

October 2019

## Factors Contributing to Successful Rehabilitation of Deaf Clients

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### Recommended Citation

Bolton, B. (2019). Factors Contributing to Successful Rehabilitation of Deaf Clients. *JADARA*, 9(2). Retrieved from <https://repository.wcsu.edu/jadara/vol9/iss2/8>

# FACTORS CONTRIBUTING TO SUCCESSFUL REHABILITATION OF DEAF CLIENTS

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Brian Bolton, Ph.D.

## OVERVIEW

The purpose of this report is to present the results of statistical analyses of client data (biographic, psychometric, and service parameters) and rehabilitation outcome for three samples of deaf clients. The statistical procedures used were: (1) factor analysis, and (2) multiple regression analysis. The various analyses were performed to facilitate understanding of the rehabilitation process by determining which combinations of predictor variables explain the variability in client outcomes.

## METHOD

*Samples.* Three samples of deaf clients drawn from the service populations of two five-year R&D projects were used in this study (Bolton, 1974; Chicago Jewish Vocational Service, 1974). The three samples, which are described in Table 1, are as follows:

- (1) 76 clients of the Hot Springs Rehabilitation Center (HSRC) Project.
- (2) 83 clients of the Chicago Jewish Vocational Service (CJVS) Project.
- (3) 92 clients of the Chicago Project.

The 76 clients of the Hot Springs Project (referred to here-after as the HSRC sample) were all enrolled in a work evaluation — vocational training service sequence. The 83 client sample from the Chicago Project (referred to hereafter as the CJVS-WA sample) is comprised of clients who were enrolled in a comprehensive work adjustment — counseling service program. The 92-client sample from the Chicago Project (referred to hereafter as the CJVS-C sample) is comprised of clients who received vocational counseling and job placement services or were selected for a preparatory program for post office employment.

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**TABLE 1**  
**DESCRIPTIONS OF THREE SAMPLES OF DEAF CLIENTS**

	<u>HSRC</u>	<u>CJVS-WA</u>	<u>CJVS-C</u>
1. Sex	Two-thirds male.	One-half male.	One-half male.
2. Age	Two-thirds less than 21.	Two-thirds between 16 and 19	Two-thirds between 16 and 22
3. Race	One-fifth black.	Two-thirds black.	One-third black.
4. Marital Status	97% single.	95% single.	80% single.
5. School	85% state residential.	20% state residential.	28% state residential.
6. Previous work experience	Two-thirds had	NA*	NA*
7. Communication Skills	Oral: poor Manual: fair	Oral: poor Manual: fair	Oral: poor Manual: above average.
8. Performance IQ	Mean of 94.	Mean of 88.	Mean of 101.
9. Reading Comprehension	Third grade.	Third grade.	Fourth grade.
10. Employed after program	66%	29%	54%

\* Not available.

The generalizability of the results of the statistical analyses reported below may be limited to specifically defined populations. The basis for this caution (looking ahead to the results) is that different combinations of predictor variables were effective for the three samples. From Table 1 the major differences among the samples are seen to be:

- (1) HSRC contains more males, more whites, and more clients from state residential schools.
- (2) CJVS-WA contains more blacks, fewer clients from residential schools, less intelligent clients, and fewer clients who achieved employment after rehabilitation services.

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- (3) CJVS-C contains more older clients, more married clients, and more intelligent clients.

*Variables.* The variables available for the three samples can be categorized under four headings:

- (1) Biographic: sex, age, race, etc.
- (2) Psychometric: intelligence and achievement tests, rated communication skills, etc.
- (3) Service: received tutoring, completion of training, length of program, etc.
- (4) Outcome: employment at follow-up.

Many of the variables measured in the Hot Springs Project were measured in identical or similar form in the Chicago Project. However, several variables or tests were unique to one Project. The psychometric variables were reduced to a few basic dimensions by factor analysis in an attempt to minimize variable-specific conclusions.

*Procedures.* The first step in the statistical analysis was to factor analyze the psychometric variables comprising the "communication — nonverbal ability domain." Two factor analyses, one for the HSRC sample and one for the CJVS samples combined, were completed using Kaiser's recently developed Little Jiffy Mark III (Kaiser, 1970). A comparative study of LJIII and three other rotational procedures by the author (Bolton, 1973b) demonstrated that LJIII produces superior solutions for rehabilitation data sets.

The second step in the statistical treatment was the completion of several sequential multiple regression analyses for each of the three samples. The general procedure, which was suggested by Cohen (1968) and illustrated by Neff and Kultov (1967) and Neff, Novick, and Stern (1968), requires that the predictor variables be placed into sets according to the time at which the data becomes available, e.g., biographic data is available prior to intake, psychometric data is available after initial testing, etc. Then the sequence of multiple regression analyses provides estimates of the degree of predictability of client outcome at any point in the rehabilitation process.

## **RESULTS AND DISCUSSION**

*Factor Analyses.* Twenty variables which sampled the "communication - nonverbal ability domain" were analyzed for the HSRC sample. The 20 variables included four communication ratings, five WAIS Performance Scale subtests, seven Stanford Achievement Test (SAT) subtests, and four Purdue Pegboard (PP) subtests. LJIII reduced the 20 variables to five major dimensions of functioning:

- I. Basic Educational Skills (arithmetic and spelling).
- II. Reading Comprehension (word and paragraph meaning).
- III. Psychomotor Skill (Purdue subtests).
- IV. Nonverbal Reasoning (WAIS subtests).
- V. Communication Skills (manual and overall ability).

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The results of this analysis differ from a previously reported factor analysis of HSRC data (Bolton, 1972) in that (1) the oral communication skills (speech and speechreading) did not define a separate factor, and (2) the achievement test subtests produced two (highly correlated) factors. In general, the results are consistent with factor analytic studies of deaf subjects (Bolton, 1971b): language and communication factors are independent of intelligence.

The 26 variables which were analyzed for the combined CJVS samples included ten communication ratings, five Ravens Progressive Matrices (RPMT) subtests, six Revised Beta (RB) subtests, the Minnesota Paper Form Board total score, and four Purdue Pegboard subtests. LJIII reduced the 26 variable set to five dimensions of functioning:

- I. Manual Communication (manual signs and fingerspelling.).
- II. Nonverbal Reasoning (RPMT and RB subtests).
- III. Oral-verbal Communication (speech, speechreading, reading, and writing).
- IV. Psychomotor Skill (Purdue subtests).
- V. Residual Hearing (residual hearing and speech).

The results of this analysis represent a slight refinement of the factor analysis of CJVS data previously reported (Bolton, 1971a) in that residual hearing emerged as a separate (but highly correlated) factor from Oral-Verbal Communication.

The delineation of three communication skill factors for the CJVS sample, as opposed to one for the HSRC sample, reflects the use of a relatively sophisticated communication rating form in the Chicago Project. The form, together with norm data, is reproduced in a monograph by Bolton (1973a). Two factors identified in each of the two analyses are very similar: Nonverbal Reasoning and Psychomotor Skill. The HSRC factor labelled Communication Skills is probably fairly close to the CJVS factor of Manual Communication. There may be some correspondence between the HSRC factor Reading Comprehension and the CJVS factor Oral-Verbal Communication which was defined primarily by reading and writing.

*Multiple Regression Analyses.* The variables which were selected for the sequential multiple regression analyses are listed by sets in Table 2. The variable selection process utilized three criteria:

- (1) The distribution of the variable was fairly normal or rectangular in form,
- (2) The intercorrelations among the selected variables were low (i.e., redundancy was avoided), and
- (3) Representative variables were chosen from each of the three predictor sets.

There were no variables which met these criteria for the CJVS-C treatment set.

Table 3 presents a brief summary of the significant correlates of employment for the three samples. For each sample, a different set of variables was predictive of outcome. A *tentative conclusion* would appear to be that the

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TABLE 2

### SELECTED VARIABLES FOR MULTIPLE REGRESSION ANALYSES

	HSRC	CJVS-WA	CJVS-C
A. Biographic	1. Sex	1. Sex	1. Sex
	2. Age	2. Age	2. Age
	3. Race	3. Race	3. Race
	4. School (years)	4. School (type)	4. School (type)
	5. Previous work		
B. Psychometric	6. Basic Educ. Skills	5. Manual Comm.	5. Manual Comm.
	7. Reading Comprehension	6. Nonverbal Reasoning	6. Nonverbal Reasoning
	8. Psychomotor Skill	7. Oral-Verbal Comm.	7. Oral-Verbal Comm.
	9. Nonverbal Reasoning	8. Psychomotor Skill	8. Psychomotor Skill
	10. Communication Skills	9. Residual Hearing	9. Residual Hearing
C. Treatment	11. Total days	10. Tutoring	
	12. Completed training	11. Total days	
	13. Overall Adjustment		
D. Criterion	14. Employment	12. Employment	10. Employment

characteristics and abilities of deaf clients which contribute to successful rehabilitation are specific to the client population and the treatment program.

TABLE 3  
SIGNIFICANT PREDICTORS OF CLIENT OUTCOME

#### HSRC

- (1) Sex: a greater proportion of males became employed (.29).
- (5) Previous work: a greater proportion of clients who had work experience became employed (.38).
- (12) Completed training: a greater proportion of clients who completed training became employed (.31).

#### CJVS-WA

- (3) Race: a greater proportion of white clients became employed (.22).
- (4) School: a greater proportion of clients who attended state residential schools became employed (.21).

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**TABLE 3**  
**SIGNIFICANT PREDICTORS OF CLIENT OUTCOME - Continued**

**CJVS-WA - Continued**

- (6) Nonverbal Reasoning: higher scores were predictive of employment (.29).
- (7) Oral-Verbal Communication: higher scores were predictive of employment (.27).

**CJVS-C**

- (2) Age: a greater proportion of older clients became employed (.28).
- (4) School: a greater proportion of clients who attended state residential schools became employed (.24).
- (5) Manual Communication: higher scores were predictive of employment (.38).

The stepwise multiple regression procedure selects predictor variables, one at a time, adding at each step the variable which makes the greatest contribution to the composite linear equation. Thus, it is possible to make statements regarding the jointly occurring combination of client characteristics which is predictive of employment (by examining the partial regression weights *and* the zero-order criterion correlations). However, the resulting optimal set of predictor variables often does not include all of the variables which, singly, correlated highest with the criterion, and the interpretation may be complicated. The conclusions stated below are focused on the interpretation of the unconfounded and nonsuppressing predictor variables.

Three sets of predictors for the HSRC sample were utilized. The results indicated that the proportion of variability in client outcomes that could be predicted increased as more information about the client became available. *Conclusion:* the male client, with previous work experience, who completed his training program was more likely to become employed.

Three sets of predictors for the CJVS-WA sample were calculated. In contrast to the HSRC sample, the psychometric variables made a substantial contribution to the prediction of successful rehabilitation for this sample. *Conclusion:* the older, more intelligent client, who possessed better oral-verbal communication skills, and attended a state residential school was more likely to become employed.

Two sets of predictor variables for the CJVS-C sample were calculated. *Conclusion:* the older, male client who possessed better manual communication skills was more likely to become employed.

The optimal regression equations for the three client samples accounted for 35, 20, and 23 percent of the variance in employment. A recent review of prediction studies in rehabilitation (Bolton, 1972) concluded that the average composite prediction equation accounted for 20 percent of the criterion variance. Using this figure as a norm, it can be stated that employment for clients in the two CJVS samples can be predicted at an average rate and

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employment for the HSRC clients can be predicted very well. The predictability for the HSRC sample is seen to be especially high when all the factors which are external to the rehabilitation process and, thus, attenuate the criterion correlation, are considered (e.g., availability of financial support for special services, economic conditions which differentially affect the job market, unreliable psychological assessments of some clients, etc.).

The conclusions of this study should be especially useful to rehabilitation practitioners in settings and programs similar to Hot Springs and Chicago. The concern of practitioners is, of course, not to predict successful rehabilitation of clients, but, rather, to avoid failure. In other words, the results of this study may be used to *identify* those clients who will need special attention, rather than *select* the clients who are most likely to be successful.

### SUMMARY

The relationship between client predictor variables and employment at follow-up for three samples of deaf rehabilitation clients was studied using sequential multiple regression procedures. The three samples differed on several characteristics and ability dimensions. Individual and composite predictors of employment for each sample were summarized and discussed. Two global conclusions were reached: (1) predictability improved as more information about the clients was included in the regression equation, and (2) predictors of employment for deaf rehabilitation clients are specific to the service program and client population.

### REFERENCES

- Bolton, B. A factor analytic study of communication skills and nonverbal abilities of deaf rehabilitation clients. *Multivariate Behavioral Research*, 1971, 6, 485-501. (a)
- Bolton, B. Factor analytic studies of communication skills, intelligence, and other psychological abilities of young deaf persons. Paper presented to the Psychometric Society meeting in St. Louis, Missouri, on April 8, 1971. (b) Reprinted in *Rehabilitation Psychology*, 1972, 19, 71-79.
- Bolton, B. Factorial studies of communication skills, non-verbal intelligence, and other psychological abilities of deaf young adults: Validation and refinement. Paper presented to the Southwestern Psychological Association meeting in Oklahoma City on April 21, 1972. (a)
- Bolton, B. The prediction of rehabilitation outcomes. *Journal of Applied Rehabilitation Counseling*, 1972, 3, 16-24. (b)
- Bolton, B. *Introduction to Rehabilitation of Deaf Clients*. Arkansas Rehabilitation Research and Training Center, 1973, (76pp.). (a)
- Bolton, B. A comparative study of Kaiser's Little Jiffy Mark III. Paper presented to the Psychometric Society meeting in Chicago on March 30, 1973. (b)

## FACTORS CONTRIBUTING TO SUCCESSFUL REHABILITATION

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### REFERENCES — Continued

- Bolton, B. A behavior-oriented treatment program for deaf clients in a comprehensive rehabilitation center. *American Journal of Orthopsychiatry*, 1974, 44, 376-385.
- Chicago Jewish Vocational Service. Community Project for the Deaf. (Final Report, SRS Grant No. 14-P-55171/5-05), 1974.
- Cohen, J. Multiple regression as a general data-analytic system. *Psychological Bulletin*, 1968, 70, 426-443.
- Kaiser, H.F. A second generation little jiffy. *Psychometrika*, 1970, 35, 401-416.
- Neff, W.S., & Koltuv, M. Work and mental disorder: A study of factors involved in the rehabilitation of the vocationally disadvantaged former mental patient. New York: ICD, 1967.
- Neff, W.S., Novick, B., & Stern, B. A follow-up counseling program: A study of the influence of continued counseling on the employability of disabled workshop trainees. (Final Report, SRS Grant No. RD 1698-6), 1968.

### FOOTNOTE

Appreciation is expressed to the Chicago Jewish Vocational Service for use of data collected in conjunction with SRS Grant No. 14-P-55171. The technical assistance of Sarah Day and James Duncan is gratefully acknowledged. The research was supported by SRS Grants No. 14-P-55216 and 16-P-56812 to the Arkansas Rehabilitation Research and Training Center.