knowledge of consumer attributes, such as previous collegiate experience and secondary disability, could be helpful to VR personnel who assist consumers with

hearing impairments achieve competitive employment. Stinson, Scherer and Walter (1987) found that people with deafness are more likely to persist in college the closer they reside to college. However, the need remains to understand the impact of secondary disabilities and collegiate experience prior to receiving VR services on the outcome of rehabilitation. Therefore, questions on the influence of previous collegiate experience and secondary disability remain for deaf and hard of hearing college students.

A theme of needed research is warranted based on the deficits in the literature so that the lives of those with hearing impairments could be improved. More specifically, the study is designed to evaluate the extent that the VR program can assist consumers with hearing impairments to:

- Reduce the amount of SSDI and SSI received so that the life of the DI Trust Fund is extended and, therefore, available for other people with hearing impairments
- Secure competitive employment through the reception of college or university training and other effective services
- Secure full-time employment with competitive wages that are appropriate to educational training

Need of the Study

After reviewing the literature on the issues related to consumers with hearing impairments of the VR program, no studies were found to explain phenomena relating to public assistance, VR services, job type, earnings, number of hours worked, previous college experience, and secondary disability. First, no studies were found in which the investigators researched the relationships of college or university training as a VR service with the amount of public assistance received by deaf and hard of hearing consumers

once rehabilitated. Gilmore et al. (2001) investigated the effects of VR postsecondary education services on public assistance but did not target consumers with hearing impairments. Therefore, it is known that consumers are less likely to be receiving SSDI or SSI after they received college or university training; however, questions remain on the extent that consumers with hearing impairments come off public assistance in the form of reduced dollars. Any reduction in public assistance is positive for the Social Security Administration as well as those projected individuals with hearing impairments who will need cash benefits. A finding on the relationship between college and university training and changes in the amount of public assistance received for consumers with hearing impairments would be helpful to those consumers seeking to reduce their dependency on public assistance programs through postsecondary education.

Second, no studies were found concerning the outcome of VR services for consumers with hearing impairments who received college or university training. Although Moore (2001b, 2001c) researched the importance of VR services that lead to competitive employment, he did not specifically isolate those services that impact postsecondary outcomes. This study identifies those VR services that are related to competitive employment. Knowledge of VR services that predict successful closure will help rehabilitation counselors and consumers as they develop comprehensive rehabilitation plans for employment.

Third, no studies were found regarding the types of jobs obtained by deaf and hard of hearing consumers of the VR program. Although Capella (2003) studied the types of full-time jobs that consumers with hearing loss obtained compared to consumers with other disabilities, she did not hold degree of hearing loss constant. Outside of the VR

program, deaf individuals were found to be more likely than those who are hard of hearing to obtain professional positions (Welsh & Walter, 1988), particularly after receiving a college degree (Schroedel & Geyer, 2000). A question that arises from the gaps in the literature is the extent that professional occupations are obtained for VR consumers across degree of hearing loss. Any evidence of relationships between hearing loss and occupations will also identify areas of needed improvement for a subset of the population of consumers with hearing loss. Consumers who are seeking particular types of occupations may use the results from this study to help determine if barriers might exists that are preventing the consumers from reaching their employment goals.

Fourth, no studies were found that examined relationships of college or university training and degree of hearing loss with earnings. Moore (2002c) investigated factors that impact earnings for VR consumers with mild to severe hearing impairments. The results were interpreted that male consumers with hearing impairments have earnings greater than females with hearing impairments. In addition, consumers who received college or university training, business or vocational training, and job placement services were found to earn more than consumers who did not receive these services. However, Moore did not examine the extent that degree of hearing loss or postsecondary outcomes and employment affects earnings. Consumers and rehabilitation counselors may use the results of this study as an aid when planning to maximize earnings potential.

Fifth, no studies were identified that specifically examined relationships of college or university training and degree of hearing loss with competitive work status (i.e., part-time, full-time). Bullis et al. (1995) investigated differences in hours worked between deaf and hearing individuals who had secondary education in a mainstreamed or

residential environment. The three groups found to work longer hours included males of both hearing statuses, deaf women from residential schools, and deaf males and females from both secondary environments. Although no statistical differences in hours worked were found between people with severe to profound hearing impairments and hearing individuals, Bullis et al. did not include VR consumers who received postsecondary training. Knowledge of relations between college and university training and the number of hours worked could be helpful to consumers and rehabilitation counselors planning to increase the number of hours on the job.

Sixth, no studies have researched the relationships of prior postsecondary education experience (i.e., before VR application) and rehabilitation outcomes. Tinto (1987) stated that prior schooling of students is an important factor leading to persistence. Kahn and Nauta (2001) investigated the extent that academic ability and past performance was associated with persistence as measured, in part, by secondary school variables. Although prior schooling was found to be a predictor of persistence, the question remains on the extent that prior collegiate experience for those with hearing impairments leads to competitive employment when college or university training is a factor. Knowledge of relations between prior collegiate experience and competitive employment would be helpful for rehabilitation counselors and consumers to plan for competitive employment though college and university training.

Finally, no studies have researched the relationships of consumers with and without secondary disabilities who received college or university training and rehabilitation outcomes. Investigators of the VR program who studied the VR outcomes of consumers with hearing impairments did not consider secondary disabilities (i.e.,

Capella, 2003; Moore, 2001b, 2001c, 2002a, 2002b). Although people with only deafness are more likely to attend college than if they have second or additional disabilities, it is reasonable to expect college students with additional disabilities since 15% of first-year students also have speech impairments (Henderson, 2001; Schildroth et al., 1991). The identification of any relationship between secondary disabilities and competitive employment for consumers with hearing impairments who received college and university training could be useful to determining if some consumers require additional services in college that would enhance employability.

In summary, a need exists for this study in order to answer several research questions regarding the outcomes of people with hearing loss in the vocational rehabilitation program. The answers to the research questions could benefit rehabilitation counselors and consumers to reduce dependency on public assistance programs and determine VR services that predict employment. Other answers could help counselors and consumers to plan for particular types of jobs obtained, earnings, and number of hours on the job. Rehabilitation counselors might also be better able to assist consumers with hearing loss to secure competitive employment when consumers present with characteristics such as previous collegiate experience or secondary disabilities. The answers to the research questions may lead toward having positive impacts in the lives of people with hearing impairments.

Research Questions

Two overall research questions can be generated based on the review of literature regarding individuals with hearing loss with public assistance and receiving college or university training through the state federal VR program. First, does the reception of VR

services impact outcome measures for consumers with hearing impairments? Several hypotheses follow:

1. H_0: There are no differences in public assistance and college and university training between consumers who were successfully closed with different degrees of hearing loss.

   H_1: There are differences in public assistance and college and university training between consumers who were successfully closed with different degrees of hearing loss.

2. H_0: There are no differences in VR services and closure status for consumers with hearing loss, given that these consumers received college or university training as a VR service.

   H_1: There are differences in VR services and closure status for consumers with hearing loss, given that these consumers received college or university training as a VR service.

3. H_0: There are no differences in occupational type and degree of hearing loss.

   H_1: There are differences in occupational type and degree of hearing loss.

4. H_0: There are no differences in weekly earnings at closure and college and university training between consumers who were successfully closed with different degrees of hearing loss.

   H_1: There are differences in weekly earnings at closure and college and university training between consumers who were successfully closed with different degrees of hearing loss.

5. H_0: There are no differences in the number of hours worked at closure and college and university training between consumers who were successfully closed with different degrees of hearing loss.

   H_1: There are differences in the number of hours worked at closure and college and university training between consumers who were successfully closed with different degrees of hearing loss.

The second overall research question is: Do pre-entry attributes of consumers who are deaf and hard of hearing impact outcome measures? Two hypotheses follow:

6. H_0: There are no differences in the type of closure and amount of previous collegiate experience for consumers with hearing impairments who received college or university training as a VR service.

   H_1: There are differences in the type of closure and amount of previous collegiate experience for consumers with hearing impairments who received college or university training as a VR service.

7. H_0: There are no differences in the type of closure and frequency of disability for consumers with hearing impairments who received college or university training as a VR service.

   H_1: There are differences in the type of closure and frequency of disability for consumers with hearing impairments who received college or university training as a VR service.

Limitations

The study has several limitations based on the design of using a database and sampling procedure. The primary limitation with secondary data analysis is the inability

to construct and test hypotheses beyond the extent that the data permits (Frankfort-Nachmias & Nachmias, 1996). Although investigators may desire to fill identified gaps in the literature, they are limited by the data they have in the particular database. Since the study is designed as secondary data analysis, the extent to which the investigator is able to examine research needs with a single dataset is limited. Threats to external validity stem from the less-than-optimum sampling procedure of random sampling. By implementing a nonprobability sampling procedure such as a criterion-based convenience sample, the investigator was unable to estimate the population's parameters with theoretical certainty (Frankfort-Nachmias & Nachmias, 1996). Therefore, the results are generalizable to the population based on similar sample characteristics to other samples found throughout the literature and not based on probability theory. Limitations to the external validity are due to the inability to use theory-driven deductions.

Definition of Terms

The following terms are used throughout the study and are defined as follows:

1. American sign language (ASL). A visual-manual language that is signed and used by many people with deafness by use of the hands, arms, facial expressions, and other body gestures (Lane et al., 1996).
2. Competitive employment. Full- or part-time employment for which a person is compensated at or above the minimum wage (RSA, 2004a).
3. Deaf/deaf (D). Individuals who rely on visual communication methods, such as a signed language are referred to as deaf (Lane et al.), however, a subset of those who are deaf refer to themselves as Deaf, which signifies a shared culture of American Sign Language, art, humor, and literature (Marschark, 1997).

4. Hard of hearing (HOH). Individuals with partial hearing loss who use their residual hearing to communicate aurally (Marschark).
5. Mainstream education. A philosophy of education in which students with disabilities are instructed alongside their peers without disabilities as well as in classes specially designed for the needs of the children with disabilities (Marschark).
6. Mild hearing loss. A 26 to 40 decibel (db) loss of hearing (Roeser, 1988).
7. Moderate hearing loss. A 41 to 55-db loss of hearing (Roeser).
8. Moderate to severe hearing loss. A 56 to 70-db loss of hearing (Roeser).
9. Profound hearing loss. A loss of hearing that is greater than 90 db (Roeser).
10. Public assistance programs. A set of benefit programs administered by the Social Security Administration. The programs provide cash benefits for people with disabilities and their dependents through the SSDI program as well as disabled, blind, and aged persons who have limited income through the SSI program. In addition, retired workers and their families as well as survivors of deceased workers are covered under a separate program (Board of Trustees, 2004).
11. Residential education. A philosophy of education in which students who are deaf reside at the institution for each school week and are instructed alongside other peers with deafness. American Sign Language is usually the primary, but not sole, method of communication at the residential school (Lane et al., 1996).
12. Severe hearing loss. A 71 to 90-db loss of hearing (Roeser).
13. Social Security disability insurance (SSDI). An insurance program providing payments to persons with disabilities based on their having been covered

previously under the Social Security program (Wunderlich, Rice, & Amado, 2002).

14. Supplemental security income (SSI). A program providing payments for disabled, blind, and aged persons who have limited income and resources (Wunderlich et al., 2002).
15. Vocational rehabilitation (VR). A governmental program that authorizes federal funds to be matched with state funds so that each state may operate an agency that is responsible for assisting people with disabilities to prepare for, locate, and participate in gainful employment (Spitznagel, 2002).

Summary

Cash benefits under the SSDI and SSI programs of the Social Security Administration are posing two serious concerns for persons who are deaf and hard of hearing. First, persons with hearing impairments may have long-term disincentives to working as recipients of financial public assistance. Second, the Social Security Trust Funds that supply millions of Americans with disabilities with cash benefits is expected to deplete as a result of an imbalance of income and expenditures. To address these problems, the state federal VR program is designed to assist people with disabilities to secure employment and ultimately reduce the need for public assistance. Fewer payments to these employees with hearing impairments could mean extending the life of the trust funds. The study measures the extent to which the VR program can not only assist in solving problems with Social Security, but also to determine the quality of rehabilitation outcomes for consumers with hearing impairments.

Chapter 2

REVIEW OF THE LITERATURE

Many persons with deafness and hard of hearing find it difficult to maintain or secure employment, persist through postsecondary education, and reduce their dependency on public assistance. An overview of individuals who are deaf and hard of hearing is presented leading to their involvement with Social Security benefits. After the public assistance programs are explained and the crisis detailed, a section on employment for people with hearing impairments is discussed. Efforts and issues associated with educating students with hearing loss at the collegiate level precede a section in which a major resource, the state federal vocational rehabilitation program, concludes the review of literature.

Deafness and Hard of Hearing

Individuals who are deaf and hard of hearing are the central group of interest throughout the review of literature. Classification and prevalence of this disability is the first of two areas presented in this section. The second area, cultural context of hearing loss, is important for readers to understand hearing loss as a sociocultural concept.

Classification and Prevalence

Generally, hearing impairment is a term used to refer to the condition in which individuals receive less sound (Heath Resource Center, n.d.). Several classification systems of hearing impairment have been developed according to criteria such as the degree of impairment (e.g., mild, profound), communication style (e.g., aural, visual), age of onset (e.g., pre-lingual, pre-vocational), and etiology and location of the physical

impairment (conductive, sensorineural; Happ & Altmaier, 1982; Henwood & Pope-Davis, 1994; Kelly, 1992; Roeser, 1988). Hearing loss occurs across frequencies (or pitch) and intensities (or loudness) of sound recognition (Kelly). Therefore, hearing loss is measured in decibels (db) and is categorized as *mild* (26 to 40 db), *moderate* (41 to 55 db), *moderate to severe* (56 to 70 db), *severe* (71 to 90 db), and *profound* (greater than 90 db; Roeser). Individuals with mild and moderate hearing loss have sufficient residual hearing to the extent that they are able to understand speech. Individuals with moderate to severe hearing loss cannot hear anything except loud sounds and may have difficulty understanding speech in groups (Kelly). Loud speech from a one-foot distance may be the most individuals with severe hearing loss can understand; however, distinguishing consonants, even with hearing aids, is difficult. For individuals with profound hearing loss, no discrimination of any speech sounds is possible (Kelly). Hearing ability differs according to the extent to which hearing loss ranges from mild to profound.

A second method of classifying people with hearing impairments is according to their method of communication. Individuals with hearing impairments, who communicate aurally, that is, through residual hearing, are referred to as *hard of hearing* (Marschark, 1997), whereas, those who rely on visual communication methods, such as a signed language, are referred to as *deaf* (Lane et al., 1996). A third method of classifying people with hearing impairments is by the age at which the hearing loss occurred. Therefore, *prelingual* hearing impairments occur prior to the acquisition of speech (Happ & Altmaier, 1982; Kelly, 1992). Conversely, *postlingual* hearing impairments occur following the acquisition of speech. Individuals who experience hearing loss following the acquisition of speech but prior to the age of 19 years are said to have *prevocational*

hearing impairments. *Postvocational* hearing impairments occur when individuals lose their hearing after the age of 19 years. Finally, a fourth classification method for people with hearing impairments involves the etiology and location of the physical impairment. Thus, a *conductive* hearing loss is caused by damage or malfunction to the outer or middle ear (Happ & Altmaier; Kelly). Some examples of causes of conductive hearing loss include genetic abnormalities and acquired illnesses such as otitis media (Kelly). A *sensorineural* hearing loss is caused by damage to the inner ear or nerve pathways from the ear to the brain. Some examples of causes of sensorineural hearing loss include genetic abnormalities and maternal illnesses such as diabetes and rubella. An accurate census of individuals with these classifications is almost impossible to compile, therefore, estimations are more likely to be made. Professionals working with people with hearing impairments can gain insight into the extent of residual hearing, timing of the impairment, and physiological characteristics of hearing loss by interacting with the classifications.

The estimations of the prevalence of deaf and hard of hearing people have increased since the last decade of the 20th century. For instance, just fewer than 11 million people of the 1990 census (6% of the population) were estimated to have difficulty hearing spoken conversations (U.S. Census Bureau, 2002). In addition, it was estimated that more than 917,000 people (0.5% of the population) did not have the ability to hear what is said in normal conversations. However, the National Center for Health Statistics (NCHS; Ries, 1994) stated in its 1990-1991 analysis that, for people older than 3 years of age, 20.3 million individuals had impairments to hearing and 4.8 million of those was not able to understand speech. Approximately four years later, Holt, Hotto, and

Cole (1994) also estimated that 20.3 million individuals ages 3 years and up (8.6% of the population) were both deaf and hard of hearing. More recently, the NCHS (2001; as cited in Harrington, 2004) extrapolated from a sample survey that more than 25 million people over 18 years of age have "a little" difficulty hearing and that 6 million have "a lot" of difficulty hearing. Finally, the highest frequency of hearing impairment, as reported by the National Institute on Deafness and Other Communication Disorders (NIDCD, 2004), was said to involve 28 million Americans. As is evident by the statistics on people with hearing impairments, hearing loss is not uncommon in the United States. Since hearing loss is not a rare occurrence, an understanding of cultural issues that families of persons with hearing impairments experience is important to consider.

The Cultural Context of Hearing Loss

Parents are often devastated to learn that their children have been diagnosed with hearing loss (Marschark, 1997). Many families have ideals that the children will grow to have better lives than that of their parents (Lane et al., 1996). As a result, parents may feel as though they have produced genetically ineffective children when the hearing loss has been discovered. Unfortunately, diagnosis is not usually made during the first year of life (Lane et al.; Marschark). In fact, diagnosis could be delayed until the children are 3 years of age (Marschark). In many instances, parents' early attempts to communicate with their children are not returned. Pediatricians and extended family members may even discount parents' concerns about the lack of communication from their children as overprotection. However, once children fail to speak their first words by the first year, parents begin to get suspicious and schedule an appointment with the audiologist (Lane et al.). Surprisingly, 90% of all deaf children are born to hearing parents (Moore & Levitan,

1993). Feelings of dismay at having a child with a disability may spur these hearing parents to seek extensive audiological services with the hopes to "fix" their hearing-impaired offspring (Gjerdingen, 1987). The goal, for many parents, is to prevent their children from becoming less like hearing people (Lane et al.). Therefore, children diagnosed with hearing loss may be encouraged to wear hearing aids, attend speech therapy, or even to be retested for hearing loss (Lane et al.). Hearing parents of children with hearing impairments may take an active role in preserving the hearing identity of their children.

The relatively late diagnoses of hearing loss may have inadvertent effects for children. Infants with average hearing abilities typically have access to the sounds of their native language (Marschark, 1997). Conversely, infants who are deaf or have severe hearing loss may miss learning cues such as the sounds of their parents' footsteps, soothing, or conversations. By the time children with hearing impairments are school-aged, they may have already fallen behind their hearing peers in language development. Children attending speech therapy could continue to fall behind in language development as they focus, perhaps futilely, at improving their speech (Lane et al., 1996). For individuals who rely on a visual means to communicate, vocal interactions do little to assist in the development of a spoken language. Therefore, a visual-manual, or signed language is more appropriate for communicating with these individuals. Children with hearing loss are at risk for delayed language development due to missed communications and any misdirected services.

Prior to an exploration of specific signed languages, it is important to consider the cultural context that language plays with deaf individuals. Although deafness has been

defined to refer to those individuals with hearing loss that rely on visual communication, *Deaf* is sometimes used as an adjective that refers to people who are deaf and belong to a community with a rich history of art, humor, literature, and language (Marschark, 1997). The customs and history of the Deaf are preserved by sharing of stories from community elders to young members of the Deaf community. Therefore, Marschark equates the word Deaf to be sociocultural in nature similar to other sociocultural terms such as African American, Hispanic, or Jewish. The descriptive, deaf, is more medical in nature, indicating the extent of hearing loss; however, Deaf, is indicative of the cultural group of people, who also happen to be deaf (Marschark). Although those identifying as deaf and Deaf share similar characteristics such as degree of hearing loss, the Deaf have cultural similarities including a shared language.

The language of the Deaf is a form of signed language called *American Sign Language* (ASL; Lane et al., 1996). Signed languages involve a vocabulary and grammar and are helpful for individuals who are deaf and hard of hearing to communicate. For most people who consider themselves Deaf, the primary language is ASL (Stedt & Rosenberg, 1987). In short, ASL is a visible communication method that involves movements of limbs and body parts around space (Lane et al.). As oral languages include strings of consonants and vowels, ASL contains a series of movements and holds. American Sign Language, like signed languages from other countries, has evolved anthropologically, that is, by the social interchanges of deaf people over time (Pollard, 1996).

Parents will eventually have to make the decision as to which type of school is most appropriate for the welfare of their child who is deaf, and this will most likely

determine the primary language of their child (Marschark, 1997). The two most common choices are to send deaf children to public schools or to private, specialized schools for the deaf. A couple of options for parents to consider within the public school system are mainstreaming and inclusion. Mainstreaming involves students with disabilities taking some classes with their peers without disabilities and some classes specially designed for the needs of the children with disabilities (Marschark). Inclusion involves students with disabilities fully included in all educational activities with other students who do not have disabilities. However, many parents complain that their mainstreamed deaf children are segregated and this environment adds to the stigma of being a "different." Many parents advocate for inclusion, especially those parents of children with residual hearing (Marschark). Deaf children who communicate through ASL are being taught insufficiently in English. Deaf students will most likely miss out on conversations while riding the bus since interpreters do not typically work in this setting.

Parents may also consider sending their children with hearing impairments to specialized residential schools for the deaf that provide education for deaf students from the pre-school to secondary levels (Lane et al., 1996). Since many students, teachers, and staff are involved in the education of students with hearing impairments, ASL is usually the primary method of communication at the residential school. Unlike public schools where deaf students are scarce, private schools for the deaf allow for ASL skills to flourish and Deaf culture to be experienced by the students. Members of the Deaf community consider the residential schools for the deaf to be the least restrictive environment. In addition, it is a place where students can learn the language, culture, and customs of the Deaf. The environment, being residential, adds to the learning

opportunities for students since many ASL conversations occur in residence halls (Lane et al.). No one educational environment is appropriate for all children with various degrees of hearing impairment. Therefore, Marschark suggests that parents monitor their children's academic and social progress once in school to determine its level of appropriateness. Residential schooling is an option for parents of children with hearing impairments to encourage knowledge and skills with culture and language.

As students with hearing impairments continue their education, additional concerns become evident in the high schools. Hearing students are more likely to receive high school diplomas than deaf students (Allen, Rawlings, & Schildroth, 1989; Harnisch, Lichtenstein, & Langford, 1986). Approximately half of deaf high school graduates receive diplomas, 20% receive certificates, and 29% drop out or age out of the program (Allen et al.). Other results of the national study by Allen et al. were documented according to race, gender, and the presence of additional disabilities. For example, deaf Whites were more likely to receive a diploma versus minority students who were deaf. In addition, deaf males received diplomas more frequently than deaf women. Finally, deaf students without additional disabilities were more likely to receive their diplomas than deaf students with additional disabilities (Allen et al.). Although deaf students are less likely to receive diplomas compared to their hearing peers, the negative influences on the acquisition of a high school diploma for deaf students seems to include a minority status, being female, and with additional disabilities. Differences between individuals who are hearing and who are deaf expand beyond secondary schools and into the isolation of adulthood.

Educational environments are not the first place in which deaf and hard of hearing individuals realize their differences to those with hearing. In a study examining social alienation and peer identification, Foster (1989) identified the consequences of having hearing impairments. Foster concluded that the dominant hearing community socially rejects individuals who are deaf. Through interviews with deaf adults, participants described a lifetime of alienation by people with hearing. An example given by the respondents included stories of how, as children, parents and family refused to learn sign language in order to communicate with the family member who was deaf. Family conversations were described as lacking depth or real information. The deaf participants described growing feelings of isolation that became magnified during family gatherings and holidays. Another example of alienation involved the lack of accessible communication in mainstreamed academic settings. Some participants described the academic isolation as a continuation of the social isolation experienced in the home. Alienation was also described as a work phenomenon. Those hearing coworkers who could write down instructions for performing work tasks failed to do so with casual conversations or jokes. In addition, deaf adults described feelings of wanting to belong since social interactions at work were missing. Still others felt powerless to change the situation at work and accepted alienation as a part of life. The development of deaf and hard of hearing individuals involves a realization of how people with hearing impairments are oppressed by the hearing majority.

Despite the negative consequences of living in a hearing world, many people with hearing impairments are able to identify with others. For instance, Foster (1989) also found that deaf adults collectively described a lifetime of acceptance by other people who

are deaf. Deaf participants gave an example of social acceptance by explaining how schools for the deaf allow for opportunities to interact with deaf peers across activities such as clubs, sports, and extracurricular activities. For the most part, sign language was a common feature within these interactions. Some of the deaf participants described how they began to learn about the history and culture of the Deaf at the schools for the deaf. Many students attending residential schools consider faculty and staff as an extension of their families. Outside of the residential school, students who were mainstreamed expressed delight when they met other deaf students at the public schools and described these experiences as rewarding. Another example of social acceptance occurs within the communities when deaf adults accept other deaf adults as mates, as professionals within professional organizations, or as friends in clubs. Deaf participants described their social communities as almost exclusively made up by other deaf adults in order to experience companionships (Foster). Unlike the oppression of those with hearing impairments by others without hearing loss, deaf and hard of hearing individuals enjoy social acceptance by their peers with hearing impairments.

Unfortunately, alienation and isolation are not the only oppressive interactions with the hearing majority. Cultural stereotypes about deafness result, in part, due to a misunderstanding and cultural preconceptions surrounding intellect, communication, mental abilities, personality, and adjustment of individuals who are deaf. Several investigators have stated that people with deafness are limited with abstract processing (Finisdore, 1984; Happ & Altmaier, 1982) despite earlier research by Vernon (1968) who suggested that no differences exists between deaf and hearing individuals' cognitive capabilities. Another stereotype of the deaf is that they are prone to mental illness

(Finisdore; Halgin & McEntee, 1986; Happ & Altmaier). In an attempt to dispute this stereotype, Longmore (1986) suggested that the media is responsible for sustaining this misconception with the portrayal of characters with disabilities that eventually perform unacceptable behavior (e.g., sexual deviancy, illegal acts). Furthermore, some psychologists have misunderstood sign language to reflect psychopathology (Hoyt, Siegelman, & Schlesinger, 1981). Another stereotype is that the deaf have different personalities than those who are hearing (Finisdore; Happ & Altmaier). Although the presence of hearing impairments affects psychological development, unhealthy personalities are not the result of loss of hearing. Many mental health counselors believe that the deaf do not have the ability to benefit from insight-oriented therapy (Stewart, 1981). However, Hoyt et al. cautions that this is a generalization since many trained counselors believed this stereotype despite some clients having postlingual deafness and an understanding of the counseling process. Stereotyping those with hearing impairments by laypersons and professionals is based on cultural ignorance.

Categorizing hearing impairment as either a medical or cultural phenomenon reveals the differences between professional service groups and those with hearing impairments. Medical perspectives on hearing loss focus on the degree of loss and methods to rectify deficiencies. Many medical professionals consider people with hearing loss to be disabled and, therefore, eligible for public assistance programs (Lane et al., 1996). However, cultural perspectives on hearing loss, especially by those who are Deaf, do not refer to themselves as disabled and, instead, refer to themselves as part of a cultural minority group, complete with a history, art, and language. A conflict for those with hearing impairments is to maintain a sense of cultural identity while acknowledging

the medical and functional nature of their disability status in order to receive public assistance.

Public Assistance Programs

Although the Social Security Administration is responsible for administering cash benefits under public assistance programs, in part, for people with hearing impairments with economic instability, any reduction in the amount of benefits or the frequency of beneficiaries can be achieved by employing the recipients of these public assistance programs. What is important to know about public assistance programs are the context in which they are operated, the outcomes of the programs, and their dynamic nature. Therefore, public assistance programs, their definitions, and the effects of working on receiving these benefits are discussed. In addition, another important area to know is how past and future performance of programs affects the implementation of public assistance programs.

Programs, Definitions, and Effects of Working

The two major federal programs that provide benefits for working-aged people with disabilities, including those with hearing impairments, are the Social Security Disability Insurance (SSDI) program and the Supplemental Security Income (SSI) program (Stoddard, Jans, Ripple, & Kraus, 1998; Wunderlich et al., 2002). Although each program is part of the Social Security Act, the SSDI program (Title II) was created in 1956 and the SSI program (Title XVI) was created in 1972. According to Wunderlich et al., the SSDI program "… is an insurance program that provides payments to persons with disabilities based on their having been covered previously under the Social Security program" (p. 17). Monthly cash benefits are paid to people with disabilities and their

dependents (Stoddard et al.). Disability insurance was considered as early as the late 1930s but concerns about defining disability and containing costs precluded legislative action (Wunderlich et al.). At the time of its creation in 1956, the SSDI program paid benefits to individuals with disabilities who were 50-64 years of age and did not yet extend payments to the beneficiaries' dependents (Committee on Ways and Means, 2000). Benefits were extended to the dependents of beneficiaries in 1958 (Wunderlich et al.) and the minimum age requirement was dropped in 1960 (Committee on Ways and Means). Vocational rehabilitation (VR) was a mandatory provision of the Social Security Amendments of 1956 as benefits were withheld if VR was refused (Committee on Ways and Means, 1974). Workers with hearing impairments as well as those with other disabilities may benefit from a federal program established 50 years ago to provide cash payments for those who once paid into the insurance-like system.

The SSI program, as stated by Wunderlich et al. (2002), is "… a means-tested income assistance program for disabled, blind, and aged persons who have limited income and resources regardless of their prior participation in the labor force" (p. 17). Benefits are provided on the basis that individuals' needs are not being met by other sources. A similarity between the SSDI and SSI programs was mandatory participation in VR services or else benefits would be withheld (Committee on Ways and Means, 1974). However, recent legislation, entitled Ticket To Work and Work Incentives Improvement Act of 1999 (TTWWIIA), gives recipients of SSDI and SSI opportunities to choose from several providers of VR and not be penalized should they refuse VR services (Zelhof, 2001b). Several differences between the SSDI and SSI programs should be mentioned. Unlike SSDI, individuals are not required to be an insured worker under the SSI program.

In addition, SSI recipients can continue to receive benefits beyond the age of 65 years, whereas, SSDI recipients are transferred to a retirement program under Social Security upon reaching 65 years. People with hearing impairments as well as those with other disabilities, who may have never worked, could also benefit from a federal program established 30 years ago for those who have an economic need.

Since each of the programs is based on disability, the Social Security Administration (SSA) had the challenge of determining the SSDI and SSI eligibility status. The meaning of *disability*, according to Section 223 [d][1] of the Social Security Act (as cited in Wunderlich et al., 2002) is an

> inability to engage in any substantial gainful activity by reason of any medically determinable physical or mental impairment which can be expected to result in death or which has lasted or expected to last for a continuous period of not less than 12 months… (p. 17).

Furthermore, the SSA stated that physical and mental impairment must be

> … of such severity that he [sic] is not only unable to do his [sic] previous work but cannot, considering his [sic] age, education, and work experience, engage in any other kind of substantial gainful work which exists in the national economy, regardless of whether such work exists in the immediate area in which he [sic] lives, or whether a specific job vacancy exists for him [sic], or whether he [sic] would be hired if he [sic] applied for work (Wunderlich et al., pp. 17-18).

People who are deaf and hard of hearing are included under the definition of disability since hearing loss is a chronic condition that is medically diagnosable (Lane et al., 1996). Furthermore, depending on the age, education, and work experience of those defined as

having a disability due to hearing loss, many people with hearing impairments may not be able to work and, subsequently, receive cash benefits under programs administered by the SSA. Substantial gainful work or activity (SGA) quantitatively means the inability to earn a minimum of $830 per month for non-blind individuals (SSA, 2004c; Zelhof, 2001a).

People with disabilities who receive cash assistance in 2005 from the SSDI and SSI programs are not forbidden to work while receiving the benefits but work does have an effect on the benefits. Beneficiaries of SSDI are allowed a trial work period of 9 months for which they may earn a minimum of $590 in gross earnings (SSA, 2004d Zelhof, 2001a). The 9-month trial work period is cumulative and not consecutive as long at the months occur within a 60-month period. Any months for which beneficiaries earn less than $590 is not counted toward the trial work period. Full SSDI benefits are payable to SSDI beneficiaries during the trial work period, even if monthly earnings exceed the SGA. Once the trail work period has been fulfilled, beneficiaries enter a 36-month consecutive extended eligibility period in which they remain eligible for benefits but must request them for any month that earnings continue to be below $830 per month (SSA, 2004c; Zelhof). The purpose for the extended eligibility period is to provide cash assistance as a safety net while beneficiaries attempt to work. Finally, once the trial work period has ended, SSA will determine if beneficiaries can engage at the SGA permanently once beneficiaries earn more than $830 per month (SSA, 2004c; Zelhof). The SSDI program can be considered a motivator to work because beneficiaries are able to retain their full benefits should they work below the threshold. Therefore, people with

hearing impairments as well as others with disabilities can continue to collect their SSDI while transitioning to the workforce.

Substantial gainful activity is a key component of the return to work for SSDI beneficiaries, but it is not a factor for SSI recipients who work. Cash benefits are reduced for working SSI beneficiaries according to a formula that takes into consideration the level of earnings from wages (SSA, 2004e). In essence, the amount of federal SSI benefit is the original benefit rate less any countable income. Since the SSA does not count the first $65 in monthly income earned nor counts half of each dollar earned above this amount received in a month, countable income is the other half of income earned above $65 per month. Other examples of income not counted are the first $20 earned per month, value of food stamps, and income tax refunds (SSA). Technically, countable income is the residual income received for wages less any non-countable income. As an example, a person with a disability who works for $317 monthly wages and has a SSI benefit rate of $564 will have $85 in non-countable income. Only half of the remaining $232 (i.e., $116) is countable income. Therefore, $448 (i.e., $564-$116) is the amount of the new SSI benefit (SSA). The SSI program can also be thought of as a motivator to work for those with hearing impairments since beneficiaries are able to retain their wages in addition to most of their SSI benefits while working. Despite this background knowledge of the SSA's public assistance programs, it is important to consider any trends in the SSDI and SSI programs that would signal problematic areas.

Trends and Projections

Estimates of the frequency of deaf and hard of hearing people receiving cash assistance from the SSA are scarce. Lane et al. (1996) asked the SSA for a count of

beneficiaries who were Deaf. The SSA could only report on those beneficiaries who had indicated that they have severe hearing loss that affects the ability to work. Results were stated that as of 1993, more than 40,000 working-aged deaf individuals were receiving SSDI and that more than 52,000 working-aged deaf individuals were receiving SSI. By comparing the total beneficiaries of the DI Trust Fund (SSDI and SSI) for the year 1993 (i.e., 5.2 million) with the 92,000 working-aged deaf individuals receiving benefits from this fund during the same year, approximately 1.8% of the total beneficiaries were working-aged deaf individuals. Of course, this calculation is made with the assumption that the 52,000 (SSI) and the 40,000 (SSDI) working-aged deaf individuals are independent of each other.

As difficult as it may be to determine the frequency of deaf and hard of hearing SSDI and SSI beneficiaries, obtaining knowledge of benefit amounts for deaf and hard of hearing recipients of SSDI and SSI are also difficult. Walter et al. (2002) studied SSA program participation rates for several thousand deaf and hard of hearing college alumni but did not research the amount of cash assistance. Diagnostic grouping of people with disabilities by the SSA does not include a category for deaf or hard of hearing individuals. Rather, deaf and hard of hearing beneficiaries are most likely classified according to other criteria such as etiology. For example, some disability groups classified by the SSA include congenital anomalies, infectious and parasitic diseases, injuries, and diseases of the nervous system and sense organs (SSA, 2004b). The three disability groups with the largest prevalence of beneficiaries of the DI Trust Fund as of December 2002 are people with mental disorders (other than mental retardation; 28%), diseases of the musculoskeletal system and connective tissue (24%), and diseases of the

circulatory system (10%; SSA). The cash benefit amount for certain groups, other than deafness, are available for comparisons; however, no amount is known for those who are deaf or hard of hearing.

Changes to vocational rehabilitation as a component of the SSDI and SSI programs have occurred throughout their histories. Stated in a Finance Committee report in 1965 was that few beneficiaries were actually receiving VR services (Social Security Advisory Board, 2003). Congress took action against the VR system in 1981 by stipulating that VR services would only be reimbursed when Social Security beneficiaries attain work to the extent that SSDI or SSI benefits are terminated (Social Security Advisory Board). Another change during the 1980s was the inclusion of private entities into the mix of agencies assisting beneficiaries to become employed. Finally, 1999 legislation (i.e., TTWIIA) removed the VR program as the primary system for VR services since beneficiaries were free to choose from many providers, one of which is the public VR system. The Ticket to Work (TTW) program was phased in beginning in 2002 and became nationwide in November 2003 (SSA, 2004a). Although early indications are that beneficiaries generally are not participating in the TTW program, 88% of beneficiaries seeking VR services have chosen state vocational rehabilitation agencies to provide the services. Several policy and funding changes have enabled VR services to become more effective as people with disabilities tend to use the VR program as a central resource in obtaining work.

A trend that could have disastrous consequences for the SSA's programs is a burdensome demand placed upon the programs by projected growth in beneficiaries. The Board of Trustees (2004) projects that by 2020, between 9.2 million and 13.0 million

people will be receiving SSDI and SSI. By comparison, the OASDI Trust Fund is projected that 66.0 million people will be receiving SSDI and SSI benefits by the year 2020. Termination rates are expected to remain steady until 2009 but the frequency of benefits are expected to grow after 2010 (Board of Trustees). Fundamental change is predicted as the frequency of beneficiaries is expected to grow while the rate of terminations is not expected to change.

The Board of Trustees (2004) estimates that the Social Security OASDI Trust Funds will experience severe consequences to changing variables in the coming decades. In the short-term, the DI Trust Fund is expected to adequately finance the SSDI and SSI programs. A more long-term expectation is that the OASDI Trust Funds will become exhausted by 2042 (Board of Trustees). The OASDI Trust Funds will have a $3.7 trillion obligation over the next 75-year performance that it will not be able to meet. Costs are expected to exceed taxable income by 2018. When considering the funds separately, the DI Trust Fund will be exhausted by 2029. Increasing tax rates and reducing benefits are options to avoiding the impending insolvency. The reduction of benefits can occur when beneficiaries obtain work at SGA levels. In order to reduce the obligation of the DI Trust Fund, it is important for deaf and hard of hearing beneficiaries to become employed. The result of predicted changes to the income/expenditure ratio is expected to be a diminishing of trust funds to the point of exhaustion.

Employment of Deaf and Hard of Hearing Individuals

The importance of work for people with hearing impairments cannot be overstated. In this section, readers will be presented two areas that address employment for people with hearing loss. Barriers to employment for individuals who are deaf and

hard of hearing and then the characteristics of employment for this population are presented.

Barriers to Employment

More than 30 years ago, a National Association of the Deaf census found that people with hearing impairments were working in every industry (Schein & Delk, 1974). Despite receiving wages 25% below the national average, deaf workers were well represented across most occupations. Then in 1973, the Rehabilitation Act removed barriers to employment for people with disabilities within the federal government and its contractors (Lane et al., 1996). During the period following the Rehabilitation Act of 1973, deaf workers began seeking federal employment and jobs with large corporations who had federal contracts exceeding $10,000. The 1990 Americans with Disabilities Act (ADA) extended coverage of the Rehabilitation Act of 1973 into the private sector. With the passage of the ADA, deaf workers were protected in recruitment, hiring, promotion, termination, and compensation, among other issues in the work environment (Lane et al.). In addition, the ADA required telephone companies to provide relay services with local and long distance calls. Relay services enable people with any degree of hearing impairments to converse with people without hearing impairments, and vise versa. Finally, deaf and hard of hearing individuals had civil rights protection that enabled them to work in the environment of their choice. As the United States gradually moved from manufacturing to information processing and service industries, more jobs required a college education than in the past. As a result, employees are expected to have competencies in English, reading, mathematics, and computers (Herr, 1999; Lane et al.). Deaf and hard of hearing individuals are finding that, despite legislation removing

barriers to work, the minimum set of skills needed to secure employment is greater than it has been in the past.

A major disadvantage for secondary students with hearing impairments is the lack of preparedness for obtaining a job after high school. Overall, students with hearing impairments are behind their hearing peers in reading and mathematic abilities (Allen, 1986). In addition, children who are hard of hearing tend to have greater difficulty with academic achievement than students who are deaf (Marschark, 1997). Several reasons may explain why hard of hearing students are more at risk for underachievement. First, mild to moderate hearing loss may be more difficult to identify in children than deafness. Second, parents of children who are hard of hearing may be unaware that their children qualify for educational support services. Third, students with mild hearing loss may not accept support services if they identify with the hearing population (Marschark). Children with mild to moderate deafness may have barriers to education that are unique to the extent of the hearing loss.

Some students who are deaf have their own barriers to academic success. Many deaf children do not even have a primary language when they begin school since parents may have encouraged inaccessible language models (Lane et al., 1996). Without a first language such as ASL, learning of English or reading becomes a major challenge for students. In addition, children with deafness may have difficulties with function words (e.g., of, but, by) and organizing words into categorical hierarchies (e.g., apple/fruit). Unfortunately, many teachers of the deaf within mainstreamed settings may not be aware of the different methods the deaf use to learn English since hearing the spoken word is not possible for the deaf students (Lane et al.). Also complicating matters is that over the

last few decades, deaf and hard of hearing students from ethnic minority backgrounds have steadily increased in the schools (Schildroth, Rawlings, & Allen, 1991). Minority students who are deaf often have the unique barriers in which ASL and the language used in their home is unlike the English used in the schools. Lane et al. suggests that deaf students receive English instruction in their native language (i.e., ASL) so that deaf students have bilingual skills in order to secure employment in a hearing world. Perhaps the barriers to achievement experienced by students who are deaf contribute to their tendency to graduate from secondary schools with a third-grade reading level on average (Marschark). Language is a unique barrier to education for some people with severe to profound deafness.

An important aspect of the transition beyond high school is the ability to plan and implement those plans throughout one's life course for the purpose of vocational success (Krumboltz, Mitchell, & Jones, 1976). Bullis, Davis, Bull, and Johnson (1997) compared the transition plans and actual experiences of deaf high school seniors with those of their hearing peers in regard to employment, postsecondary education, and independent living. In addition, the expectations of the students' parents were also studied. Bullis et al. found that, during the final year of high school, both deaf and hearing students agreed that their transition plans were similar to the expectations of their parents. Once the transition occurred, the deaf group was more likely to deviate from their plans than the hearing group. In other words, the actual transitional experiences of the deaf students were inconsistent according to their plans. Similarly, the expectations of the parents of deaf students were inconsistent with the actual experiences of the deaf students. Put another way, hearing students are more likely than deaf students to implement their plans

according to the expectations of their parents (Bullis et al.). Furthermore, Bullis et al. found that the greatest inconsistency of the deaf group was in regard to employment. The conclusion stated was that adolescents who are deaf either plan to work and then do not, or do not plan to work and then find work.

Characteristics of Employment

A National Longitudinal Transition Study (NLTS; Valdes, Williamson, & Wagner, 1990) was conducted to examine transitional experiences of hearing and deaf students 3-5 years out of high school. Although 85% of the deaf group had been employed at least once since leaving high school, only 44% of deaf participants were employed at the 5-year mark of the study (D'Amico & Blackorby, 1992). Bullis, Bull, Johnson, and Peters (1995) similarly researched the school-to-work experiences of deaf and hearing young adults. The investigators found that, overall, hearing adults (95% employed) were more likely to be employed than deaf adults (66% employed). When controlling for type of secondary school (i.e., residential, mainstreamed), mainstreamed deaf women (83%) had higher levels of employment than mainstreamed deaf males (70%), as well as residential deaf males (67%) and females (46%; Bullis et al.). A potential benefit for deaf students in the mainstreamed school is that students are closer to family supports and networks that could help in locating work (Schildroth et al., 1991). In a longitudinal study on the career attainments of 57 intellectually gifted deaf and hard of hearing adults, as many as 30% of participants were unemployed (Vernon & LaFalce-Landers, 1993). The results of these studies are reflective of a deaf and hard of hearing population that is behind their hearing peers in the workforce.

In addition to having a relatively low employment rate, many people with hearing impairments are restricted to a limited range of jobs. A follow-up to the 1987 Annual Survey of Hearing-Impaired Children and Youth conducted by the Center for Assessment and Demographics Studies at Gallaudet University found that 20% of deaf young adults one year out of high school were employed in food preparation (Schildroth et al., 1991). Another 17% of the deaf participants were employed in secretarial and office work. Still another 10% were employed as janitors. Several investigators researched the impact of college on type of job. Welsh and Walter (1988) examined deaf adults with and without baccalaureate degrees. Students without a college degree represented the group most often working in technical, sales, and administrative support. Students with a college degree were most often employed in managerial and professional jobs. People who are deaf are most likely to work in non-professional occupations unless they obtain a college degree.

Differences in the types of occupations that deaf and hard of hearing college graduates represent are evident across gender. In a study that examined postsecondary employment of deaf and hard of hearing alumni, female graduates were more likely working in the professional, technical, administrative support, and service occupations. Whereas, male graduates were more likely employed in precision, operative, and farm occupations (El-Khiami, 1993). Just seven years later, Schroedel and Geyer (2000) found contradictory evidence as more deaf male college graduates (61%) were primarily working in white-collar professional and managerial jobs than deaf female college graduates (52%). However, deaf women were more than twice as likely to be working in clerical jobs than deaf men. A breakdown of the types of jobs by hearing status reveals

that deaf alumni are more likely to be employed in professional, managerial, and technical occupations (62%) over clerical (24%) and crafts, labor, and machine operation occupations (14%) than the more equally represented hard of hearing alumni (39%, 25%, 37%, respectively). Put another way, more than 55% of deaf and hard of hearing alumni of collegiate institutions are employed in professional occupations (Schroedel & Geyer). The El-Khiami (1993) and Schroedel and Geyer (2000) studies represent a longitudinal shift away from deaf employees working in clerical occupations and toward a greater emphasis on professional occupations.

The infrequency of employment for people with disabilities, especially those with hearing impairments, coupled with differences in the types of jobs of deaf and hard of hearing college graduates and non graduates indicates the potential importance of having a college degree. A snapshot of labor force participation 5 years following high school and college is supportive of a college degree expediting the rate of employment since 44% of high school graduates were employed (D'Amico & Blackorby, 1992) versus 84% of college graduates (El-Khiami, 1993). Furthermore, in their study on the effects of college, Welsh and Walter (1988) found that unemployment was 24% for deaf adults without a college degree, 9% for those who attended but did not graduate from college, and only 2% for deaf adults who graduated from a specialized college for the deaf. The benefits of college extend to wages as deaf college graduates earned $496 per week versus $230 per week for deaf adults without a college degree (Welsh & Walter). These studies indicate the economic benefits for pursuing and obtaining a college degree.

Postsecondary Education

After a short overview, four areas comprise this section on postsecondary education. The first area is the benefits and rates of attendance in college. The second and third areas involve the concept of persistence. Specifically, persistence in postsecondary environments and persistence of deaf and hard of hearing students are the areas. The fourth area involves a discussion on some resources for students with hearing impairments.

The value and choice of attending postsecondary education is available to students with hearing loss. Both students with and without disabilities place similar values on a college education (Bailey, 1994). In general, college students with disabilities are comfortable in higher education and feel positive about their relations with faculty, staff, and other college students (Wiseman, Emry, & Morgan, 1988). Approximately 6% of undergraduate students surveyed reported having a disability, of which, 16% reported hearing impairments as the primary disabling condition (National Center for Education Statistics [NCES], 1999). Deaf and hard of hearing students have several options when choosing to attend college. First, students can choose from thousands of colleges and universities as these institutions are required by law to provide support services so that the students benefit from educational programs and activities (Heath Resource Center, n.d.; NCES, 2001). Second, specially funded colleges and universities have programs specifically for deaf and hard of hearing students (Postsecondary, 2004). As a result, small communities of deaf and hard of hearing students attend these specialized institutions. Third, the government established and continues to support two higher education institutions, Gallaudet University and the National Technical Institute for the

Deaf (NTID), in which the majority of the students are deaf and communicate in a visual language (Heath Resource Center). Deaf and hard of hearing individuals can select from several options of postsecondary institutions that will provide lifelong benefits.

Benefits and Rate of Attendance

A measure of the benefits of college is consistently the earnings potential of graduates. Brown and Green (1987) surveyed former students of a federally funded higher education institution for deaf and hard of hearing students to determine wage discrepancies. The results were reported that deaf college graduates earn more over time than the deaf non-college graduates. In comparing the average wages of deaf and hard of hearing graduates to their hearing peers, NCES (1999) found that, nationally, people with hearing impairments ($25,999) earned slightly more than the hearing group ($25,274) following the completion of a college degree in 1993. In a subsequent study, Walter et al. (2002) found that deaf and hard of hearing alumni with bachelor degrees from 1980-1996 earned much more than the people who withdrew from college during the same period. More specifically, male alumni earned $16,000 per year more than the withdrawal group and female alumni earned $7,000 per year more than the withdrawal group. Perhaps not surprising was that deaf male college graduates earn more than their deaf female counterparts. People with hearing impairments were more likely to earn higher wages when they persist through college and obtain a degree.

Although postsecondary education is beneficial for people with hearing impairments in the form of increased wages, reliance on public assistance program also changes. In a study examining the effects of persisting through college on the reliance of federal public assistance programs, Walter, Clarcq, and Thompson (2002) reported that

dependence on SSI and SSDI differs for deaf and hard of hearing students who received a bachelor degree, a sub-bachelor degree (e.g., associate or technical), withdrew, or did not attend college. A greater percentage of male students aged 26 years remained dependent on SSI when they either did not attend college (26%) or withdrew (24%) than students of the same age who received a sub-bachelor degree (11%) or a bachelor degree (6%). In a similar pattern, a greater percentage of female students aged 26 years remained dependent on SSI when they either did not attend college (31%) or withdrew (28%) than students of the same age who received a sub-bachelor degree (17%) or a bachelor degree (13%). Graduates of either bachelor or sub-bachelor degrees were the only groups not receiving SSI in the 40-year age group (Walter et al.). Other results were stated regarding those individuals receiving SSDI assistance. A greater percentage of male students aged 26 years remained dependent on SSDI when they either did not attend college (21%) or withdrew (23%) than students of the same age who received a sub-bachelor degree (13%) or a bachelor degree (17%). When considering female students, a greater percentage aged 26 years remained dependent on SSI when they either did not attend college (28%) or withdrew (29%) than students of the same age who received a sub-bachelor degree (24%) or a bachelor degree (5%). All age groups continued to receive SSDI. The effects of college do not remove the dependence on public assistance as 15% of male and 20% of female graduates continued to collect SSDI one year following graduation. A possible explanation is that students continued their education or were involved in the job search process (Walter et al.). Apparently, for some deaf and hard of hearing students, obtaining a college degree does not curtail receiving public assistance.

Besides being deaf and hard of hearing, at least 15% of first-year students also have speech impairments (Henderson, 2001; Schildroth et al., 1991). The presence of additional disabilities means that the inability to hear is not the only issue that needs attention in academe. Many students in college are dependents of parents but this is less likely for deaf and hard of hearing students as they are more likely to be independent than students without disabilities (NCES, 1999).

Persistence in Postsecondary Environments

Since the benefits of college are not as great for persons who withdraw, persistence is a central component for deaf and hard of hearing students. In examining the theoretical concept of persistence, the model proposed by Tinto (e.g., 1975, 1987, 1993, 1997, 1999) has been used most often. The central aspect of Tinto's (1987) model is that students must become integrated into the academic and social systems of the institution in order to persist. Tinto states that students must be able to separate from past forms of association (e.g., high school, peer groups) and adjust to new challenging academic and social demands. People may choose to depart college when these demands are too difficult. The model presented by Tinto is longitudinal and factors in students' pre-entry attributes, goals and commitments, experiences at college, and degree of integration, as well as other external factors, and influences students' decisions whether to persist.

According to the model, each student has pre-entry attributes that influence their goals and commitments to learning (Tinto, 1987). For example, varying levels of family involvement, finances, skills, abilities, and prior schooling of students that allow these students to develop the reasons to attend college and create their goals influence the decision to remain or leave college. Students may be striving for entry into a particular

occupation or simply just desire a bachelor's degree. The extent to which students are committed to a particular postsecondary environment to achieve this goal is based on the students' pre-entry attributes and goals. The attributes, combined with the goals and commitments, influence the degree of academic and social experiences within the institution. Academic and social systems of college are interrelated in that academic aspects occur in a larger social system and that social communities arise from the academic activities that take place within classrooms (Tinto, 1997). To the extent that students become integrated into academic and social systems on campus, reflects the degree of incongruence with the institution. For instance, students who experience barriers to socialization may not become integrated into the social system. In short, a positive integration into each system will facilitate learning and, ultimately, the decision to persist (Tinto, 1997).

A series of variables influence the extent that students become integrated into the academic and social system of the institution. Two variables that have been studied are academic performance and external commitments. Kahn and Nauta (2001) investigated factors associated with first-year students' persistence. Using logistical regression analyses, it was found that academic ability and past performance were the only pre-college variables that predicted student persistence. Academic ability and past performance were measured by combining high school rank, grade point averages, and the ACT Assessment Test composite score (Kahn & Nauta). Another influencing factor to persist is external commitments of the students. Napoli and Wortman (1998) studied psychosocial factors of more than 1,000 students across three college campuses. External commitments involved marital status, number of dependent children, hours worked

during the upcoming semester, and the amount of time socializing outside the college environment. The investigators found that persistence was negatively affected by the external commitments (Napoli & Wortman).

Another variable that may influence the persistence decision is economic in nature. Studies in which the effects of financial aid on persistence were examined have varied according to different databases, statistical methods, and logical models used (St. John, Andrieu, Oescher, & Starkey, 1994). St. John et al. (1994) compared multiple ways to assess the influence of tuition. Models that include the cost of attendance as a variable are better at predicting persistence than models that exclude tuition costs. Tuition has been found to be a constant, negative influence on persistence (St. John et al., 1994; St. John, Paulsen, & Starkey, 1996). In addition, other monetary measures such as financial aid and housing also have a negative effect on persistence (St. John et al., 1996).

The variables discussed so far are partially student-centered factors such as academic performance, external commitments, and financing college expenses. However, colleges and universities can provide organizational support for the students that could impact the decision to persist. Berger and Braxton (1998) considered the effects of organizational attributes on persistence. The attributes were institutional communication, policy fairness, and participation of students in making academic assignments and rules. All of the organizational attributes were found to indirectly influence students' intent to persist. Some other actions that institutions can do to enhance persistence are provide understandable and accessible information about institutional requirements, provide support resources (e.g., academic, personal, social), and involve students as valued

members of the organization (Tinto, 1999). Therefore, students' ability to remain in college through graduation is partially dependent on institutional variables.

Persistence of Deaf and Hard of Hearing Students

Although Tinto's (1987) model has been used to explain college persistence, as applied to students who are hard of hearing or deaf, several modifications are needed. In particular, three new variables including communication skills, mainstreaming, and distance from home must be added. Danermark (1996) proposes that three external factors, specific to the hearing-impaired population, influences persistence. First, a political factor is the legislation that allows for an increase in deaf and hard of hearing students in college. Such legislation includes IDEA, the Rehabilitation Act of 1973, and the ADA. Second, an economic factor is the changing labor market. Thus, the market for academically education personnel is growing since labor demands a higher educated workforce. Third, a demographic factor is the growing competition among institutions of higher education for students. As a result, higher education is paying more attention to persistence (Danermark). In relation to demographics, most students with hearing impairments attend 2-year community colleges. Napoli and Wortman (1998) concluded that Tinto's model could also be generalized to community colleges. With the addition of external factors, Tinto's model is useful when applied to those with hearing impairments. Background on the applicability of the model on the population of students with hearing impairments is helpful when exploring the trends of persistence with this population.

The frequencies of withdrawal for deaf and hard of hearing students vary across studies. Although the National Center for Education Statistics (1998) claimed that 25% of all college students nationwide did not persist beyond their first-year studies, withdrawal

rates might depend on one factor such as type of college attended. A small sample was used to conclude that deaf and hard of hearing students attending 2- and 4-year colleges withdrew at a 75% rate for each type of college (Rawlings, Karchmer, DeCaro, & Allen, 1991). Conversely, 58% of hearing students withdraw from 2-year colleges and 30% at 4-year colleges (Tinto, 1987). Half of 1988 eighth-graders who were deaf and hard of hearing persisted in college to their 1994 graduation (NCES, 1999). Similarly, results of a study conducted at the NTID were stated to include a 50% withdrawal rate for students who attended classes specifically for the deaf. However, when considering deaf students who attended classes with students with different hearing abilities and students who were mainstreamed with only students with hearing, 32% withdrew from the mixed tract and only 28% withdrew from the mainstreamed tract (Walter & Welsh, 1988). Overall, deaf students were found to withdraw at a 46% rate across the three educational tracts. The percentages of withdrawals for students with hearing impairments range from 28% to 75%, but are not descriptive of model-specific problem areas that prevent persistence.

The persistence model can be used to identify areas in which deaf and hard of hearing students may experience barriers to persistence in college. Since persistence is reliant on the extent of academic and social integration, those factors should be considered when exploring persistence of students with hearing impairments. On one hand, perceptions of access to academics seem favorable to deaf and hard of hearing students. In one study, when asked if students with hearing impairments are integrated into the classrooms, students with hearing believed this to be the case (Brown & Foster, 1991). Beyond the traditional classroom are labs that also provide good opportunities for interactions between student groups. On the other hand, barriers to academic integration

could be problematic since many students with hearing impairments sit in front of the classroom and, therefore, lack opportunities to interact with their hearing colleagues (Brown & Foster). Academic difficulties also may arise due to problems with reading, literacy, and issues surrounding communication by students with hearing impairments. Tinto (1987) stated that the most important factor to persistence is learning. For deaf and hard of hearing students, barriers to learning do exist. Although academic probation or suspension is a likely outcome for deaf and hard of hearing students with problems in communication, math, and reading, communication alone does not influence the persistence decision (Dagel & Dowaliby, 1989; Scherer & Walter, 1988). Students with hearing impairments interested in attending college can improve their academic abilities with a short and intensive summer preparation program (Bat-Chava et al., 1999). Once at school, interacting with faculty on academic matters can lead toward persisting by students with hearing impairments (English, as cited in Danermark, 1995).

Students with hearing impairments may not be accepted in campus social environments (Brown & Foster, 1991). Deaf college students living on-campus experience negative interactions with their hearing peers. In addition, those hearing students reported that they formed a parallel social system in which deaf and hearing systems rarely interacted on the college campus. The degree of interaction is not confined to the college environment since college students with hearing impairments who reflected on their high school mainstreamed experiences reported a range of social interactions from acceptance to isolation (Foster, 1988). Deaf and hard of hearing students should be encouraged to develop expectations for involvement in college as this positively influences social integration (Braxton, Vesper, & Hossler, 1995). However, a delicate

balance with collegiate socializing should be taken in order to have access to activities while preventing excessive involvement. First-year deaf and hard of hearing college students who were satisfied with their social situation were more likely to persist than students who were unsatisfied (Stinson et al., 1987). However, when students with hearing impairments participated in a large number of social activities, however, they were less likely to persist than other students who kept a manageable limit on socializing activities. Students with hearing impairments need to find the right balance of becoming socially integrated into higher education without becoming too involved.

Factors that indirectly affect academic and social integration in postsecondary environments occur prior to and during the college years for students with hearing impairments. With regard to the pre-entry attributes of the persistence model for students with hearing loss, Stinson et al. (1987) found that first-year college students who lived further from college were less likely to persist than students who resided closer. Steps can be taken prior to attending college to improve the likelihood that students will remain in college. In one study, deaf students who took a pre-college preparatory program decided on a major during the first year of college and were also more likely to persist than those deaf students who did not participate in the preparatory program. At college, students face several barriers that must be overcome in order to remain in college. The decision on declaring a major is an important step toward persistence since many deaf students who withdrew from college were unable to make this decision by the end of the first year (Stinson & Walter, 1997). Other factors that reduce college persistence include delaying enrollment, enrolling part-time, working full-time, having the equivalent of a high school diploma, being financially dependent, single parent, or having dependents (NCES, 1999).

Unfortunately, barriers are more likely to exist for students with disabilities than students without disabilities (NCES, 2002).

The academic unpreparedness in postsecondary environments by students with disabilities is reflected in the comparison of populations who take remedial courses. For example, first- and second-year college students with disabilities (24%) are more likely to have taken remedial courses in college than same-year students (20%) without disabilities (NCES, 2002). The poor performances of people with disabilities in college are also documented according to grade point average (GPA). The average GPA for students with disabilities is lower than the average GPA of students without disabilities. In addition, college students who passed the test for General Education Development (GED) are mostly students with disabilities. External commitments can be detrimental to persistence. For instance, students with disabilities are more likely to be married, be single parents, and have dependent children than students without disabilities (NCES). In addition, a higher percentage of students with disabilities (12%) perform community service activities than students without disabilities (9%). The evidence reflects serious challenges for people with disabilities and those with hearing impairments to succeed in college. Integration into academic and social aspects of college can be skipped since another discussion of this is repetitive. Instead, a closer look at the indirect factors is warranted.

An important yet indirect fact to college persistence includes economic resources. Although students with disabilities are less likely to have credit cards than students without disabilities, the former group carries higher monthly balances (NCES, 2002). Another economic factor affecting persistence is the type and amount of financial aid.

Non-repayable grants are less likely awarded to students with disabilities. Instead, students with disabilities are more likely awarded loans. The amount of total aid awarded favors dependent students without disabilities ($7,422) over dependent students with disabilities ($7,098). Income earned during college is also greater for students without disabilities. Moreover, students with disabilities are more likely to come from families with low incomes.

Students with disabilities are more likely than students without disabilities to experience miscellaneous risk factors such as living off campus without family, part-time enrollment, and delayed enrollment. On average, students with disabilities have 2.6 risk factors to persistence, whereas, only 2.1 risk factors are associated with students without disabilities (NCES). The economic and miscellaneous risks to withdrawing from college are greater for people with disabilities.

Resources for Deaf and Hard of Hearing Students

Support services for students with disabilities used in higher education can be found in areas such as academic, transportation, housing, accessibility, recreation, individual and group, health, and career and job placement (Kundu, Dutta, Schiro-Geist, & Crandall, 2003). Services specific to students with deafness may include the provision of interpreters, notetakers, tutors, or captioning (Heath Resource Center, n.d.; Hurwitz & Kersting, 1993). Other services, geared for hard of hearing students are access to communication disorder specialists, assistive listening devices, and considerations to environmental conditions (e.g., acoustic ceiling tile, lighting).

Although these resources may have positive effects on persistence for college students with hearing impairments, many deaf students express concerns about the

adequacy of resources (English, as cited in Danermark, 1995; Schriner, Roessler, & Raymer, 1991). Possibly helpful is self-advocacy and conflict resolution training of students, as this has been shown to improve the negotiating of accommodations by students with disabilities (Palmer & Roessler, 2000). Deaf and hard of hearing students might be more sensitive to their own needs as they were more likely than students with hearing to use wages from summer employment to offset college expenses (Henderson, 2001). Another possibility could be that deaf and hard of hearing students are highly motivated as they ranked themselves the highest on the drive to achieve. In any event, support services are helpful but they are not implemented equally.

Although these support services contribute to college persistence they are not distributed equally. For example, female Caucasian students are more likely to receive support than male students or students from racial and ethnic groups (Elkins, Braxton, & James, 2000). Knowledge of who is satisfied with support services is helpful to understanding if educational needs of students with disabilities are being met by higher education. Kundu et al. surveyed students with disabilities across four universities about their level of satisfaction with disability support services. The investigators found that those satisfied with support services included students with good high school and college GPAs and students who had never married, separated, or divorced. Although the supportive needs of certain groups are not being met, support services cannot be implemented without the involvement of key personnel.

For deaf and hard of hearing individuals, having access to people who have knowledge on issues related to hearing loss and the Deaf is important when transitioning to postsecondary education. In particular, students who attend residential schools for the

deaf have an advantage to mainstreamed students as residential school personnel are knowledgeable about education and deaf youth (Schildroth et al., 1991). Faculty and staff in higher education, however, do not share this knowledge about deafness. The Postsecondary Education Consortium conducted a survey of postsecondary institutions in the United States and Puerto Rico to determine the needs for serving students who are deaf and hard of hearing (Wolfe & Woodrick, 1997). Approximately 80% of the responding institutions each served less than 10 students with hearing impairments. The greatest need from these institutions was to increase faculty and staff awareness about the issues that deaf and hard of hearing students experience. As might be expected, deaf students attending a federally-sponsored university for the deaf reported that they were satisfied with their faculty, counselors, interpreters, and other campus personnel (Schriner et al., 1991). Another group on college campuses, disability support personnel, was professionally established in 1978 and named the Association on Handicapped Student Services Programs in Higher Education. The organization, now known as the Association for Higher Education and Disability (AHEAD), responded to criticisms that disability support personnel lacked professional standards and certification requirements by creating and implementing standards (Bigaj, Shaw, Cullen, McGuire, & Yost, 1995). An important source of information and assistance for college students is the campus career center. Unfortunately, only 25% of students with disabilities use career planning and placement services. Reasons were reported that students were unaware of the services or they felt that participation in career services might compromise their studies (Friehe, Aune, & Leuenberger, 1996). For the most part, those in higher education are unaware of issues concerning students with hearing students.

A more recent tool in providing support services is a result of the advancement of technology. The Internet and the World Wide Web are increasingly being used in higher education for instruction, support services, and communication (Burgstahler, 2002). Kim-Rupnow, Dowrick, and Burke (2001) stated that three trends are occurring in higher education technology. A first trend is the shift from slow one-way devices (e.g., videotape) to fast interactive methods. Second, support services for students with disabilities can be implemented simultaneously with academic instruction. Third, multiple kinds of media technology are being used for instruction (e.g., threaded message boards, compact disks). Technological trends appear to be helpful for all students but not every institution welcomes change. The National Center for Education Statistics (1999c) investigated the delivery of technology across the United States and found that less than half of institutions had a policy to purchase assistive technology for students with disabilities. Furthermore, of those institutions that planned on making purchases of assistive technology, only half stated that they considered the needs of students with disabilities. Cost was the primary deterrent to purchasing assistive technology for students (Michaels, Prezant, Morabito, & Jackson, 2002). Despite the increasing number of students using technology in higher education, students with disabilities continue to have barriers to accessing these technologies (Burgstahler). As an example, students with sensory disabilities may have difficulty seeing the objects on a computer screen or hearing audible information (IMS, 2002). As a result, an unequal educational experience occurs and students with disabilities miss opportunities to learn how to gather web-based information (Rowland, 2000). Although technology is increasingly being used in higher

education, the effectiveness of these services may be poor for students with hearing impairments.

State Federal Vocational Rehabilitation

A valuable resource for many people with disabilities who seek employment occurs through the state federal vocational rehabilitation program. After an overview of the VR program, a review of some investigations using VR data is presented. Deaf and hard of hearing consumers are then discussed in relation to their involvement with the VR program.

Overview of the VR Program

The legislative origin of the State Federal Vocational Rehabilitation (VR) program is the Smith-Fess Act of 1920, which authorized vocational and guidance services for people with disabilities (Jenkins et al., 1992; Spitznagel, 2002). Since then, millions of people with disabilities have received comprehensive vocational services to assist them to enter or return to work (Spitznagel). The 1973 Rehabilitation Act was responsible for the creation of the Rehabilitation Services Administration (RSA), a federal agency within the Department of Education that, among other things, establishes funding for VR agencies in each state and some territories of the United States (Lane et al., 1996). Another mandate of the 1973 legislation was to establish a priority for VR services for people with severe or significant disabilities (Jenkins et al.). The RSA defines significant disability as an individual who (a) has a physical or mental impairment that limits functioning, (b) is expected to require an extended amount of vocational rehabilitation, and (c) has a disability from a pre-selected list (RSA, 2004a).

Approximately 600,000 cases are closed each year by the VR program with a budget that annually exceeds $2 billion (Spitznagel; RSA, 1998).

The RSA differentiates people with hearing impairments according to the extent of loss and communication type. First, the degree of hearing loss is categorized according to the extent of the loss: hearing loss and deafness (RSA, 2004a). Second, the RSA acknowledges that communication type is not necessarily associated with degree of hearing loss. Therefore, each degree of hearing impairment is further categorized according to visual or auditory communication modes. As an example, consumers with hearing impairments of the VR program can be identified as with deafness and primarily communicating in visual or auditory modes. Conversely, consumers can be identified as having hearing loss and primarily communicating in visual or auditory modes (RSA). The classification scheme of the RSA in categorizing the consumers with hearing impairments involves the extent of the hearing loss and the type of communication used.

Consumers of the state federal VR program process through three broad stages toward reaching their goal of becoming employed. First, individuals who seek services from the state federal VR program must meet eligibility criteria in order to receive services. (Hart, Gilmore, Zafft, & Bose, 2003). A person is eligible for rehabilitation services if they have a disability and require the vocational services in order to become employed (Workforce Investment Act, 1998). Hearing impairment is just one of the many types of disabilities represented in the VR program (RSA, 2004a). Second, consumers have many different service options that may be used to facilitate employment once they are found eligible (RSA, 2004a). Some of the services offered include assessment, guidance and counseling, and job placement services (Hart et al., 2003). Consumers

could also receive college and university training leading to a degree that could enhance employability (Gilmore et al., 2001; Hart et al.; RSA). Third, consumers search for employment based on the services and assistance of the VR program (Hart et al.). At the end of the process consumers' cases can be closed for several reasons such as, among other reasons, 90 days after successfully obtaining employment, unsuccessful outcome closure, or the consumer refused services (RSA). Determining eligibility, provision of services, and securing employment make up the three general stages of the VR program.

Investigations Using the RSA 911 Database

Equality across several aspects of the VR program is absent across race and ethnicity. Herbert and Martinez (1992) stated that eligibility for VR services and successful rehabilitation was less likely for consumers who identified as Black, White/Hispanic origin, Black/Hispanic origin, or Asian/Pacific Islander than those identified as White/not of Hispanic origin. In addition, Wilson, Harley, McCormick, Jolivette, and Jackson (2001) found in their review of the VR literature that African Americans are less likely to be referred for services and less likely to be found eligible for services than other groups of race and ethnicity. Vocational rehabilitation outcomes tend to disfavor certain groups even when hearing impairment is the primary disability. Moore (2001c) used the RSA 911 database for fiscal year 1996 to identify differences in successful closures based on race and ethnicity. Chi-square analyses were used to conclude that race/ethnicity and closure status was related. More specifically, the combination of deaf and hard of hearing African Americans, American Indians, and Asian Americans experienced less successful closures than did deaf and hard of hearing Caucasians (67% versus 74%, respectively). Also, Moore found that deaf and hard of

hearing consumers identifying as Latinos (70%) had less work success than those identifying as non-Latinos (73%). Disparities of outcomes from the VR program apply to consumers with hearing impairments. By looking at those who are deaf reveals differences in the number of services received. Moore (2002a) investigated VR outcome variables in the form of number of services and earnings for Caucasian, African American, and Asian American consumers who are deaf of the VR program for fiscal year 1997. Moore used a multivariate analysis of variance procedure to evaluate the relationship between an independent variable and several interval scale dependent variables. African Americans who are deaf were found to receive significantly more services than Caucasians or Asian Americans who are also deaf. When considering the income of employed consumers post VR services, deaf African Americans earned significantly less than other deaf racial groups. Despite receiving more VR services than other racial and ethnic groups, African American consumers who are deaf earn less. Much evidence is supportive of a VR program in which differences in service and outcomes are apparent amongst racial and ethnic groups.

Vocational rehabilitation's expenses associated with college or university training are outpacing inflationary rates. Gilmore et al. (2001) studied the costs associated with postsecondary education as a service provision of the VR program. More specifically, the investigators used a repeated measure analysis on the RSA 911 database to determine costs associated with overall cases in relation to costs associated with postsecondary training during selected years between 1988 and 1998. Results revealed that although overall closure costs of consumers in the VR program did not exceed the rate of inflation, the costs for college and university services rose by 6%, after adjusting for inflation.

Interestingly, the costs for business and vocational services did not exceed inflation. Average costs for college and university training rose from $4,227 to $7,315 during this same time period. Finally, the average costs for business and vocational training were $3,133 in 1988, rising to $4,159 by 1998. The actual average cost for all closures (excluding college costs) was $2,018 in 1988, rising to $3,689 ten years later (Gilmore et al.). In a similar study, Walls, Misra, and Majumder (2002) examined process variables of the VR program across a 20-year period. Means were used to calculate costs of case services. Walls et al. found that, prior to make inflationary adjustments, average costs tripled between 1978 and 1998. An important note is that Walls et al. did not break down costs according to types of services (e.g., college and university training). Despite the differences in these results, a central theme in the VR trends is that closure costs are increasing and that the costs associated with college and university training are greater than the average overall costs.

Costs associated with college and university training is just one aspect of some trends. Other areas include the prevalence of consumers receiving postsecondary education through the VR program as well as outcomes in the form of earnings. Gilmore et al. (2001) investigated postsecondary education as evidenced by the RSA 911 database. Repeated analyses of variance were used across years 1988, 1991, 1993, 1995, and 1998. The findings reported were that the frequency of VR consumers who receive college and university training has not changed significantly over the years. In looking over a 10-year period, the percentage of closures in which college and university training were provided was 13% in 1988 and yet rose slightly to 17% in 1998. However, Walls et al. (2002), who looked at the data across a 20-year period, reported that during the years

of 1978, 1988, and 1998, the percentages of consumers with successful closures who received college and university services were 17%, 10%, and 15%, respectively. Approximately the same percentage of consumers is receiving college and university training as were 20 years ago. Gilmore et al. not only considered the frequency of consumers receiving postsecondary training, but also looked at trends in earnings for consumers with college and university training, business and vocational services, and no postsecondary education. In short, consumers of the VR program who receive college and university services are the only group to earn incomes above the poverty level. The results are not as favorable for consumers of business and vocational services as they were found to consistently earn below the poverty level. Finally, consumers of the VR program who do not receive any postsecondary education were found to earn less than consumers who received college, university, business, or vocational services (Gilmore et al.). Although a steady amount of consumers have been receiving college or university training over the years, this is the VR service that leads to decent wages.

Trends in VR for consumers who are deaf and hard of hearing are contradicting. The RSA reported that over a 10-year period that ended in 1998, the number of successful closures of deaf and hard of hearing consumers had declined consistently (RSA, as cited in Anderson, Boone, & Watson, 2003). In looking at the data a bit more closely, RSA noted that, among deaf and hard of hearing consumers, consumers who are deaf are more likely to be closed successfully than hard of hearing consumers. However, more recently, Anderson et al. surveyed directors of the state federal VR program across all 50 states and the District of Columbia. After receiving an 84% response rate, the investigators reported that less than half of the states had increases in the frequencies of

successful closures for consumers who are deaf. However, more than half of the states had increases of successful closures for all disability groups and for those who are hard of hearing. Anderson et al. cautions that more research is needed to provide additional information on outcomes of the VR program for consumers who are deaf and hard of hearing.

Deaf and Hard of Hearing Consumers

Although people with disabilities in general have higher unemployment rates than people without disabilities, deaf and hard of hearing college graduates experience low unemployment rates compared to deaf and hard of hearing individuals without a college degree (Taylor, 2004; Welsh & Walter, 1988). Unfortunately, people with hearing impairments are less likely to attend postsecondary education than people without disabilities or people with hearing (NCES, 1999). Also, the prevalence of students with hearing impairments attending some form of postsecondary training has declined in recent decades (Henderson 2001). Many deaf and hard of hearing individuals choose not to attend higher education despite the benefits to unemployment.

Fortunately, people with disabilities are using the state federal VR program as a resource for postsecondary education. First, the VR program may be a motivator for high school students to continue their education. Schildroth et al. (1991) reviewed data from several reports by the Center for Assessment and Demographic Studies at Gallaudet University to examine transition for deaf youth. The investigators found that deaf high school seniors who contacted the VR program were more likely to attend college than those who didn't contact VR. Second, many people who seek VR services are provided some form of higher education. Hart et al. (2003) used RSA 911 data from fiscal year

1997 to determine the extent that consumers received postsecondary services. Hart et al. calculated percentages and reported that 21% of all consumers whose cases were closed either rehabilitated or not rehabilitated had received postsecondary education. Slightly more of these consumers received college or university training than business or vocational training. The VR program is also a central source of support for students with hearing impairments. Of those deaf and hard of hearing students who attend specialized postsecondary environments, 65-70% receive VR assistance (Stewart, Schroedel, & Watson, 1991). The VR program is an excellent resource for people with hearing impairments to get into college.

The state federal VR program is not without problems when it comes to assisting consumers with postsecondary education. Hebel (as cited in Anderson et al., 2003) stated that consumer choice in VR postsecondary education services is limited and that additional limitations on funding may not be adequate to ensure support services. Stewart et al. (1991) surveyed VR agencies on policies relating to assisting consumers with hearing impairments for postsecondary education and reported variations. According to the findings, most agencies have a needs test to determine eligibility for various purchases, however, only half of the agencies have a needs test to purchase postsecondary-related resources that are typically used by consumers with hearing impairments, such as interpreters, tutors, and notetakers. Also, less than half of the reporting VR agencies used a standard financial aid form to document other sources of financial assistance such as family, loans, grants, and student earnings. Stewart et al. mentions that communication inconsistencies were also reported between VR agencies and specialized postsecondary programs for deaf and hard of hearing students. Despite

being helpful for those with hearing impairments in higher education, the VR program needs improvement with policies and communications with this population.

Consumers with hearing impairments may find that their degree of hearing loss and public assistance influences VR services. Moore (2001b) used the RSA 911 database for fiscal year 1997 to investigate the extent that degree of hearing loss was related to VR services that were predictors of employment. Logistic regression was first used to identify VR services that predicted competitive work at closure. A subsequent chi-square analysis was used to compare the services that were found to be predictors of employment and type of hearing loss. Moore found those VR consumers who were deaf received college or university training and business or vocational training at significantly higher rates than consumers who were hard of hearing. Consumers who are hard of hearing may experience more difficult becoming competitively employed than those who are deaf. The reception of public assistance also affects VR services. Berry, Price-Ellingstad, Halloran, and Finch (2000) examined the RSA 911 database from fiscal year 1996 regarding VR services for SSI-collecting and non-collecting consumers who were 16 to 24 years of age of no specific disability group. Calculations were largely based on percentages. Consumers who collected SSI were found to receive college or university training half as often as the non-SSI collectors. Interestingly, consumers with hearing impairments were twice as likely to be recipients of SSI at application than to be non-recipients of SSI. Hart et al. (2003) used fiscal year 1997 RSA 911 data to determine the extent that public assistance and access to college or university services were related. Findings were reported that 15% of all VR consumers who received SSI and 19% of all VR consumers who received SSDI also received postsecondary education services.

People with hearing impairments may experience barriers to receiving college or university VR services as a result of their impairment or reception of public assistance.

Another outcome variable often researched is earnings. Earnings of consumers with disabilities are mixed for individuals who received SSI or college or university services. In one study, 41% of consumers receiving SSI became competitively employed earning above the SGA; however, 84% of consumers who did not receive SSI earned above the SGA (Berry et al., 2000). Hart et al. (2003) stated that the impact of college or university training in the VR program cannot be overlooked as consumers who received this service had average weekly earnings ($325) higher than those of consumers who received business or vocational services ($256), both college or university and business or vocational services ($257), or no postsecondary education services ($238). In a comparison of earnings for consumers with hearing impairments with that of consumers with other disabilities, Capella (2003) found that average earnings were similar for the two groups. Moore (2002c) investigated factors that impact earnings for deaf and hard of hearing consumers based on data from the RSA 911 fiscal year 1996 database. A multiple linear regression was used to predict those VR services responsible for income. Additionally, the relationship between gender and income was assessed with a t-test. Finally, a chi-square analysis was used for gender and VR services that were found to predict income. Moore found that although male consumers were found to earn higher earnings than females, consumers who received college or university training, business or vocational training, and job placement services were more likely to earn more than consumers who did not receive these services. No studies were found in which the

investigators researched the relationships between degree of hearing loss and reception of college or university training with regard to earnings.

With regard to the general disability population of the VR program, postsecondary education services have no relationship to predict rehabilitation outcome rates (Hart et al., 2003). Hart et al. warn, however, that determining if postsecondary education services have an impact on rehabilitation rates depend on whether all people accepted for services are included in the analyses. Hart et al. conducted two analyses, one in which VR status 30 (i.e., case closed before rehabilitation plan was completed) was omitted and the other in which status 30 was included. By omitting status 30 cases, the investigators found that consumers who did not receive postsecondary education had their cases closed at a rate of 61%; consumers who received college services had their cases closed at a rate of 58%; consumers who received business or vocational training had their cases closed at a rate of 62%; and consumers who received both college and business or vocational services had their cases closed at a rate of 63% (Hart et al.). However, when status 30 cases were included the results were different. According to the results when status 30 was included, consumers who did not receive postsecondary education had their cases closed at a rate of 44%; consumers who received college services had their cases closed at a rate of 57%; consumers who received business or vocational training had their cases closed at a rate of 59%; and consumers who received both college and business or vocational services had their cases closed at a rate of 57%. As expected, the inclusion of consumers without rehabilitation plans resulted in less successful closures of consumers who did not receive postsecondary education services. However, consumers who had their cases closed successfully were no more likely to

receive postsecondary education services than consumers who completed their rehabilitation plans.

The association of variables such as postsecondary education services, successful closures, public assistance, and employment outcomes all affect consumers with hearing impairments. Vocational rehabilitation postsecondary services have been found to positively affect consumers who are deaf by reducing the rate at which they are underemployed (Williams & Sussman, 1971). Predictors of successful closures in the VR program for consumers with all degrees of hearing loss were found to be postsecondary education services, on-the-job training, and job placement services (Moore, 2001b). A closer look at consumers with hearing impairments reveal that deaf consumers more often achieve competitive employment than hard of hearing consumers. However, deaf consumers do not achieve competitive employment at higher rates than hard of hearing consumers when both groups received college or university training. Competitive employment for consumers with disabilities is more likely to occur when the consumers are receiving SSI at application. As an example, Berry et al. (2000) found that 40% of all consumers receiving SSI at application became competitively employed versus 38% of all consumers not receiving SSI at application became employed. No studies were found in which the investigators researched the relationships of prior postsecondary education experience (i.e., before VR application) with the rate of rehabilitation for consumers with hearing impairments. Similarly, no studies were found that examined the outcome of VR services given that consumers with hearing impairments also have secondary disabilities.

Outcomes of VR also include the type of competitive jobs for consumers. Capella (2003) used the 911 database and found persons with hearing loss were more likely to be

employed in clerical and administrative support and less likely to be employed in service occupations than consumers with other types of disabilities. In addition, consumers with hearing loss were more likely than consumers with other disabilities to be employed in homemaker, unpaid family worker, vending stand clerks or operators, in extended employment, or in self-employed occupations. No studies were found that examined the types of jobs obtained by deaf and hard of hearing consumers. In addition, no studies were found that examined the relationships of VR services and degree of hearing loss with competitive work status (i.e., part-time, full-time).

Still, another outcome variable is the effects of VR services on public assistance. Gilmore et al. (2001) investigated the effects of postsecondary education services on public assistance by analyzing the RSA 911 database for fiscal years 1988, 1991, 1993, 1995, and 1998. Consumers of the VR program who received postsecondary education services were less likely to be receiving SSDI or SSI at the time of case closure than consumers who did not receive postsecondary education services. No studies were found in which the investigators researched the relationships of VR services with the amount of public assistance received by deaf and hard of hearing consumers once rehabilitated.

Summary

Since the United States economy shifted away from manufacturing and toward information processing and service industries, persons who are deaf or hard of hearing have not participated in the workforce as their hearing peers. Most employees must have competencies in English, reading, mathematics, and computer literacy. Unfortunately, many people with hearing impairments are unprepared to enter the workforce after high school since barriers to learning limit academic achievements. For those who find

employment, most of them are either underemployed or work in non-professional positions such as janitorial or technical jobs. In addition, the frequency of students with hearing loss in postsecondary environments is consistently below that of those without disabilities or those with hearing. Benefits await college graduates with hearing impairments since they have higher wages and lower unemployment rates than non-graduates. Another benefit of college is a decrease in reliance on public assistance programs such as SSI and SSDI. Although postsecondary education is beneficial for people with hearing impairments, many students with hearing impairments experience barriers to persisting through college. A central resource for people with disabilities seeking employment is the state federal VR program.

The state federal VR program has a long history assisting people with disabilities in their efforts to become employed. The percentage of consumers rehabilitated has been increasing over the last few decades. Unfortunately, the VR program has not served its consumers with equality as differences in acceptance rates and services across race and ethnicities has been reported. Despite the flaws of the VR program, deaf and hard of hearing consumers have enjoyed low unemployment rates and decent earnings as a result of receiving VR postsecondary services. The reception of postsecondary education services is important in VR to the extent that postsecondary education is partially responsible for the successful closures of deaf and hard of hearing consumer cases. Arguably the greatest benefit of postsecondary education services in the VR program for consumers and the United States is the reduction of dependency by consumers on Social Security public assistance programs.

Chapter 3

PROCEDURES OF THE STUDY

Research Design

The data for the study comes from the RSA 911 national database for fiscal year 2004. Heppner, Kivlighan, and Wampold (1999) stated that passive research is a type of quantitative descriptive design. More specifically, the study is an ex post facto design since no manipulation of independent variables and no random assignment of participants to treatment groups has been attempted. The RSA 911 database was developed by VR agencies across the United States and its territories and forwarded to the Rehabilitation Services Administration (RSA, 2004a). Therefore, the study is secondary data analysis in design since the research findings is based on data gathered by others (Frankfort-Nachmias & Nachmias, 1996).

Heppner et al. (1999) stated that descriptive field studies are high in external validity and low in internal validity. High external validity stems from the selection of participants as well as the degree that the study influences the behaviors of participants during their set of actions. The selection of participants within the RSA 911 database from the population allows for easier generalization to individuals with hearing impairments who could benefit from VR services. In addition, database research, as a retrospective study, is not disruptive to the participants as they interact with the state federal VR program (Frankfort-Nachmias & Nachmias, 1996; Heppner et al., 1999; Webb, Campbell, Schwartz, Sechrest, & Grove, 1981). The reason for low internal validity, however, is that the investigator has limitations to control variables of interest

(Heppner et al.). For example, the investigator doesn't have the ability to randomly assign participants to treatment conditions. Therefore, the design of the study limits the investigator's ability to determine population units who decided not to participate in the state federal VR program.

Research Questions

Two overall research questions can be generated based on the review of literature regarding individuals with hearing loss with public assistance and receiving college or university training through the state federal VR program. First, does the reception of VR services impact outcome measures for consumers with hearing impairments? Several hypotheses follow:

1. H_0: There are no differences in public assistance and college and university training between consumers who are successfully closed with different degrees of hearing loss.

   H_1: There are differences in public assistance and college and university training between consumers who are successfully closed with different degrees of hearing loss.

2. H_0: There are no differences in VR services and closure status for consumers with hearing loss, given that these consumers received college or university training as a VR service.

   H_1: There are differences in VR services and closure status for consumers with hearing loss, given that these consumers received college or university training as a VR service.

3. H_0: There are no differences in occupational type and degree of hearing loss.

H_1: There are differences in occupational type and degree of hearing loss.

4. H_0: There are no differences in weekly earnings at closure and college and university training between consumers who are successfully closed with different degrees of hearing loss.

   H_1: There are differences in weekly earnings at closure and college and university training between consumers who are successfully closed with different degrees of hearing loss.

5. H_0: There are no differences in the number of hours worked at closure and college and university training between consumers who are successfully closed with different degrees of hearing loss.

   H_1: There are differences in the number of hours worked at closure and college and university training between consumers who are successfully closed with different degrees of hearing loss.

The second overall research question is: Do pre-entry attributes of consumers who are deaf and hard of hearing impact outcome measures? Two hypotheses follow:

6. H_0: There are no differences in the type of closure and amount of previous collegiate experience for consumers with hearing impairments who received college or university training as a VR service.

   H_1: There are differences in the type of closure and amount of previous collegiate experience for consumers with hearing impairments who received college or university training as a VR service.

7. H_0: There are no differences in the type of closure and frequency of disability for consumers with hearing impairments who received college or university training as a VR service.

   H_1: There are differences in the type of closure and frequency of disability for consumers with hearing impairments who received college or university training as a VR service.

Variables of the Study

The variables of the study are based on the definitions contained in the RSA 911 Case Service Report (RSA, 2004a).

Level of Education Attained at Application (Independent Variable)

Level of education at application is a nominal variable with two levels (collegiate experience or no collegiate experience). Level of education at application is abbreviated as PRECO and defined as the code that VR staff identified in the Case Service Report (RSA, 2004a).

Degree of Hearing Loss (Independent Variable)

Degree of hearing loss is a nominal variable with two levels (deaf or hard of hearing). Degree of hearing loss is abbreviated as DHOH and defined as the code that VR staff identified as the primary disability in the Case Service Report (RSA, 2004a). Cases that are identified with codes 03 and 04 have been labeled as deaf (D) and with 05 and 06 labeled as hard of hearing (HOH).

Secondary Disability (Independent Variable)

Secondary disability is a nominal variable with two levels (secondary disability or no secondary disability). Secondary disability is abbreviated as TWODIS and defined as

the code that VR staff recorded in the Case Service Report (RSA, 2004a). The TWODIS variable reflects the disability that contributes to, but does not primarily cause, impediments to employment.

Weekly Earnings at Application (Independent Variable)

Weekly earnings at application is a ratio variable. Weekly earnings at application is abbreviated as PREEARN and defined as the amount of money the consumer earned in a typical week at the time of application. PREEARN is the amount recorded by VR staff in the Case Service Report (RSA, 2004a).

Hours Worked in a Week at Application (Independent Variable)

Hours worked in a week at application is a ratio variable. Hours worked in a week at application is abbreviated as PREHRS and defined as the number of hours the consumer worked for wages in a typical week at the time of application. PREHRS is the amount recorded by VR staff in the Case Service Report (RSA, 2004a).

Monthly Public Support Amount at Application (Independent Variable)

Monthly public support amount at application is a ratio variable. Monthly public support amount at application is abbreviated as PRESSDISSI and defined as the sum of the monthly amount of money the consumer received from Social Security Disability Insurance and Supplemental Security Income at the time of application. PRESSDISSI is the amount recorded by VR staff in the Case Service Report (RSA, 2004a).

Assessment (Independent Variable)

Assessment is a nominal variable with two levels (received assessment or did not receive assessment). Assessment is abbreviated as ASMT and defined as the code that VR staff identified in the Case Service Report (RSA, 2004a). The ASMT variable reflects

the services and activities required to (a) determine an applicant's eligibility for VR services, (b) categorize consumers as priority, and (c) determine nature of VR services to be provided.

Diagnosis and Treatment of Impairments (Independent Variable)

Diagnosis and treatment of impairments is a nominal variable with two levels (received diagnosis and treatment of impairments or did not receive diagnosis and treatment of impairments). Diagnosis and treatment of impairments is abbreviated as DOTX and defined as the code that VR staff identified in the Case Service Report (RSA, 2004a). Examples of services provided within the DOTX variable include (a) corrective surgery, (b) dentistry, (c) nursing services, (d) drugs, (e) prosthetics, (f) speech or hearing therapy, and (g) mental health services.

Counseling and Guidance (Independent Variable)

Counseling and guidance is a nominal variable with two levels (received counseling and guidance or did not receive counseling and guidance). Counseling and guidance is abbreviated as CO and defined as the code that VR staff identified in the Case Service Report (RSA, 2004a). The CO variable reflects therapeutic counseling that is necessary to achieve an employment outcome.

College or University Training (Independent Variable)

College or university training is a nominal variable with two levels (received college or university training or did not receive college or university training). College or university training is abbreviated as CU and defined as the code that VR staff identified in the Case Service Report (RSA, 2004a). The CU variable reflects consumer

involvement in full- or part-time academic training beyond the secondary level that leads toward a degree, certificate, or another educational credential.

Occupational/Vocational Training (Independent Variable)

Occupational/vocational training is a nominal variable with two levels (received occupational/vocational training or did not receive occupational/vocational training). Occupational/vocational training is abbreviated as OCCVOC and defined as the code that VR staff identified in the Case Service Report (RSA, 2004a). The OCCVOC variable reflects preparation of consumers for gainful employment through non-degree education at a community college, business, vocational, trade, or technical school.

On-the-Job Training (Independent Variable)

On-the-job training is a nominal variable with two levels (received on-the-job training or did not receive on-the-job training). On-the-job training is abbreviated as OJT and defined as the code that VR staff identified in the Case Service Report (RSA, 2004a). The OJT variable reflects training of job skills provided by an employer for a specific purpose.

Basic Academic Remedial or Literacy Training (Independent Variable)

Basic academic remedial or literacy training is a nominal variable with two levels (received basic academic remedial or literacy training or did not receive basic academic remedial or literacy training). Basic academic remedial or literacy training is abbreviated as BARLT and defined as the code that VR staff identified in the Case Service Report (RSA, 2004a). The BARLT variable reflects training provided to enhance basic academic skills.

Job Readiness Training (Independent Variable)

Job readiness training is a nominal variable with two levels (received job readiness training or did not receive job readiness training). Job readiness training is abbreviated as JRT and defined as the code that VR staff identified in the Case Service Report (RSA, 2004a). The JRT variable reflects the preparation of consumers for employment by enhancing their work behaviors, promptness to work, dress and grooming, and productivity.

Disability Related Augmentative Skills Training (Independent Variable)

Disability related augmentative skills training is a nominal variable with two levels (received disability related augmentative skills training or did not receive disability related augmentative skills training). Disability related augmentative skills training is abbreviated as DRAST and defined as the code that VR staff identified in the Case Service Report (RSA, 2004a). The DRAST variable reflects training such as orientation and mobility, rehabilitation teaching, use of low vision aids, Braille, speech reading, sign language, and cognitive training.

Miscellaneous Training (Independent Variable)

Miscellaneous training is a nominal variable with two levels (received miscellaneous training or did not receive miscellaneous training). Miscellaneous training is abbreviated as MISC and defined as the code that VR staff identified in the Case Service Report (RSA, 2004a). The MISC variable reflects any training not covered by any other category, such as General Educational Development or other training leading to a high school diploma.

Job Search Assistance (Independent Variable)

Job search assistance is a nominal variable with two levels (received job search assistance or did not receive job search assistance). Job search assistance is abbreviated as JSA and defined as the code that VR staff identified in the Case Service Report (RSA, 2004a). The JSA variable reflects activities that support consumers with the job search, such as resume preparation, identification of job opportunities, development of interview skills, and networking.

Job Placement Assistance (Independent Variable)

Job placement assistance is a nominal variable with two levels (received job placement assistance or did not receive job placement assistance). Job placement assistance is abbreviated as JPLACE and defined as the code that VR staff identified in the Case Service Report (RSA, 2004a). The JPLACE variable reflects referrals to specific jobs.

On-the-job Supports (Independent Variable)

On-the-job supports is a nominal variable with two levels (received on-the-job supports or did not receive on-the-job supports). On-the-job supports is abbreviated as OJTSUP and defined as the code that VR staff identified in the Case Service Report (RSA, 2004a). The OJTSUP variable reflects support services provided to consumers in order to enhance job retention, such as job coaching, follow-up, and job retention services.

Transportation Services (Independent Variable)

Transportation services is a nominal variable with two levels (received transportation services or did not receive transportation services). Transportation services

is abbreviated as TRANS and defined as the code that VR staff identified in the Case Service Report (RSA, 2004a). The TRANS variable reflects support for travel, such as training in the use of transportation, relocation expenses, repair of vehicles, travel expenses for personal care attendants.

Maintenance (Independent Variable)

Maintenance is a nominal variable with two levels (received maintenance or did not receive maintenance). Maintenance is abbreviated as MAINT and defined as the code that VR staff identified in the Case Service Report (RSA, 2004a). The MAINT variable reflects the monetary support for food, shelter, and clothing that are in excess of the consumer's expenses.

Rehabilitation Technology (Independent Variable)

Rehabilitation technology is a nominal variable with two levels (received rehabilitation technology or did not receive rehabilitation technology). Rehabilitation technology is abbreviated as RTECH and defined as the code that VR staff identified in the Case Service Report (RSA, 2004a). The RTECH variable includes rehabilitation engineering service, assistive technology devices, and assistive technology and services.

- Rehabilitation engineering service is the application of engineering sciences to design, develop, test, evaluate, apply, and distribute technological solutions to problems encountered by consumers, such as mobility, communications, hearing, independent living, education, and integration into the community.
- Assistive technology devices involves the acquisition, modification, or customization of any item, piece of equipment, or product system that is used to increase, maintain, or improve consumers' functional capabilities.

- Assistive technology services are services for consumers with selecting, acquiring, or using any assistive technology device.

Reader Services (Independent Variable)

Reader services is a nominal variable with two levels (received reader services or did not receive reader services). Reader services is abbreviated as READ and defined as the code that VR staff identified in the Case Service Report (RSA, 2004a). The READ variable reflects services for consumers who cannot read due to blindness or another disability such as Braille or sound recordings.

Interpreter Services (Independent Variable)

Interpreter services is a nominal variable with two levels (received interpreter services or did not receive interpreter services). Interpreter services is abbreviated as INTER and defined as the code that VR staff identified in the Case Service Report (RSA, 2004a). The INTER variable reflects services for consumers with loss of hearing or sight, such as sign language, oral interpretation, captioning services, or tactile interpretation.

Personal Attendant Services (Independent Variable)

Personal attendant services is a nominal variable with two levels (received personal attendant services or did not receive personal attendant services). Personal attendant services is abbreviated as PAS and defined as the code that VR staff identified in the Case Service Report (RSA, 2004a). The PAS variable reflects services such as bathing, feeding, dressing, or providing mobility and transportation.

Technical Assistance Services (Independent Variable)

Technical assistance services is a nominal variable with two levels (received technical assistance services or did not receive technical assistance services). Technical

assistance services is abbreviated as TAS and defined as the code that VR staff identified in the Case Service Report (RSA, 2004a). The TAS variable reflects services provided to conduct market analyses, to develop business plans, and other services for consumers pursuing self-employment, telecommuting, and small business operation outcomes.

Information and Referral Services (Independent Variable)

Information and referral services is a nominal variable with two levels (received information and referral services or did not receive information and referral services). Information and referral services is abbreviated as INFO and defined as the code that VR staff identified in the Case Service Report (RSA, 2004a). The INFO variable reflects the services provided to consumers who need services from agencies outside the state federal VR program.

Other Services (Independent Variable)

Other services is a nominal variable with two levels (received other services or did not receive other services). Other services is abbreviated as OTHER and defined as the code that VR staff identified in the Case Service Report (RSA, 2004a). The OTHER variable reflects all other VR services not recorded elsewhere such as occupational licenses, tools and equipment, or acute medical care.

Occupation at Closure (Independent Variable)

Occupation at closure is a nominal variable with two levels (professional occupations or no professional occupations). Occupation at closure is abbreviated as OCC and defined as the code that VR staff identified in the Case Service Report (RSA, 2004a). The OCC variable reflects the consumer's occupation at the time when case services was closed. A nine-digit code is used to identify the occupation according to the

Dictionary of Occupational Titles (DOT; U.S. Department of Labor, 1991). The OCC variable has been collapsed into professional occupations (i.e., professional, technical, and managerial) and nonprofessional occupations (i.e., all other categories) based on the DOT's one-digit occupational categories (i.e., 0/1 professional; 2-9 nonprofessional).

Closure Status (Independent Variable/Dependent Variable)

Closure status is a nominal variable with two levels (competitively employed or not competitively employed). Closure status is abbreviated as CLO and defined as the code that VR staff identified in the Case Service Report (RSA, 2004a). The CLO variable reflects whether the consumer achieved competitive employment.

Weekly Earnings at Closure (Dependent Variable)

Weekly earnings is a ratio variable. Weekly earnings is abbreviated as EARN and defined as the weekly earnings the consumer receives from employment at the time of closure. EARN is the amount recorded by VR staff in the Case Service Report (RSA, 2004a).

Hours Worked in a Week at Closure (Dependent Variable)

Hours worked in a week at closure is a ratio variable. Hours worked in a week at closure is abbreviated as HRS and defined as the number of hours the consumer works for wages when the case service record was closed. HRS is the amount recorded by VR staff in the Case Service Report (RSA, 2004a).

Monthly Public Support Amount at Closure (Dependent Variable)

Monthly public support amount at closure is a ratio variable. Monthly public support amount at closure is defined as the monthly amount of money the consumer received from Social Security Disability Insurance and Supplemental Security Income at

the time the case service record was closed and is abbreviated as SSDISSI. SSDISSI is the amount recorded by VR staff in the Case Service Report (RSA, 2004a).

Operationalized Hypotheses

To test the first research hypothesis that consumers who are deaf and hard of hearing and received college or university training will have low amounts of public assistance at closure, a two-way analysis of covariance (ANCOVA) was run. The purpose of a two-way ANCOVA is to identify relations between a ratio response variable and one or more nominal explanatory variables, but it is augmented with the addition of a quantitative ratio variable that is related to the response variable (Neter, Kutner, Nachtsheim, & Wasserman, 1996). The ANCOVA, therefore, is helpful in determining if relations exist between the amounts of public assistance at closure (SSDI/SSI), degree of hearing loss (D/HOH), and college or university training (C/U). The quantitative variable that is related to SSDI/SSI is the monthly public support amount at application (PRE-SSDI/SSI). Violations of ANCOVA assumptions led to analysis with a rank F test. The purpose of the test is to determine if the treatment means of ranks are equal. The null hypothesis is that no differences exist in public assistance and college and university training between consumers who are successfully closed with different degrees of hearing loss.

To test the second research hypothesis that, given college or university training was received by consumers who are deaf and hard of hearing, other VR services will influence successful closure, a logistic regression analysis was conducted. The purpose of logistic regression analysis is to predict relationships between two or more independent variables and a binary dependent variable (Huck, 2004). Logistic regression analysis,

therefore, is helpful in determining if relations exist between the state federal VR program services (i.e., ASMT, DO/TX, CO, OCCVOC, OJT, BARLT, JRT, DRAST, MISC, JSA, JPLACE, OJTSUP, TRANS, MAINT, RTECH, READ, INTER, PAS, TAS, INFO & OTHER) and closure status (CLO), given that the consumers received C/U. The null hypothesis is that no differences exist in VR services and closure status for consumers with hearing loss, given that these consumers received college or university training as a VR service.

To test the third research hypothesis that consumers who are deaf and hard of hearing and received college or university training will be employed in professional occupations, a chi-square analysis was conducted. The chi-square test can be used to detect nonchance relationships between two nominal variables (Huck, 2004). The chi-square analysis, therefore, is helpful in determining if college or university training (C/U) is related to occupation at closure (OCC). The null hypothesis is that no differences exist in occupational type and degree of hearing loss.

To test the fourth research hypothesis that consumers who are deaf and hard of hearing and received college or university training will have high weekly earnings, a two-way ANCOVA was conducted. The ANCOVA is helpful in determining if relations exist between the weekly earnings at closure (EARN), degree of hearing loss (D/HOH), and college or university training (C/U). The quantitative variable that is related to EARN is the weekly earnings at application (PRE-EARN). Violations of ANCOVA assumptions led to analysis with a rank F test. The purpose of the test is to determine if the treatment means of ranks are equal. The null hypothesis is that no differences exist in weekly

earnings at closure and college and university training between consumers who are successfully closed with different degrees of hearing loss.

To test the fifth research hypothesis that consumers who are deaf and hard of hearing and received college or university training will work a high number of hours at closure, a two-way ANCOVA was conducted. The ANCOVA is helpful in determining if relations exist between the number of hours worked in a week at closure (HRS), degree of hearing loss (D/HOH), and college or university training (C/U). The quantitative variable that is related to HRS is the number of hours worked in a week at application (PRE-HRS). Violations of ANCOVA assumptions led to analysis with a rank F test. The purpose of the rank F test is to determine if the treatment means of ranks are equal. The null hypothesis is that no differences exist in the number of hours worked at closure and college and university training between consumers who are successfully closed with different degrees of hearing loss.

To test the sixth research hypothesis that consumers who are deaf and hard of hearing and received college or university training will be successfully closed if they had previous postsecondary educational experience, a chi-square analysis was conducted. The chi-square analysis is helpful in determining if the level of education attained at application (PRECO) is related to closure status (CLO), given that the consumers received college or university training as a VR service. The null hypothesis is that no differences exist in the type of closure and amount of previous collegiate experience for consumers with hearing impairments who received college or university training as a VR service.

To test the seventh research hypothesis that consumers who are deaf and hard of hearing and received college or university training will be successfully closed if they had no secondary disability, a chi-square analysis was conducted. The chi-square analysis is helpful in determining if the presence of a secondary disability (2DIS) is related to closure status (CLO), given that the consumers received college or university training as a VR service. The null hypothesis is that no differences exist in the type of closure and frequency of disability for consumers with hearing impairments who received college or university training as a VR service.

Population and Sampling

According to sampling theory, the selection of research participants involves the selection of a sample from a population of interest (Heppner et al., 1999). Heppner et al. discussed five practical considerations when selecting participants for a study. First, the population must be defined. The population for the current study is defined as individuals who (a) have hearing loss, which results in, or contributes to impediments to employment, and (b) can benefit from the state federal VR program to secure, retain, or regain employment.

Second, the participant pool must be identified (Heppner et al., 1999). The participant pool includes people who fit the parameters of the population and are accessible (Heppner et al.). The consumers whose cases are documented on the RSA 911 database comprise the participant pool since their characteristics match the population parameters. Since all individuals in the population do not have the same probability of being selected for the sample, the sample design is a nonprobability sampling procedure (Frankfort-Nachmias & Nachmias, 1996). For instance, the RSA 911 database is a record

only of those consumers who have had their cases closed during a given fiscal year (Moore, 2002c). Therefore, consumers who fit the definition of the population and are receiving services from the state federal VR program but have not had their cases closed were not eligible for the participant pool. Similarly, individuals with disabilities who fit the definition of the population but have not sought VR services or found to be eligible were not included in the participant pool.

Third, research study participants must be selected from the participant pool (Heppner et al., 1999). Convenience sampling is a type of nonprobability sample design in which the investigator selects participants based on ease of availability (Frankfort-Nachmias & Nachmias, 1996). Although randomization of participants is ideal for validity purposes, a criterion-based convenience sample of research participants were drawn from the set of RSA 911 databases by selecting fiscal year 2004 (i.e., October 1, 2003 through September 30, 2004) as the database for the study.

Fourth, validity must be established in the absence of random selection (Heppner et al., 1999). Since the sampling of participants included a criterion-based convenience sample from RSA 911 archival records, establishing validity is important. In the absence of random sampling, generalizations are made rationally, rather than statistically (Serlin, 1987). Characteristics of the study participants should be identified so that investigators can make valid inferences to the population (Heppner et al.). Ponterotto and Casas (1991) recommended that descriptions of sample characteristics should include more than race and ethnicity in order to accurately describe the sample. Other characteristics, such as age, education, SES, and any other characteristics should be determined.

In a review of studies (i.e., Moore 2001b, 2001c, 2002a, 2002b, 2002c) in which the RSA 911 database was used to examine variables associated with deaf and hard of hearing consumers, characteristics of the participants such as ethnicity, gender, age, and education were compiled. The participants for all but one of the studies included consumers who were deaf and hard of hearing. Only consumers with deafness were examined in Moore (2002a). The range of percentages for ethnic group identified across the studies of Moore includes Caucasians (79-88%), followed by Latinos (11-18%,), African Americans (9-17%), Asian Americans (2-4%), and Native Americans (1%). Overall, a slight majority of the participants across the studies favored males as they ranged from 49-55% of the participants. Females were found to range from 45-51% of the participants. Age was reported in only one study (i.e., Moore, 2001c) in which 48% of participants were between 16-34 years, 34% of participants were between 35-49 years, and 19% of participants were between 50-65 years. Level of education was also reported in only one study (i.e., Moore, 2001c) in which 30% of participants had less than 12 years of education, 69% of participants had between 12-16 years of education, and 2% had more than 16 years of education. Several characteristics of deaf and hard of hearing consumers have been reported in the literature and will be compared to similar characteristics of the current study.

Fifth, the number of participants used in the study must be pre-determined (Heppner et al., 1999). McCready (1996) stated that, for nonprobability sampling, the sample size should be large enough to detect changes in the dependent variable. In addition, McCready recommended establishing a sample size comparable to that of investigators cited in the review of literature. In looking at state federal VR consumers

with hearing loss across several studies, Moore (2001b, 2001c, 2002a, 2002b, 2002c) sampled between 1,108 and 15,248 consumers. In general, as the number of study participants increases, so does the probability that the sample represents the population. However, determining the number of participants is related to the concept of power analysis (Cohen, 1988; Heppner et al.), which is discussed under "data analyses."

Data Collection Procedures

The process of collecting data for the study is an unobtrusive measure since the investigator did not witness, nor be involved with, the events being studied (Frankfort-Nachmias & Nachmias, 1996). Personnel from each agency of the state federal VR program record consumer information into a computer database system. The classification of consumer information is based on RSA's coding scheme in which many variables are binary. Thus, personnel record the extent to which each VR service was provided for the consumer (RSA, 2004a). In addition, the elements of the RSA 911 database are both mutually exclusive and exhaustive. To be mutually exclusive, consumer information should fall into only one category (e.g., received the service; did not receive the service). To be exhaustive, all consumer information must fall into a category. In other words, the categories of the element exhausts all possible responses expected by the consumers (Frankfort-Nachmias & Nachmias). As an example, VR personnel documenting the significant disability element can choose to record "no significant disability," "significant disability," or "information is not available for closure code 1" (i.e., significant disability; RSA).

Reliability

Although no instruments are used in this study, reliability in coding must be addressed. Frankfort-Nachmias & Nachmias (1996) stated that studies in which coders followed a coding structure were less likely to have problems with reliability than studies with no coding structure. The reason is that a coding structure allows the coders to avoid exercising their own judgment when deciding which code to record. Structure may involve using a codebook, closed-ended questions, and receiving training in coding procedures. The Reporting Manual for the RSA 911 Case Service Report (RSA, 2004a) is a codebook that is used by personnel of the state federal VR program for reporting consumer information. Each element of the RSA 911 database is described in the codebook along with any policy changes for reporting formats.

In determining which code to document in the database for each element, VR personnel use a variety of resources to gather information. In many instances, VR personnel seek answers to closed-ended questions posed to consumers, personnel in medicine and psychology, vocational evaluators, job placement specialists, among other resources, in which the answers are coded in the database (Roessler & Rubin, 1998). Therefore, consumers can furnish personal information that is coded for the RSA 911 database such as information on social security numbers, date of birth, gender, and race and ethnicity. Personnel in medicine and psychology can provide documentation of consumer information such as the existence of primary and secondary disabilities. Education personnel can document consumers' education level at application or evidence of participation in an individualized education program.

Although no literature was found regarding the training procedures for state federal VR personnel, some insight into this issue was obtained. A district administrator for the Pennsylvania Office of Vocational Rehabilitation (OVR) stated that support staff to VR personnel inputs the codes of consumer information into the agency database. Training of support staff for coding occurs during orientation for new hires. In addition, any changes in policy or instruction on coding are communicated to the support staff through memorandums. No regular training occurs otherwise (C. Pillar, personal communication, June 6, 2005).

In addition to operating under a coding structure, VR personnel review the database in a two-part method to ensure accuracy. First, a central office, in which VR agencies within a district report to, oversees the RSA 911 database for the district and advises agencies about any wrong or inconsistent coding that was found following an audit (C. Pillar, personal communication, June 6, 2005). Although audits are infrequent, VR personnel are aware that central office personnel can review all coding within the database. Second, each VR agency is required to examine their portion of the database for errors prior to forwarding to the RSA at the end of every fiscal year (RSA, 2004a). The VR agencies use computer programs that, among other things, checks for errors in date sequences and reasonableness of data (RSA, 2004b).

Validity

Validity has been defined as the extent that inferences made from tests are appropriate, meaningful, and useful (American Educational Research Association [AERA], American Psychological Association [APA], and National Council on Measurement in Education [NCME], 1985). Consequences of the misuse of test results

have recently been debated (e.g., Messick, 1989; Popham, 1997). Messick argued that validity includes consequences of test results such as any implications for action based on the interpretation of test scores. Popham acknowledged the importance of consequences, but stated that consequences should be separated from the interpretation of data. Although no test is used in the current study, the coding procedure is the numerical representation of consumer constructs (e.g., whether consumers received C/U). A common theme in the definition of validity by AERA, APA, and NCME and the writings of Messick and Popham is that validity involves the inferences made from test results, or in the case of this study, coding of consumers' experiences.

Any inferences made from coding should be made with the knowledge that codes are assigned and recorded based on evidence gathered in case management procedures. Case management, which partially involves coordinating services for consumers as well as recording and reporting consumers' progress, has been a consistent knowledge requirement for VR personnel (Leahy et al., 2003; Rubin et al., 1984). Medical, psychological, vocational, and other services are coordinated and implemented for diagnostic, enhancement, and employment purposes (Roessler & Rubin, 1998). Therefore, compiled evidence is helpful when determining, not only if a consumer experiences a particular element, but also the category of the experiences. Thus, after reviewing documented evidence from medical personnel, VR personnel may code a consumer as not only having a disability, but also categorized as deafness. Inferences based on coding results are, for many elements of the RSA 911 database, dichotomous. Closed-ended questions are used to determine the status of the construct for the consumers. As an example, codes are used to indicate whether consumers received VR

services, an individualized education program, and were closed as competitively employed.

Data Analyses

The statistical analyses considered or used in this study include ANCOVA, rank F test, logistic regression, and chi-square. Each procedure was performed with SPSS 13.0. A section on power analysis that includes the formulas for calculating effect sizes is preceded by a description of each statistical procedure along with the statistical formulas for each analysis.

ANCOVA

Three analyses of covariance were considered for this study. First, a 2 (degree of hearing loss) X 2 (college or university training) analysis of covariance on the monthly public support amount at closure (with the monthly public support amount at application serving as the covariate) was considered. Second, a 2 (degree of hearing loss) X 2 (college or university training) analysis of covariance on the weekly earnings at closure (with the weekly earnings at application serving as the covariate) was also considered. Third, a 2 (degree of hearing loss) X 2 (college or university training) analysis of covariance on the number of hours worked in a week at closure (with the number of hours worked in a week at application serving as the covariate) was considered for this study. The application of an ANCOVA is useful for investigators who want to reduce the probability of a Type II error as well as control extraneous variables (Huck, 2004). In short, Type I errors are made when investigators reject true null hypotheses; and Type II errors are made when false null hypotheses are retained (Grimm, 1993; Huck). The presence of a covariate helps investigators reject null hypotheses by reducing the error

variance (Huck). Specifically, mean square error (MSE) is reduced, and, once the MSE is divided into the mean squares (MS) for main and interaction effects, the calculated F is larger and the associated p-value is smaller than they would be without a covariate. Null hypotheses are more likely to be rejected when the associated Fs are large (Huck).

Analysis of covariance is also useful when the investigator wants to control extraneous variables. With ANCOVA, each group mean on the dependent variable is adjusted based on differences between the two groups on the covariate (Huck, 2004). Therefore, a comparison group with an above-average mean on the dependent variable will have that score lowered to the extent to which that group stands above on the covariate. However, a comparison group with a below-average mean on the dependent variable will have that score raised to the extent to which that group stands below on the covariate. According to Huck (2000), "…ANCOVA provides the best estimates of how the comparison groups would have performed if they had possessed identical means on the control variable(s)" (p. 538).

A factorial analysis of covariance is used to examine the possibility of an interaction of the different factors, determine the factor that contributes to differences on the dependent variable, and find the best factor combinations (Neter et al., 1996). The factors, or independent variables, each have two levels (e.g., deaf, hard of hearing). Since two factors, each with two factor levels, are used in this study, a total of four distinct cell groups are associated with each ANCOVA of the study. The factors of the study are classification factors because the status of the factor is not being assigned to the consumers (Neter et al.). Since the factors are not under the control of the investigator, the cells of the ANCOVA are unequal in size (Glantz & Slinker, 2001; Neter et al.).

The seven assumptions associated with the ANCOVA analysis involve randomness, independence, normality, homogeneity of variance, homogeneity of regression, linearity, and independent variables not affecting the covariate variable (Huck, 2004; Neter et al., 1996). First, the sample should be randomly selected from the population. Huck stated that randomness is a methodological issue and not statistical. For instance, the validity of the treatment comparisons might be affected in the event that randomization cannot occur (Neter et al.). Therefore, since the first assumption of the ANCOVA analysis cannot be met based on the design of the study, validity must be established in the absence of random selection (Heppner et al., 1999). Similar to the validity of the sampling procedure, the characteristics of the study participants are used to make valid inferences to the population. Second, an observation should be independent from the observations of other subjects, or consumers (Huck). Once again, Huck stated that independence is a methodological issue and not statistical. The data coded in the RSA 911 database pertain to individual consumers of the state federal VR program (RSA, 2004a); therefore, observations are independent. Third, the population should be normally distributed in regard to the dependent variable (Huck; Neter et al., 1996). Skewness values are reviewed to determine if the data meet the normality requirement. Fourth, an equal variance should occur with regard to the dependent variable for two samples. The data are tested in order to determine normality and homogeneity of variance. Retaining the null hypotheses of the normality and homogeneity of variance tests is akin to meeting the assumption of the ANCOVA (Huck). Investigators who determine that the normality or homogeneity of variance assumptions have been violated have three options in order to continue with the study. For example, investigators can (a)

use a formula designed for the lack of normality or homogeneity of variance, (b) transform the data, or (c) use another test statistic that does not have the assumptions of normality or homogeneity of variance (Huck).

The last three assumptions are specific to ANCOVAs since they each involve the covariate variable (Huck, 2004). The fifth assumption is that all treatment regression lines must have the same slope (Neter et al., 1996). In other words, the dependent variable and the covariate have similar correlations for each treatment (Huck). A test for homogeneity of regression has been conducted. Sixth, a linear relation between the covariate and the dependent variable is assumed (Huck). A finding of nonlinearity could result in the lowering of statistical power. Therefore, a test has been conducted to assess linearity. Seventh, although the dependent variable is assumed related to the covariate, no such relation should occur between the independent variables and the covariate or else any treatment effects may fail to show (Huck; Neter et al.). Huck warns that covariates collected after the treatments have been applied could be problematic and that the investigator must explain how the treatments do not affect the covariate. The covariates for the ANCOVA analyses are the monthly public support amount at application, the weekly earnings at application, and the number of hours worked in a week at application. The only treatment of the ANCOVA that occurred prior to the application of the covariate is degree of hearing loss. To what extent does the degree of hearing loss affect the monthly public support amount at application, the weekly earnings at application, and the number of hours worked in a week at application? The SSDI program is an insurance program that provides payments based on the Social Security coverage while employed (Wunderlich et al., 2002). The SSI program is a means-tested program for deaf and hard

of hearing individuals who have limited incomes. Therefore, the amount of payment is not affected by the type, or degree, of hearing loss. In addition, no studies were found in which earnings or hours worked were related to the degree of hearing loss. Nonetheless, a scatter plot has been used to determine if the independent variables influence the covariate variables (Neter et al.). Therefore, the observations of the covariates should be similarly distributed on a scatter plot when not influenced by the independent variables.

Transformation of the dependent variable could be useful to investigators who find the data is not meeting the assumptions of the test (Neter, et al., 1996). Researchers can look at variance and standard deviations proportional to population parameters to determine which transformation is most appropriate for the data. The options include square root, logarithmic, and reciprocal transformations.

According to Neter et al. (1996), the model for a two-factor ANCOVA with one covariate variable using the regression approach, is:

$$Y_{ijk} = \mu.. + \alpha_1 X_{ijk1} + \beta_1 X_{ijk2} + (\alpha\beta)_{11} X_{ijk1} X_{ijk2} + \gamma\,(X_{ijk} - \bar{X}...) + \varepsilon_{ijk}$$

$$i = 1,\ldots, a;\ j = 1,\ldots, b;\ k = 1,\ldots, n$$

where $\alpha_1 X_{ijk1}$ is the main effect for factor A, $\beta_1 X_{ijk2}$ is main effect for factor B, $(\alpha\beta)_{11} X_{ijk1} X_{ijk2}$ is the interaction, $\gamma\,(X_{ijk} - \bar{X}...)$ is the regression coefficient for the covariate, and ε_{ijk} is the residual. The reduced model to test for an interaction within a two-factor ANCOVA, based on a regression approach, with unequal sample sizes, is:

$$Y_{ijk} = \mu.. + \alpha_1 X_{ijk1} + \beta_1 X_{ijk2} + \gamma\,(X_{ijk} - \bar{X}...) + \varepsilon_{ijk}$$

The reduced model to test for factor A main effects within a two-factor ANCOVA, based on a regression approach, with unequal sample sizes, is:

$$Y_{ijk} = \mu.. + \beta_1 X_{ijk2} + (\alpha\beta)_{11} X_{ijk1} X_{ijk2} + \gamma (X_{ijk} - \bar{X}...) + \varepsilon_{ijk}$$

The reduced model to test for factor B main effects within a two-factor ANCOVA, based on a regression approach, with unequal sample sizes, is:

$$Y_{ijk} = \mu.. + \alpha_1 X_{ijk1} + (\alpha\beta)_{11} X_{ijk1} X_{ijk2} + \gamma (X_{ijk} - \bar{X}...) + \varepsilon_{ijk}$$

The general linear test statistic, for a two-factor ANCOVA, based on a regression approach, with unequal sample sizes, is:

$$F^* = \frac{SSE(R) - SSE(F)}{df_R - df_F} \Big/ \frac{SSE(F)}{df_F}$$

where R is the reduced model and F is the full model. The Bonferroni test statistic and decision rule, for a post hoc analysis, is:

$$t^* = \frac{\hat{L}}{s\{\hat{L}\}}; \qquad \text{If } |t^*| > t[1 - \alpha / 2g; n_T - ab], \text{ conclude } H_a$$

where $\hat{L}$ is the estimated factor level means, $s\{\hat{L}\}$ is the estimated standard deviation of the estimated factor level means, and g is the number of comparisons. An example of a 95 percent family confidence interval for factor level α, is:

$$\hat{L} - t(s\{\hat{L}\}) \leq \alpha_1 - \alpha_2 \leq L + t(s\{\hat{L}\})$$

Investigators who find a significant interaction may find insight into the interaction with a graphical representation or post hoc analyses (Huck, 2004). Otherwise, the finding of no interaction but a significant main effect is followed up with a means comparison. A graph of the cell means displays the factors and the factor levels in relation to the dependent variable when looking for the interaction. Another option for investigators is to run post hoc analyses, such as the Bonferroni procedure, in order to

determine the extent of the interaction (Neter et al.). The Bonferroni procedure, a method to simultaneously test more than one factor, is preferable when the number of contrasts is small. Simultaneous testing of factors is useful to determine the factor levels that interact to produce an outcome on the dependent variable. A finding of no interaction but a significant main effect requires no post hoc analysis for a 2 X 2 ANCOVA (Huck). Instead, the investigator only needs to compare factor means across the levels. Therefore, a comparison of the column or row means is made for a factor when that factor has been found statistically significant for main effects.

Nonparametric Rank F Test

When data transformations are not successful in correcting error variance in ANCOVA, the nonparametric rank F test is useful (Neter et al., 1996). The only requirement for the rank f test is that the distribution is continuous. All dependent variable data are ranked in ascending order from 1 to n_T. Any ties within the data are given the means of the ranks. The F* test statistic is calculated based on the ranks and not the original dependent variable values. The purpose of the test is to determine if the treatment means of ranks are equal. A multiple pairwise testing procedure is used after the rank F test detects unequal cells. The null hypothesis of the pairwise test is that two treatment means do not differ. Finding zero in the testing limits of the pairwise comparison concludes no differences. Testing limits that do not include zero indicate two cells with significantly different treatment means.

The formulas and the test statistic for the nonparametric F test, denoted by F_R^*:

$$F_R^* = \frac{MSTR}{MSE}$$

$$SSTR = \Sigma n_i (\bar{R}_{i.} - \bar{R}_{..})^2 \qquad SSE = \Sigma\Sigma n_i (R_{ij.} - \bar{R}_{i.})^2$$

$$MSTR = SSTR / r - 1 \qquad MSE = SSE / n_T - r$$

$$\text{If } F_R^* \leq F(1 - \alpha; r - 1, n_T - r), \text{ conclude } H_o$$

$$\text{If } F_R^* > F(1 - \alpha; r - 1, n_T - r), \text{ conclude } H_a$$

The Bonferroni multiple pairwise testing procedure is used for the nonparametric rank F test if the sample size is not too small (Neter et al., 1996). The family level of significance for each pairwise comparison is tested with the formula:

$$(\bar{R}_{i.} - \bar{R}_{i'.}) \pm B\sqrt{n_T(n_T + 1)/12\ (1/n_i + 1/n_{i'})}$$

Whereas, $B = Z(1 - \alpha/2g)$; $g = \frac{r(r-1)}{2}$

Any testing limits that include zero are reflective of equal treatment means.

Logistic Regression

A multiple logistic regression analysis to determine the extent to which VR services (i.e., ASMT, DO/TX, CO, OCCVOC, OJT, BARLT, JRT, DRAST, MISC, JSA, JPLACE, OJTSUP, TRANS, MAINT, RTECH, READ, INTER, PAS, TAS, INFO & OTHER) lead to successful closure (i.e., competitively employed) for deaf and hard of hearing consumers, given that college or university training (C/U) was received, is used in this study. Multiple logistic regression is useful when one binary dependent variable and two or more independent variables are being studied (Agresti, 2002; Huck, 2004;

Neter et al., 1996). A dummy variable on the dependent variable is required in binary logistic regression with Y = 1 reflecting competitively employed and Y = 0 reflecting not competitively employed (Glantz & Slinker, 2001). A key feature of logistic regression is that investigators can determine the odds of an event happening and not just the probability that the event will happen (Huck). As an example, the probability of rolling matching numbers with a pair of dice is .167, or 6 times out of a possible 36 combinations. However, the odds are five to one that a matching pair will occur. In other words, it is five times more likely that no matching pairs will occur than a matching pair.

A procedure to validate the logistic regression model by checking the model's predictive ability with comparison data was conducted. Neter et al. (1996) stated that three methods to validation are available. Investigators can collect new data, review previous empirical results, or use a holdout sample from which to compare the model. Any additional data collected would have to be gathered from a separate sample of the participant pool (i.e., another fiscal year) since all deaf and hard of hearing consumers from the 2004 fiscal year were used for the logistic regression analysis. In addition, no previous empirical results exist using logistic regression analysis with the variables used in the current study. The best method for the study involved the creation of a holdout sample and was accomplished with SPSS by splitting the data equally into two sets (i.e., model-building, validating) through random selection. Only variables statistically significant for both sample groups were considered to predict the outcome (Cohen, Cohen, West, & Aiken, 2003). Attention was given to sample size to ensure that the sets were large enough for reliable models. The goal of validation is to examine if, from the

holdout sample, a similar model emerges, regression coefficients and standard deviations are similar, and the same inferences can be made as with the original model (Neter et al.).

Maximum likelihood estimation (MLE) is the procedure used to estimate the population parameters of the logistic equation (Agresti, 2002; Glantz & Slinker, 2001; Neter et al., 1996; Tabachnick & Fidell, 2001). Put another way, MLE is the best approach to estimate the population parameters that produced the observed sample (Glantz & Slinker). The MLE procedure involves a repetitive process that begins with arbitrary values for the coefficients and then maximizes the likelihood of obtaining the observed frequencies by adjusting the coefficients' direction and size (Tabachnick & Fidell). The residuals are then tested so that additional adjustments can be made to the coefficients. The repetitive process continues until little change is needed with the coefficients. In other words, the MLE process is completed when the coefficients reach convergence. Neter et al. noted that studies with large numbers of independent variables might be problematic as investigators may experience difficulties in obtaining convergence. A solution is to reduce the number of independent variables if convergence problems occur. Since the study has 21 independent variables for the logistic regression analysis, the investigator monitored convergence.

The extent to which the independent variables are important in predicting the dependent variable is the focus of logistic regression. Therefore, the goal is to determine the odds of membership in either category of the dependent variable given a particular combination of categories of the independent variables (Tabachnick & Fidell, 2001). A first step is to examine the relationship between the dependent variable and the entire set of independent variables of the regression model with a type of goodness-of-fit test called

the likelihood ratio test (Neter et al., 1996; Tabachnick & Fidell). A full model log-likelihood (i.e., contains all coefficients) and simple model log-likelihood (i.e., contains only the constant) is compared and then multiplied by two to create a chi-square statistic (Tabachnick & Fidell). A significant statistic is indicative of independent variables that are related to the outcome. Once a relationship is found for the full model, elimination of any independent variables while maintaining a strong prediction can then simplify the regression model.

Testing whether each independent variable contributes to the dependent variable is possible with the Wald test or the likelihood ratio test (Glantz & Slinker 2001; Neter et al., 1996; Tabachnick & Fidell, 2001). The statistical significance of each coefficient is evaluated with a Wald test by dividing the coefficient by its standard error. The corresponding z statistic, if significant, represents an independent variable that contributes to an increase in the odds that Y = 1. An associated P-value can then be found from tables. Menard (1995) cautioned that there is an increased risk to making a Type II error with the Wald test because the estimated standard error becomes too large when the regression coefficient is large. Therefore, the likelihood ratio test is considered an alternative to the Wald test (Tabachnick & Fidell). With the likelihood ratio test, independent variables can be added or removed from the model while concurrently evaluating the predictive ability of the new models (Glantz & Slinker; Tabachnick & Fidell).

The seven assumptions associated with the logistic regression analysis involve the expected value of error, correlation among error terms, correlation of error terms and independent variables, independence, multicollinearity, outliers, and sample size. First,

the expected value of error is zero (Neter et al., 1996). Second, the errors of the independent variables are not correlated to one another (Tabachnick & Fidell, 2001). Third, the error terms are not correlated with the independent variables (Neter et al.). A plot of the residuals against the independent variables can provide information about the regression model. Fourth, the independent variables cannot be correlated with other independent variables (Huck, 2004; Spicer, 2005; Tabachnick & Fidell). Models with multicollinearity make it more difficult to reject null hypotheses (Spicer). An indication that multicollinearity is an issue is inflated standard errors for parameter estimates (Tabachnick & Fidell). Investigators can refer to a correlation matrix of the parameter estimates in which values above .80 indicate multicollinearity. A more formal method of detecting multicollinearity, the variance inflation factor (VIF), measures the extent estimated coefficients are inflated as compared to when the independent variables are not related (Neter et al.). Any VIF values greater than 10 is an indication of multicollinearity.

Fifth, observations of individual participants cannot be affected by the observations of other participants (Spicer, 2005). In other words, each observation must be independent of all other observations. Sixth, outliers must be examined to detect values of the independent variable that the model predicts poorly (Tabachnick & Fidell, 2001). By interpreting an analysis of the residuals the investigator determined if any outliers require remediation. Seventh, sample size must be adequate for unbalanced data (Agresti, 2002). Multiple logistic regression analyses call for larger sample sizes than for logistic regression (Agresti; Spicer). Guidelines range from a minimum of 10 cases for each independent variable (Peduzzi, Concato, Kemper, Holford, & Feinstein, 1996) to 50 cases for each independent variable (Wright, 1995). In general, the more unequal the

number of cases across independent variables, the larger the sample size that is needed (Spicer).

According to Neter et al. (1996), the model for multiple logistic regression, is:

$$\pi_i = \frac{\exp(\beta_0 + \beta_1 X_1 + \cdots + \beta_{p-1} X_{p-1})}{1 + \exp(\beta_0 + \beta_1 X_1 + \cdots + \beta_{p-1} X_{p-1})}$$

where π_i is the log odds that $Y_i = 1$ (i.e., competitively employed), β_0 is the log odds that $Y = 1$ when all independent variables are held constant, β_i is the effect of X_i on the odds that $Y = 1$ when all other independent variables are held constant, and X_i is the value of the independent variables (Agresti, 2002; Glantz & Slinker, 2001; Neter et al.).

Chi-square

A total of three chi-square tests of independence analyses are used in this study. First, a 2 (degree of hearing loss) X 2 (occupation at closure) chi-square analysis is used. Second, a 2 (level of education attained at application) X 2 (closure status) chi-square analysis is used. Third, a 2 (secondary disability) X 2 (closure status) chi-square analysis is used. Chi-square analyses are useful when determining if nonchance relationships exists between variables (Grimm, 1993; Huck, 2004). The null hypothesis states that the factors have no influence on the observed frequencies. Frequencies can be estimated by dividing the total number of participants into the product of the relevant column and row (Grimm). A sample drawn from a population will most likely have sampling error in the data; therefore, expected frequencies should be dissimilar from the observed frequencies (Huck). The question that a chi-square analysis can answer is the extent to which the differences are due to chance.

Investigators can run three tests to determine influential cells, strength of association, and directional measure of association. Once nonchance relationships have been found in 2 X 2 analyses, investigators can determine the cell or cells that are major contributors of the significant results by analyzing the standardized residuals (Grimm, 1993). Subtracting the cell expected frequency from the observed frequency and dividing the difference by the square root of the expected frequency generates an R value that, if exceeds 2.00 in either direction, indicates a cell that contributes to the significance results. Strength of association is calculated with the phi coefficient (Huck, 2004). The phi coefficient is the square root of the chi-square statistic divided by the sample size and represents a measure of association by factoring out sample size and taking the square root. The value of phi is analogous to a correlation coefficient when using a 2 X 2 table (Huck). A directional measure of association, lambda, is useful when using nominal variables (Frankfort-Nachmias & Nachmias, 1996). Lambda is an asymmetrical coefficient that explains the percentage of error that is reduced when predicting the dependent variable by taking into account the independent variable. Calculations of lambda require the investigator to subtract the number of errors after considering the independent variable as a predictor from the number of errors without predictors and dividing the difference by the number of errors without predictors (Frankfort-Nachmias & Nachmias). A limitation to lambda is that it is inappropriate when modal frequencies are concentrated in one category of the dependent variable.

The three assumptions associated with the chi-square analysis involve data structure, generalizability, and independence. First, the data must be in the form of a frequency count (Grimm, 1993). Each variable for the chi-square analyses were coded 0,

1 or was collapsed into 0/1 categories. Second, the sample should be representative of the population of interest (Grimm). Validity was established in the absence of random selection (Heppner et al., 1999) by comparing the characteristics of the study participants with the characteristics of participants from similar studies. Third, each observed frequency must be independent from every other observed frequency (Grimm).

According to Grimm (1993), the formula for chi-square, is:

$$\chi^2 = \sum \frac{(f_o - f_e)^2}{f_e}$$

where f_o is the observed frequency of a given cell and f_e is the expected frequency of a given cell. The expected frequency is computed by:

$$f_e = \frac{f_c f_r}{N}$$

where f_c is the frequency for the relevant column and f_r is the frequency for the relevant row.

Power Analyses

Cohen (1988) defined power as "… the probability that [the statistical test] will yield statistically significant results" (p. 1). Whereas rejecting the null hypothesis is acknowledging that differences between sample means and the hypothesized population are not due to chance, power is the probability of detecting the effect (Cohen; Grimm, 1993). Put another way, hypothesis testing involves deciding if a phenomenon exists and power involves the likelihood of detecting that phenomenon. A power analysis can be conducted while planning a study or as a post hoc analysis; however, Grimm suggests that determining power in the planning stages can save time and expense.

Power is a parameter that is dependent upon other parameters such as the significance criterion, sample size, and effect size (Cohen, 1988). In many studies the significance criterion (i.e., alpha = α) is preset to .05 (Grimm, 1993). In these instances, investigators are willing to accept that the probability of committing a Type I error is 5 out of 100 times. In other words, the probability of acknowledging that differences between sample means and the hypothesized population are not due to chance when, if fact, they are due to chance or sampling error is a risk that must be taken. Conversely, investigators are also taking a Type II error (i.e., β) risk by accepting the probability of acknowledging that differences between sample means and the hypothesized population are due to chance when, if fact, they are not (Grimm). Since the probability of making a Type I error is α, then the probability of not rejecting a true null hypothesis is $1 - \alpha$. Similarly, since the probability of making a Type II error is β, the probability of correctly rejecting a false null hypothesis is $1 - \beta$.

Cohen (1988) stated that the reduction of variance in the observations would increase power. Therefore, as sample size increases, the variance will decrease and will result in a subsequent increase in power. Effect size represents the extent to which the population has the attribute of the dependent variable (Cohen). As effect size increases, so too, does the extent to which the dependent variable is manifested in the population. Cohen distinguishes between small, medium, and large effect sizes for several types of statistical tests.

Power, significance criterion, sample size, and effect size are the four interdependent parameters of power analysis (Cohen, 1988). After any three of the four

parameters are set, the fourth parameter can be easily determined by referring to charts found in Cohen. Therefore, investigators can plan for power, sample size, effect size, or alpha, given that the other three parameters are known prior to the implementation of the study. In the present study, power can be set according to Cohen's suggestion, effect size can be set according to the effect sizes from previous studies, and alpha can be set according to suggestions from previous research as well.

A sample size must be determined in order to conduct the study with preset power, effect size, and alpha levels for each statistical procedure. Power was set at .80 since Cohen (1988) suggested that investigators set power to .80 when no otherwise basis for setting the value is evident. The 11 effect sizes reported from the only study (i.e., Moore 2002c) in which the RSA 911 database was used for deaf and hard of hearing consumers ranged from .06 (small) to .29 (medium) for a multiple logistic regression analysis. The average effect size was .14 (small). Therefore, it was reasonable to expect a small effect size for each statistical analysis in the current study. Although many investigators set alpha at .05, conducting multiple significant tests increases the probability of finding significant results (Bland & Altman, 1995). For example, the probability of finding no significant results is $(1 - \alpha)^k$. When k = 20 the probability of finding significance is $(1 - .05)^{20}$, or .36. In other words, there is a 64% chance of finding a significant result. Therefore, a simple resolution is to adopt the Bonferroni method by dividing alpha by the number of tests. The first five hypotheses of the study is a comparison of deaf and hard of hearing groups; therefore, the .05 alpha is divided by five according to the number of hypotheses (k = 5) and adhering to the Bonferroni method. The last two hypotheses of the study is a combination of deaf and hard of hearing

consumers into one group. Instead of dividing .05 by the two groups, an alpha of .01 was set for each of the last two hypotheses for overall simplicity. Therefore, for the purposes of power analysis, alpha was set to .01 for each statistical analysis.

With the power (.80), effect size (small), and alpha (.01) parameters of power analysis set, the sample size can be determined by referring to tables in Cohen (1988). According to Table 8.4.1, the conditions $\alpha = .01$, $u = 4 - 1 = 3$, $f = .10$, and power = .80 for unequal cells in a 2 X 2 ANCOVA/ANOVA requires an average n = 388 for each cell (Cohen). In other words, 1,552 participants are required for each ANCOVA. According to Table 9.4.1, the conditions $\alpha = .01$, $u = 11$, $f^2 = .02$, and power = .80 for multiple logistic regression requires n = 1,145 for the analysis (Cohen). According to Table 7.4.1, the conditions $\alpha = .01$, $u = 4 - 3 = 1$, $w = .10$, and power = .80 for chi-square requires n = 1,168 for the analysis (Cohen).

Actual effect sizes were computed post hoc according to the formulas found in Cohen (1988) and Nagelkerke (1991). The effect size of the interaction for the ANCOVA is identified as f, with the formula:

$$f = \frac{\sigma_x}{\sigma}$$

where σ_x is the square root of $X^2ij / \alpha\beta$ and σ is the within cell population standard deviation (Cohen). For the chi-square the effect size is identified as w, with the formula:

$$w = \sqrt{\sum_{i=1}^{k} \frac{(P_{1i} - P_{0i})^2}{P_{0i}}}$$

where P_{0i} is the proportion in cell i posited by the null hypothesis and P_{1i} is the proportion in cell i posited by the alternative hypothesis. The strength of association measure for logistic regression used in SPSS and based on the Cox and Snell (1989) and Nagelkerke models of R^2, is:

$$R^2_N = \frac{R^2_{CS}}{R^2_{MAX}}$$

where R^2_N is the value for Nagelkerke's strength of association, R^2_{CS} is Cox and Snell's measure = $1 - \exp[-2/n[LL(B) - LL(B)_I]]$, and $R^2_{MAX} = 1 - \exp[2(n^{-1})LL(0)]$.

Sampling Procedure

Several methods of data cleanup were undertaken in order to prepare the RSA 911 database containing 654,040 cases for analysis. First, cases coded other than deafness and hard of hearing were removed from the database. Cases coded as having other hearing impairments were also deleted since no evidence existed suggesting the degree of hearing impairment. A total of 620,504 cases were removed. Second, 2,277 cases of deaf and hard of hearing consumers were coded as closed due to being found not eligible for the VR program. Persons not eligible for the VR program also do not meet the parameters of the population and were subsequently removed from the database. Third, detailed inspection of the database revealed 33 instances of consumers receiving CU when, intuitively; no services should have been received. Of the 2,885 cases coded as receiving CU, 26 cases were closed prior to a developed rehabilitation plan, 4 cases closed prior to implementation of services, and 3 cases closed from a waiting list were removed. The remaining 31,226 cases were appropriate for establishing validity and represented the main sample from which subsequent hypotheses were taken.

All seven hypotheses originated from the main sample. The following is a description of how each sub-sample was derived:

- From the main sample 10,666 consumers did not exit the VR program with an employment outcome and had missing data under OCC, EARN, and HRS variables. The remaining 20,560 cases were appropriate for hypotheses 3, 4, and 5.
- From the main sample 34 cases with missing PRESSDISSI information and 152 cases with missing SSDISSI information were removed. Also, 22,762 cases in which zero values coded for both PRESSDISSI and SSDISSI variables were removed to make the remaining 8,278 cases available for hypothesis 1.
- Deaf and hard of hearing consumers who had received CU as a VR service made up 2,852 cases from the main sample. Therefore, 2,852 cases were appropriate for hypotheses 2, 6, and 7.

An important note is that the RSA 911 Case Service Report (RSA, 2004a) states that missing CLO data reflects cases that were not closed with employment. Therefore, missing data was recoded as closed without competitive employment and made available for hypotheses 1, 2, 6, and 7.

Limitations

The study has limitations by design that must be considered. Perhaps the most important and potentially damaging limitation concerns the validity of the study. More specifically, questions about both the internal and external validity are present that limit the potential effectiveness of the study. Another question that surfaces reflects the structure of the design based on secondary data analysis. Limitations to statistical

assumptions and procedures could also be problematic for the study. Finally, a lack of contextual information prohibits comprehensive understanding on a central variable from the database.

Some threats to validity exists that stem from a lack of control with variables and a less-than-optimum sampling procedure. A first question that arises concerns the extent to which factors other than the variables of study can be ruled out as explaining any relations or associations. As a descriptive field study, the variables under examination are not being manipulated and are; therefore, examined as they occur naturally (Heppner et al., 1999). Internal validity can be jeopardized by any extrinsic factors not controlled for that may be responsible for any found differences (Frankfort-Nachmias & Nachmias, 1996). Another question concerning validity is the extent to which a representative sampling of the population was taken. By implementing a nonprobability sampling procedure such as a criterion-based convenience sample, the investigator was unable to estimate the population's parameters with theoretical certainty (Frankfort-Nachmias & Nachmias). The first limitation to external validity is that the results from the study is generalizable to the population based on similar sample characteristics to other samples found throughout the literature and not based on probability theory. Another limit to generalizing occurs because consumers are not independent from other consumers. Although the VR program is national, consumers most likely attend only one agency in any given state or territory. Therefore, clusters of consumers are reported in the RSA 911 database.

Frankfort-Nachmias and Nachmias (1996) stated the primary limitation with secondary data analysis is that constructing and testing hypotheses are limited to the

extent the data permits. Although investigators may desire to fill identified gaps in the literature, they are limited by the contents of the database. Since the study was designed as secondary data analysis, a concern is the extent the investigator is able to examine the gaps identified in the literature with a single dataset. The last question involves the extent to which the analyses can be accurately interpreted. The analysis was based on the characteristics of the sample to other samples found throughout the literature.

An important concept and variable of the current study is college and university training; however, no descriptive information exists in the RSA 911 database for this variable. For instance, unknown for consumers is the duration of time spent at postsecondary environments, whether or not a degree was conferred, majors declared, and other related information. Explanations on any found differences when college and university training is involved are limited by the lack of contextual information with postsecondary environments for consumers who received this VR service.

Chapter 4

RESULTS

Demographic information on the sample of deaf and hard of hearing consumers of the VR program for fiscal year 2004 can be broken down into several categories. First, information is provided for the entire sample based on the variables used by Moore (2001c, 2002a) in order to make valid inferences such as disability type, gender, race/ethnicity, age, and level of education. Secondly, information is provided for the sub-sample used for hypotheses 3, 4, and 5. Thirdly, information is provided for the sub-sample used for hypothesis 1. Finally, information is provided for the sub-sample used for hypotheses 2, 6, and 7.

Demographic Information

A listing of demographic information for validity purposes as well as for all hypotheses can be found in Table 1. In regards to the sample (n = 31,226) from which all research hypotheses were drawn, deaf (38%, n = 11,861) were outnumbered by hard of hearing (62%, n = 19,365) consumers. Almost 23% (n = 7,089) of all consumers with hearing impairments had a secondary disability. An even percentage of male and female consumers with hearing loss participated (n = 31,226) in the study. As for race/ethnicity, 83% (n = 25,862) of consumers were White, 14% (n = 4,209) were African American, 10% (n = 3,009) were Hispanic or Latino, 2% (n = 573) were Asian American, 1% (n = 307) were American Indian or Alaskan Native, and less than 1% (n = 173) were Native Hawaiian or Pacific Islander. Of the Hispanic or Latino consumers, 89% (n = 2,676) identified as White Hispanic or Latino and 2% (n = 72) identified as Black Hispanic or

Latino. The age of the participants ranged from 15-102 years (M = 43.55, SD 15.54). Approximately 32% (n = 10,100) of the sample was 16-34 years of age, 32% (n = 9,896) was 35-49 years, 27% (n = 8,517) was 50-65 years, 9% (n = 2,712) was over 65 years, and only one participant was 15 years of age. Level of education at application included 24% (n = 7,624) of consumers with less than 12 years of education, 72% (n = 22,546) between 12-16 years, and 3% (n = 1,056) with more than 16 years of education. The characteristics of the sample are very similar to Moore (2001c, 2002a), thus supporting the ability to make valid inferences to the population of people with hearing loss who are eligible for VR services (Heppner et al., 1999).

Table 1

Percentages of Participants Across Hypotheses

Variable	Hypotheses: Main Sample[a]	1[b]	3, 4, 5[c]	2, 6, 7[d]
Disability				
Deaf	38.0	69.8	30.6	57.2
Hard of Hearing	62.0	30.2	69.4	42.8
Secondary Disability	22.7	32.9	18.5	25.9
Gender				
Male	50.1	48.2	50.9	45.1
Female	49.9	51.8	49.1	54.9
Race/Ethnicity				
White	82.8	73.3	85.6	84.0
African American	13.5	22.3	11.4	10.9
Hispanic/Latino	9.6	11.9	8.2	11.0
White	88.9	88.2	88.8	92.7
Black	2.4	2.6	2.7	2.2
Asian American	1.8	2.3	1.5	3.6
American Indian/Alaskan Native	1.0	1.3	0.8	1.2
Native Hawaiian/Pacific Islander	0.6	0.6	0.5	0.8
Age				
16-34 Years	32.3	44.0	25.2	74.6
35-49 Years	31.7	32.0	32.1	17.8
50-65 Years	27.3	14.2	31.8	7.1
> 65 Years	8.7	9.7	10.9	0.5
Education at Application[e]				
< 12 Years	24.4	32.7	20.5	33.0
12-16 Years	72.2	66.0	75.2	65.9
> 16 Years	3.4	1.2	4.3	1.1

[a]n = 31,226.
[b]n = 8,278.
[c]n = 20,560.
[d]n = 2,852.
[e]The values are for validity purposes only. Education at Application as a variable analyzed in hypothesis 2 has different parameters and is shown in Table 2.

A portion of the sample was reduced to only consumers who received public assistance in order to determine if consumers who are deaf and hard of hearing and received college or university training would have low amounts of public assistance at closure. Demographic information of the sub-sample (n = 8,278) for the first hypothesis differs in degree of hearing loss from the sample from which all research hypotheses were drawn. Approximately 70% (n = 5,776) of consumers were deaf and 30% (n = 2,502) were hard of hearing. Secondary disability accounted for a third (n = 2,723) of the sub-sample. Females (52%, n = 4,290) outnumbered males (48%, n = 3,988). Race/ethnicity included 73% (n = 6,064) White, 22% (n = 1,844) African American, 12% (n = 988) Hispanic or Latino, 2% (n = 188) Asian American, 1% (n = 109) American Indian or Alaskan Native, and 1% (n = 48) Native Hawaiian or Pacific Islander consumers. Of the Hispanic or Latino consumers, 88% (n = 871) identified as White Hispanic or Latino and 3% (n = 26) identified as Black Hispanic or Latino. Approximately 44% (n = 3,644) of the sample was 16-34 years of age, 32% (n = 2,650) was 35-49 years, 14% (n = 1,179) was 50-65 years, and 10% (n = 805) was over 65 years. Level of education at application included 33% (n = 2,710) of consumers with less than 12 years of education, 66% (n = 5,466) between 12-16 years, and 1% (n = 102) with more than 16 years of education.

Another portion of the sample was reduced to only those consumers who exited the VR program with an employment outcome in order to determine differences in (a) occupational type and degree of hearing loss, (b) weekly earnings at closure and college and university training between consumers who are successfully closed with different degrees of hearing loss, and (c) the number of hours worked at closure and college and

university training between consumers who are successfully closed with different degrees of hearing loss. Demographic information of the sub-sample (n = 20,560) for the third, fourth, and fifth hypotheses is similar to the sample from which all research hypotheses were drawn in terms of the degree of hearing loss, gender, race/ethnicity, age, and education at application. Only 31% (n = 6,300) of consumers were deaf and 69% (n = 14,260) were hard of hearing. Secondary disability accounted for 19% (n = 3,802) of the sub-sample. Males (51%, n = 10,459) favored females (49%, n = 10,101) by a fraction. Race/ethnicity included 86% (n = 17,608) White, 11% (n = 2,336) African American, 8% (n = 1,693) Hispanic or Latino, 2% (n = 303) Asian American, 1% (n = 155) American Indian or Alaskan Native, and 1% (n = 103) Native Hawaiian or Pacific Islander consumers. Of the Hispanic or Latino consumers, 89% (n = 1,504) identified as White Hispanic or Latino and 3% (n = 46) identified as Black Hispanic or Latino. Approximately 25% (n = 5,175) of the sample was 16-34 years of age, 32% (n = 6,593) was 35-49 years, 32% (n = 6,547) was 50-65 years, and 11% (n = 2,245) was over 65 years. Level of education at application included 21% (n = 4,220) of consumers with less than 12 years of education, 75% (n = 15,455) between 12-16 years, and 4% (n = 885) with more than 16 years of education.

A final portion of the sample was reduced for those consumers who received college and university training as a VR service in order to determine differences in (a) VR services and closure status for consumers with hearing loss, (b) the type of closure and amount of previous collegiate experience for consumers with hearing impairments who received college or university training as a VR service, and (c) the type of closure and frequency of disability for consumers with hearing impairments who received college

or university training as a VR service. Demographic information of the sub-sample (n = 2,852) for the second, sixth, and seventh hypotheses also differs in degree of hearing loss from the sample from which all research hypotheses were drawn. Deaf consumers accounted for 57% (n = 1,632) of the sub-sample, whereas, 43% (n = 1,220) were hard of hearing. Secondary disability accounted for 26% (n = 739) of the sub-sample. Females (55%) now favored males (45%) by 10 percentage points. Race/ethnicity included 84% (n = 2,395) White, 11% (n = 310) African American, 11% (n = 315) Hispanic or Latino, 4% (n = 102) Asian American, 1% (n = 33) American Indian or Alaskan Native, and 1% (n = 22) Native Hawaiian or Pacific Islander consumers. Of the Hispanic or Latino consumers, 93% (n = 292) identified as White Hispanic or Latino and 2% (n = 7) identified as Black Hispanic or Latino. Approximately 75% (n = 2,128) of the sample was 16-34 years of age, 18% (n = 508) was 35-49 years, 7% (n = 203) was 50-65 years, and 1% (n = 13) was over 65 years. Level of education at application included 33% (n = 33) of consumers with less than 12 years of education, 66% (n = 1,879) between 12-16 years, and 1% (n = 31) with more than 16 years of education.

Categorical Variables

Categorical variables are summarized in Table 2 and include education at application and VR services for the entire sample. The type of occupation and competitive employment categorical variables represent only those consumers who secured employment at or above minimum wage. About a third (n = 10,249) of consumers had previous collegiate experience at the time of application (PRECO). As for VR services, 68% (n = 21,094) received assessment (ASMT), 57% (n = 17,652) received diagnostic and treatment of impairments (DOTX), 56% (n = 17,625) received counseling

and guidance (CO), 32% (n = 9,916) received rehabilitation technology (RTECH), 18% (n = 5,454) received other services (OTHER), 17% (n = 5,443) received job placement assistance (JPLACE), 16% (n = 4,843) received job search assistance (JSA), 14% (n = 4,287) received transportation (TRANS), 12% (n = 3,861) received information and referral services (INFO), 12% (n = 3,700) received interpreter services (INTER), 10% (n = 3,184) received maintenance (MAINT), 9% (n = 2,852) received college and university training (CU), 8% (n = 2,334) received on-the-job supports (OJTSUP), 5% (n = 1,673) received job readiness training (JRT), 5% (n = 1,657) received miscellaneous training (MISC), 5% (n = 1,608) received occupational/vocational training (OCCVOC), 4% (n = 1,200) received technical assistance services (TAS), 2% (n = 497) received on-the-job training (OJT), 1% (n = 425) received disability related augmentative skills training (DRAST), 1% (n = 365) received reader services (READ), 1% (n = 291) received basic academic remedial or literacy training (BARLT), and less than 1% (n = 80) received personal attendant services (PAS). Consumers closed with employment outcomes classified in professional, technical, and managerial occupations represented 26% (n = 5,281) of the sub-sample. Finally, 95% (n = 19,612) of consumers of the sub-sample were closed as competitively employed.

Table 2

Descriptive Statistics for Categorical Variables

Variable	% Receiving	n
Education[a]		
Education at application	32.8	10,249
VR Services[a]		
Assessment	67.6	21,094
Diagnosis and treatment of impairments	56.5	17,652
Counseling and guidance	56.4	17,625
Rehabilitation technology	31.8	9,916
Other services	17.5	5,454
Job placement assistance	17.4	5,443
Job search assistance	15.5	4,843
Transportation	13.7	4,287
Information and referral services	12.4	3,861
Interpreter services	11.8	3,700
Maintenance	10.2	3,184
College and university training	9.1	2,852
On-the-job supports	7.5	2,334
Job readiness training	5.4	1,673
Miscellaneous training	5.3	1,657
Occupational/vocational training	5.1	1,608
Technical assistance services	3.8	1,200
On-the-job training	1.6	497
Disability related augmentative skills training	1.4	425
Reader services	1.2	365
Basic academic remedial or literacy training	0.9	291
Personal attendant services	0.3	80
Type of Occupation[b]		
Professional	25.7	5,281
Non-Professional	74.3	15,279
Type of Closure[b]		
Competitive Employment	95.4	19,612
Non-Competitive Employment	4.6	948

[a]n = 31,226.
[b]n = 20,560.

Continuous Variables

The continuous variables in the study are summarized in Table 3. Means and standard deviations were calculated for weekly earnings at application (PREEARN; M = 208.95, SD 297.34), number of hours worked in a week at application (PREHRS; M = 17.66, SD 18.71), amount of SSDI and SSI at application (PRESSDISSI; M = 518.89, SD 336.01), weekly earnings at closure (EARN; M = 408.00, SD 294.04), number of hours worked in a week at closure (HRS; M = 34.27, SD 10.70), and amount of SSDI and SSI at closure (SSDISSI; M = 536.31, SD 334.70).

Table 3

Descriptive Statistics for Continuous Variables

Variable	M	SD	Range	Low	High	25%ile	75%ile
At Application							
PREEARN[a]	275.95	322.11	7,500.00	0.00	7,500.00	0.00	427.00
PREHRS[a]	22.70	18.54	99.00	0.00	99.00	0.00	40.00
PRESSDISSI[b]	518.89	336.01	2,697.00	0.00	2,697.00	347.00	681.25
At Closure							
EARN[a]	408.00	294.04	7,500.00	0.00	7,500.00	226.00	516.00
HRS[a]	34.27	10.70	99.00	0.00	99.00	30.00	40.00
SSDISSI[b]	536.31	334.70	2,697.00	0.00	2,697.00	368.00	700.00

[a]n = 20,560.
[b]n = 8,278.

Hypothesis 1

Do differences in public assistance and college and university training (CU) exists between consumers who are successfully closed with different "degrees of hearing loss" (DHOH)? A rank F test was used to examine the differences in rankings of the change in public assistance received at closure from the time of application. An ANCOVA analysis was deemed inappropriate for the data after assumptions of the ANCOVA could not be met.

The statistical assumptions of ANCOVA include normality, homogeneity of variance, homogeneity of regression, linearity, and independent variables not affecting the covariate variable (Huck, 2004; Neter et al., 1996). Normality was first assessed using the Kolmogorov-Smirnov test (D = .098, df = 8,278, p = .000) indicating non-normal distribution of the amount of public assistance at closure (SSDISSI). A histogram supported the test, as almost 1,200 SSDISSI values were $0.00. Skewness (.496) and kurtosis (1.324) values indicated a peaked curve with SSDISSI values ranging from $0.00-$2,697. A closer look revealed skewness (.542) and kurtosis (1.912) values for deaf consumers to be more distorted than the skewness (.367) and kurtosis (.382) values for the hard of hearing consumers. The breakdown of skewness and kurtosis indicated a greater frequency of deaf consumers receiving a particular benefit amount than did hard of hearing consumers. More specifically, a histogram revealed that almost 1,000 deaf (D) consumers versus less than 400 hard of hearing (HOH) consumers received slightly more than $500 in SSDI and SSI benefits. Tabachnick and Fidell (2001) note that, although a violated assumption of ANCOVA, non-normality poses no problems for analysis. Homogeneity of variance was tested with Levene's Test of Equality of Error Variances

and indicated non-equal variances between SSDISSI and DHOH ($F = 74.21$, $p = .000$) but equal variances between SSDISSI and CU ($F = 1.33$, $p = .249$). Homogeneity of regression test revealed a violation of the assumption ($F = 10.72$, $p = .001$) since the regression lines had different slopes. Based on violating several assumptions of the ANCOVA analysis, an attempt to transform the values of the dependent variable was undertaken.

ANCOVA F tests are only robust against unequal variances when sample sizes are similar. Therefore, a transformation of the dependent variable was required since the assumptions of normality, homogeneity of variance, and homogeneity of regression were not met. Neter et al. (1996) suggested a simple transformation as a first step to preparing ANCOVA data when the assumptions are violated. Calculated for each factor level was variance proportional to factor mean (s_i^2/μ_i), standard deviation proportional to factor mean (s_i/μ_i), and standard deviation proportional to squared factor mean (s_i/μ_i^2). For the factor levels deaf (D), college and university training (CU) $s_i^2/\mu_i = 215.58$, $s_i/\mu_i = 0.67$, and $s_i/\mu_i^2 = 0.0014$. For the factor levels D, no CU $s_i^2/\mu_i = 189.48$, $s_i/\mu_i = 0.60$, and $s_i/\mu_i^2 = 0.0011$. For the factor levels hard of hearing (HOH), CU $s_i^2/\mu_i = 271.47$, $s_i/\mu_i = 0.73$, and $s_i/\mu_i^2 = 0.0014$. For the factor levels HOH, no CU $s_i^2/\mu_i = 237.80$, $s_i/\mu_i = 0.65$, and $s_i/\mu_i^2 = 0.0011$. The standard deviation proportional to μ_i^2 of each factor level was most similar across the three statistics and was determined the most appropriate simple transformation method. The SSDISSI variable was transformed into a new variable by calculating its inverse (i.e., 1/Y) in order to retry the ANCOVA with the hopes that the assumptions can be met by using the transformed variable.

The assumptions of normality, homogeneity of variance, and homogeneity of regression were retested with SSDISSI, transformed into its inverse. The Kolmogorov-Smirnov test (D = .478, df = 8,278, p = .000) indicated non-normality. Homogeneity of variance was tested with Levene's Test of Equality of Error Variances and indicated equal variances between the transformed SSDISSI and DHOH (F = 1.75, p = .186) but non-equal variances between the transformed SSDISSI and CU (F = 44.07, p = .000). A homogeneity of regression test indicated equal slopes (F = 1.08, p = .300).

Neter et al. (1996) stated that a nonparametric rank F test can be used in replace of ANCOVA when original data and its transformations did not have a normal distribution, equal error variances, and equal regression slopes. A summary of the rank F test can be found in Table 4. The rank F test is a comparison of mean ranks but the ANCOVA had been designed to control for the variance with the amount of public assistance at application covariate. The covariate was incorporated into the rank F test analysis with a new dependent variable (i.e., DiffSSDISSIs). DiffSSDISSIs is the difference between SSDISSI and the amount of public assistance at application (PRESSDISSI) and represents the amount of change in public assistance benefits received between applying for VR services and being closed from the VR program. Therefore, cases in which SSDISSI are smaller than the corresponding PRESSDISSI result in a negative DiffSSDISSIs value. The DiffSSDISSIs values were ranked ascending and ranged from 1-8,278 (M = 4,139.50, SD = 2,250.73). Deaf consumers who received CU (n = 848) had the highest mean ranking (M = 4,522.67, SD = 2,501.82) of all cells followed by hard of hearing consumers also receiving CU (n = 159, M = 4,183.44, SD = 2,514.53). Hard of hearing consumers not receiving CU (n = 2,343) had

the next highest mean ranking (M = 4,118.29, SD = 2,302.13) than only deaf consumers not receiving CU (n = 4,928, M = 4,082.23, SD = 2,164.11). Summary statistics include SSTR (142,026,854) and SSE (40,803,639,898). Mean statistics include MSTR (47,342,285) and MSE (4,931,549). The treatment means were found to be significantly different with less than a small effect size, $F(3, 8{,}274) = 9.60$, $p < .01$, $f = .06$. Therefore, the null hypothesis for the first hypothesis was rejected. Rankings on the amount of change in public assistance from the time of application to closure differs for consumers with various degrees of hearing loss who either receive or do not receiving college or university training.

Table 4

Nonparametric Rank F Test Comparing Changes in the Ranks of Differences in Public Assistance for Deaf and Hard of Hearing Consumers in Each of Two Levels of College and University Training

Source	SSTR	SSE	MSTR	MSE	F
Factor Levels:					
Deaf with no college/ university training	16,163,115	23,075,021,221	47,342,285	4,931,549	9.60*
Deaf with college/ university training	124,502,723	12,412,087,943			
Hard of hearing with no college/ university training	1,054,031	5,301,472,919			
Hard of hearing with college/ university training	306,985	15,057,815			

*$p < .01$.

A Bonferroni pairwise comparison (Neter et al., 1996) was used to test pairs of factor means to determine which pair differs from zero. A summary of the pairwise comparisons can be found in Table 5. Since $g = 4(4 – 1)/2 = 6$ and $B = z(.9992) = 3.14$, the testing limits for the D/CU and D/no CU pairwise test ranged from 283 to 598 ($d = .20$). The range for the HOH/no CU and D/no CU comparison was –70.21 to 142.33. The range for the HOH/CU and D/no CU comparison was –240.00 to 442.42. The range for the D/CU and HOH/no CU comparison was 234.67 to 574.09 ($d = .18$). The range for the D/CU and HOH/CU comparison was –26.74 to 705.20. Finally, the HOH/CU and HOH/no CU comparison ranged from –281.89 to 412.19. The treatment means D/CU and D/no CU as well as D/CU and HOH/no CU are statistically different. Deaf consumers who received college and university training as a VR service had greater increases in the public assistance than did deaf and hard of hearing consumers who did not receive college and university training as a VR service.

Table 5

Summary of Pairwise Comparisons for Rankings of Differences in Amount of Public Assistance Between Degree of Hearing Loss and College and University Training

Source	Factor Means	±	Range	d
Deaf with college: Deaf with no college	4,522.67 – 4,082.23	157.44	283.00 to 597.88	.20
Hard of hearing with no college: Deaf with no college	4,118.29 – 4,082.23	106.27	–70.21 to 142.33	
Hard of hearing with college: Deaf with no college	4,183.44 – 4,082.23	341.21	–240.00 to 442.42	
Deaf with college: Hard of hearing with no college	4,522.67 – 4,118.29	169.71	234.67 to 574.09	.18
Deaf with college: Hard of hearing with college	4,522.67 – 4,183.44	365.97	–26.74 to 705.20	
Hard of hearing with college: Hard of hearing with no college	4,183.44 – 4,118.29	347.04	–281.89 to 412.19	

The results of the first hypothesis seem to support the VR program as an entity that increases the demand placed on the public assistance programs. The finding refutes other studies in which demand was lessened through a means other than reducing benefit amounts. For example, fewer beneficiaries receive SSDI and SSI after receiving postsecondary services (Gilmore et al., 2001) or following attainment of a college degree (Walter, 2002).

Hypothesis 2

Do differences in VR services and closure status for consumers with hearing loss exist, given that these consumers received college or university training as a VR service? A logistic regression was used to examine any relationships between VR services and competitive employment. Separate logistic regression analyses were run for a random sampling of the data into two halves. Any VR services identified in both the model-building and validating sets were considered associated with competitive employment.

A logistic regression analysis was used on successful competitive employment (Y = 1) as outcome and 16 VR service predictors: assessment (ASMT), diagnosis and treatment of impairments (DOTX), counseling and guidance (CO), occupational/vocational training (OCCVOC), job readiness training (JRT), miscellaneous training (MISC), job search assistance (JSA), job placement assistance (JPLACE), on-the-job supports (OJTSUP), transportation (TRANS), maintenance (MAINT), rehabilitation technology (RTECH), interpreter services (INTER), technical assistance services (TAS), information and referral services (INFO), and other services (OTHER). Analyses were performed with SPSS 13.0 for both models of data.

Logistic Regression Model-Building Set

Although Cohen and Cohen (1983) suggested that distributions of dichotomous predictor variables greater than 80% - 20% should be excluded from logistic regression analysis, Moore, Flowers, and Taylor (2000) considered 95% - 5% as the cutoff for their logistic regression analysis of the VR program. In other words, variables in which 95% or more of the sample either received or did not receive the VR service were excluded from analysis. An examination of the 21 VR service variables in the model-building set yields five variables with a distribution greater than 95% - 5% that were subsequently excluded (i.e., OJT, BARLT, DRAST, READ, and PAS). A direct logistic regression analysis was used on successful competitive employment (Y = 1) as outcome and 16 VR service predictors: ASMT, DOTX, CO, OCCVOC, JRT, MISC, JSA, JPLACE, OJTSUP, TRANS, MAINT, RTECH, INTER, TAS, INFO, and OTHER. An initial analysis of 1,416 cases confirms that a model including all VR services predicts successful competitive employment better than a model that only includes the constant (–2LL = 1,802.02, $\chi^2 = 116.61$, df = 16, p = .000, Nagelkerke $R^2 = .11$). Therefore, the null hypothesis for the model-building set of the second hypothesis was rejected. The expected value of error was zero and no correlation among the error terms was found (r range = –.206 to .270). Plots of the residuals against each independent variable indicated no correlations. No evidence of multicollinearity was found (VIF range = 1.06 to 1.51). No outliers were found graphically but were reassessed statistically. Wright (1995) recommended that logistic regression sample size be more than 50 times the number of independent variables. The number of participants in the logistic regression model-building set analysis (n = 1,416) meets the sample size assumption (50 x 21 = 1,050). The

obtained sample size also exceeds the power requirements thus reflecting adequate probability of detecting any effect (Cohen, 1988).

An analysis of the residuals helps to determine if the log likelihood model can be improved when cases are removed from the analysis. Standardized residuals with values less than –2 or greater than +2 require attention. Seven cases were found in which values were less than –2 (range = –2.37 to 1.75). Leverage values ranged from 0.00 to 0.52 with 115 cases indicating a potentially large influence on the parameters of the model by exceeding the 2(k + 1)/N cutoff value of .031 (Neter et al., 1996). Menard (2002) suggested an analysis of the difference in χ^2 when deleting a case after detecting potential high leverage cases. Differences in χ^2, as computed by standardized residual/(1 – leverage), are a summary indicator of influential cases and were calculated as ranging from .000 to 4.206. No cases significantly influence χ^2 if removed from analysis ($\chi^2 <$ 6.63, df = 1, p > .01). Therefore, no cases were removed based on leverage results. Dbeta is defined as the standardized change in the regression coefficient as a case is removed from the analysis (Menard). Any dbeta values over 1.0 should be inspected. Although only one case exceeded 1.0 (dbeta = 1.10), differences in χ^2 for this case indicated no influence on the regression coefficient. A closer inspection of the cases with standardized values less than –2.00 revealed seven consumers who were closed without competitive employment and received at least six VR services. As a group, these cases were inconsistent with the model, exceeded residual parameters, and were removed from analyses resulting in a new predictive model (–2LL = 1,769.21, χ^2 = 136.94, df = 16, p = .000, Nagelkerke R^2 = .13).

The individual coefficients were tested with the likelihood ratio test to determine which logistic regression equation best predicts competitive employment. Comparisons of the full model with 16 reduced models, each having a separate predictor removed, resulted in χ^2 decreases that were compared to a χ^2 critical value of 6.63 (df = 1, α = .01). Any χ^2 decrease greater than –6.63 suggested an independent variable that improves the regression model (Neter et al., 1996). Conversely, decreases less than –6.63 do not improve the model. A total of 10 independent variables (i.e., DOTX, JRT, MISC, JSA, JPLACE, TRANS, MAINT, RTECH, INFO, and OTHER) contribute to the model ($\Delta\chi^2$ range = –55.64 to –7.68) and were retained. Six independent variables (ASMT, CO, OCCVOC, OJTSUP, INTER, and TAS) do not contribute to the model and were removed ($\Delta\chi^2$ range = –6.38 to –0.28). The final model is logit(CLO) = .516 + .236(DOTX) – .496(JRT) + .363(MISC) + .504(JSA) + .904(JPLACE) – .519(TRANS) + .372(MAINT) + .563(RTECH) – .449(INFO) + .473(OTHER). Table 6 contains coefficients, changes in χ^2 if the associated independent variable is removed from the model, and exp(B) values for the model-building set.

A total of seven VR services increase the odds of competitive employment but three decrease the odds given that all consumers received college and university training. Consumers were almost 150% more likely to become competitively employed after receiving job placement services. Also, consumers were 76%, 66%, and 61% more likely to become competitively employed after receiving rehabilitation technology, job search assistance, and other VR services, respectively. Finally, consumers were 45%, 44%, and 27% more likely to become competitively employed after receiving maintenance

services, miscellaneous services, and diagnosis and treatment of impairments, respectively. Conversely, consumers were 36%, 39%, and 41% less likely to become competitively employed after receiving information and referral services, job readiness training, and transportation services, respectively. All other VR services neither contributed to nor detracted from the odds of becoming competitively employed.

Table 6

Summary of Simultaneous Logistic Regression Analysis for the Model-Building Set

VR Service	B	$\Delta\chi^2$	Exp(B)
Assessment	.245	–6.38	1.277
Diagnosis and treatment of impairments	.236	–7.94	1.266
Counseling and guidance	.172	–3.30	1.188
Occupational / vocational training	.134	–0.92	1.143
Job readiness training	–.496	–7.68	.609
Miscellaneous training	.363	–8.34	1.438
Job search assistance	.504	–16.98*	1.655
Job placement assistance	.904	–55.64**	2.468
On-the-job supports	.091	–0.28	1.095
Transportation service	–.519	–32.48**	.595
Maintenance	.372	–16.14*	1.451
Rehabilitation technology	.563	–36.02**	1.756
Interpreter services	–.102	–1.04	.903
Technical assistance services	.173	–0.86	1.189
Information and referral services	–.449	–14.74*	.638
Other services	.473	–26.24**	1.605
Constant	–.516		.597

*p < .01, **p < .001.

Logistic Regression Validating Set

An examination of the 21 VR service variables in the validating set yields five variables with a distribution greater than 95% - 5% that were subsequently excluded (i.e., OJT, BARLT, DRAST, READ, and PAS). A direct logistic regression analysis was used on successful competitive employment (Y = 1) as outcome and 16 VR service predictors: ASMT, DOTX, CO, OCCVOC, JRT, MISC, JSA, JPLACE, OJTSUP, TRANS, MAINT, RTECH, INTER, TAS, INFO, and OTHER. An initial analysis of 1,436 cases confirms that a model including all VR services predicts successful competitive employment better than a model that only includes the constant (–2LL = 1,867.22, $\chi^2 = 77.62$, df = 16, p = .000, Nagelkerke $R^2 = .07$). Therefore, the null hypothesis for the validating set of the second hypothesis was rejected. The expected value of error was zero and no correlation among the error terms was found (r range = –.132 to .314). Plots of the residuals against each independent variable indicated no correlations. No evidence of multicollinearity was found (VIF range = 1.06 to 1.43). No outliers were found graphically but were reassessed statistically. A sample of 1,436 is more than 50 times the number of independent variables (50 x 21 = 1,050), and is beyond the upper range to determine adequate sample size (Wright, 1995). The obtained sample size also exceeds the power requirements thus reflecting adequate probability of detecting any effect (Cohen, 1988).

Standardized residuals did not exceed values less than –2 or greater than +2 (range = –1.99 to 1.83). Leverage values ranged from 0.00 to 0.20 with 122 cases indicating a potentially large influence on the parameters of the model by exceeding the 2(k + 1)/N cutoff value of .031 (Neter et al., 1996). Differences in χ^2 were computed to range from 0.15 to 4.08. No cases were found to significantly influence χ^2 if removed

from analysis ($\chi^2 < 6.63$, df = 1, $p > .01$), therefore, all cases with high leverage values were retained for analysis. No dbeta values exceeded 1.0.

The individual coefficients were tested with the likelihood ratio test to determine which logistic regression equation best predicts competitive employment. Comparisons of the full model with 16 reduced models, each having a separate predictor removed, resulted in χ^2 decreases that were compared to a χ^2 critical value of 6.63 (df = 1, $\alpha = .01$). Any χ^2 decrease greater than –6.63 suggested an independent variable that improves the regression model (Neter et al., 1996). Conversely, decreases less than –6.63 do not improve the model. A total of nine independent variables (i.e., JSA, JPLACE, TRANS, MAINT, RTECH, INTER, TAS, INFO, and OTHER) contribute to the model ($\Delta\chi^2$ range = –36.24 to –8.36) and were retained. Seven independent variables (ASMT, DOTX, CO, OCCVOC, JRT, MISC, and OJTSUP) do not contribute to the model and were removed ($\Delta\chi^2$ range = –4.72 to 0.04). The final model is logit(CLO) = –.045 + .475(JSA) + .538(JPLACE) – .244(TRANS) + .233(MAINT) + .481(RTECH) – .385(INTER) – .324(TAS) – .181(INFO) + .090(OTHER). Table 7 contains coefficients, changes in χ^2 if the associated independent variable is removed from the model, and exp(B) values for the validating set.

A total of five VR services increase the odds of competitive employment but four decrease the odds given that all consumers received college and university training. Consumers were 71% more likely to become competitively employed after receiving job placement services. Also, consumers were 62%, 61%, 26%, and 10% more likely to become competitively employed after receiving rehabilitation technology, job search

assistance, maintenance, and other VR services, respectively. Conversely, consumers were 17%, 22%, 28%, and 32% less likely to become competitively employed after receiving information and referral services, transportation, technical assistance, and interpreter services, respectively. All other VR services neither contributed to nor detracted from the odds of becoming competitively employed.

Table 7

Summary of Simultaneous Logistic Regression Analysis for the Validating Set

VR Service	B	$\Delta\chi^2$	Exp(B)
Assessment	.202	–4.72	1.224
Diagnosis and treatment of impairments	.039	–0.24	1.040
Counseling and guidance	–.029	–0.10	.971
Occupational / vocational training	.028	–0.04	1.028
Job readiness training	.037	–0.04	1.038
Miscellaneous training	.217	–2.86	1.243
Job search assistance	.475	–18.58*	1.607
Job placement assistance	.538	–24.28*	1.712
On-the-job supports	.171	–1.02	1.186
Transportation services	–.244	–8.36	0.783
Maintenance	.233	–8.36	1.263
Rehabilitation technology	.481	–36.24**	1.618
Interpreter services	–.385	–27.64*	0.680
Technical assistance services	–.324	–11.76	0.723
Information and referral services	–.181	–11.30	0.834
Other services	.090	–8.88	1.095
Constant	–.045		0.956

*p < .01, **p < .001.

Table 8 contains coefficients for the combined predictive logistic regression model. The VR services found related to competitive employment across both samples include job placement services, rehabilitation technology, job search assistance, other services, maintenance, information and referral services, and transportation. Consumers were more likely to become competitively employed after receiving job placement services, rehabilitation technology, job search assistance, other services, and maintenance. However, consumers were less likely to become competitively employed after receiving information and referral services, and transportation.

Many of the variables found in this study related to competitive employment were also found related to VR outcomes in other studies. Job placement has much support in the literature for being related to competitive employment. The tasks associated with job search assistance resemble tasks with job placement and are not surprisingly related to competitive employment. Maintenance and other services have only minor support in the literature for VR outcomes. Rehabilitation technology was the only variable from this study to contribute to competitive employment but not in other studies. Two other studies also found that transportation had a negative relation to VR outcomes. Finally, no studies were found in which information and referral services was related to VR outcomes.

Table 8

Summary of Simultaneous Logistic Regression Analysis for the Combined Predictive Model

VR Service	B	SE B	Exp(B)
Job search assistance	.504	.175*	1.655
Job placement assistance	.904	.176**	2.468
Transportation services	–.519	.130**	0.595
Maintenance	.372	.132*	1.451
Rehabilitation technology	.563	.134**	1.756
Information and referral services	–.449	.166*	0.638
Other services	.473	.132**	1.605

Note. Y = 1 competitively employed. X = 1 received VR service.
*p < .01, ** p < .001.

Hypothesis 3

Do differences in occupational type (OCC) and degree of hearing loss (DHOH) exists? A chi-square test of independence was used to examine if nonchance relationships were evident between two nominal variables.

A summary of the chi-square results is located in Table 9. Estimated frequencies were calculated for the deaf (D) by nonprofessional cell (f_e = 4,682), the deaf by professional cell (f_e = 1,618), the hard of hearing (HOH) by nonprofessional cell (f_e = 10,597), and the hard of hearing by professional cell (f_e = 3,663). Crosstabs of DHOH and OCC identified observations on the frequency of deaf consumers in the nonprofessional (n = 4,939) and professional (n = 1,361) levels as well as the frequency of hard of hearing consumers in the nonprofessional (n = 10,340) and professional (n = 3,920) levels. Results of the chi-square analysis detected a significant relationship between degree of hearing loss and occupation at closure ($\chi^2 = 79.13$, df = 1, $p < .01$). Therefore, the chi-square null hypothesis of independence was rejected for the third hypothesis.

The R values for the deaf/nonprofessional cell (R = 3.76), the deaf/professional cell (R = –6.39), the hard of hearing/nonprofessional cell (R = –2.50), and the hard of hearing/professional cell (R = 4.25) indicate that all cells contribute to the significant findings. First, the proportion of deaf consumers who obtained nonprofessional jobs was higher than would be expected by chance. Second, the proportion of deaf consumers who obtained professional jobs was lower than would be expected by chance. Third, the proportion of hard of hearing consumers who obtained nonprofessional jobs was lower

than would be expected by chance. Finally, the proportion of hard of hearing consumers who obtained professional jobs was higher than would be expected by chance.

Since chi-square tests are sensitive to large sample sizes, a measure of association is helpful in understanding the extent the variables are related. A directional measure of association was attempted by lambda; however, the modal frequencies were concentrated in one category of the dependent variable (i.e., nonprofessional of OCC) thereby resulting in a zero measure. Strength of association by phi ($\phi = .06$) and a less than small effect size ($w = .06$) as categorized by Cohen (1988) were identical.

The relationship between degree of hearing loss and type of occupation found in the current study supports Schildroth et al. (1991) who found that deaf adults were primarily employed in nonprofessional jobs. Some nonprofessional occupations included janitorial and food preparatory jobs. The current study did not include analyses on job titles; instead, used the Department of Labor classification of occupations under the professional, technical, and managerial occupations.

Table 9

Chi-Square Results for Degree of Hearing Loss by Occupation at Closure

Degree of Hearing Loss	Nonprofessional		Professional		Total	
	n	%	n	%	n	%
Deaf	4,939	24.0	1,361	6.6	6,300	30.7
Hard of hearing	10,340	50.3	3,920	19.1	14,260	69.3
Total	15,279	74.3	5,281	25.7	20,560	100.0

Note. χ^2 (1, n = 20,560) = 79.19; p < .01; phi = .06. w = .06.

Hypothesis 4

Do differences in weekly earnings at closure (EARN) and college and university training (CU) exists between consumers who were successfully closed with different degrees of hearing loss (DHOH)? A rank F test was used to examine the differences in rankings of the change in weekly earnings at closure from the time of application. An ANCOVA analysis was deemed inappropriate for the data after assumptions of the ANCOVA could not be met.

Normality was assessed using the Kolmogorov-Smirnov test (D = .124, df = 20,560, p = .000) indicating non-normal distribution of EARN. Skewness (3.701) and kurtosis (45.575) values indicated a peaked curve with EARN values ranging from $0.00-$7,500. A closer look revealed skewness (3.861) and kurtosis (47.439) values for hard of hearing consumers (HOH) to be more distorted than the skewness (2.191) and kurtosis (11.641) values for the deaf (D) consumers. Specifically, a much greater frequency of hard of hearing consumers was receiving similar earnings than deaf consumers, not surprising since hard of hearing consumers comprised almost 70% of the sample. Non-normality is not a sole problem for ANCOVA (Tabachnick & Fidell, 2001). Homogeneity of variance was tested with Levene's Test of Equality of Error Variances and indicated non-equal variances between EARN and DHOH (F = 251.324, p = .000) and between EARN and CU (F = 28.357, p = .000). A homogeneity of regression test revealed a violation of the assumption (F = 6,488, p = .000) since the regression lines have different slopes.

A transformation of the dependent variable was required since the assumptions of normality, homogeneity of variance, and homogeneity of regression were not met. For

the factor levels D, CU $s_i^2/\mu_i = 128.62$, $s_i/\mu_i = 0.55$, and $s_i/\mu_i^2 = 0.0013$. For the factor levels D, no CU $s_i^2/\mu_i = 153.80$, $s_i/\mu_i = 0.67$, and $s_i/\mu_i^2 = 0.002$. For the factor levels HOH, CU $s_i^2/\mu_i = 140.20$, $s_i/\mu_i = 0.58$, and $s_i/\mu_i^2 = 0.0014$. For the factor levels HOH, no CU $s_i^2/\mu_i = 233.90$, $s_i/\mu_i = 0.73$, and $s_i/\mu_i^2 = 0.0017$. The standard deviation proportional to μ_i of each factor level has the most constancy of the three statistics and was determined the most appropriate simple transformation method. The EARN variable was transformed into a new variable by calculating log Y.

The assumptions were retested with EARN, transformed into log Y. The Kolmogorov-Smirnov test (D = .187, df = 20,560, p = .000) indicated non-normality. Homogeneity of variance was tested with Levene's Test of Equality of Error Variances and indicated non-equal variances between the transformed EARN and DHOH (F = 8.56, p = .003) and the transformed EARN and CU (F = 65.31, p = .000) variables. A homogeneity of regression test indicated unequal slopes (F = 1,619.24, p = .000). As a result, systematic errors in the fit of the two groups of data were present thus rendering the ANCOVA analysis problematic.

A nonparametric rank F test was used because of the violated assumptions of the ANCOVA analysis. A summary of the rank F test can be found in Table 10. Since the nonparametric rank F test uses an ANOVA approach, the covariate was incorporated into the analysis with a new dependent variable (i.e., DiffEARNs). DiffEARNs is the difference between EARN and weekly earnings at application (PREEARN). Cases in which EARN are smaller than the corresponding PREEARN result in a negative DiffEARNs value. The DiffEARNs values were ranked ascending and ranged from 1-

20,560 (M = 10,280.50, SD = 5,847.53). Ranked cases from the D, no CU factor level (n = 5,378, M = 11,696.49, SD = 5,629.01) ranged from 6-20,557.00. Ranked cases from the HOH, no CU factor level (n = 13,453, M = 8,987.82, SD = 5,523.07) ranged from 1-20,560.00. Ranked cases from the D, CU factor level (n = 922, M = 16,176.70, SD = 4,243.61) ranged from 147-20,556. Ranked cases from the HOH, CU factor level (n = 807, M = 15,657.11, SD = 4,597.49) ranged from 79.50-20,558. Summary statistics include SSTR (88,645,486,660) and SSE (614,341,042,774). Mean statistics include MSTR (29,548,495,553) and MSE (29,886,215). The treatment means were found to be significantly different with a medium effect size, $F(3, 20{,}556) = 988.70$, $p < .01$, $f = .36$. Therefore, the null hypothesis for the fourth hypothesis was rejected. Rankings on the amount of change in weekly earnings from the time of application to closure differs for consumers with different degrees of hearing loss who either receive or do not receiving college or university training.

Table 10

Nonparametric Rank F Test Comparing Changes in the Ranks of Differences in Weekly Earnings for Deaf and Hard of Hearing Consumers in Each of Two Levels of College and University Training

Source	SSTR	SSE	MSTR	MSE	F
Factor Levels:					
Deaf with no college/ university training	10,783,038,864	170,374,537,099	29,548,495,553	29,886,215	988.70*
Deaf with college/ university training	32,053,490,834	16,585,604,915			
Hard of hearing with no college/ university training	22,480,253,343	410,344,541,513			
Hard of hearing with college/ university training	23,328,703,619	17,036,359,247			

*$p < .01$.

A Bonferroni pairwise comparison (Neter et al., 1996) was used to test pairs of factor means to determine which pair differs from zero. A summary of the pairwise comparisons can be found in Table 11. Since $g = 4(4 – 1)/2 = 6$ and $B = z(.9992) = 3.14$, the testing limits for the D/CU and D/no CU comparison ranged from 4,105.32 to 4,855.10 (d = .82). The range for the D/no CU and HOH/no CU comparison was 2,538.99 to 2,878.35 (d = .50). The range for the HOH/CU and D/no CU comparison was 3,563.58 to 4,357.66 (d = .72). The range for the D/CU and HOH/no CU comparison was 6,830.84 to 7,546.92 (d = 1.32). The range for the D/CU and HOH/CU comparison was 12.60 to 1,026.58 (d = .10). Finally, the range for the HOH/CU and HOH/no CU comparison was 6,288.12 to 7,050.46 (d = 1.22).

Table 11

Summary of Pairwise Comparisons for Rankings of Differences in Weekly Earnings Between Degree of Hearing Loss and College and University Training

Source	Factor Means	±	Range	d
Deaf with college: Deaf with no college	16,176.70 – 11,696.49	374.89	4,105.32 to 4,855.10	.82
Hard of hearing with no college: Deaf with no college	11,696.49 – 8,987.82	169.68	2,538.99 to 2,878.35	.50
Hard of hearing with college: Deaf with no college	15,657.11 – 11,696.49	397.04	3,563.58 to 4,357.66	.72
Deaf with college: Hard of hearing with no college	16,176.70 – 8,987.82	358.04	6,830.84 to 7,546.92	1.32
Deaf with college: Hard of hearing with college	16,176.70 – 15,657.11	506.99	12.60 to 1,026.58	.10
Hard of hearing with college: Hard of hearing with no college	15,657.11 – 8,987.82	381.17	6,288.12 to 7,050.46	1.22

All treatment means are statistically different. Deaf consumers who received college and university training as a VR service had the greatest increase in earnings than hard of hearing consumers who also received this service as well as deaf and hard of hearing consumers who did not receive college and university training. Consumers who were hard of hearing and received college and university training had a greater increase in earnings than deaf and hard of hearing consumers who did not receive this service. Finally, hard of hearing consumers who did not receive college and university training had the least increase in earnings than any other group in the analysis.

The current finding supports other studies concluding that benefits of college include enhanced earnings. Brown and Green (1987) found that college graduates earn more than those who did not graduate. Walter et al. (2002) found similar results for deaf and hard of hearing individuals. Finally, Hart et al. (2003) concluded that VR consumers who received college and university training benefited the most in the form of increased earnings.

Hypothesis 5

Do differences in the number of Hours Worked at Closure (HRS) and college and university training (CU) exists between consumers who were successfully closed with different degrees of hearing loss (DHOH)? A rank F test was used to examine the differences in rankings of the change in number of hours worked in a week at closure from the time of application. An ANCOVA analysis was deemed inappropriate for the data after assumptions of the ANCOVA could not be met.

The Kolmogorov-Smirnov test for normality ($D = .325$, $df = 20,560$, $p = .000$) indicated a non-normal distribution of HRS. Normality can also be checked visually with

a histogram (Tabachnick & Fidell, 2001). The histogram supported the test, as more than 10,000 HRS values reflected 40 hours worked at closure. Skewness (-1.325) and kurtosis (2.349) values indicated a peaked curve with HRS values ranging from 0-99. In other words, the majority of consumers were working 40-hour weeks at the time their cases were closed. Tabachnick and Fidell note that, although a violated assumption of ANCOVA, non-normality poses no problems for analysis. Homogeneity of variance was tested with Levene's Test of Equality of Error Variances and indicated non-equal variances between HRS and DHOH ($F = 29.305$, $p = .000$) and between HRS and CU ($F = 105.056$, $p = .000$). The number of hours worked in a week at closure varied unequally between deaf and hard of hearing consumers. A homogeneity of regression test revealed a violation of the assumption ($F = 790.69$, $p = .000$) since the regression lines have different slopes.

A transformation of the dependent variable was required since the assumptions of normality, homogeneity of variance, and homogeneity of regression were not met. For the factor levels D, CU $s_i^2/\mu_i = 2.15$, $s_i/\mu_i = 0.25$, and $s_i/\mu_i^2 = 0.007$. For the factor levels D, no CU $s_i^2/\mu_i = 3.56$, $s_i/\mu_i = 0.33$, and $s_i/\mu_i^2 = 0.01$. For the factor levels HOH, CU $s_i^2/\mu_i = 2.21$, $s_i/\mu_i = 0.24$, and $s_i/\mu_i^2 = 0.007$. For the factor levels HOH, no CU $s_i^2/\mu_i = 3.38$, $s_i/\mu_i = 0.31$, and $s_i/\mu_i^2 = 0.009$. The variance proportional to μ_i of each factor level has the most constancy of the three statistics and was determined the most appropriate simple transformation method. The HRS variable was transformed into a new variable by calculating the sum of the square root of Y and one plus the square root of Y.

The assumptions were retested with HRS, transformed by taking the sum of the square root of HRS and one plus the square root of HRS. The Kolmogorov-Smirnov test (D = .306, df = 20,560, p = .000) indicated non-normality. Homogeneity of variance was tested with Levene's Test of Equality of Error Variances and indicated non-equal variances between the transformed HRS and DHOH (F = 8.37, p = .004) and the transformed HRS and CU (F = 98.27, p = .000) variables. A homogeneity of regression test indicated unequal slopes (F = 659.84, p = .000). As a result, systematic errors in the fit of the two groups of data were present thus rendering the ANCOVA analysis problematic.

Neter et al. (1996) stated that a nonparametric rank F test can be used in replace of ANCOVA when original data and its transformations did not have a normal distribution, equal error variances, and equal regression slopes. A summary of the rank F test can be found in Table 12. Since the nonparametric rank F test uses an ANOVA, the covariate was incorporated into the analysis with a new dependent variable (i.e., DiffHRS). DiffHRS is the difference between HRS and the number of hours worked in a week at application (PREHRS). Cases in which HRS are smaller than the corresponding PREHRS result in a negative DiffHRS value. The DiffHRS values were ranked ascending and ranged from 1-20,560 (M = 10,280.50, SD = 5,561.54). Ranked cases from the D, no CU factor level (n = 5,378, M = 12,053.04, SD = 5,602.22) ranged from 4-20,557.50. Ranked cases from the HOH, no CU factor level (n = 13,453, M = 8,934.26, SD = 5,071.16) ranged from 1-20,559.00. Ranked cases from the D, CU factor level (n = 922, M = 15,484.73, SD = 4,548.41) ranged from 14-20,560. Ranked cases from the HOH, CU factor level (n = 807, M = 14,964.57, SD = 4,751.57) ranged from 14-

20,519.00. Summary statistics include SSTR (83,956,285,680) and SSE (554,249,387,908). Mean statistics include MSTR (27,985,428,560) and MSE (26,962,901). The treatment means were found to be significantly different with a medium effect size, $F(3, 20{,}556) = 1{,}037.92$, $p < .01$, $f = .36$. Therefore, the null hypothesis for the fifth hypothesis was rejected. Rankings on the amount of change in hours worked from the time of application to closure differs for consumers with different degrees of hearing loss who either receive or do not receiving college or university training.

Table 12

Nonparametric Rank F Test Comparing Changes in the Ranks of Differences in Hours Worked for Deaf and Hard of Hearing Consumers in Each of Two Levels of College and University Training

Source	SSTR	SSE	MSTR	MSE	F
Factor Levels:					
Deaf with no college/ university training	16,897,127,722	171,058,225,055	27,985,428,560	26,962,901	1,037.92*
Deaf with college/ university training	24,971,457,121	19,053,664,807			
Hard of hearing with no college/ university training	24,381,707,843	345,940,083,928			
Hard of hearing with college/ university training	17,705,992,994	18,197,414,118			

*$p < .01$.

A Bonferroni pairwise comparison (Neter et al., 1996) was used to test pairs of factor means to determine which pair differs from zero. A summary of the pairwise comparisons can be found in Table 13. Since $g = 4(4 – 1)/2 = 6$ and $B = z(.9992) = 3.14$, the testing limits for the D/CU and D/no CU comparison ranged from 3,431.69 to 4,181.47 ($d = .66$). The range for the D/no CU and HOH/no CU comparison was 2,949.10 to 3,288.46 ($d = .60$). The range for the HOH/CU and D/no CU comparison was 2,514.49 to 3,308.57 ($d = .56$). The range for the D/CU and HOH/no CU comparison was 6,192.43 to 6,908.51 ($d = 1.26$). The range for the D/CU and HOH/CU comparison was 13.17 to 1,027.15 ($d = .10$). Finally, the range for the HOH/CU and HOH/no CU comparison was 5,649.14 to 6,411.48 ($d = 1.16$).

Table 13

Summary of Pairwise Comparisons for Rankings of Differences in Hours Worked Between Degree of Hearing Loss and College and University Training

Source	Factor Means	±	Range	d
Deaf with college: Deaf with no college	15,484.73 – 12,053.04	374.89	3,431.69 to 4,181.47	.66
Hard of hearing with no college: Deaf with no college	12,053.04 – 8,934.26	169.68	2,949.10 to 3,288.46	.60
Hard of hearing with college: Deaf with no college	14,964.57 – 12,053.04	397.04	2,514.49 to 3,308.57	.56
Deaf with college: Hard of hearing with no college	15,484.73 – 8,934.26	358.04	6,192.43 to 6,908.51	1.26
Deaf with college: Hard of hearing with college	15,484.73 – 14,964.57	506.99	13.17 to 1,027.15	.10
Hard of hearing with college: Hard of hearing with no college	14,964.57 – 8,934.26	381.17	5,649.14 to 6,411.48	1.16

All treatment means are statistically different. Deaf consumers who received college and university training as a VR service had the greatest increase in hours worked than hard of hearing consumers who also received this service as well as deaf and hard of hearing consumers who did not receive college and university training. Consumers who were hard of hearing and received college and university training had a greater increase in hours worked than deaf and hard of hearing consumers who did not receive this service. Finally, hard of hearing consumers who did not receive college and university training had the least increase in hours worked than deaf consumers who also did not receive college and university training as well as than deaf and hard of hearing consumers who received college and university training. The finding of the current study does not support nor refute any other study since no other studies were found in which investigators researched the same outcome.

Hypothesis 6

Do differences exist in the type of Closure (CLO) and Amount of Previous Collegiate Experience (PRECO) for consumers with hearing impairments who received college or university training as a VR service? A chi-square test of independence was used to examine if nonchance relationships were evident between two nominal variables.

A summary of the chi-square results is located in Table 14. Estimated frequencies were calculated for the no previous college by not competitively employed cell ($f_e = 828$), the no previous college by competitively employed cell ($f_e = 1{,}186$), the previous college by not competitively employed cell ($f_e = 345$), and the previous college by competitively employed cell ($f_e = 493$). Crosstabs of PRECO and CLO identified observations on the frequency of consumers with no previous college in the not competitively employed (n =

866) and competitively employed (n = 1,148) levels as well as the frequency of consumers with previous college in the not competitively employed (n = 307) and competitively employed (n = 531) levels. Results of the chi-square analysis detected a significant relationship between previous collegiate experience and closure status (χ^2 = 10.08, df = 1, $p < .01$). Therefore, the chi-square null hypothesis of independence was rejected for the sixth hypothesis.

The R value for the previous college/not competitively employed cell (R = –2.05) indicates a contribution to the significant findings. The proportion of deaf and hard of hearing consumers who received college and university training as a VR service and had previous collegiate experience but did not become competitively employed was lower than would be expected by chance.

Since chi-square tests are sensitive to large sample sizes, a measure of association is helpful in understanding the extent the variables are related. A directional measure of association was attempted by lambda; however, the modal frequencies were concentrated in one category of the dependent variable (i.e., competitively employed of CLO) thereby resulting in a zero measure. Strength of association by phi ($\phi = .06$) and a less than small effect size (w = .06) as categorized by Cohen (1988) were identical.

The current finding that consumers with previous collegiate experience tended to not become competitively employed is not supportive of other studies since no other studies were found in which these variables were examined. The finding may be incorporated into Tinto's (1987) theory of persistence as the pre-entry attribute of prior educational experience.

Table 14

Chi-Square Results for Level of Education Attained at Application by Closure Status

Education at Application	Not Competitively Employed		Competitively Employed		Total	
	n	%	n	%	n	%
No previous college	866	30.4	1,148	40.3	2,014	70.6
Previous college	307	10.8	531	18.6	838	29.4
Total	1,173	41.1	1,679	58.9	2,852	100.0

Note. χ^2 (1, n = 2,852) = 10.08; p < .01; phi = .06. w = .06.

Hypothesis 7

The purpose of the seventh hypothesis was to determine if differences exist in the type of Closure (CLO) and Frequency of Disability (TWODIS) for consumers with hearing impairments who received college or university training as a VR service. A chi-square test of independence was used to examine if nonchance relationships were evident between two nominal variables.

A summary of the chi-square results is located in Table 15. Estimated frequencies were calculated for the no secondary disability by not competitively employed cell (f_e = 869), the no secondary disability by competitively employed cell (f_e = 1,244), the secondary disability by not competitively employed cell (f_e = 304), and the secondary disability by competitively employed cell (f_e = 435). Crosstabs of TWODIS and CLO identified observations on the frequency of consumers with no secondary disabilities in the not competitively employed (n = 819) and competitively employed (n = 1,294) levels as well as the frequency of consumers with secondary disabilities in the not competitively employed (n = 354) and competitively employed (n = 385) levels. Results of the chi-square analysis detected a significant relationship between secondary disability and closure status (χ^2 = 18.86, df = 1, $p < .01$). Therefore, the chi-square null hypothesis of independence was rejected for the seventh hypothesis.

The R value for the secondary disability/not competitively employed cell (R = 2.87) and the secondary disability/competitively employed cell (R = –2.40) indicate contributions to the significant findings. The proportion of deaf and hard of hearing consumers who received college and university training as a VR service and had secondary disabilities but did not become competitively employed was higher than would

be expected by chance. In addition, the proportion of deaf and hard of hearing consumers who received college and university training as a VR service and had secondary disabilities and become competitively employed was lower than would be expected by chance.

Since chi-square tests are sensitive to large sample sizes, a measure of association is helpful in understanding the extent the variables are related. A directional measure of association was attempted by lambda; however, the modal frequencies were concentrated in one category of the dependent variable (i.e., competitively employed of CLO) thereby resulting in a zero measure. Strength of association by phi ($\phi = .08$) and a less than small effect size ($w = .08$) as categorized by Cohen (1988) were identical.

Once again, no published literature is available to which the current finding can support that people with secondary disabilities tend to not secure competitive employment after receiving college and university training. The finding may also be incorporated into Tinto's (1987) theory of persistence as the pre-entry attribute of skills and abilities.

Table 15

Chi-Square Results for Secondary Disability by Closure Status

Secondary Disability	Not Competitively Employed		Competitively Employed		Total	
	n	%	n	%	n	%
No	819	28.7	1,294	45.4	2,113	74.1
Yes	354	12.4	385	13.5	739	25.9
Total	1,173	41.1	1,679	58.9	2,852	100.0

Note. χ^2 (1, n = 2,852) = 18.86; p < .01; phi = .08. w = .08.

Chapter 5

DISCUSSION

The purpose of the study was to determine (a) any changes in public assistance, (b) effective VR services, (c) the types of jobs, (d) earnings, (e) the number of hours worked, (f) the impact of previous college experiences, and (g) the impact of secondary disabilities for consumers with hearing impairments in the VR program. As a result, there were seven main findings of the study that have implications for practitioners, rehabilitation counselor educators, and future research.

Hypothesis 1

Do differences in public assistance and college and university training exists between consumers who are successfully closed with different degrees of hearing loss? Deaf consumers who received college and university training as a VR service had greater increases in public assistance than deaf and hard of hearing consumers who did not receive college and university training as a VR service. The results differ from the findings of Gilmore et al. (2001) and Walter et al. (2002) who each found relationships between attending postsecondary education and a reduced demand on public assistance programs. Fewer people with disabilities received SSDI or SSI after receiving postsecondary education as a VR service (Gilmore et al.). Similarly, fewer deaf and hard of hearing collegiate alumni received SSDI or SSI than their peers with hearing impairments that withdrew or did not attend college (Walter et al.). Although reduced demand on public assistance programs was found by Gilmore et al. and Walter et al. by

way of fewer beneficiaries, the current study found that demand on the public assistance programs was intensified with increased payments to beneficiaries.

A plausible explanation exists for the finding that deaf consumers who received college and university training had the greatest increase in combined SSDI and SSI amounts. It is possible that rehabilitation counselors assisted deaf consumers to receive or increase the amount of public assistance to meet the financial demands of college. For example, perhaps a greater proportion of deaf consumers received SSI than SSDI and that a greater proportion of hard of hearing consumers received SSDI than SSI. Since SSI is based on a means-test (Wunderlich et al., 2002), deaf consumers receiving college and university training may have demonstrated economic needs that would result in SSI payments or increasing SSI payments.

Hypothesis 2

Do differences in VR services and closure status for consumers with hearing loss exist, given that these consumers received college or university training as a VR service? Deaf and hard of hearing consumers who received college and university training as a VR service were more likely to become competitively employed when also receiving (a) diagnosis and treatment of impairments, (b) miscellaneous training, (c) job search assistance, (d) job placement assistance, (e) maintenance, (f) rehabilitation technology, and (g) other services. The validating set was used to validate the results of the first sample and did not support diagnosis and treatment of impairments and miscellaneous training as predictors. Job placement services has a long history of being found related to positive outcomes for VR consumers such as African American and Caucasian SSDI recipients with mental retardation (Moore, Alston, Donnell, & Hollis, 2003), recipients of

SSDI and SSI (Rogers, Bishop, & Crystal, 2005), deaf non-Latinos (Moore, 2002b), consumers with mental retardation (Moore et al., 2000; Moore, Feist-Price, & Alston, 2002; Moore et al., 2004), deaf and hard of hearing (Moore, 2001b), and prevocational deaf consumers (Moore, 2002c). Whereas job search assistance prepares consumers in their search for job leads and opportunities, job placement involves referrals to specific jobs that result in job interviews (RSA, 2004a). Therefore, it is not surprising that JSA was found to predict competitive employment in the current study.

The finding that maintenance contributed to the model that predicts competitive employment refutes earlier findings by Moore (2001b) but supports Moore (2001a). Moore (2001b) researched consumers with hearing impairments but did not control for college and university training when reporting that maintenance was not an outcome predictor. Moore (2001a) did find that maintenance was related to closure status for African Americans with mental retardation later that year. The current finding that the predictive model includes other services supports Rogers et al. (2005) who found that other services helped recipients of public assistance programs secure employment.

Perhaps most surprising was that consumers who received rehabilitation technology were 76% more likely to become competitively employed than consumers who did not receive this VR service. In fact, RTECH was second to JPLACE as the most influential variable contributing to competitive employment. Although no previous studies were found in which rehabilitation technology predicts employment for consumers with hearing impairments, this variable played a prominent role in the current study for deaf and hard of hearing consumers who were enrolled in postsecondary program leading to a degree. No knowledge was gained regarding the specific

components of rehabilitation technology, such as rehabilitation engineering, assistive technology devices, or assistive technology services, which may have contributed significantly to the results.

Conversely, deaf and hard of hearing consumers who received college and university training as a VR service were less likely to become competitively employed when also receiving (a) job readiness training, (b) transportation services, and (c) information and referral services. However, the validating set did not support job readiness training as significantly contributing to the predictive model. The results that consumers who received transportation services were 41% less likely to become competitively employed supports other outcome studies involving consumers with hearing loss (Moore, 2001c; Moore, 2002c). Transportation services did not significantly contribute to a predictive model of closure status for deaf and hard of hearing consumers (Moore, 2001c) or a predictive model of income at closure for consumers who were deaf (Moore, 2002c). No previous studies were found in which information and referral services contributes to a model predicting competitive employment.

Reasons for the finding that deaf and hard of hearing consumers who received college and university training as a VR service were more likely to become competitively employed when also receiving (a) job search assistance, (b) job placement assistance, (c) maintenance, (d) rehabilitation technology, and (e) other services could be related to the frequency of each service received and to the purpose of each VR service. A greater percentage of consumers in postsecondary programs leading to a degree received those VR services found related to competitive employment except for rehabilitation technology than did consumers not in programs leading to a degree. Perhaps the VR

services found related to competitive employment are more likely provided to consumers in degreed programs.

The purpose of each VR service might also explain the relationships to competitive employment. Job searching and placement assistance activities, such as obtaining occupational information, facilitating skill development, and job finding, makes rehabilitation counselors effective at helping individuals with disabilities secure competitive employment (Roessler & Rubin, 1998). Therefore, it is possible that consumers who received JSA and JPLACE worked with effective and efficient rehabilitation counselors. Since maintenance involves monetary assistance for food and shelter beyond the normal expenses of the individual (RSA, 2004a), it is reasonable to expect that costs associated with living on-campus would fall under maintenance. Integration into academic and social aspects of college leading to persistence is more likely when students reside on campus (Tinto, 1997) and may explain why receiving maintenance as a VR service was related to obtaining competitive employment.

Rehabilitation technology, in part, targets barriers to education for consumers with disabilities (RSA, 2004a). Consumers could receive (a) engineering services that address communication and hearing problems, (b) technological devices designed to improve functioning, and (c) technological services assisting in the informed choice about various technological devices and their uses. Burgstahler (2002) stated technology, such as the Internet and the World Wide Web, are increasingly being used in higher education for instruction, support services, and communication. Unfortunately, half of surveyed institutions decided not to purchase assistive technology for students with disabilities and cited cost as the primary reason (Michaels et al., 2002; National Center

for Education Statistics, 1999c). Consumers may have become competitively employed because the reception of rehabilitation technology as a VR service removed barriers to education that would not have been removed by the institutions of higher education.

Other services is a catchall category for various VR services such as occupational licenses, tools, supplies, and medical care that cannot be documented under other VR services (RSA, 2004a). Rogers et al. (2005) also found other services to significantly contribute to closure status but limited their discussion on the finding because other services are multi-dimensional and ill defined. Since OTHER is a catchall category, it is difficult to determine the VR service, non-classifiable elsewhere, that contributed to the findings of the current study.

Considering the purpose of each VR service might also explain the finding that deaf and hard of hearing consumers who received college and university training as a VR service were less likely to become competitively employed when also receiving transportation as well as information and referral services. Transportation services involve the provision of travel and payments for related expenses (RSA, 2004a). Examples of transportation services include payments for the travel expenses of personal care attendants, relocation expenses, purchase or repair of vehicles, bus passes, and training in the use of public transportation. Nosek (1992) stated that mobility, such as the use of public transportation, is a key component to living independently and must be managed daily. Perhaps consumers who received transportation services had needs requiring daily interventions that may have also negatively impacted persistence or securing competitive employment. Referrals to agencies outside the VR program are made when services are not available through the VR program (RSA). Mandeville and

Brabham (1992) warn that consumer-counselor relationships may suffer when rehabilitation counselors are not able to participate in referred services. Since the consumer-counselor relationship is an essential component in rehabilitation counseling (Thomas et al., 1992), it is plausible that consumers may have had difficulty obtaining competitive employment after being referred outside the VR program and concurrently experienced harm to their relationships with rehabilitation counselors.

Hypothesis 3

Do differences in occupational type and degree of hearing loss exists? The proportion of deaf consumers who obtained nonprofessional jobs was higher than would be expected by chance but lower for hard of hearing consumers. Also, the proportion of deaf consumers who obtained professional jobs was lower than would be expected by chance but higher for hard of hearing consumers. The results partly support the finding of one study in which 47% of deaf adults were employed in nonprofessional occupations such as food preparation, secretarial and office work, and janitorial (Schildroth et al., 1991). Although Schroedel and Geyer (2000) found 62% of deaf alumni employed in professional occupations versus 39% of hard of hearing alumni, the current study did not control for postsecondary education. Still, the fact that the proportion of consumers receiving college and university training as a VR service favored deaf consumers in the current study, it is reasonable to believe the pattern as identified by Schroedel and Geyer should have impacted the results. However, the results of the current study seem to support the tendency for deaf adults to work in nonprofessional jobs, as also found by Schildroth et al.

A possible explanation exists for the finding that deaf consumers tend to become employed in nonprofessional occupations while those who are hard of hearing tend to secure professional employment. An important reminder is that the descriptor *professional* refers to one of the nine primary occupational categories identified by the U.S. Department of Labor (1991) and is more accurately labeled *professional, technical, and managerial occupations*. Examples of professional occupations include those in engineering, medicine, art, and administration. Examples of nonprofessional occupations include those in information distribution, lodging, forestry, metal processing, printing, wood fabrication, welding, and transportation. Any discussion on the current findings with regard to professional occupations is limited to the parameters set by the design of the study and the U.S. Department of Labor. Schildroth et al. (1991) stated that jobs that pay well and do not require communication with individuals who are hearing are difficult to find for people who are deaf. Therefore, it is plausible that professional jobs tend to require greater communications skills, perhaps to interact with customers, than nonprofessional jobs.

Another potential explanation for the discrepancies in types of jobs obtained for consumers with hearing impairments involves a set of barriers to goal attainment that deaf individuals may experience over a lifetime. People who are deaf may experience a late diagnosis leading to delayed acquisition of language, poor instruction in elementary schools, (Marschark, 1997), a lifetime of alienation by people with hearing (Foster, 1989), and stereotyping by professionals and laypersons (Finisdore, 1984; Finisdore et al., 1986; Happ & Altmaier, 1982; Hoyt et al., 1981; Stewart, 1981). Quite possibly, deaf

consumers of the current study faced more barriers to securing professional employment than did those consumers who were hard of hearing.

Hypothesis 4

Do differences in weekly earnings at closure and college and university training exists between consumers who were successfully closed with different degrees of hearing loss? Deaf consumers who received college and university training as a VR service had the greatest increase in earnings than hard of hearing consumers who also received this service as well as deaf and hard of hearing consumers who did not receive college and university training. Consumers who were hard of hearing and received college and university training had a greater increase in earnings than deaf and hard of hearing consumers who did not receive this service. Finally, hard of hearing consumers who did not receive college and university training had the least increase in earnings than any other group in the analysis. The length of time in academic program was not controlled in the current study; however, the results partly support other findings that deaf college graduates earn more than the deaf non-college graduates (Brown & Green, 1987) and that deaf and hard of hearing alumni with bachelor degrees earned more than those who withdrew from college (Walter et al., 2002). The current findings are also supportive of Hart et al. (2003) who found that consumers who received college and university training had average weekly earnings higher than those of consumers who received business or vocational services, both college or university and business or vocational services, and no postsecondary education services.

Since it is well documented that a benefit of postsecondary education is higher wages, the surprising result is that deaf consumers had the greater increase in wages over

those who were hard of hearing whether or not college and university training was received. Perhaps the reason for the finding in earnings change is that individuals who were deaf earned less than people who were hard of hearing prior to approaching the VR program. A likely scenario would then result in deaf consumers more likely to benefit in the form of changes to earnings than for hard of hearing consumers.

Hypothesis 5

Do differences in the number of hours worked at closure and college and university training exists between consumers who were successfully closed with different degrees of hearing loss? Deaf consumers who received college and university training as a VR service had the greatest increase in hours worked than hard of hearing consumers who also received this service as well as deaf and hard of hearing consumers who did not receive college and university training. Consumers who were hard of hearing and received college and university training had a greater increase in hours worked than deaf and hard of hearing consumers who did not receive this service. Finally, hard of hearing consumers who did not receive college and university training had the least increase in hours worked than any other group in the analysis. The pattern of findings is identical to the pattern of changes in earnings. No prior studies were found in which the investigators found differences in the number of hours worked across degree of hearing loss and between those who did or did not receive college and university training. However, Bullis et al. reported evidence, albeit not statistically significant, in which persons who were deaf worked longer hours than those who were hearing.

Once again, the surprising result is that deaf consumers had the greater increase in hours worked over those who were hard of hearing whether or not college and university

training was received. Perhaps the reason for the finding in the change of hours worked is that individuals who were deaf worked less than people who were hard of hearing prior to approaching the VR program. A similar likely scenario would be that deaf consumers were more likely to benefit in the form of changes to the number of hours worked than the hard of hearing consumers.

Hypothesis 6

Do differences exist in the type of closure and amount of previous collegiate experience for consumers with hearing impairments who received college or university training as a VR service? The proportion of deaf and hard of hearing consumers who received college and university training as a VR service and had previous collegiate experience but did not become competitively employed was lower than would be expected by chance. According to Tinto (1987), prior schooling is a pre-collegiate attribute that allows students to develop the reasons to attend college and create their goals thereby influencing the decision to remain or leave college. Tinto discusses prior schooling in the context of secondary education but the design of the current study considers prior postsecondary education instead. The extent to which the results of the current study support Tinto is unknown because it is easy to credit Tinto's theory whether or not the consumers had previous collegiate experience and whether or not consumers became competitively employed.

A plausible reason exists for the finding that the proportion of deaf and hard of hearing consumers who received college and university training as a VR service and had previous collegiate experience but did not become competitively employed was lower than would be expected by chance. Despite the limitation that Tinto's (1987) theory

applies across either level of PRECOL and CLO, it is possible that consumers who had previous collegiate experience had experiences that positively influenced their decision to persist through postsecondary education during the VR program. The decision to persist may have impacted the outcome of having fewer of their cases closed as not competitively employed. Another possible reason for the finding is that consumers with previous collegiate experience also had a greater totality of postsecondary educational experience that was valued by employers.

Hypothesis 7

Do differences exist in the type of closure and frequency of disability for consumers with hearing impairments who received college or university training as a VR service? The proportion of deaf and hard of hearing consumers who received college and university training as a VR service and had secondary disabilities but did not become competitively employed was higher than would be expected by chance. Also, the proportion of deaf and hard of hearing consumers who received college and university training as a VR service and had secondary disabilities and become competitively employed was lower than would be expected by chance. The results lend some support to Tinto's (1987) theory of persistence. Tinto suggested that attributes acquired prior to entering higher education impacts the student's ability to integrate into postsecondary settings. Unfortunately, students who do not initially adjust to college may decide not to persist with their academic studies. Once again, it is easy to credit Tinto's theory whether or not the consumers had secondary disabilities and whether or not consumers became competitively employed.

A plausible reason exists for the finding that the proportion of consumers with secondary disabilities not becoming competitively employed was higher than would be expected by chance as well as the proportion consumers with secondary disabilities becoming competitively employed was lower than would be expected by chance. Skills and abilities are examples of pre-entry attributes (Tinto, 1987). Lynch (2002) stated that disability could have a negative impact on skills and abilities through limitations to functioning. Despite the limitation that Tinto's theory applies across either level of TWODIS and CLO, it is possible that consumers with secondary disabilities of the current study found it more difficult to adjust to the demands of postsecondary education based on limitations to functioning than did those consumers without secondary disabilities. As a result, additional functional limitations caused by secondary disabilities may have contributed to decisions not to persist and the subsequent outcome of not securing competitive employment.

Implications for Practitioners

Based on the results, several recommendations can be made for practitioners in the state federal vocational rehabilitation program. Several VR services were found to contribute to a model in which deaf and hard of hearing consumers became competitively employed. The primary services contributing were job placement, rehabilitation technology, and job search assistance. Rehabilitation counselors are advised to consider the importance of the contributing services for consumers with hearing impairments who may also be receiving college and university training. Similarly, Roessler and Rubin (1998) suggest rehabilitation counselors view job placement as part of a model set of services for consumers. Since technology changes rapidly and is important to learning

(Rupnow et al., 2001), VR personnel should understand how technology removes barriers to education for consumers with hearing impairments in postsecondary environments. Rehabilitation counselors should also recognize situations that may reflect consumers with hearing impairments who will struggle to persist in college. The study found that transportation services as well as information and referral services were associated with consumers who did not find competitive employment. It is recommended that consumers attending higher education through the VR program and receiving transportation services be monitored for additional services that could help with the management of daily needs. Counselors should also pay attention to the consumer-counselor relationships with consumers who are referred to outside agencies, particularly when these consumers are also receiving college and university training.

Deaf consumers tended to secure nonprofessional occupations while hard of hearing consumers tended to secure professional occupations in the current study. Since it is likely that barriers exists that prevent deaf consumers from achieving professional employment, rehabilitation counselors must have multicultural competencies in order to effectively work in the cultural context of deafness. Multicultural competency involves self-awareness of how attitudes influence consumer behaviors, knowledge of the deaf culture, and being able to demonstrate interpersonal skills, counseling techniques, and intervention strategies to be effective with consumers (Sue, Arredondo, & McDavis, 1992). A recommendation for VR personnel is to ensure rehabilitation counselors have beliefs, knowledge, and skills to work with the cultural characteristics of deaf consumers such as those surrounding impairment, language, education, and alienation.

Consumers who received college and university training had a greater increase in earnings than those who did not receive this VR service. Rehabilitation counselors must be aware of the earnings potential for consumers receiving college and university services. Consumers who received college and university training earned incomes above the poverty level (Gilmore et al., 2001). Conversely, earned incomes at closure were not found to be over the poverty level for consumers who received postsecondary services not leading to a degree as well as for those consumers not receiving postsecondary education. Therefore, VR counselors should explore college and university training with eligible consumers with hearing impairments and determine if such services are warranted, particularly when consumers are trying to earn incomes above the poverty level.

Another finding was that deaf consumers experienced a greater increase in earnings from the time of application to closure regardless if college and university training was received. Counselors should pay attention to the weekly incomes at application for both deaf and hard of hearing consumers. It might be expected that changes in earnings could be greater for deaf consumers than hard of hearing consumers. VR counselors might recall this pattern when counseling consumers as to the potential outcomes from VR services. Although each consumer's needs and situations are unique, rehabilitation counselors should be encouraged to place the earnings goals of the consumers in the context of the results of this study.

Consumers who received college and university training had a greater increase in the number of hours worked than those who did not receive this VR service. Important as it is for rehabilitation counselors to be aware of the earnings potential for consumers

receiving college and university services, it is equally important for counselors to understand the relationship between this VR service and the quantity of time on the job. Therefore, VR counselors should also explore college and university training with eligible consumers with hearing impairments and determine if such services are warranted, particularly when consumers are trying to substantially increase the amount of time they spend at work.

Another finding was that deaf consumers experienced a greater increase in the number of hours worked from the time of application to closure regardless if college and university training was received. Recommendations for counselors are similar to the recommendations for earnings. It might be beneficial for VR counselors to monitor the quantity of hours on the job for consumers with hearing impairments at the time of application so that counselors can place the working expectations of consumers in the context of the results of this study. Rehabilitation counselors are also advised to be aware of any biases that could surface based on the results of the study. For instance, it should not be expected that the number of hours would change slightly for consumers who are hard of hearing from the time of application to closure. Rather, counselors must understand that deaf consumers could experience a larger difference in hours worked but still work fewer hours than hard of hearing consumers at closure.

An interesting finding from this study that has implications for practitioners is that fewer than expected consumers who had experience in higher education prior to applying to the VR program did not secure competitive employment after receiving college and university training as a VR service. The most important factor to persistence is learning (Tinto, 1987) and barriers to learning do exist for deaf and hard of hearing students.

Perhaps rehabilitation counselors should spend extra time and effort ensuring that barriers to learning are identified and then overcome through a variety of interventions. For example, rehabilitation technology was found in this study related to consumers who become competitively employed and may allow consumers with hearing impairments overcome communication barriers in academic and social aspects of postsecondary environments. Counselors should discuss with consumers any strategic planning for success in the classroom, such as to avoid sitting in front since consumers might lack opportunities to interact with their hearing colleagues (Brown & Foster, 1991).

Rehabilitation counselors should not overlook the importance of reading, literacy, and communication skills of the consumers with hearing impairments since these skills are required for success in college (Brown & Foster). Any academic deficits may be improved with a summer preparation program (Bat-Chava et al., 1999). In order to facilitate persistence, rehabilitation counselors could encourage consumers with hearing impairments to interact with faculty on academic matters (English, as cited in Danermark, 1995). Finally, VR counselors should reach out to key disability campus personnel, who may be members of AHEAD, trained to understand the needs of postsecondary students with disabilities.

Consumers with hearing impairments and secondary disabilities tended to not become competitively employed after receiving college and university training. Acquired skills and abilities prior to entering postsecondary environments can influence the decision to persist (Tinto, 1987). Disability, or multiple disabilities, can limit the functioning on these skills and abilities (Lynch, 2002) thereby having a potential negative impact on the decision to persist. All recommendations suggested when deaf and hard of

hearing consumers have previous collegiate experience apply here as well. However, rehabilitation counselors are advised to identify the needs of the consumers based on barriers due to each disability and not just the primary disabling condition used to determine eligibility. Consumers with hearing impairments and other disabilities may require interventions that do more than simply ensure effective communication. Again, VR counselors are encouraged to build rapport and brainstorm solutions not only with consumers but also with disability support staff at postsecondary environments.

Based on the results of this study, recommendations for rehabilitation counselors can be summarized into three broad categories of increasing understanding of the VR program, issues associated with hearing impairments, and the self. First, counselors should understand certain VR services might have particular importance for consumers with hearing impairments especially when these consumers are enrolled in a college degree program. Second, counselors must be culturally aware of Deaf issues as well as issues surrounding people with hearing impairments in order to identify barriers and develop solutions. Third, learning about the self in relation to consumers with hearing impairments might enhance rehabilitation counselors' abilities to put aside biases, develop relationships with consumers, and strengthen competencies to work with a multicultural caseload.

Implications for Rehabilitation Counselor Educators

Recommendations can also be made for educators in the disciplines of rehabilitation counseling in relation to the accreditation standards of the Council on Rehabilitation Education (CORE, 2005). The first recommendation is that educators ensure rehabilitation counseling students are able to synthesize the results of this study

with other supporting and refuting literature as required by CORE standard C.8 (i.e., research and program intervention). Several limitations to this study have been identified and students should understand how these limitations impact the results and generalizations.

Rehabilitation counselor educators may discuss the results the first hypothesis in the context of discussing professional identity with students according to CORE (2005) standard C.1.5. For example, students should be aware of public policy, societal issues, and trends as they relate to deaf and hard of hearing consumers receiving SSDI and SSI and the impact that VR may have on the amount of benefits.

Several VR services were found associated with competitive employment. Educators in rehabilitation counseling can refer to the results of the second hypothesis when facilitating knowledge and skills with students regarding (a) employment and career development, (b) counseling and consultation, (c) assessment, and (d) medical, functional, and environmental aspects of disability (CORE, 2005). Job placement was found related to competitive employment and the CORE standard C.4.14 states that students should be able to apply job placement strategies as part of career development activities. Since consumers provided with INFO tended to not find competitive employment, educators should encourage students to develop and maintain a counseling relationship with deaf and hard of hearing consumers (C.5.2). The results of this study can be used when instructing students on assessment techniques. A CORE requirement is to assess consumers' need for rehabilitation technology (C.7.7). Consumers who received RTECH improved their odds of becoming competitively employed when also enrolled in postsecondary education. Students should be able to identify when RTECH can make a

significant contribution to the outcome. Educators can also assist students to determine the need for assistive technology (C.9.4) so that deaf and hard of hearing consumers can overcome barriers to learning.

Relationships between degree of hearing loss and the type occupation were found in the current study. Rehabilitation counselor educators may discuss the results from the third hypothesis when facilitating knowledge and skills with students regarding (a) professional identity, (b) social and cultural diversity, and (c) rehabilitation services and resources (CORE, 2005). It is possible that deaf consumers tended to secure nonprofessional occupations because of experiencing lifelong barriers unique to individuals who are deaf. CORE standards from professional identity (C.1.1, C.1.4), social and cultural and diversity (C.2.1, C.2.8), and rehabilitation services and resources (C.10.3), in general, require students to apply ethical standards when working with consumers in planning, including consumers from diverse backgrounds. The most pertinent standard of the Code of Professional Ethics for Rehabilitation Counselors (2001) is section A.2 in which practitioners are expected to respect diversity in part by respecting the culture of the consumers. Educators exposing students to Deaf culture may also be indirectly helping Deaf consumers to overcome barriers and secure professional occupations.

Additional relationships were discovered between degree of hearing loss and reception of college and university training with regard to outcome variables such as earnings and the number of hours worked. Rehabilitation counselor educators may discuss the results from the fourth and fifth hypotheses when facilitating knowledge and skills with students on employment and career development (CORE, 2005). For example,

it might be beneficial for students to refer to the results of this study when using labor market information to accomplish vocational planning (C.4.3) with hard of hearing consumers. Also, students might be better able to assist deaf and hard of hearing consumers plan for employment by incorporating the results of this study with any occupational alternatives (C.4.5) for the purposes of identifying jobs with earnings and number of hours required that meet the expectations of the consumers.

The characteristics of consumers found to be related to competitive employment included previous collegiate experience and secondary disabilities. Rehabilitation counselor educators may discuss the results from the sixth and seventh hypotheses when facilitating knowledge and skills with students regarding rehabilitation services and resources (CORE, 2005). In addition, discussions on assessment can also be useful to students when referring to the results for consumers with secondary disabilities. It is possible that consumers with hearing impairments overcame barriers to persisting in higher education that may have contributed to fewer than expected consumers unable to secure competitive employment. Consumers with secondary disabilities might have had additional limitations that contributed to difficulty persisting and the subsequent negative outcome. A CORE standard under rehabilitation services and resources (C.10.8) requires students to develop working relations with other service providers. Educators should have students interact with AHEAD personnel and other disability support staff who provide services for students with disabilities at colleges and universities. Exposure to such personnel would give students knowledge and skills of a critical resource for deaf and hard of hearing consumers in higher education. Another CORE standard under assessment (C.7.10) requires students to apply consumers' assessment data to identify

functional limitations. Rehabilitation counselor educators should ensure students use assessments to determine any limitations that result from both primary and secondary disabilities. The identification of all limitations for consumers with secondary disabilities may result in plans to overcome each identified barrier in postsecondary environments.

Implications for Future Research

Researchers wanting to study similar or related variables or outcomes to this study are advised to first consider suggested directions for follow-up investigations. Based on the methodology used for this study, issues may need to be addressed prior to designing additional research. A first recommendation is to eliminate the limitations, such as restrictions on the types of research questions, which pose threats to internal validity. For example, research questions will not be limited to the variables of a database when researchers sample consumers from the VR program. New questions can be asked that cannot with the database, such as, to what extent does consumer satisfaction relate to other variables? Perhaps duration of services or counselor competence with ASL would have affected the results of this study. Researchers should investigate how the outcomes are affected by duration and competence variables. Second, action is recommended for allowing better generalizations through improved sampling techniques. A criterion-based convenience sample was used for this study; however, a stronger method such as a random sample of an identified population is ideal for generalizing outside the sample. Finally, an unintended finding in this study was the high frequency of consumers who did not receive SSDI or SSI benefits at only one point in the VR process. A nonparametric analysis eventually replaced the parametric analysis. Researchers should place more time in considering how the data will be shaped prior to deciding on statistical analyses.

New research questions are available for investigators bases on the findings of this study. The public assistance program is the first area researchers are suggested to explore. What impact does the type of public assistance have on competitive employment for consumers with hearing impairments? For example, do a greater proportion of deaf consumers receive SSI than hard of hearing consumers? Do a greater proportion of hard of hearing consumers receive SSDI than deaf consumers? Finally, are deaf consumers receiving SSI more likely to become competitively employed than deaf consumers receiving SSDI? A similar question can be asked for hard of hearing consumers.

Several VR services were identified in this study as contributing to a model that predicts competitive employment. A possible explanation for these particular services predicting competitive employment was reduced to the purpose of each service. For example, consumers with hearing impairments who became competitively employed may have worked with efficient rehabilitation counselors, persisted with the assistance of maintenance services, and overcame barriers to education through rehabilitation technology. Qualitative studies that are designed to explore the nature of each service and how consumers with hearing impairments benefit are recommended. What meaning is generated when consumers interact with a particular VR service? What are the effective elements of each VR service? Do patterns exist in service delivery for deaf and hard of hearing consumers?

New questions are developed for future research in the area of the types of occupations for consumers with hearing impairments. What are the communication requirements for a subset of professional and nonprofessional occupations as identified by the U.S. Department of Labor (1991)? Are deaf consumers more likely to become

employed in occupations identified as not requiring communication skills than do hard of hearing consumers? What is the relation between degree of hearing loss and type of occupation according to other resources? How do deaf and hard of hearing consumers identify themselves in their jobs (i.e., professional, nonprofessional)? What specific barriers prevent deaf consumers from securing professional occupations?

Researchers could consider questions for future investigations on the earnings or number of hours worked by consumers with hearing impairments in order to better understand how these variables are related individuals with hearing loss. To what extent do earnings differ for deaf and hard of hearing consumers? How do expectations on earnings differ for consumers with various degrees of hearing loss? How do promotions in the form of increased earnings differ for consumers with hearing impairments up to 5 years on the job? Most of these questions can be reworded inserting number of hours worked in replace of earnings.

New questions surrounding previous collegiate experience could be considered by researchers for future studies. What specific previous postsecondary education experience is associated with the outcome? No control for education at application was implemented in the current study. It is possible that consumers who completed an earlier postsecondary program secured competitive employment but those withdrawing from an earlier program also withdrew in the VR program. Future research should control for education at application. How do consumers describe their collegiate experiences? To what extent do consumers with hearing impairments in the VR program become integrated into the academic and social aspects of postsecondary environments?

Finally, questions should be answered regarding consumers with secondary disabilities receiving college and university training. Are differences in adjustment to higher education evident between consumers with and without secondary disabilities? To what extent are rehabilitation counselors effective in working with consumers with and without secondary disabilities when planning college and university training? Do disability support personnel influence the rate consumers with secondary disabilities become competitively employed? What supports are effective for consumers with hearing impairments and secondary disabilities in postsecondary environments in persisting?

Many useful findings have been generated from this study that impacts the lives of consumers with hearing impairments. For instance, VR services are associated with increases in public assistance, competitive employment, type of occupation, and increases in earnings as well as the number of hours worked. Characteristics of consumers with hearing loss, such as having previous exposure to postsecondary environments and having secondary disabilities, are associated with becoming competitively employed. The information generated from this study is applicable to rehabilitation counselors who work with deaf and hard of hearing consumers. New information is available for educators of graduate students in rehabilitation counseling programs to use when facilitating knowledge and skills. Researchers should be able to replicate or build from this study to further knowledge of the processes that lead to successful rehabilitation outcomes within the VR program. Perhaps most important is that readers have an understanding of how assisting people with hearing loss to become competitively employed improves the practice of the state federal vocational rehabilitation program.

Limitations

Several limitations stem from the use of an archival database set in which variables are predetermined, thereby, limiting control of the variables. Moore (2001b, 2002b, 2004) identified seven limitations to using the RSA 911 database. First, records of successful case closures do not accurately reflect the maintenance of employment beyond the 90-days of work that consumers are required to have prior to considering them competitively employed (Moore, 2001b). The argument is that an extended amount of time on the job may be required for consumers to become independent at work. Second, the database does not indicate the duration of VR services received by the consumers. Therefore, any differences found could be a result of the influence of service duration. Third, measurements of quality of services are not recorded in the database such as consumer satisfaction. Once again, any found differences could be a result of varying quality of services. Fourth, several job placement techniques are available to counselors and the database does not capture the extent that job placement services differ. Instead, the database contains a record of whether job placement services were provided. Fifth, the RSA 911 database does not contain a record of other key variables that may influence outcomes, such as consumers' work history, socioeconomic status, and cultural values (Moore, 2002b). Sixth, reasons for counselors' decision vary and may explain differences in consumer outcomes; however, reasons for VR service delivery is not measured and included in the database (Moore, 2004). Seventh, counselors' competence with sign language and knowledge of Deaf culture is varied and could contribute to VR cases that have not been closed successfully (Moore, 2002b). Counselor competence is not

measured and included in the database. For these reasons as well as other uncontrolled or unknown variables within the study, internal validity may be compromised.

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VITA of DANIEL L. BOUTIN

EDUCATION

Ph.D., Counselor Education, The Pennsylvania State University, University Park, PA, August 2006
M.S., Rehabilitation Counseling, Springfield College, MA, December 1999
B.S., Rehabilitation Services, Springfield College, MA, May 1997

WORK EXPERIENCE (condensed list)

Rehabilitation Consultant, Aetna US Healthcare, Hartford, CT, April 1999 – August 2000
Provided case management services for 100-150 long-term disability claimants. Analyzed medical, vocational, and other information to determine eligibility for rehabilitation services. Consulted with providers, employers, claimants, and in-house personnel. Hired vendors to implement plans. Coordinated the assistance of returning claimants to work.

RESEARCH (condensed list)

Boutin, D. L. (In press). Accessibility considerations in the use of Internet-based counseling for people with disabilities: An ethical perspective for the counseling relationship and professional responsibility. *Journal of the Pennsylvania Counseling Association.*

TEACHING (condensed list)

Co-Instructor, Department of Counselor Education, Counseling Psychology, and Rehabilitation Services, The Pennsylvania State University, PA, January 2006 – May 2006. Served as one of two instructors for teaching REHAB 412: Rehabilitation Facilities and Services in Pennsylvania. This 3-credit undergraduate course is designed to acquaint advanced undergraduate Rehabilitation Services students with human service networks. Students develop a professional awareness of service organizations, their structures, objectives, services, personnel, procedures, and challenges.

PROFESSIONAL ASSOCIATION SERVICE (condensed list)

National Association of the Deaf, Consumer Advisory Committee, summer 1998. Rewrote aspects of the Americans with Disabilities Act into clear and understandable language for Deaf consumers.

CERTIFICATIONS AND LICENSES

Licensed Professional Counselor, Commonwealth of Pennsylvania
Licensed Rehabilitation Counselor, Commonwealth of Massachusetts
Certified Disability Management Specialist
Certified Rehabilitation Counselor
National Certified Counselor

PROFESSIONAL MEMBERSHIPS (condensed list)

National Council on Rehabilitation Education
National Rehabilitation Association