Predictors of Vocational Rehabilitation Return-to-Work Outcomes in Workers' Compensation

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The postinjury return-to-work (RTW) status of 502 injured workers in Montana who were referred for vocational rehabilitation services between 1984 and 1991 was examined to determine which variables improved the capacity to predict RTW outcomes after injury. Predictor variables included age, education, attorney involvement, mandated vocational rehabilitation, and time from injury to referral. The number of years of preinjury education was found to be a strong predictor of postinjury RTW outcomes. Age, attorney involvement, mandated vocational rehabilitation, and timely provision of services were also found to be significant predictors.

Work-related injuries and return to work (RTW) after injury have become issues of growing national concern (Tate, 1992b; Weed & Field, 2001). Each year, more than half a million workers in the United States incur injuries or illnesses that disable them for at least 5 months. Almost half of these individuals never return to work (Hester, Decelles, & Gaddis, 1986; National Institute of Handicapped Research [NIHR], n.d.; Tate, 1992b). According to the National Academy of Social Insurance (2000), in 1998 the resulting financial burden in terms of direct costs for medical care and cash benefits to the injured worker was estimated to be $41.7 billion. This amount does not include employer-related costs, expenses related to loss of productivity, and replacement worker costs (Perry, 1996; Pope & Tarlov, 1991). As these costs increase, RTW has become more important, and interest in identifying predictors of RTW has increased (Beck, 1989; Gardner, 1991; Hall, 1994; Hester et al., 1986; Perry, 1996; Smith & Crisler, 1985).

Earlier findings suggested a number of factors that might influence successful RTW outcomes for workers injured on the job. These included, but were not limited to, workers' compensation benefit systems, timely provision of vocational rehabilitation services, worker injury types and demographic characteristics, and attorney involvement (Ash & Goldstein, 1995; Gardner, 1991; Gumerman, 1998; Hester et al., 1986; Loeser, Henderlite, & Conrad, 1995; Tate, 1992b).

Some studies supported the contention that laws for compensating injured workers have been found to decrease the potential for returning to work (Bednar, Baesher-Griffith, & Osterman, 1998; Hunter, Shaha, Flint, & Tracy, 1998; Loeser et al., 1995; Roidl, 1996; Tate, 1992a). Other studies, however, found no relationship between compensation and return to work (Dworkin, Handlin, Richlin, Brand, & Vannucci, 1985). Workers' compensation—and related litigation with attorney involvement—has been reported to decrease an injured worker's RTW potential; however, the literature remains mixed in terms of demonstrating the effects of attorney involvement on RTW outcome (Gallagher et al., 1995; Gumerman, 1998).

Various studies reported a number of demographic factors and job characteristics related to RTW outcomes.

Variables such as age, gender, education, and injury have been found to be predictors (Hall, 1994; Hester et al., 1986; Pearson, 1999; Roidl, 1996; Tate, 1992a).

Authors of some studies suggested that early vocational rehabilitation intervention can make a positive difference in RTW outcomes (Hood & Downs, 1985; Strautins & Hall, 1989). Gardner (1991) noted, however, that although conventional wisdom suggests that early referral and intervention are important in getting injured workers back into employment, much of the support for this contention is drawn from anecdotes or from studies that failed to control for confounding factors such as age, type of injury, and education.

In this study, we developed a predictive model of injured worker RTW outcomes after injury. Given the findings of earlier studies (Gardner, 1991; Hall, 1994; Hester et al., 1986), we hypothesized that including variables related to age (less than 50 years old), gender (male), marital status (married), education (more education), type of injury (back, upper body, lower body), mandated vocational rehabilitation, timely provision of services (less than 6 months from injury to referral), and attorney involvement would significantly improve the capacity to predict RTW outcomes after injury.

METHOD

Participants

This is a retrospective study of 502 injured workers in Montana who were receiving workers' compensation benefits and were referred for vocational rehabilitation services during calendar years 1984 to 1991. This study only reviewed cases in which the individual was insured under the State Compensation Insurance Fund (SCIF) and had been referred to a designated rehabilitation provider (i.e., certified rehabilitation counselor [CRC]), other than employed by the state) for vocational rehabilitation services. The cases were handled by one of the three major private rehabilitation firms contracted with the SCIF to provide vocational rehabilitation services to Montana workers who were injured during that period. The term *vocational rehabilitation services* was defined as follows: "consist[s] of a program of evaluation, planning, and delivery of goods and services to assist a disabled worker to return to work" (Montana Workers' Compensation Act of 1987, 39-7101911(6)). Under this Act, the goal of rehabilitation services is to return a worker who has been disabled to work with a minimum of retraining and as soon as possible after an injury occurs. This requires the rehabilitation provider to evaluate and determine the most appropriate RTW option from the following hierarchy:

1. return to the same position,
2. return to a modified position,
3. return to a related occupation based on the worker's education and marketable skills,
4. on-the-job training (OJT),
5. short-term training (less than 24 months),
6. long-term training (48 months maximum), or
7. self-employment.

Information from case files was collected on workers' demographic characteristics, injury-related data, attorney representation, vocational rehabilitation service time frames, and RTW outcomes. Records of 502 injured workers whose cases were referred for vocational rehabilitation services and subsequently closed during the calendar years 1984 to 1991 were reviewed. These cases were further divided into two groups: those where the date of injury occurred before July 1, 1987 (identified as pre-law cases), and those where the injury occurred after July 1, 1987 (post-law cases), when the law required workers' compensation insurers to provide vocational rehabilitation services for workers who had been disabled.

To make observations about the influence of a law on vocational rehabilitation outcomes, a researcher must be able to compare pre-law RTW behaviors of study participants with post-law behaviors of participants. This comparison requires data to be collected before and after the law was passed. Unless the study has access to an archival database or has begun to collect the required data before the law was passed, obtaining the appropriate data would be difficult because governmental legislation is not under the control of the researcher. Fortunately, in this study the data on RTW outcomes were recorded by the rehabilitation provider 3 years before the Montana Workers' Compensation Act was passed. In addition, the provider collected RTW outcome data for 4 years after the Act was passed. Of the 502 cases in this study, 282 (56.2%) were served before the Act and 220 (43.8%) were served after the law had been passed. Although the data used in this study are somewhat dated, it is still extremely useful for comparing the RTW outcomes of injured workers referred for services both before and after passage of the Montana Workers' Compensation Act.

The workers' demographic database included age, gender, education, marital status, and attorney representation. Injury-related data included date and type of injury, time from injury to referral for vocational rehabilitation services, and RTW status.

Data were collected as part of a larger study of a workers' compensation case database. Because a casewise deletion technique was used, cases that were missing one or more variables were not used in the analysis. Of the 1,105 cases initially examined, approximately 55% (n = 603) were excluded from this study due to one or more missing variables in the database as a result of inconsistent data collection and computer software/hardware incom-

patibilities. Comparisons were made to determine if the cases used to develop the model were different than those cases excluded from the analyses. No significant differences between these two groups were found on any of the variables under consideration. The presence of the Montana Workers' Compensation Act was the only variable that showed a significance difference between the included and excluded cases in that the excluded group contained 46.1% pre-law cases and 53.9% post-law cases, whereas the included group contained 56.2% pre-law cases and 43.8% post-law cases.

Data Analysis

We hypothesized that the dependent variable of RTW would be associated with age, education, attorney involvement, mandated vocational rehabilitation, and time from injury to referral. To test our hypothesis, we performed bivariate analyses to determine which independent (predictor) variables would be analyzed. Next, we examined variables found to be significantly correlated with RTW ($\phi < .001$) through use of a multiple logistic regression analysis with a forward inclusion of independent variables, using the likelihood ratio approach to develop a predictive model for RTW. Logistic regression is a technique that is appropriate for predicting a probability of a binary outcome (return to work/not returning to work; Ash & Goldstein, 1995).

The Hosmer-Lemeshow goodness-of-fit test (Hosmer & Lemeshow, 1989) was included in the final model to determine whether there was systematic underestimation or overestimation of RTW based on the independent variables in the model. Goodness-of-fit tests are intended to determine whether the observed data deviate significantly from the fitted model. A value of 1.0 indicates perfect discrimination, whereas a value of 0.5 indicates that the model performs no better than chance. This value was a measure of the extent to which the model predicted higher probabilities of returning to work for those clients who did return to work, and it was a function of the model's true- and false-positive rates. Goodness of fit for the study sample was measured by comparing fitted probabilities of RTW with observed RTW within deciles of risk and calculating the corresponding observed statistics. A small Hosmer-Lemeshow chi-square value and high probability (> .10) test statistic suggested a reasonable fit between the predicted model and the observed data.

TABLE 1. Outcomes of Injured Workers

Variable	*n*	%
Returning to work		
Employment		
Same position	60	12.0
Modified position	85	16.9
Related occupation	12	2.4
Training		
On the job	16	3.2
2 years of training	49	9.8
4 years of training	5	1.0
Self-employed	19	3.8
Not returning to work	256	50.9

TABLE 2. Mean Age and Educational Level of Sample

Variable	Not returning to work	Returning to work
Age (yrs.)	40.86 ± 12.04	37.09 ± 10.52
Education (yrs.)	11.09 ± 2.31	11.91 ± 1.78

RESULTS

Descriptive data are presented in Table 1. These results showed that RTW, as measured by the study criteria, broke down as follows: 12.0% of the participants were employed in the same position, 16.9% were employed in a modified position, and 2.4% were employed in a related occupation. Fourteen percent were in training and 3.8% were self-employed. Fifty-one percent were closed as not returning to work because (a) the injured worker's injury was too severe to benefit from vocational rehabilitation services, (b) the injured worker failed to cooperate with the rehabilitation provider, or (c) the case was withdrawn from rehabilitation services by the injured worker's attorney.

Table 2 presents the mean ages and educational grade levels for the study participants. Table 3 summarizes the demographic and injury-related variables predictive of RTW outcomes. Five variables were significantly associated with RTW status ($p < .0005$).

Correlations between the dependent and independent variables are presented in Table 3. Of the 502 participants, 246 (49.0%) returned to work. Of those cases that returned to work, 161 (32.1%) did not retain an attorney ($\phi = .18$, $p < .0005$). Similarly, of the injured workers who returned to work, 108 (21.5%) were referred for services after the Montana Workers' Compensation Act had been passed ($\phi = .24$, $p < .0005$). Among the injured workers who returned to work, 103 (20.5%) were referred for services within the first 6 months after injury ($\phi = .19$, $p < .0005$). Of those who returned to work, 211 (42.0%) were less than 50 years of age ($\phi = .14$, $p < .001$). Years of education prior to injury was the only ratio variable in the model that was found to show a significant relationship with RTW ($r = .20$, $p < .0001$). The nominal sociodemographic variables of gender ($\phi = -.06$, $p = ns$), marital status ($\phi = .08$, $p = ns$), and injury type (back injury, $\phi = .08$,

TABLE 3. Characteristics of the Workers' Compensation Cases

Variable	Not returning to work	Returning to work	ϕ
Workers' Compensation law[a]			
(0) Prelaw	174 (34.7%)	138 (27.5%)	.24**
(1) Postlaw	82 (16.3%)	108 (21.5%)	
Attorney involved			
(1) No	121 (24.1%)	161 (32.1%)	.18**
(0) Yes	135 (26.9%)	85 (16.9%)	
Injury to referral			
(1) < 6 months	62 (12.4%)	103 (20.5%)	.19**
(0) > 6 months	194 (38.6%)	143 (28.5%)	
Age			
(1) Under 50 yrs.	190 (37.9%)	211 (42.0%)	.14*
(0) Over 50 yrs.	66 (13.1%)	35 (7.0%)	
Gender			
(0) Male	174 (34.7%)	180 (35.9%)	.06
(1) Female	82 (16.3%)	66 (13.1%)	
Marital status			
(1) Married	179 (35.7%)	155 (30.9%)	.10
(0) Not married	77 (15.3%)	91 (18.1%)	
Injury			
(1) Back	103 (20.5%)	102 (20.3%)	.08
(0) Not back	153 (30.5%)	144 (28.7%)	
(1) Upper body	54 (10.8%)	52 (10.4%)	< .01
(0) Not upper body	202 (40.2%)	194 (38.6%)	
(1) Lower body	38 (7.6%)	44 (8.8%)	.04
(0) Not lower body	218 (43.4%)	202 (40.2%)	

[a]Montana Workers' Compensation Act of 1987.
*$p < .001$. **$p < .0005$.

p = *ns*; upper body injury, $\phi = .01$, p = *ns*; lower body injury, $\phi = .04$, p = *ns*) were not significantly associated with RTW.

Table 4 summarizes results of the regression analysis for the five variables found to be significantly correlated with RTW outcomes. As seen in Table 4, age, education, attorney involvement, mandated vocational rehabilitation, and time from injury to referral predicted RTW status. That is, an injured worker was more likely to return to work after an injury, if she or he (a) was less than 50 years of age, (b) had more years of preinjury education, (c) was not represented by an attorney, (d) was required to receive vocational rehabilitation services, and, (e) was referred for services within the first 6 months after injury.

The model's predictive accuracy is shown in Table 4. The first column, labeled *b*, contains the logit coefficients of the predictor variables. These unstandardized logistic regression coefficients correspond to the *b* (unstandardized regression) coefficients in ordinary least-squares regression (Garson, 2001). These parameter estimates describe the steepness and the direction of the logistical regression curve (Wright, 1995). Unlike ordinary least-squares regression, logistic regression calculates changes in the log odds of the dependent variable. The Wald chi-square statistic in the third column tests the significance of the logit coefficient associated with a given independent variable. This corresponds to significance testing of *b* coefficients in ordinary least squares regression (Garson). The column labeled Exp (*b*), contains the odd ratio for each predictor in the model. The odds ratio is an estimate of the increase in the likelihood of returning to work for one unit increase in the predictor variable when the other independent variables in the model are controlled for (Wright). The odd ratio is always 0 or greater, and it is 1 when membership in the RTW group or did-not-return-to-work group is equally likely. Moreover, the odds are proportional; a variable with a odds ratio of 2 has double the effect of one with an odds ratio of 1.

For each year's increase in education, there was a 1.18 increase in likelihood of the worker's return to work (Wald = 11.29, $p = .0008$). Interestingly, the likelihood of returning to work increased 1.98 times for those workers who were referred post-law (Wald = 10.14, $p = .0015$). Likewise, the likelihood of returning to work increased

TABLE 4. Logistic Regression Analysis of Return-to-Work Status as a Function of Significant Individual Predictors

Variable	*b*	*SE*	Wald χ^2	*p*	Exp (*b*)
Education (yrs.)	.17	.05	11.29	.0008	1.18
No attorney	.55	.20	7.54	.0060	1.74
State law	.68	.21	10.14	.0015	1.98
< 50 years old	.58	.25	5.35	.0207	1.79
< 6 months to referral	.42	.22	3.58	.0584	1.52

1.79 times when the injured worker was less than 50 years old (Wald = 5.35, $p = .0207$). Workers referred for vocational rehabilitation within 6 months of their injury were 1.52 times more likely to return to work than those referred after 6 months (Wald = 3.58, $p = .0584$). Finally, a negative predictor for RTW was attorney involvement. When injured workers did not retain an attorney, they were 1.74 times more likely to return to work than clients who had an attorney (Wald = 7.54, $p = .006$). Thus, the injured workers who returned to work were more likely to be better educated, under 50 years of age, referred for vocational rehabilitation services within 6 months after injury, and not be represented by an attorney. There were no significant relationships between RTW and the variables associated with gender, marital status, or type of injury.

Overall, this five-variable model correctly predicted 64.5% of RTW outcomes. These variables correctly classified 58.5% of the injured workers who were able to return to work and 70.3% of those who did not return to work. The goodness of fit of the predicted model with the observed behavior of injured workers who returned to work was assessed by the Hosmer-Lemeshow statistic. The overall fit of the RTW model suggested there was a satisfactory fit between the predicted model and the data collected, ($\chi(5, N = 502) = 6.66$, $p = 0.465$.

Discussion

This study examined which variables would improve the prediction of RTW status for injured workers who are referred for vocational rehabilitation after injury. The present results suggested our hypothesis model would significantly improve the capacity to predict RTW outcomes for these workers. The most significant individual predictors of RTW status were education, age, mandated vocational rehabilitation, time from injury to referral, and attorney involvement. Typically, the lower the level of education, the less transferability of skills to other employment areas (Smith & Crisler, 1985). Individuals who were less than 50 years of age, had more education preinjury, were referred for vocational rehabilitation services within 6 months after injury, and were not represented by an attorney were more likely to return to work.

An initial regression analysis found that the combination of age, education, mandated rehabilitation, timely referral for services, and lack of attorney involvement significantly predicted RTW outcomes. These results are consistent with previous studies of RTW in workers' compensation cases (Gardner, 1991; Hall, 1994; Hester et al., 1986; Smith & Crisler, 1985). The findings from these studies indicated that older age, less education, delay in the time from injury to referral for vocational rehabilitation services, and attorney involvement can present substantial barriers to RTW; therefore, vocational rehabilitation interventions may need to target these variables with more collaborative and aggressive strategies.

There were several limitations to this study. First, the data were drawn from a single rehabilitation service provider. As a result, despite the large sample size, the ability to generalize results from this study to injured workers is limited, suggesting a need for replication in other rehabilitation provider settings. A second limitation was that the large majority of injured workers were men between the ages of 35 and 55. The injured workers in this study included individuals who had various career opportunities available to them. Although there was the possibility of sexism, rehabilitation obstacles related to racism or poverty did not affect most of these workers. The proposed model thus may fit quite differently in a sample of injured workers who have had different life experiences from those of the individuals in this study. Readers should be cautious when attempting to generalize these models to workers of diverse ethnic backgrounds, age groups, or more prestigious career paths. Third, there was also a unique historical event taking place (enactment of the Montana Workers' Compensation Act) that may have influenced the outcome of this study. Finally, another impact of the retrospective nature of this study was the loss of data. Of the 1,105 cases, 603 had one or more missing datapoints, and if a case was missing one of the demographic or rehabilitation time variables, it was eliminated from the analyses. We conducted analyses to determine if the study participants were systematically different from the individuals who were excluded. This comparison indicated no significant difference in any of the variables used to build the model, with the exception of mandated vocational rehabilitation.

These limitations notwithstanding, this study extends the current literature on RTW outcomes by showing the role that certain factors play in predicting postinjury work status. Although the findings are tentative and limited in scope, they do suggest that variables associated with age, education, attorney involvement, mandated vocational rehabilitation, and timely provision

of services improved the capacity to predict RTW after injury. These findings should be interpreted cautiously, however, because they are merely possible indicators of RTW that need to be corroborated through future investigations.

Because the findings from this study suggested that education may play a particularly important role in RTW for an injured worker, we need to better understand how this variable increases the likelihood of work status. Further research is needed to determine the specific educational skills that increase the likelihood of successful postinjury career development and placement.

These data also raise important questions about the influence of legislation on the effectiveness and efficiency of the rehabilitation provider. Specifically, when state laws require injured workers, employers, and service providers to be actively engaged in the vocational rehabilitation process, the injured worker is more likely to return to work. More collaboration across various geographic and state rehabilitation providers will be required in order to better understand the legal factors that affect access to and vocational rehabilitation outcomes for injured workers. In addition, more research is needed on better defining the role of the attorney and his or her impact on the vocational rehabilitation process.

Finally, our findings underscore the importance of an early vocational rehabilitation intervention. Although early intervention appears to have an important impact on RTW status following injury, it is not clear what impact it has on sustaining employment. Evaluating the "staying power" of vocational rehabilitation will require more longitudinal follow-up studies.

There is no "quick fix" for the problems injured workers face in their RTW efforts after injury. Awareness and early detection of such problems are critical first steps in selecting and providing effective vocational rehabilitation services designed to facilitate successful outcomes. Rehabilitation providers need to be able to identify those injured workers who are most at risk and develop strategies to better facilitate a successful RTW. Injured workers must be provided with appropriate services early in their rehabilitation process.

For injured workers who are at risk of not returning to work due to complicating factors such as age and less education, the rehabilitation provider must clarify and more clearly identify the crucial factors associated with successful and nonsuccessful RTW outcomes and develop appropriate intervention strategies. These factors may include the option of RTW with the preinjury employer, tenure on a preinjury job, a modified job, and additional job-related education and/or job-training options (Tate, 1992a). Because many factors are out of the control of the rehabilitation provider (mandated vocational rehabilitation, time from injury to referral, attorney representation), the provider may need to strengthen working relationships with employers, insurance carriers, legislators, and attorneys to better ensure that injured workers receive appropriate rehabilitation interventions and follow-up services.

Conclusions

This study was designed to provide updated evidence of factors associated with the likelihood of RTW for workers who have been injured on the job. Although our analysis has been limited to retrospective case studies, these results have practical implications because they contribute to the identification of variables that are important in predicting RTW after injury and suggest the need to incorporate these findings within existing workers' compensation and vocational rehabilitation programs. We hope that this study will stimulate future investigations of factors influencing RTW outcomes and facilitate successful vocational rehabilitation intervention strategies for workers who are injured on the job.

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NOTICES

Council for Learning Disabilities Seeks Executive Director

The Council for Learning Disabilities (CLD) is seeking applications for an Executive Director (ED) position. The ED is responsible for coordinating and accomplishing administrative, advocacy, and conference-related tasks in collaboration with and as directed by CLD's Board of Trustees. The ED (.50–.75 FTE) will represent the organization and will respond to the needs of CLD members. The ED will receive support to maintain a national CLD office in his or her community. The salary will be commensurate with the successful candidate's skills and experience; a multiyear contract with an annual renewal review will be written. The new ED will assume full responsibilities July 1, 2003.

Desired Qualifications and Related Experiences

- Leadership, administration, and project management
- Oral and written communication
- Conference planning
- Financial record-keeping
- Advocacy
- Collaboration and team problem solving
- Flexibility, independent work, and time management
- Computer (e.g., word processing, databases, spreadsheets, e-mail)
- Specific learning disabilities (i.e., knowledge and experience)

Application Requirements

The ED application packet must include

1. A cover letter detailing the applicant's qualifications for the ED position
2. A current resume or curriculum vitae
3. Complete contact information for five professional references

Please submit completed applications electronically to the CLD ED Search Committee Chair, Dr. Chriss Walther-Thomas, at tcwalt@wm.edu. For additional information about this position, please contact Chriss by e-mail or by phone at 757/221-2310. Application review will begin November 15, 2002, and will continue until the position is filled. For more information about CLD's mission, strategic goals, organizational structure, and accomplishments, visit the CLD's Web site (www.cldinternational.org).

Tentative Search Committee Timeline

November 15, 2002—Application review will begin.

December 2002–February 2003—Telephone and in-person interviews will be conducted.

March 2003—New Executive Director will be selected.

March to June 2003—Transition period

July 1, 2003—New Executive Director will assume full responsibilities (.50–.75 FTE).

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