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A Comparison of the Rehabilitation Outcomes of Persons who are Deaf and Hard-of-Hearing and Persons with Other Disabilities

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Abstract

The purpose of this study was to evaluate the rates of closure success (i.e., status 26) and level of income (i.e., weekly earnings at closure) for consumers with hearing loss (i.e., deaf and hard-of-hearing) and consumers with other disabilities. A random sample of case records (N=34,911) obtained from the RSA 911 database for fiscal year 1997 was evaluated. A series of logistic and multiple linear regression analysis, chi-square analysis, and t-tests were utilized to investigate potential relationships. Results indicated that consumers with hearing loss achieved closure success more often, and possessed higher levels of income when compared to consumers with other disabilities; and a significantly lower proportion of those services found to be significantly associated with closure success (i.e., restoration) and income (i.e., business and vocational training) were provided to consumers with other disabilities. Results are presented for each criterion variable, and the implications of findings for service and research are discussed.

Introduction

Approximately 8.6% of the U.S. population (between 21 and 28 million Americans) possesses some type of hearing loss (Ries, 1994). Among the approximately 21 million Americans with hearing loss, it is estimated that 1.7 million are deaf and 19.3 million are hard-of-hearing (Bureau of the Census, 1995). Given this rate of incidence, hearing loss is considered to be the most prevalent, chronic, disabling condition in the U.S. today (Schein, 1996; U.S. Commission on Civil Rights, 1998). Deafness is defined as a hearing impairment of such severity, the individual must depend primarily upon visual communication such as writing, lip reading, manual communication, and gestures (RSA Manual, 1995). Hard-of-hearing is defined as a hearing impairment resulting in a functional loss, but not to the extent that persons have to depend upon visual communication (RSA Manual, 1995).

Estimates of the total numbers of Americans with disabilities vary, and therefore make efforts to postulate percentages for persons with other disabilities (i.e., not including persons with hearing loss) difficult if not impossible. For example, the National Council on Disability (NCD) Bulletin (1997) identified 54 million Americans with disabilities between October 1994 and January 1996. Conversely, based on data from the 1990 National Health Interview Survey, the Disability Statistics Rehabilitation Research and Training Center proposed a figure of 36.1 million, or 14.5% of the total population (LaPlante, 1992). Nevertheless, the state/federal Vocational Rehabilitation (VR) program has remained pro-active in attempting to address the VR service needs of all persons with disabilities. To this end, the rehabilitation outcomes (i.e., closure success, and income) for persons who are deaf and hard-of-hearing, and all other persons with disabilities have been a key focus of current research.

Several studies (i.e., Bolton, 1975; Lafitte, 1978; Moore, 2001a, 2001b, in press-a, in press-b, in press-c; Moore & Schroedel, 2000; Watson, 1972)

have investigated the relationship between consumer characteristics and the rehabilitation outcomes for persons with hearing loss. For example, Moore (2001a) reported that a higher proportion of Caucasians with hearing loss achieved closure success when compared to racial and ethnic members of under-represented groups (i.e., African Americans, Native Americans, and Asian Americans) with hearing loss. Moore (2001b) reported that deaf VR consumers were more likely to be placed into competitive jobs when compared to late-deafened and hard-of-hearing consumers. Moore (in press-a) found that female's consumers who were deaf achieved significantly lower levels of income when compared to male consumers who were deaf. The practical intent of these studies was to provide counselors with a proactive screening profile to identify applicants with hearing loss with potentially higher probabilities of successful rehabilitation to more effectively plan provision of services.

Studies have evaluated the relationship between such consumer characteristics and rehabilitation outcomes among persons with hearing loss. However, there exist relatively little applied empirical research that has compared the rates of closure success between persons with hearing loss (i.e., deaf, late-deafened and hard-of-hearing) and consumers with other disabilities (i.e., visual impairments, orthopedic impairments, substance abuse, cancer, amputees, etc). Moreover, few studies have compared the rates in which these target groups (i.e., consumers with hearing loss and consumers with other disabilities) are provided with specific VR services. One might hypothesize that many consumers who fail to achieve closure success (closure status 26) and higher levels of income may have not received all the services needed to achieve those outcomes. As services are a function of need, results from the current study could provide better data to identify, plan, and evaluate a more effective service delivery package for persons with hearing loss.

The purpose of this study was to investigate the relationship between type of disability (i.e., hearing loss or other disabilities), and those VR services found to be significantly related to consumer outcomes. The following research questions were addressed: a) Do consumers who are deaf and hard-of-hearing achieve closure success at a significantly greater rate when compared to consumers with other disabilities?, b) Do consumers who are deaf and hard-of-hearing earn a significantly higher amount income when compared to persons with other disabilities ?, c) Are assessment, restoration, college/university, business/vocational, adjustment, on-the-job training, counseling, job finding services, job placement, transportation, and maintenance associated with closure success?, and d) Are assessment, restoration, college/university, business/vocational, adjustment, on-the-job training, counseling, job finding services, job placement, transportation, and maintenance positively associated with higher levels of income?

Method

Sample

In order to derive data specific to persons with hearing loss, (i.e., deaf and hard-of-hearing), all consumers reported as having a primary hearing

loss were included in the sample. All other cases were identified as representing those consumers with other disabilities. The population for this study was all 20,355 (5.9%) consumers with primary hearing loss and 327,367 (94.1%) persons with other disabilities closed by the VR system (nationally) in statuses 26 and 28 during the fiscal year 1997 (Oct 1, 1996 through Sept 30, 1997). A random sampling technique yielded 2,057 consumers with hearing loss and 32,854 consumers with other disabilities for analysis.

Data Collection
This study utilized data obtained from individual client closure reports, RSA-911 national data tape, provided by the Rehabilitation Services Administration. The RSA-911 data tape was designed to maintain consumer information (i.e., socio-demographic characteristics, VR services received, and outcomes achieved). These client closure reports include a section for primary disability (type of hearing loss), consumer characteristics, service variables, and outcome variables.

The state/federal VR program has developed a national standard for client outcome that includes the following two categories: ?rehabilitated? (closure status 26) or ?not rehabilitated? (closure status 28 or 30) (RSA, Manual, 1995). Closure status 26 indicates that a client has been suitably employed for a minimum of 90 days (RSA Manual, 1995). Closure status 28 indicates that a client was closed not rehabilitated after the individualized plan for employment (IPE) was implemented (RSA Manual, 1995).

Data Analysis
Four different tests of statistical significance were utilized in the current study: logistic regression analysis, multiple linear regression analysis, chi-square analysis, and t-tests. Based upon Cohen and Cohen's (1983) approach, logistic regression was the most appropriate analysis for evaluating the linear relationship between two or more predictor variables (e.g., type of disability, and VR services) and a dichotomous dependent variable (e.g., closure status). Multiple linear regression analysis was selected as the most appropriate for evaluating the relationship between any two or more predictor variables (e.g., type of disability, and VR services) and an interval criterion variable (e.g., income). Chi-square analysis is appropriate for evaluating dichotomous independent and dependent variables (Huck & Cormier, 1996). Finally, t-tests are appropriate for evaluating the mean differences between two groups (Saxon, Alston, & Hobert, 1994).

First, a logistic regression analysis evaluated the linear relationship between type of disability, VR services and closure status. Second, a multiple linear regression analysis evaluated the relationship between type of disability, VR services and weekly earnings (status 26 closures only). Third, a series of chi-square tests evaluated the proportions of significant VR services received by consumers with hearing loss and consumers with other disabilities (i.e., visual impairments, orthopedic impairments, substance abuse, cancer, amputees, etc).

Last, the relationship between type of disability and closure status, and type of disability and weekly earnings were evaluated while controlling for the "no" level of those VR services found to be significantly associated with successful closure and weekly earnings. That is, only those consumers who had received the VR service that was found to be significant were included in the final series of analysis. Those consumers who had not received the significant VR service were eliminated from the sample. Thus, in this study, the researcher was able to examine two-way interactions among: a) type of disability, closure status, and VR services, (chi-square) and b) type of disability, income, and VR services (t-test) while controlling for those who "did not" receive those significant VR services. The Statistical Package for the Social Sciences, logistic regression, multiple linear regression, chi-square, and t-test procedures (SPSS, 1989), were used in these calculations.

Results

Participation Rates

For the period under study (i.e., October 1, 1996 to September 30, 1997), the sample consisted of 2,057 consumers with hearing loss (deaf, late deafened, and hard-of-hearing), and 32,854 consumers with other disabilities. Combining these two groups indicated that consumers with hearing loss represented 5.9% of the total sample. The sample consisted of 55.5% of men. Caucasians represented an overwhelming majority (77.4%) of these consumers. This sample was composed of 20.3% African-Americans, .8% American-Indians, and 1.5% Asian-Americans. A small percentage of consumers received restoration, college/university training, business/vocational school, adjustment, on-the-job training, and maintenance.

Closure Status Comparisons

An analysis of the available data revealed that 21,342 of the 34,911 participants (61.1%) were successfully closed following VR intervention. First, the distributions of the predictor variables were examined. Ideally, those variables should exhibit a 50%-50% split or distribution. Although distributions of 80%-20% are appropriate for logistic regression analysis, variables with distributions greater than 80%-20% (e.g., 95%-5%) should be excluded from the procedure (Cohen & Cohen, 1983). No predictor variables were excluded based on this criterion.

Second, 2 X 2 cross tabulations between type of disability (i.e., hearing loss or general disability) and closure status, and each VR service variable and closure status were examined visually to determine the relationship (if any) among each of the variables (see Table 1). For example, if the percentage of consumers who received restoration services placed in status 26 was different from the percentage of those who did not receive this service, the restoration service variable would be retained as a variable that might shed light on closure status. If an equal percentage of consumers who received restoration and who did not receive restoration were successfully rehabilitated, this variable would not help in evaluating differences. As a general rule, differences of more than 5% on the independent variables for

each level of the dependent variable were considered for further analysis (Bullis, Davis, Bull, & Johnson, 1995). Because they did not meet this criterion, six variables were dropped at this point: assessment, college/university training, business/vocational training, adjustment, transportation, and maintenance.

Table 1. Comparison of Successful and Unsuccessful Closure Types across Demographic and Service Variables

Variables	Successful (n=21,342)	Unsuccessful (n=13,569)
Type of Disability		
(1) Hearing Loss	74.3	25.7
(0) Other Disabilities	60.3	39.7
Assessment		
(1) Yes	61.2	38.8
(0) No	60.7	39.3
Restoration		
(1) Yes	67.2	32.8
(0) No	58.8	41.2
College/University		
(1) Yes	60.2	39.8
(0) No	61.3	38.7
Business/Vocational		
(1) Yes	61.9	38.1
(0) No	61.0	39.0
Adjustment		
(1) Yes	63.4	36.6
(0) No	60.6	39.4
On-the-Job Training		
(1) Yes	68.5	31.5
(0) No	60.4	39.6
Counseling		
(1)Yes	62.3	37.7
(0) No	56.0	44.0
Job Finding		
(1) Yes	74.3	25.7
(0) No	52.4	47.6
Job Placement		
(1) Yes	77.7	22.3
(0) No	53.1	46.9
Transportation		
(1) Yes	60.1	39.9
(0) No	61.6	38.4
Maintenance		
(0) Yes	63.0	37.0
(1) No	60.7	39.3

Note. Values in closure type cells are percentages.

Third, phi correlations among the five predictor variables were calculated, as were correlations between the predictor variables and the criterion variable. Intercorrelation among these variables ranged from .02 to .84. The correlation coefficient for job placement and job finding services (r=.84) indicated that multicollinearity was an issue. Therefore, the job finding service variables was dropped from further analysis. Intercorrlelations among the remaining predictor variables, ranging from .02 to .15, were sufficiently low to conclude that multicollinearity was no longer an issue. Correlations among the predictor variables and the criterion variable ranged from .06 to .23.

Fourth, a logistic regression analysis investigated the linear relationship between type of disability, restoration, on-the-job training, counseling, job placement and closure status. Of the five retained predictor variables entered into the logistic regression, type of disability (p<.001, r^2=.01), restoration (p<.001, r^2=.01), and job placement (p<.001, r^2=.04) were significant predictors of closure success (see Table 2). Although partial correlations for type of disability, restoration, and job placement appear to be minimal in statistical terms, small effect sizes can be important (Prentice & Miller, 1992).These results suggest that consumers with hearing loss and those provided with restoration and job placement services are more likely to be successfully closed.

Table 2. Results of Logistic Regression Analysis (n=34,911)

Variables	B	SE	R^2	P
Type of Disability	.59	.05	.01	.000*
Restoration	.44	.03	.01	.000*
On-the-Job Training	.21	.04	.00	.001
Counseling	.07	.03	.00	.998
Job Placement	1.1	.03	.04	.000*

* p<.001;denotes statistical significance

Fifth, a series of chi-square analysis were conducted between the type of disability variable, and restoration and job placement. There were significant type of disability main effects for restoration. Chi-square analysis revealed a significant association between type of disability and restoration (χ^2=739.14, df=1, p<.001). That is, consumers with hearing loss appear to have been provided with restoration services at a significantly higher proportion when compared to consumers with other disabilities. Last, the researcher examined two-way interactions among type of disability, closure status, and restoration. Interaction models were created by separating the group that received restoration from the group that did not receive the restoration service. Subsequent chi-square analyses were conducted in order to evaluate the relationship between type of disability and closure success for consumers provided with restoration services. Thus, interactions were interpreted by comparing the contingency table cells (chi-square) for type of disability and closure status only for those consumers who were provided with the restoration service. The researcher identified two-way interactions for further analysis: type of disability by restoration.

Type of disability by restoration interaction effects indicated that when compared to consumers with other disabilities, a significantly higher proportion of persons with hearing loss who received restoration (χ^2=110.73, df=1, p<.001) achieved closure success.

Income

A multiple linear regression analysis investigated the relationship between the type of disability and income, and VR services and income (status 26 closures only). First, mean comparisons between each predictor variable (i.e., consumer characteristics and VR services) and income were examined visually to determine the relationship (if any) among each variable. Only those cases with higher levels of income for persons who received the services when compared to the level of earnings for those who did not receive the services were considered for further analysis. Because they did not meet this criterion, four variables were not evaluated using multiple linear regression analysis: adjustment, on-the-job training, job finding services, and job placement.

Second, phi correlations among the nine predictor variables were calculated, as were correlations between the predictor variables and the criterion variable. Intercorrelations among the predictor variables ranged from .02 to .27. Intercorrlelations among the variables were sufficiently low to conclude that multicollinearity among the remaining predictor variables was no longer a concern. Correlations among the predictor variables and the criterion variable ranged from .00 to .13. Assessment (r=.004, p=.45) did not exhibit an alpha level of .05 with the predictor variable (Hosmer & Lemeshow, 1989), so it was dropped from further analysis.

Third, a multiple linear regression analysis investigated the linear relationship between type of disability, restoration, college/university training, business/vocational training, counseling, transportation, maintenance and level of income. Of the seven retained predictor variables entered into the multiple regression equation, three were significant predictors for income: type of disability (p<.001, r^2=.01), college/university training (p<.001, r^2=.04), and business and vocational training (p<.001, r^2=.01) (see Table 3). That is, consumers with hearing loss and those provided with college and university training, and business and vocational training appear to achieve significantly higher levels of weekly earnings.

Table 3. Results of Multiple Linear Regression Analysis (status 26 closures only: n=21,340)

Variables	B	t	R^2	P
Type of Disability	.07	9.55	.01	.000*
Restoration	.01	1.64	.00	.068
College/University	.20	29.11	.04	.000*
Business/Vocational	.08	11.83	.01	.000*
Counseling	.02	4.28	.00	.001
Transportation	.04	6.21	.00	.001
Maintenance	.04	4.93	.00	.001

*p<.001; denotes statistical significance

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Fourth, c hi-square analysis were ran between the type of disability variable and those VR services (i.e., college/university, and business/vocational training) found to be significantly associated with weekly earnings. Chi-square analysis revealed a significant association between type of disability and business and vocational training (χ^2=46.38, $\underline{df}$=1, $\underline{p}$<.001). That is, consumers with hearing loss appear to have been provided with business and vocational training at a significantly higher proportion when compared to consumers with other disabilities.

Last, the researcher examined two-way interactions among type of disability, weekly earnings, and business and vocational training. Interaction models were created by separating the group that received restoration from the group that did not receive the service. A $\underline{t}$-test evaluating the relationship between type of disability and level of income for those consumers provided with restoration services was then conducted. Thus, interactions were interpreted by comparing the average level of income of consumers with hearing loss and consumers with other disabilities ($\underline{t}$-test) only for those consumers who were provided with the business and vocational training. The researcher identified two-way interactions for further analysis: type of disability by business and vocational training. $\underline{T}$- tests yielded no significant difference in the average level of income between the two groups.

Discussion

The researcher believes that the findings presented in this article should be interpreted in light of four measurement validity shortcomings. First, when referring to the aggregate group of persons with other disabilities, it should be recognized that the diversity of the consumers within this pool might pose problems in correctly interpreting the implications of some findings in the current study. Thus, the reader should use caution when attempting to compare consumers with hearing loss against consumers with other disabilities. Second, since the 26 closure status is established at the point in which a client has maintained employment for 90 days, the client's success in retaining employment beyond 90 days is unknown. It is possible that findings might not indicate a statistically significant relationship between type of disability and closure success if the study evaluated the maintenance of employment after 120 days.

Third, there are no data that represent the exact amount or form (e.g., duration) of each service provided to a consumer. Therefore, one must be sensitive to the possibility that a non-significant relationship between type of disability and significant VR services as they relate to closure status in the current study could be misleading, and result in a Type II error (i.e., accept a false null hypothesis)(Saxon, Alston, & Holbert, 1994). That is, a finding of non-significance between those VR services relating to closure status (i.e., restoration and job placement) and type of disability might be a finding of significance if the researcher could have controlled for duration of VR service.

Last, the absence of a valid measure of the quality of each service provided is also potentially problematic for generalizing the findings. One

has no way of knowing if those clients who received a particular service and who achieved successful rehabilitation received a better quality of service than those who received the same service but were not successfully rehabilitated. Bearing these points in mind, the researcher discusses the results for closure status and level of income.

Type of Disability and VR Services

Of those VR services that were found to be significantly associated with closure success and weekly earnings, consumers with hearing loss received restoration, and business and vocational training at significantly greater proportion t han d id c onsumers w ith o ther d isabilities. R easons f or t he significantly higher proportions of consumers with hearing loss achieving closure success and higher levels of income could in fact relate the specific nature of the VR services they more often receive.

Restoration refers to those medical and medically-related services which are necessary to correct or substantially modify a physical or mental condition (RSA Manual, 1995). Examples of restoration services are surgery, therapy, treatment, and hospitalization. Such services improve or maintain an individual's ability to function. As such, those consumers who function on a higher level, due to the provision of restorative services, therefore may be more likely to succeed. The current findings suggest that consumers with hearing loss receive restoration services at a significantly greater proportion than do consumers with other disabilities. It might be postulated that the lower proportions of restoration services provided to consumers with other disabilities impact their rate of closure success.

One could argue that consumers with hearing loss are provided with restoration services at a greater proportion because there is a greater need. That is, consumers with hearing loss may require restoration services (i.e., cochlear implants, hearing aid, assistive listening device) at a greater rate due to the distinctiveness of hearing loss. Particularly for consumers who are hard-of-hearing with workforce experience, short term rehabilitation intervention (i.e., restoration services) may be all that is needed to overcome the manifested functional limitations of post-vocational hearing loss.

However, a similar argument can be made about the need for restoration services among certain disability groups (i.e., visual impairments, mental and emotional conditions, cardiac conditions, respiratory conditions) that comprise the other disabilities sub-sample. For example, consumers with visual impairments, because of the nature of the disability may require cataract surgery more often than consumers with hearing loss. Consumers with mental and emotional conditions may require therapy more often than consumers with hearing loss. Consumers with cardiac and respiratory conditions may require surgery in order to overcome functional limitations more often than consumers with hearing loss. Thus, the need for specific types of restoration services among consumers with other disabilities could be equal to that of consumers with hearing loss.

Business and vocational training is defined as training in a) a business/commercial school or college or b) a vocational/trade school (RSA

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Manual, 1995). Training in a business/commercial school or college is geared toward preparing the individual for work in areas of office practice, typing, word processing accounting, data processing, etc. Considering that such individuals are being given the skills to enter into one of these many areas of work, it is not surprising that consumers provided with these opportunities possess higher levels of weekly earnings compared to those who do not receive this service. Those consumers who are more skilled, via training or work experiences, may be more likely to obtain higher paying jobs. For those individuals who have not received training in these areas, their lack of skills may impact negatively on average level of income. In the current study, consumers who are deaf and hard-of-hearing possess significantly higher levels of income than do consumers with other disabilities. One plausible explanation for this finding might be that consumers who are deaf and hard-of-hearing are provided with a significantly greater proportion of business/vocational training.

Conclusions

The findings of the current study point out that consumers with hearing loss are more likely to achieve closure success and higher levels of income when compared to consumers with other disabilities. Findings also indicate that a significantly lower proportion of those services found to be significantly associated with closure success (i.e., restoration) and income (i.e., business and vocational training) were provided to consumers with other disabilities compared to consumers who were deaf and hard-of-hearing. Finally, findings based on two- way interactions suggest that although restoration was found to be significantly related to closure success, other factors (e.g., quality of services) could impact outcome.

With these findings in mind, the researcher discusses the following three implications for current practice. First, the results of this study could serve as an explanation for the significantly lower numbers of consumers with non-hearing related primary disabilities (i.e., other disabilities) achieving closure success and higher levels of income. It appears that consumers with non-hearing related primary disabilities are not receiving the same types of services (i.e., restoration, and business/vocational training) as consumers who are deaf and hard-of-hearing. Rehabilitation counselors should be encouraged to identify additional consumers with non-hearing rela ted primary d isabilities w ho c ould m ost b enefit f rom restoration services and business and vocational training.

Second, the results of the current study (two-way interactions) suggest that even for consumers who receive restoration services, consumers with non-hearing related primary disabilities continue to achieve closure success at a significantly lower proportion. This finding suggest that other factors, such as the lack of specialized VR service personnel, could be attributing to this phenomena. Many consumers who are deaf and hard-of-hearing are served by specialized rehabilitation counselors for the deaf (RCDs). RCDs are aware of those issues, theories, and techniques that impact the rehabilitation outcomes for persons who are deaf a nd h ard-of-hearing. Thus, general rehabilitation practitioners might want to stay abreast of

those current issues, theories, and techniques that impact the vocational prognosis for individuals belonging to specific disability groups (i.e., visual impairments, orthopedic impairments, mental retardation, mental illness, traumatic brain injury, etc.).

Third, graduate rehabilitation counseling education programs (RCEs), particularly those with an emphasis on hearing loss, may wish to infuse such findings into their graduate curriculum which focus on VR services. For example, the results of the current study suggest that restoration and job placement are positively associated with closure success. Further, these results suggest that college and university training, and business and vocational training are positively associated with higher wages. As such, RCE programs might consider requiring that restoration, job placement, college and university training, business and vocational training, and other effective VR services be a major focus. This action may enhance the graduate's understanding that the provision of restoration, job placement, college and university training, and vocational and business training (and other VR services) for VR consumers should be considered a priority.

Future Research

Future research may warrant the use of data collection procedures that include face to face personal interviews with consumers rather than an archival study. These data collection methods may limit the aforementioned plausible threats to the internal validity of the current study. Further, an extension to the 90 day maintenance of employment for successful rehabilitation could also be implemented. As such, future research questions that may be addressed are: (a) is duration of reception of VR services significantly associated with rehabilitation outcomes as measured by closure status and weekly earnings? and (b) is quality of VR services significantly associated with rehabilitation outcome as measured by closure status and weekly earnings?

This study represents merely one look at this complex issue of employment maintenance and wages. The researcher hopes that these findings will be used to focus and guide service delivery efforts and prompt other research. It will only be through coordinated service delivery and research efforts that professionals can learn how best to promote a meaningful VR service process experience to all persons with disabilities.

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