Predictors of Returning to Work

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An investigation of predictors of returning to work in a sample of physically injured persons who are receiving workers' compensation benefits and vocational rehabilitation is presented. One hundred fourteen injured subjects (86 with back injury; 28, other injury) undergoing vocational rehabilitation and receiving workers' compensation benefits were assessed on demographic, emotional, cognitive, financial incentive, and miscellaneous variables. Predictors for returning to work were identified using stepwise logistic regression. Patients with moderate or severe depression, defined as a score greater than 16 on the Beck Depression Inventory (BDI), were significantly less likely to return to work following vocational rehabilitation efforts than patients with less severe depression (for back-injured patients, odds ratio (OR) = 31, 95% CI [8.8, 108]). BDI scores correctly classified 84 percent of the back-injury and 86% of the other-injury groups with respect to their return to work. The level of workers' compensation benefit was the only variable that added (marginally) to the predictive power of the BDI. In a physically injured population receiving workers' compensation benefits, who are judged to be not clearly permanently disabled, level of depressive symptoms is a strong predictor of returning to work. Caution is warranted in using the BDI as the sole determinant in a forensic situation for making a real-world prediction, as BDI responses are easy to fake. Treatment of concurrent depression is an important component of helping physically injured workers resume gainful employment.

Psychiatrists are frequently called on to evaluate claimants with back injuries or other medical injuries in workers' compensation or Social Security disability cases, most often because psychiatric conditions are thought to be a concurrent problem, or no organic basis for the injury is found and a psychogenic etiology is hypothesized. The prediction of whether or not a person can or will return to work is often central in these cases. In case conferences, discussions with other evaluators, reviewing reports for courts, and trials, one hears a number of theories pertaining to the variables relevant to this prediction: "you can't teach an old dog new tricks" (age); "he's making so much staying off work, he'll never go back" (financial incentives); and "she's been off so long, she's in a rut" (length of time off).

Much of the research on this question comes from outcome studies in the orthopedic literature of the treatment of low back pain, some of which have used return to work as an outcome measure. Organic factors, such as level of pain and severity of physical injury, have generally not yielded good outcome predictions,[1, 2] in

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significant part because of the difficulty in making reliable measurements. Forensic factors such as injury at work,[3] involvement with the workers' compensation system,[4] and litigation have been found associated with worse outcomes.[2, 5, 6] Nonorganic factors such as length of time off work,[1] age,[5] and mixed social factors[1, 5, 7, 8] (e.g., family problems, feelings about work, and attitude toward illness) have been identified as having some significance as predictors of outcome.

Psychological factors generally[3, 2, 9] have been found associated with disability. The MMPI has been the most used standardized measure in research in this area. The MMPI subscales for hypochondriasis, hysteria, and depression, have been found elevated in the chronic low back pain population.[7, 8, 10, 11] However, studies have generally concluded there is little value for the MMPI in predicting return to work.[2, 5, 8, 12] One study[7] using both the MMPI and the Beck Depression Inventory (BDI) found significant treatment outcome results on the BDI, but not on the MMPI depression scale.

The present study was designed to shed further light on the prediction of returning to work following physical injury by examining a number of variables for their predictive power.

Method

The sample for this study included 114 adults who were receiving workers' compensation benefits and had been referred for vocational rehabilitation services. Thus it had already been decided at the time of referral that they were unable to return to their previous jobs. They were referred because it was thought they might be able to return to work with assistance; this was not a population who had been judged permanently disabled. Eighty-six had a primary complaint of back pain, and they were selected as the primary group for analysis. The remaining 28 were more varied in their disability, and were used as a comparison group.

Clients were rated on a variety of scales that were thought to be potential predictors for their returning to work. These included standardized measures of emotional functioning (the Beck Depression Inventory,[13] Rotter Internal/External Locus of Control,[14] Coopersmith Self Esteem Inventory[15]); standardized measures of cognitive functioning (Wechsler Adult Intelligence Scale-Revised [WAIS-R] and Wide Range Achievement Test [WRAT]); demographic variables (age, sex); financial variables (previous wage, workers' compensation benefit, benefit as a percentage of previous wage); severity of physical injury (presence of surgical intervention); length of time off work; and whether school was attended as part of the rehabilitation effort. Overall, 36 percent of the clients returned to work.

The data were analyzed using stepwise logistic regression techniques using the SPSS/PC+[16] statistical package. Logistic regression is a technique appropriate in predicting a probability of a binary outcome (return to work/not return to work).*

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*For those unfamiliar with logistic regression, it is somewhat analogous to linear regression in that it allows for multiple variables to be entered into the predictive equation. However, instead of using a linear function of variables, it uses an exponential function. Furthermore, it allows for the use of categorical variables. It is generally to be preferred in predicting yes/no outcomes.[17]

Results

Back Injury Subgroup The return-to-work (RTW) and no return-to-work (no RTW) groups were significantly different (by t tests) on variables related to emotional state, cognitive functioning, and whether subjects attended school as part of the rehabilitation effort. The most striking difference was on the BDI (RTW mean = 11; no RTW mean = 23; $t > 7$; $p < .001$). Potential predictors for returning to work were analyzed using logistic regression techniques. The power of individual predictors is shown in Table 1 by the r statistic (a measure of partial correlation in logistic regression). As can be seen, the emotional and cognitive variables were significantly correlated with returning to work ($p < .01$), while presence of back surgery, time off work, and the demographic and financial variables were not significant single variable predictors. Further, BDI scores were the best single predictor of returning to work. Using the prediction rule that everyone with a BDI score greater than 16 will not return to work correctly predicted the result in 84 percent of cases (see Table 2). This cutoff score approximates a lower bound for moderate to severe depression.[13] This level of prediction is highly significant (model $\chi^2 > 38$; $p < .00005$; odds ratio [OR] = 31; 95% CI [8.8, 108]). The predicted probability distribution from the logistic regression analysis is shown in Figure 1. Of interest, the outlier (BDI = 39; the "Y" to the far left of Figure 1) who did return to work only did so after he received a lump settlement and moved to England, which raised the possibility that his depression score reflected an attempt to influence litigation rather than his level of depression.

Stepwise logistic regression allows for the addition of significant variables in the

Table 1
Individual Predictors: Back-Injured Patients

Rank Ordering of Individual Predictors N = 86 (37% returned to work)	
Variable	r
Beck Depression Inventory (BDI)	.5425
Rotter Locus of Control	.4049
Coopersmith Self Esteem	.3973
IQ, performance	.3448
WRAT, reading	.3395
School part of rehabilitation	.3385
IQ, full scale	.3053
WRAT, math	.2344
IQ, verbal	.2212*
Age	.0996†
Workers' compensation benefit ($)	.0000
Previous wage	.0000
Sex	.0000
Back surgery	.0000
Workers' compensation benefit (%)	.0000
Time off work	.0000

*$p < .01$.
†$p > .05$.

Table 2
Prediction of Return to Work (using Cutoff of BDI = 16)

	Back Injury,* N = 86 Predicted		Other Injury,† N = 28 Predicted	
	No	Yes	No	Yes
Observed				
No	44	10	16	2
Yes	4	28	2	8

*Accuracy 83.7%.
†Accuracy 85.7%.

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    16 ┼
 F
 R    12 ┼
 E
 Q        N
 U        N
 E     8 ┼ N
 N        N                    ↓ cutoff point
 C        N
 Y        YN    N              Y                   Y         Y
       4 ┼NN    N       N      Y         Y    Y    Y         Y
          NNNNN N   Y   N N    N    Y  Y    Y  Y    Y  Y  Y
          NNNNN N   N   N N    N  Y Y  N  Y  Y  N    Y Y Y  Y
          NNNNNN NNN N N N N   N  Y N  N  N  N  N N  Y Y Y YN YN Y
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 BDI  score   >24      20      16           10        5       0
                                ↑
 Predicted:  No return to work  │  Yes return to work
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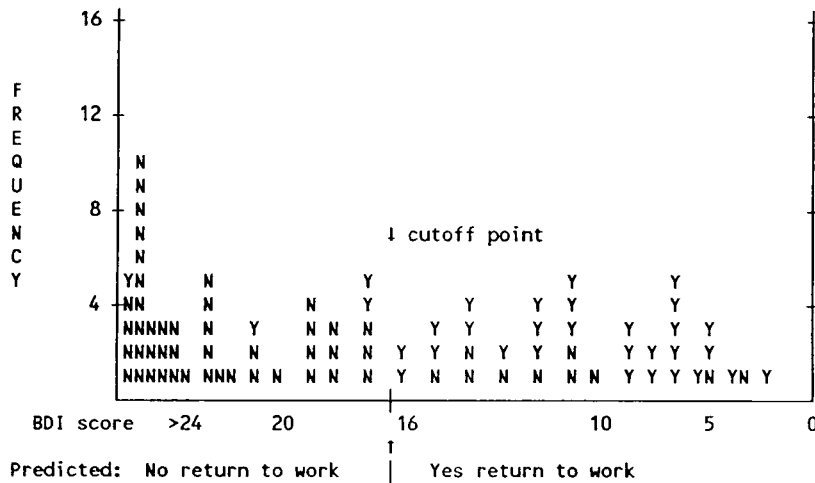
Figure 1. Frequencies of observed return to work (Y/N) compared with predictions (back-injured group, N = 86). X-axis is linear for predicted probability of return to work and therefore is not linear with respect to BDI.

predictive model.[†] The second significant variable was the workers' compensation benefit received. The addition of this variable did not improve the accuracy of classifying a person as returning to work or not, but did improve the contours of the probability distribution (improvement of model $\chi^2 = 4.4$; $p < .05$). In other words, the level of workers' compensation benefit, although of no predictive value as a single variable, statistically helped discriminate among those subjects who were mildly to moderately depressed. There was no significant increase in predictive power in adding any of the other variables to the prediction equation.

Other Injury Subgroup Using the same predictor rule of a BDI cutoff score

of 16, 86 percent of the group of mixed "other" orthopedic disabilities was correctly classified (Table 2), a highly significant result (logistic regression model $\chi^2 > 13$; $p < .0002$; OR = 32; 95% CI [3.8, 270]). Stepwise logistic regression found no significant increase in power with the addition of any of the other variables beyond the BDI score. These findings are very similar to those found in the back-injured subgroup.

Association of Depression with Other Variables After finding that severity of depression was the strongest predictor of returning to work, *post hoc* analyses were carried out to see what variables were associated with depression. As expected, severity of depression was highly correlated with external locus of control and low self esteem (Pearson $r > .58$, $p < .001$). More severe depression was also significantly correlated with lower IQ

[†]After statistically utilizing the first variable, stepwise logistic regression tests whether any other variables add to the overall level of prediction.

scores, lower achievement, and no additional schooling as part of the rehabilitation effort (all $r > .36, p < .001$). Severity of depression was not significantly correlated with sex, age, length of time off work, presence of back surgery, or financial variables (all $r < .15$, p not significant).

Discussion

Depression was a common problem in this sample. Specifically, 63 percent of the back-injured sample reported moderate to severe levels of depression on the BDI. In a physically injured population receiving workers' compensation benefits who were judged to be not clearly permanently disabled, the level of depression was the best predictor of returning to work. Other factors, such as financial incentives or disincentives to work, the length of time the person had been off work, cognitive capacities, or demographic variables, had minimal to no predictive power after statistically controlling for the effect of depression.

This study found considerably more predictive power in using the BDI than have previous studies using the MMPI. This finding is consistent with the results of Barnes et al.,[7] who found the BDI to be a significant predictor of treatment outcome, although in that study the MMPI depression subscale was not a significant predictor.

A number of variables that might be predictive of return to work were not included in this study. Our measure of severity of injury—history of surgical treatment—gets at only a small part of the picture. Although severity of injury or

degree of pain has not been found to be predictive, this may reflect difficulties in reliable measurement, and, as better measures become available, these variables need to be studied further. Other variables, such as an injured worker's own self-expectations or attitudes towards work, may be important in themselves or in association with depression. The finding that depression is such a strong predictor raises a host of further questions. (1) To what extent is post injury depression associated with preinjury depression? (Our clinical impression was that preinjury depression was uncommon, but in a population involved in litigation, some minimization of preinjury conditions is to be expected.) (2) Are there particular symptom patterns to the depressions? (3) How responsive to what types of treatment are the depressions? (4) To what extent will treatment of depression shorten time off work? These questions await further research.

Some cautions are in order in using these findings in forensic evaluations. First, scores on the BDI are easy to fake,[13] which is a significant limitation in using the BDI as the sole determinant in a clinical situation for making a real-world prediction. In a clinical situation, forensic psychiatrists have other standardized instruments and clinical skills to make a fuller assessment of the severity of depression. Second, it must be understood that this sample represented a middle ground of cases: they had already been adjudged significantly injured, but not to the level of permanent disability. Psychiatric evaluation often comes prior to that adjudication, and much of that initial de-

termination likely hinges on an assessment of the physical injury. Finally, the methodological limitations of this study need to be considered in applying the results to individual cases.

The findings have clear implications for intervening in this population. Although our study did not investigate the nature of the depression or the extent to which the depression was reactive to being off work, our results strongly suggest that treatment of concurrent depression is an important component of helping the physically injured workers' compensation population resume gainful employment.

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