



# The Impact of Vocational Evaluation on Outcomes in the Vocational Rehabilitation Services Program

Debra B. Homa, Ph.D., CRC, CVE  
University of Wisconsin – Stout  
220 10th Avenue East  
Menomonie, WI 54751

## Abstract

This study used the nationally-representative database of the Longitudinal Study of the Vocational Rehabilitation (VR) Services Program to investigate the impact of vocational evaluation (VE) on outcomes for consumers of VR services. Using structural equation modeling, the study examined the impact of VE on employment outcomes, while controlling for consumer characteristics that influence outcomes. The structural equation model suggested that the direct effect of VE on employment outcomes was negative; that is, consumers who received VE without employment services were less likely to achieve an employment outcome. In contrast, the indirect effect of VE appeared to be both significant and positive, indicating that VE acted as a mediator between consumer characteristics, employment services, and employment outcomes. The structural equation model further indicated that VE acted as a mediator between client characteristics and provision of training services. These findings suggest that VE, when combined with employment services, significantly contributes to successful outcomes for rehabilitation consumers. Implications of the study are that VE, when followed by employment services, helps consumers who might otherwise not have been successful to achieve an employment outcome. That is, VE may improve the effectiveness of VR services for persons who are considered less job-ready, but their success is also dependent upon provision of employment services. It also underscores the need to examine the effectiveness of VE within the context of both client characteristics and service variables.

## The Impact of Vocational Evaluation on Outcomes in the Vocational Rehabilitation Services Program

For approximately four decades, vocational evaluation (VE) has been a widely used service within the vocational rehabilitation system and continues to play a key role in the rehabilitation process. Historically, state vocational rehabilitation agencies have been the major source of referrals to VE. For example, in a 1983 survey of state vocational rehabilitation agencies, Bordieri and Thomas (1986) found that of the four main services traditionally provided by rehabilitation facilities (VE, work adjustment, skill training, and employment-related), VE was the service most often purchased by state rehabilitation agencies, followed by work adjustment. In addition, a 1993 survey based on a stratified random sample of 200 state vocational rehabilitation counselors in four Midwestern states found that 56% of the counselors utilized VE services that year for one-fifth to four-fifths of their clients (Lee, Taylor, & Rubin, 1995). A more recent survey of vocational

evaluators (Woodford & Modahl, 1999) suggests that the state vocational rehabilitation system continues to play a dominant role; the survey indicated that a majority of VE referrals (60%) were from state vo-

---

**One of the key purposes of VE is to provide information that will help people establish vocational goals that are consistent with their abilities and interests. As a consequence, VE should increase the probability of successful rehabilitation outcomes, including more appropriate job matches, placement in better quality jobs, and more efficient provision of rehabilitation services.**

---

ational rehabilitation agencies. A national longitudinal study of 8500 consumers participating in the Vocational rehabilitation

Services Program between 1994 and 1999 found that VE was the third most frequently provided diagnostic service, after medical evaluation and psychological/psychiatric evaluation, with an average cost of \$964 (Hayward & Schmidt-Davis, 2002b).

One of the key purposes of VE is to provide information that will help people establish vocational goals that are consistent with their abilities and interests. As a consequence, VE should increase the probability of successful rehabilitation outcomes, including more appropriate job matches, placement in better quality jobs, and more efficient provision of rehabilitation services (Fourteenth Institute on Rehabilitation Issues, 1987). Although these benefits have long been assumed, researchers have commented on the lack of empirical studies that specifically examine the effectiveness of VE in predicting rehabilitation outcomes (Bond & Dietzen, 1993; Adelman, Spitznagel, & Saxon, 1997; Lee, Taylor, & Rubin, 1994; Menz, 1984; Myers & Dagley, 1996). Even fewer studies have examined its usefulness within

the state vocational rehabilitation system, which is striking, given that the state vocational rehabilitation system has long been a major purchaser of VE services (Bordieri & Thomas, 1986). Moreover, the increased emphasis on accountability in rehabilitation services should provide a further impetus for assessment of VE'S contribution to rehabilitation outcomes (Thomas, Hiltenbrand, & Tibbs, 1997).

### Challenges to Studying VE's Effectiveness

A number of challenges impede research of VE's effectiveness in relation to outcomes. First, as Vandergroot (1987) pointed out, services that are provided closer in time to the actual outcome of rehabilitation services -- usually employment -- are more likely to demonstrate unequivocal effectiveness. For example, job placement services often demonstrate a direct association with successful outcomes in rehabilitation research. However, VE normally occurs very early in the vocational rehabilitation process and is therefore far removed from the point of closure (Vandergroot, 1987). During the intervening time between VE and eventual case closure, many factors may interfere with a successful outcome, for example, changes in an individual's health status, unexpected family problems, and a downturn in the economy, which could not be foreseen at the time of the evaluation.

Assessment of VE's effectiveness in contributing to rehabilitation outcomes is further complicated by the fact that rehabilitation counselors may not implement the recommendations provided in the VE report (Caston & Watson, 1990; Kosciulek, Prozonic, & Bell, 1995; Vandergroot, 1987). A VE may provide useful information, but if its recommendations are not followed, there may not be a clear link between provision of VE services and case outcomes, thus hampering analysis of its effectiveness within the rehabilitation process. In addition, client variables have an impact on rehabilitation outcomes and need to be considered when examining the value of VE. For example, individuals with severe disabilities or other employment barriers may be referred to VE more often than other consumers (Caston & Watson, 1990; Dunn, 1975; Spitznagel & Saxon, 1995). The few studies that have explored this issue in conjunction with VE suggest

that the following characteristics are significantly associated with rehabilitation outcomes: race/ethnicity, public assistance (Caston, 1987), work history (Adelman, Spitznagel, & Saxon, 1987), and education level (Cook & Razzano, 1994). These findings are consistent with other rehabilitation research examining the association of client characteristics to outcomes. For example, a recent longitudinal study using a national database of consumers in the public vocational rehabilitation program identified the following to be among the consumer variables that have a significant impact on rehabilitation outcomes: disability type, severity of disability, receipt of financial assistance, race/ethnicity, and self-esteem (Hayward & Schmidt-Davis, 2002c).

### Studies of VE's Effectiveness in the Vocational Rehabilitation Services Program

A review of the literature identified six previous studies that examined the effectiveness of VE in the public vocational rehabilitation program. Using data exclusively from the state vocational rehabilitation system, these studies compared rehabilitation outcomes for consumers who have or have not received VE services. All use samples limited to one state and have produced contradictory findings regarding the contribution of VE to rehabilitation outcomes. Only two studies obtained unequivocally positive results supportive of vocational evaluation (Adelman, Spitznagel, & Saxon, 1997; Potsubay & Fredrickson, 1985). Potsubay and Fredrickson (1985) used an experimental design to examine the impact of vocational assessment on job placement outcomes in one state vocational rehabilitation agency. Results were supportive of the value of vocational assessment, as 76% of clients who had received the assessment were successfully placed in a job that matched the job goal listed in the individualized rehabilitation plan. In contrast, only 32% of clients in the control group (i.e., who had not received vocational assessment) were successfully placed and in a job consistent with the rehabilitation plan goal. Adelman et al. (1997) found a significant relationship between successful closure (Status 26) and VE, with chi-square analysis indicating that clients who had been given a VE were significantly more likely to have a successful case closure than those

who not received VE services.

In contrast, two other studies obtained primarily negative findings regarding the impact of VE on rehabilitation outcomes (Caston & Watson, 1990; Spitznagel & Saxon, 1995). Caston and Watson (1990) found that consumers with successful closures were significantly less likely to have obtained a VE than those with unsuccessful closures. Using a large dataset of vocational rehabilitation recipients from the State of Florida, Spitznagel and Saxon (1995) noted that receipt of VE was not associated with a successful rehabilitation outcome, as a majority of successfully closed cases did not undertake a VE. The researchers surmised that individuals referred for VE may have been more likely to have a severe disability or other barriers to employment.

Other studies using state vocational rehabilitation data have obtained mixed results (Caston, 1987; Evans, 1989). Using a large sample size, Evans (1989) examined the association between VE and successful closures in Wisconsin's department of vocational rehabilitation services. These comparisons revealed no significant differences in the likelihood of successful closures for clients without or without a VE. However, additional examination suggested that clients with severe disabilities had a higher probability of achieving successful closure if they had a VE, when compared to those without severe disability. Investigating the association between VE services and other variables on vocational rehabilitation outcomes, Caston (1987) utilized a database of 200 closed cases from the Ohio department of rehabilitation services. No relationship between VE job recommendations and employment outcomes was found.

The contradictory findings of these studies suggest a need for further research to provide supportive evidence for VE's effectiveness in promoting successful outcomes in the state-federal vocational rehabilitation program. Previous studies generally have not controlled for client variables that have a demonstrable impact on rehabilitation outcomes, such as disability type and severity, receipt of financial assistance, race/ethnicity, and age. Moreover, employment-related services, such as job placement, which have been shown to have a significant impact on rehabilitation outcomes (Vandergroot, 1987) have not been included in analyses of VE's effectiveness.

Meaningful investigation of VE's contribution to rehabilitation outcomes should include analysis of its impact within the context of both client and service variables. The current study hypothesized that while VE has a positive and significant impact on rehabilitation outcomes, its effect is indirect; that is, VE influences the relationship between client variables, service variables, and employment outcomes. It was also hypothesized that VE influences the relationship between client characteristics and educational outcomes (defined here as participation in training programs). Accordingly, the current study examined the following hypotheses:

Hypothesis 1: Vocational evaluation has an indirect, but significant, effect on employment outcomes by acting as a mediator between client demographic and disability characteristics, employment services, and employment outcomes.

Hypothesis 2: Vocational evaluation does not have a significant, direct effect on employment outcomes.

Hypothesis 3: Vocational evaluation has an indirect, but significant, effect on provision of training services by acting as a mediator between client demographic and disability characteristics and training services.

## Method

### *Design*

The current study utilized data from a massive database collected over a five-year period, the Longitudinal Study of the Vocational Rehabilitation Services Program (LSVRSP), by Research Triangle Institute International for the Rehabilitation Services Administration and the Department of Education under contract number HR92022001 (Cornell University, 2002). The LSVRSP used a longitudinal, non-experimental design that tracked consumers in the state-federal VR program for a period of three years. A stratified random-sampling procedure was used to obtain data that would be representative of the population of VR consumers throughout the United States. Data were obtained from 40 local VR offices in 30 states. The study began with a cohort design in which consumers were randomly selected according to the following stages of the VR process: 25 percent of participants were in the application stage, 50 percent were currently re-

ceiving services, and 25 percent were those whose cases had been closed. Data collection took place between January, 1995 and January, 2000, and each consumer was followed for a three-year period. (Hayward & Schmidt-Davis, 2002a). Information for the LSVRSP database was collected by means of interviews with consumers (either in person or over the telephone) and from case records (Hayward & Schmidt-Davis, 2002a).

### *Participants*

Participants for the current study were selected from the LSVRSP database, which contained a total of 8500 rehabilitation consumers. To examine the contribution of VE to employment and training outcomes, participants for the current study were selected from the LSVRSP database according to the following inclusion criteria: (1) consumers who were either in applicant or active status at the beginning of data collection; and (2) consumers whose rehabilitation status categories were between 18 (in training) and 28 (closed without an employment outcome, after service provision) at the end of the data collection period. Thus, for investigation of the hypotheses, consumers whose cases were already in closure status at the beginning of data collection and those who exited the vocational rehabilitation process before services were initiated were excluded as participants in the current study. In addition, only consumers of traditional working age (16 to 65 years old) were included.

The current study's hypotheses were examined using Structural Equation Modeling (SEM). SEM permits simultaneous analysis of relationships among independent and dependent variables, which may be either continuous or categorical; these variables also may be either measured or latent (i.e., reflect constructs that cannot be measured directly). In addition, SEM enables the researcher to construct a hypothetical model of these relationships and then test the model to see how well the data fit its parameters (Ullman, 2001). Of particular relevance to the current study, SEM allows relationships among variables to be examined for both direct and indirect effects. To examine the relationship of VE as a mediating variable (that is, of having an indirect effect) between consumer and disability characteristics and outcomes

(training and employment outcomes), the following latent (or unobserved) variables were postulated: client demographic and disability characteristics, employment services, and training outcomes; employment outcome was measured as a dichotomous dependent variable.

The structure of this model is illustrated on Figure 1. In SEM, latent variables are "predicted" by measured variables that are called indicators (Ullman, 2001). The latent variable of client/disability characteristics was used as an independent variable indicated by the following measured variables: age (a continuous variable), gender (categorical), race/ethnicity (categorical), amount of SSI/SSDI benefits at entry (continuous), self-esteem (continuous), disability type (a categorical variable) and disability severity (ordinal). The following categories were used for disability type: orthopedic, psychiatric, non-orthopedic physical, mental retardation, deaf/hard-of-hearing, learning disability, vision impairment, substance abuse, traumatic brain injury, and other conditions. With the exception of gender, these variables were selected because they were shown to have a significant impact on employment outcomes in the LSVRSP project (Hayward & Schmidt-Davis, 2002a). Gender was added because of its possible influence on training outcomes.

The indicators (measured variables) of the latent variable, employment services (a dependent variable), were job development, job placement, job search training, and on-the-job training/job trial. The indicators for training, a latent variable (and also a dependent variable), were business/vocational training, two-year community college, and four-year college. Training was analyzed separately from employment in the model because it was believed that many consumers would still be attending training programs at the end of the three-year follow-up period and therefore would not have yet achieved an employment outcome. Employment outcome, also a dependent variable, was used as a measured dichotomous variable (no/yes). Vocational evaluation, a dependent variable, was likewise measured as a dichotomous variable. This model hypothesized that vocational evaluation had an indirect effect (that is, was a mediator in the SEM model) between client demographic/disability characteristics and train-

ing, and also between client demographic/disability characteristics, employment services, and employment outcomes.

### Procedure

The current study utilized data sets made available in SPSS format in CD-ROM format by Cornell University's Program on Employment and Disability (2002). The current study used five of the LSVRSP data sets containing the specific variables that were examined. Data were initially analyzed using the statistical software package, SPSS Version 11.0. Prior to data analysis, all variables were examined for outliers and for missing data. The distributions of continuous variables used in this study were examined for normality by using histograms, boxplots, and measures of skewness and kurtosis available as descriptive statistics in SPSS. The SPSS data files were then exported into a structural equation modeling program, LISREL, for analysis of the hypothesized model.

### Results

The five datasets of the Longitudinal Study of the Vocational Rehabilitation Services Program (LSVRSP) were merged into one file containing demographic characteristics, disability information, employment outcome, self-esteem, and services received. The file was examined for missing data, and 111 cases were deleted that had missing data for the variables of age, race/ethnicity, and disability. After applying the inclusion criteria of selecting participants who were of traditional working age, in applicant or active status at the beginning of data collection, and whose rehabilitation status category was less than 18 (training) or greater than 28 (closed after receiving services) at the end of the study, the final sample size was 4978 and was used for the analysis of the SEM model. The median age of this sample was 34 (mean = 34.15, SD = 12.13). The mean SSI/SSDI amount received was \$156.36, SD = \$255; \$1529 per month was the highest amount received, and almost 70% of the sample did not receive any SSI/SSDI benefits. The mean total score of the self-esteem measure was 24.9, SD = 4.7.

*Model Assessment.* Several criteria were employed to evaluate the model fit: decrease in chi-square, a Root Mean Square Error of Approximation (RMSEA) equal

to or less than .08 (preferably less than .06), Comparative Fit Index greater than .90, and Goodness of Fit Index greater than .90 (Byrne, 1998; Ullman, 2001). Briefly, the RMSEA estimates the discrepancy in the fit between the hypothesized model and a perfect, population-based model (Ullman, 2001). The Comparative Fit Index (CFI) uses the sample data to compare the fit of the proposed model to a baseline model that assumes that none of the variables correlate (Kline, 1998; Ullman, 2001). The Goodness of Fit Index (GFI) can be interpreted as an indicator of how much variance-covariance is explained by the hypothesized model (Kline, 1998).

The initial model had a chi-square of 3116,  $p < .01$ . In SEM, a significant chi-square indicates a lack of fit; however, this statistic is highly sensitive to sample size and is typically significant in SEM analyses, which require large sample sizes. Consequently, the chi-square is often most useful as a means of assessing whether changes in model parameters improve or worsen the fit of the data to the model (Byrne, 1998). Based on post-hoc analyses of the Modification Indices in the LISREL output, a path from Client Characteristics to Training was added, as were two error covariances, one between SSI/SSDI benefits and Severity and another between Gender and Self-Esteem. This final model had the following fit indices: RMSEA = .06, CFI = .60, and GFI = .97. Although two of the indices, RMSEA and GFI, were within acceptable limits, the CFI was less than .9, suggesting that the model's parameter estimates should be interpreted cautiously. Figure 2 displays the final model with standardized estimates.

*Measurement Model.* As may be seen in Figure 2, all of the indicator variables for the latent factors were significant. However, with the exception of age and disability, the standardized estimates of the indicators for the latent variable of Client Characteristics (that is, characteristics that predict employment outcomes) were low, suggesting that they had unique variance not attributable to the latent variable. In other words, they may have been measuring something other than client characteristics that predict outcomes. These estimates may also have been affected by the types of variables used to measure Client Characteristics, which included categorical variables

that are nominal, such as primary disability, gender, and ethnicity. The standardized estimate of one of the indicators for the Training variable, Business/Vocational training, was lower than the other two indicators (two-year and four-year college), suggesting that only a small amount of its variance was explained by the Training variable, in contrast to the indicators for two and four-year college training, perhaps because specific vocational training is in some way fundamentally different from the other two variables. All of the indicators for the Employment Services latent variable appeared to be adequate.

*Structural Model.* All of the path coefficients between the latent variables were significant. The path from Client Characteristics to Employment Outcome was in a positive direction, suggesting that consumers who had more of the characteristics that predicted employment in the Longitudinal Study, such as being White and having higher self-esteem, were more likely to have a successful outcome. In this sample, age appeared to positively associate with employment, perhaps because older consumers had more work experience. The relationship between Client Characteristics and VE and between Client Characteristics and Employment Services was negative, suggesting that consumers who received these services differed from those who achieved direct employment. For example, VE recipients were more likely to be younger, have lower self-esteem, have a severe disability, and be African-American than consumers who became employed without Employment Services. The relationship between VE and Employment Services was positive, indicating that consumers who had VE also had a greater likelihood of receiving employment services. Of those consumers who had a VE, 31% also received Employment Services, compared to 20.5% of consumers without VE. The path coefficient between VE and Employment Outcome suggests that consumers who received VE without Employment Services were less likely to achieve employment.

The path from Client Characteristics to Training was likewise negative. Not surprisingly, younger individuals were more likely to attend two or four-year colleges. Women were significantly more likely than men to attend two-year community college, Pearson  $\chi^2(1, N = 4978), 6.52, p = .01$  and



four-year college/university, Pearson  $\chi^2(1, N = 4978)$ , 8.06,  $p = <.01$ . The path coefficient between VE and Training Services was significant, suggesting an association between VE and training when controlling for consumer characteristics. The negative sign before this path coefficient may be the result of the combined indicator variables for the latent variable of Training; for example, a small proportion of consumers with VE services also received four-year college training. When all three types of training are combined, 36 percent of VE recipients received training, compared to 38 percent of consumers who did not have VE services.

Next, the direct and indirect effects of VE on employment and training outcomes were examined, using LISREL. Direct effects may be seen in the path coefficients of Figure 2. For example, the path coefficient between VE and Employment Services is .26. Indirect effects represent the influences of a variable through other variables. In the model, VE had a direct effect on employment, as shown by the arrow pointing from VE to Employment Outcome (with a path coefficient of -.14), as well as an indirect influence through Employment Services. Table 1 shows the effects of the independent variables, Client Characteristics, VE, and Employment Services on the dependent variables, VE, Training, Employment Services, and Employment Outcome (VE and Employment Services act as either independent or dependent variables, according to their position in the model). VE appeared to have a significant and positive indirect effect on Employment Outcome through Employment Services (.138), suggesting that both VE and Employment Services acted as mediators between Client Characteristics and Employment Outcome in the model. Client Characteristics, via VE, appeared to have a small but significant indirect influence on training, suggesting that VE may function as a mediator between training and client characteristics in the model.

## Discussion

### *The Effect of VE on Employment Outcomes*

The first hypothesis postulated that VE has an indirect, but significant effect on employment outcomes by acting as a mediator between consumer characteristics, employment services, and employment

outcomes. This hypothesis was supported in the structural equation model. Both VE and employment services appeared to act as mediators in the model and made a positive contribution to employment outcomes. In addition, there appeared to be significant differences between individuals who received either VE or employment services and those who obtained employment directly, without these services. For example, consumers who achieved employment without VE or employment services tended to be older (mean age of approximately 39, versus a mean age of 33 for those who had a VE), received lower amounts of SSI/SSDI, were less likely to have a psychiatric disability or mental retardation, and were less likely to be African-American. Of those VE recipients who achieved an employment outcome without employment services, almost 14 percent were placed in sheltered employment, compared to only three percent of consumers without VE or employment services. This finding may reflect the fact that VE services are often provided by rehabilitation facilities and suggests that some consumers are steered toward sheltered employment within the facility, rather than outside placement. Alternatively, consumers may be more likely to receive VE services due to having marginal employment potential, in which case a VE could help determine whether a sheltered workshop placement or supported employment option would be most appropriate.

Consistent with the Longitudinal Study report (Hayward & Schmidt-Davis, 2002b), the model indicated that employment services made a strong contribution to successful outcomes; however, the significant indirect effect of VE, via employment services, suggests that VE also had a positive impact. In addition, there was a significant relationship between VE and employment services, indicating that consumers who received VE also had increased likelihood of receiving employment services. Overall, these findings suggest that VE, when followed by employment services, helped consumers who might otherwise not have been successful to achieve an employment outcome. The importance of employment services was not surprising, since previous studies have long demonstrated the effectiveness of job placement in contributing to successful outcomes (Vandergroot, 1987), but prior studies of VE

have not examined its effectiveness in relation to provision of employment services while taking into account client variables that affect outcomes.

The second hypothesis, that VE does not have a significant, direct effect on employment outcomes was not supported. It had been hypothesized that VE by itself would not have any effect, either positive or negative, when controlling for consumer variables. However, the structural equation model indicated a significant and negative relationship between VE and employment, that is, that consumers who received VE without employment services were less likely to achieve a successful outcome. This finding was consistent with two studies comparing employment outcomes for consumers with and without VE services (Caston & Watson, 1990; Spitznagel & Saxon, 1995), which noted a decreased rate of successful closure for consumers who had received a VE. In contrast, other comparison studies have found VE to have either a positive impact (Adelman et al., 1997) or no significant effect (Evans, 1989). The contradictory findings of these previous studies may perhaps be explained by the fact that they did not control for client variables or use samples that were nationally representative of VR consumers.

### *The Effect of VE on Training Services*

This study proposed that VE would demonstrate an indirect, significant effect on provision of training services by acting as a mediator between consumer characteristics and training services. This hypothesis was supported, as the structural model indicated a significant relationship between VE and training services. Overall, a similar proportion of consumers who had VE also received training (36 percent) compared to consumers who had training without VE services (38 percent). Since the structural model should control for the effect of consumer variables, the path coefficient is interpreted to mean that VE significantly influenced provision of training services. In addition, examination of the indirect effects of consumer characteristics was significant, suggesting that VE acted as a mediator between these characteristics and training. This finding corresponds to previous studies indicating correspondence between VE recommendations for training and provision of training services (Cole,

2001; Kosciulek et al., 1995).

### *Limitations of Study*

As the current study was non-experimental in nature, we cannot make inferences about causal factors in the structural model; however, results may help illuminate the relationship of VE to consumer characteristics, services, and outcomes; it also provides guidance for future empirical research. One key limitation of this study was that the specific recommendations of the VE report were unknown, and previous research has suggested that rehabilitation counselors may follow VE recommendations only about half of the time (Caston & Watson, 1990; Kosciulek et al., 1995; Vandergroot, 1987). Thus, this study cannot determine if VE recipients would have had a higher rate of employment outcome or earnings if these recommendations were implemented. However, we believe that the large sample size of this study, combined with structural equation modeling, helps compensate for this limitation. Another limitation of the study is that VE is not a homogeneous construct. For example, it varies in program duration, and there may be variations among vocational rehabilitation agencies in different states regarding referral questions and the types of information requested from a VE. In addition, the quality of VE may vary, depending on the training of the vocational evaluation staff and availability of appropriate assessment resources.

Within the scope of this study, we examined the impact of VE on employment outcome and training services, while taking into account client and service variables that influence rehabilitation outcomes. For future research, it would be interesting to include additional variables in the structural equation model, such as the quality of the counselor-client relationship, which may have an important impact on rehabilitation outcomes (Hayward & Schmidt-Davis, 2002c; Lustig, Strauser, Rice, & Rucker, 2002). A more comprehensive model could also include contextual variables that may affect outcomes, such as labor market conditions, community resources, and VR agency policies.

In the current study, structural equation modeling (SEM) was found to be a useful approach in examining the inter-relationships of client and service variables to training and employment outcomes. However,

the study used several categorical variables that were nominal, such as gender, race/ethnicity, and disability type, which may have been a factor in some of the negative path coefficients and complicate interpretation of the structural equation model. For example, the coefficients of the seven measured variables used for the client characteristics latent variable were significant, but the values of five of these variables were rather low, possibly due to the nominal variables that were used. One of the three indices of model fit, the Comparative Fit Index (CFI), was below the expected criterion, and the combination of categorical and dichotomous variables may have been a factor in reducing this fit index in the model. Future studies using SEM to examine rehabilitation outcomes could benefit from using primarily interval-level and ordinal data. For example, including functional capacity ratings in the model (on an ordinal scale) may be a more useful variable than disability type.

### *Implications for Vocational Rehabilitation Practice*

The current study underscores the important role of VE working in conjunction with employment services, an issue not specifically addressed in prior research of VE's effectiveness. Results suggest the value of VE in contributing to employment outcomes for persons who may be considered less job-ready, whose success is also dependent upon provision of employment services. Thus, VE may increase the rate of successful employment outcomes for consumers who receive employment services. Government-funded employment programs have long recognized the value of VE in contributing to successful outcomes, as a short-term VE has often been the first step in identifying appropriate on-the-job training and direct employment sites for participants in these programs, and follow-up data have supported the predictive accuracy of VE recommendations (Meade & Hoine, 1995). In contrast to participants in government employment programs, consumers within the vocational rehabilitation system are more likely to need additional services, such as counseling, medical restoration, and training, before they are ready to seek employment. However, some rehabilitation consumers might benefit from a program combining short-term VE with employ-

ment services, where vocational evaluators and placement personnel could work closely as a team to ensure that consumers are placed in jobs matching their skills, aptitudes, and interests.

Recent research has indicated that consumers in the vocational rehabilitation system are being placed in low-quality jobs, even when controlling for consumer variables (Capella, 2002). The structural equation model indicated that VE acted as a mediator between client characteristics and training services, suggesting that, by contributing to provision of training services, VE may play an important role in enhancing consumers' future earning potential. Although results of the Longitudinal Study suggested that training had less impact in effecting successful outcomes than employment services (Hayward & Schmidt-Davis, 2002c), this may change in the future, as jobs in the 21<sup>st</sup> century become increasingly complex. Thus, it may become increasingly important for training to be included in VE recommendations, and further research is recommended to examine the frequency of training recommendations in VE reports, as well as follow-up studies to determine the extent to which VE recommendations are implemented by rehabilitation counselors.

Vocational evaluation does not occur within a vacuum; rather, it takes place within a multidimensional context of client, service, and environmental variables. The current study used a large, nationally-representative sample to examine the effectiveness of VE in contributing to employment outcomes in the public vocational rehabilitation system. This investigation has extended earlier research by including the relationships of client characteristics, training, and employment services in the analysis and by examining indirect as well as direct effects of vocational evaluation on outcomes. Results suggest that VE's contribution to employment outcomes, while positive, tends to be indirect; these findings highlight the importance of assessing VE within the context of client characteristics and other rehabilitation services.

## References

- Adelman, E.J., Spitznagel, R.J., & Saxon, J.P. (1997). The effects of vocational evaluation on the vocational rehabilitation of clients with disabilities. *Vocational Evaluation and Work Adjustment Bulletin*, 30(2/3), 74-79.
- Bond, G.R., Dietzen, L.L. (1993). Predictive validity and vocational assessment: Reframing the question. In R.L. Gleuckauf, L.B. Sechrest, G.R. Bond, & E.C. McDonel (Eds.), *Improving assessment in rehabilitation and health* (pp. 61-86). Newbury Park, CA: Sage Publications.
- Bordieri, J.E., & Thomas, D. (1986). Facility based services purchased by state vocational rehabilitation agencies. *Vocational Evaluation and Work Adjustment Bulletin*, 19(3), 135-138.
- Byrne, B.M. (1998). *Structural equation modeling with LISREL, PRELIS, and SIMPLIS: Basic concepts, applications, and programming*. Mahwah, NJ: Erlbaum.
- Capella, M.E. (2002). Inequities in the VR system: Do they still exist? *Rehabilitation Counseling Bulletin*, 45 (3), 143-153.
- Caston, H.L. (1987). An analysis of the relationship of vocational evaluation and rehabilitation outcomes of disabled individuals (Doctoral dissertation, University of Cincinnati, 1987). *Dissertation Abstracts International*, 48(7), 1658.
- Caston, H.L. & Watson, A.L. (1990). Vocational assessment and rehabilitation outcomes. *Rehabilitation Counseling Bulletin*, 34(1), 61-66.
- Cole, T.A. (2001). Vocational assessment and employment: What makes the difference. In R. Fry (Ed.), *The issues papers: Tenth national forum on issues in vocational evaluation, assessment, and work adjustment* (pp. 266-281). Menomonie, WI: University of Wisconsin-Stout, The Rehabilitation Resource.
- Cook, J.A., & Razzano, L. (1994). Predictive validity of the McCarron-Dial Testing Battery for employment outcomes among psychiatric rehabilitation clientele. *Vocational Evaluation and Work Adjustment Bulletin*, 27(2), 39-47.
- Cornell University, Program on Employment and Disability (November 22, 2002), *Longitudinal Study of the Vocational Rehabilitation Service Program* (LSVRSP), CD-ROM.
- Dunn, D.J. (1975). Characteristics of vocational evaluation service recipients. *Vocational Evaluation and Work Adjustment Bulletin*, 8 (1), 8-17.
- Evans, L. (1986). A study regarding placement and performance of students receiving vocational evaluations. In R. Fry (Ed.), *Second National Forum on Issues in Vocational Assessment: The issues papers* (pp. 135-138). Menomonie, WI: Materials Development Center, University of Wisconsin-Stout.
- Fourteenth Institute on Rehabilitation Issues (1987). *The use of vocational evaluation in VR*. Menomonie, WI: University of Wisconsin-Stout, Research and Training Center.
- Hayward, B.J., & Schmidt-Davis, H. (2002a). *Longitudinal study of the Vocational Rehabilitation Services Program Report 1: How consumer characteristics affect access to, receipt of, and outcomes of VR services*. Research Triangle Park, NC: Research Triangle Institute.
- Hayward, B.J., & Schmidt-Davis, H. (2002b). *Longitudinal study of the Vocational Rehabilitation Services Program Second Final Report: VR services and outcomes* [Revised draft report]. Research Triangle Park, NC: Research Triangle Institute.
- Hayward, B.J., & Schmidt-Davis, H. (2002c). *Longitudinal study of the Vocational Rehabilitation Services Program Fourth Final Report: Results of the VR program*. Research Triangle Park, NC: Research Triangle Institute.
- Kline, R.B. (1998). *Principles and practices of structural equation modeling*. New York: Guilford.
- Kosciulek, J.F., Prozonc, L.A., & Bell, D. (1995). On the congruence of evaluation, training, and placement. *Journal of Rehabilitation*, 61(4), 20-23.
- Lee, D.-Y., Taylor, D.W., & Rubin, S.E. (1994). Rehabilitation counselors' perceived value of vocational evaluation information. *Vocational Evaluation and Work Adjustment Bulletin*, 27(2), 33-37.

