

# Clinical Factors Associated With Employment Among People With Severe Mental Illness

## *Findings From the Employment Intervention Demonstration Program*

Lisa A. Razzano, PhD,\* Judith A. Cook, PhD,\* Jane K. Burke-Miller, MS,\* Kim T. Mueser, PhD,†  
 Susan A. Pickett-Schenk, PhD,\* Dennis D. Grey, BA,\* Richard W. Goldberg, PhD,‡  
 Crystal R. Blyler, PhD,§ Paul B. Gold, PhD,|| H. Stephen Leff, PhD,¶ Anthony F. Lehman, MD,‡  
 Michael S. Shafer, PhD,# Laura E. Blankertz, PhD,\*\* William R. McFarlane, MD,††  
 Marcia G. Toprac, PhD,‡‡ and Martha Ann Carey, PhD, RN§

**Abstract:** Research has shown that supported employment programs are effective in helping psychiatric outpatients achieve vocational outcomes, yet not all program participants are able to realize their employment goals. This study used 24 months of longitudinal data from a multisite study of supported employment interventions to examine the relationship of patient clinical factors to employment outcomes. Multivariate random regression analysis indicated that, even when controlling for an extensive series of demographic, study condition (experimental versus control), and work history covariates, clinical factors were associated with individuals' ability to achieve competitive jobs and to work 40 or more hours per month. Poor self-rated functioning, negative psychiatric symptoms, and recent hospitalizations were most consistently associated with failure to achieve these employment outcomes. These findings suggest ways that providers can tailor supported employment programs to achieve success with a diverse array of clinical subpopulations.

**Key Words:** Employment, clinical factors, mental illness, random regression.

(*J Nerv Ment Dis* 2005;193: 705–713)

\*Center on Mental Health Services Research and Policy, Department of Psychiatry, University of Illinois at Chicago, Chicago, Illinois; †New Hampshire-Dartmouth Psychiatric Research Center and Dartmouth Medical School, Concord, New Hampshire; ‡Department of Psychiatry, University of Maryland, Baltimore, Maryland; §Center for Mental Health Services, Substance Abuse and Mental Health Services Administration, Rockville, Maryland; ||Department of Psychiatry, Medical University of South Carolina, Charleston, South Carolina; ¶Human Services Research Institute, Cambridge, Massachusetts; #Community Rehabilitation Division, University of Arizona, Tucson, Arizona; \*\*School of Social Work and Social Research, Bryn Mawr College, Bryn Mawr, Pennsylvania; ††Department of Psychiatry, Maine Medical Center, Portland, Maine; and ‡‡Texas Department of Mental Health and Mental Retardation, Austin, Texas.

Send reprint requests to Lisa Razzano, PhD, UIC Center on Mental Health Services Research and Policy, Department of Psychiatry, 104 South Michigan Ave., Suite 900, Chicago, IL 60603.

Copyright © 2005 by Lippincott Williams & Wilkins

ISSN: 0022-3018/05/19311-0705

DOI: 10.1097/01.nmd.0000185939.11282.3e

Research from diverse fields presents substantial evidence of the importance of employment to people with severe mental illness (Cook and Pickett, 1995). There is a great interest in working (Rogers et al., 1991), and numerous studies demonstrate successful participation of people with severe mental illness in the labor market across different types of competitive employment settings (Cook and Razzano, 2000; Crowther et al., 2001). Research also has identified the benefits of employment for this population, including alleviation of poverty (Polak and Warner, 1996), improved functioning (Anthony et al., 1995; Bond et al., 2001a; Lehman, 1995), and enhanced quality of life (Arns and Linney, 1995). Yet it is estimated that the majority of people with psychiatric disabilities, 75% to 90%, remain outside of the labor force in the United States (Anthony and Blanch, 1987; Mueser et al., 2001).

Although evidence-based supported employment programs facilitate improvement in vocational outcomes (Bond, 2004), many participants remain unable to realize their employment goals (McGurk and Mueser, 2004). To address this problem, relationships between clinical aspects of psychiatric illness and employment outcomes have been studied to identify subgroup variations in the outcomes of individuals receiving vocational services. The intent of this line of research is to gain knowledge that will help to improve models of vocational service delivery by tailoring programs according to participants' clinical needs (Bond et al., 2001b; Twamley et al., 2003). These clinical factors include diagnosis, symptomatology, functional impairment, co-occurring substance use, co-occurring medical conditions or disabilities, medication adherence, and psychiatric hospitalization.

Prior research suggests that people diagnosed with schizophrenia spectrum disorders have poorer employment outcomes than others with severe mental illness. A recent review of the literature on the association between diagnostic factors and employment outcomes by Wewiorski and Fabian (2004) found that many studies conducted over the past 2 decades have concluded that people with schizophrenia demonstrate poorer vocational outcomes, in terms of both job

attainment and job tenure, compared with people with other psychiatric diagnoses. However, other research reviews report that psychiatric symptoms are a more powerful predictor of employment status than psychiatric diagnosis (Cook and Razzano, 2000; Tsang et al., 2000). For example, Tsang et al. (2000) observed that when studies of psychiatric symptoms and employment differentiate between positive and negative symptoms, it is negative symptoms that are most often found to be associated with poor work outcomes.

Functional impairment also has been found to be associated with employment outcomes among psychiatric outpatients (Cook and Razzano, 2000). Since level of functioning cuts across clinical diagnoses and symptomatology, it has been argued that functioning is a more important factor than diagnosis in understanding work ability (Cook and Rosenberg, 1994; Gaudino et al., 2001). Although other investigations have examined functioning as a treatment outcome (Goethe et al., 1996), Tsang et al. (2000) note in their review of the literature that 11 empirical studies have established support for social functioning measures as predictors of vocational outcomes. Self-report measures of functioning have the added benefits of being easier to obtain than clinical assessments and also of involving consumers' perspectives in assessing their needs. Self-report assessments have also been shown to be reliable (O'Malia et al., 2002) and valid measures of functioning (Khatri et al., 2001).

Co-occurrence of other disabilities and medical conditions represents additional clinical factors that affect employment among people with severe mental illness. Dixon et al. (2001) cite a growing body of literature indicating the high prevalence of medical disorders among people with severe mental illness, including cardiovascular disease, tuberculosis, and diseases of the lungs, kidneys, and digestive tract, all of which may be related to impaired physical and social role functioning. Cognitive impairments also have been shown to limit the success of vocational rehabilitation for outpatients diagnosed with schizophrenia (Cook and Razzano, 2000). Bell and Bryson (2001) speculate that cognitive impairments are relatively independent of psychiatric symptomatology yet may be important contributors to disability. Furthermore, despite identification of some methodological flaws, Tsang et al. (2000) conclude that previous research has established a pattern in which cognitive impairments are associated with poorer vocational functioning.

Substance use is perhaps the most frequently identified co-occurring disorder among psychiatric outpatients, with estimates that as many as half of all people with severe mental illness have substance use disorders (Drake et al., 2003). However, there also are inconsistent findings regarding the relationship of substance use to employment outcomes in this population. While some studies suggest that substance use has deleterious effects on employment outcomes (Meisler et al., 1997; Pickett-Schenk et al., *In press*), others have found that clients with dual diagnosis do as well as or better than those without comorbidity in vocational programs (Bell et al., 2002; Drebing et al., 2002).

The effects of clinical interventions on employment, especially given more recent developments in psychophar-

macology, also have received research attention. Studies on the impact of atypical antipsychotic medications on work status among people with diagnoses of schizophrenia have found modest or nonsignificant results (Bond and Meyer, 1999; Ziegler and Peachey, 2003). However, there may be an indirect link between the effects of medications on symptom control, which, in turn, facilitates job attainment (Bond and Meyer, 1999; Meyer et al., 2002; Noordsy and O'Keefe, 1999). In a review of the research on medication compliance, Cramer and Rosenheck (1998) found no significant differences in medication compliance rates between individuals with psychiatric disorders and those with physical disorders. Nonetheless, other studies have reported a wide range in rates of medication compliance among people with severe mental illness, with consequent risks for relapse and hospitalization (Haywood et al., 1995). Psychiatric hospitalization itself also is a deterrent to employment, and even after discharge from inpatient settings, studies have found that in addition to being at risk for rehospitalization (Haywood et al., 1995), many people continue to experience substantial functional deficits as barriers to employment (Goethe et al., 1996).

Prior research on the relationship of these clinical factors to employment outcomes generally has been limited in two ways. First, most studies of vocational interventions have used relatively small samples, restricting their ability to explore subgroup variations (Bond et al., 2001a). Second, the cross-sectional design or limited follow-up periods of prior research impede the assessment and evaluation of temporal relationships (Cook and Razzano, 2000). The present study addresses these limitations by using data from a multisite intervention demonstration program with a large sample size and an extended longitudinal follow-up period of 2 years to examine the relationship between clinical factors and vocational outcomes.

## METHODS

### Study Participants

Study participants took part in the Employment Intervention Demonstration Program (EIDP). The EIDP was a multisite longitudinal investigation of supported employment located at eight study demonstration sites, including Maryland, Connecticut, South Carolina, Pennsylvania, Arizona, Massachusetts, Maine, and Texas. The EIDP was developed under a cooperative agreement funding mechanism, in which researchers and federal personnel collaborated in the implementation of a common interview protocol, uniform data collection methods, and statistical analysis (Cook et al., 2002). These efforts were lead by the EIDP Coordinating Center based at the University of Illinois at Chicago, Center on Mental Health Services Research and Policy, Department of Psychiatry, in partnership with the Human Services Research Institute, located in Cambridge, Massachusetts. Demonstration sites recruited participants from existing clinical populations in a variety of ways, including case manager referrals, self-referrals, word of mouth, and newspaper advertisements. Additional information regarding the background of the multisite study is described elsewhere in detail

(Cook et al., 2002) and is available from the EIDP Web site (<http://www.psych.uic.edu/eidp>).

Participants met specific inclusion criteria: being 18 years or older at the time of study enrollment, willingness and ability to provide informed consent, having a DSM-IV Axis I diagnosis of mental illness, and being unemployed at time of entry into the study. Subjects were recruited between February 1996 and May 2000, and all were monetarily compensated, with amounts varying from \$10 to \$20 per interview. Each site received approval from its local Institutional Review Board for protection of human subjects and obtained written informed consent from all participants. All EIDP study sites administered the same semiannual interview protocol (i.e. EIDP Common Protocol) measuring demographic characteristics and other study outcomes; vocational assessments of employment status were completed weekly for all EIDP participants. Enrolled participants were randomly assigned to either the enhanced or comparison study conditions at each site. Evaluation of the equivalence of the two study conditions on relevant participant characteristics (e.g. demographic, clinical, and work history) found no statistically significant differences, confirming the success of randomization procedures. The results of the experimental study condition are described elsewhere in detail (Cook et al., 2005).

The evaluation presented here uses 24 months of data from 1273 EIDP participants in seven states (Arizona, Connecticut, Massachusetts, Maryland, Maine, South Carolina, and Texas). Data from the Pennsylvania site have been excluded since that site tested a job retention intervention for already employed participants. As a result, Pennsylvania subjects did not meet the study inclusion criterion of unemployment, and the distribution of their outcome data was inappropriate for pooling with those of the remaining EIDP study sites.

## Study Measures

### Clinical Variables

Clinical indicators used in the present analysis included a DSM-IV Axis I diagnosis of schizophrenia spectrum disorders (DSM-IV code 295.xx) versus all other Axis I diagnoses. Physical and developmental comorbidities were assessed at baseline by a clinician familiar with the participant as well as obtained from clinical records. Comorbid substance use was assessed from three sources: 1) clinician ratings using the Alcohol Use Scale and Drug Use Scale (Drake et al., 1990, 1996); 2) a DSM-IV substance use-related diagnosis; or 3) self-report of any use of illegal drugs, improper use of prescription drugs, or use of alcohol at least 7 out of the past 30 days at any time during the study. Information from these three sources was used to create an indicator for any substance use during EIDP participation that was included in multivariate analyses as a fixed covariate (i.e. not time-varying).

The clinical variables described below were measured at baseline and at each of the five semiannual interviews that followed over 24 months. Thus, they are included in the analyses as time-varying covariates. Positive, negative, and

general psychopathology symptoms were measured using the Positive and Negative Syndrome Scale (PANSS; Kay et al., 1987). Although the PANSS traditionally has been used with individuals with schizophrenia, other published studies have demonstrated that the PANSS is a valid and reliable assessment when used to evaluate symptoms among individuals with other diagnoses, including bipolar disorder, personality disorders, and posttraumatic stress disorder (Daneluzzo et al., 2002; Hamner et al., 1999; Koenigsberg et al., 2003). Independent psychometric analyses of the EIDP Common Protocol instrumentation revealed that high levels of interrater and test-retest reliability were achieved on the PANSS as well as other study measures (Salyers et al., 2001). A self-rated item assessing functioning in nonvocational life roles ("Overall, how would you rate your functioning in home, social, and school settings at the present time?") was scored on a 4-point Likert scale (excellent, good, fair, poor) and then dichotomized into fair/poor versus good/excellent. This item was adopted from the Quality of Life Interview, a measure shown to demonstrate good to excellent reliability and validity in prior research (Lehman, 1988). A categorical level indicator of adherence to psychotropic medications was derived from two self-report items: "How often do you take your medication(s) as prescribed?" and "When you take [your medication], how much do you take?" These items were then collapsed into a single dichotomous variable in which respondents who reported any response except being "almost always" adherent and/or any instance of taking an incorrect dosage of their medications were coded as nonadherent. Occurrence of recent psychiatric hospitalization was assessed from participant self-report of hospitalization in the 6 months preceding each study assessment and confirmed with respondents' service providers.

### Dependent Variables

Two time-varying vocational outcome variables were selected for analysis by the EIDP Steering Committee to reflect two different aspects of employment (i.e. work quality versus intensity) and in keeping with prior research regarding evidence-based principles of vocational rehabilitation (Kregel et al., 1989; Polak and Warner, 1996; Rogers et al., 1991). The first, competitive employment<sup>1</sup> (CE), was defined as a job that 1) paid minimum wage or higher; 2) was located in a mainstream, socially integrated setting; 3) was not set aside for mental health consumers; and 4) was held independently (i.e. not contracted with a social service agency). The first two criteria defining the CE outcome correspond to those in the US Department of Labor's definition of competitive employment, while the second two are consistent with definitions of competitive employment used in prior research (Bond et al., 2001b; Drake et al., 2003). For each month of the 2-year study period, participants were coded as either having worked in competitive employment (1) or not (0). During the first month of study participation, almost 5% of all participants engaged in CE; this proportion rose to 17% during month 12, and continued to climb to 20% at month 24. At the end of the study, a total of 44.7% of all participants had

engaged in competitive employment at least once during their time in the program.

The second employment outcome, work for 40 or more hours per month (W40), is an outcome used by the Centers for Medicare and Medicaid Services in their demonstration program, "Demonstration to Maintain Independence and Employment," issued June 7, 2000 (CFDA No. 93.779). This outcome evaluates the intensity of employment in terms of the number of hours worked during a 1-month time period. For each of the 24 months of the study period, participants were coded as either having achieved this level of employment (1) or not (0). During the first month of study participation, just over 2% of all participants worked for 40 or more hours, and this proportion rose to 19% in month 12 and 22% in month 24. By the study's end, a total of 45.2% of all participants had worked for at least 40 hours in 1 or more months.

### Covariates

Results of prior research suggest that a number of covariates might confound clinical characteristics and employment outcomes and therefore should be included in the multivariate models as control variables. These covariates include prior employment history, age, gender, race, and education. In addition, the effects of study site, study condition, and number of assessments also were controlled for in this evaluation.

### Follow-Up Rates and Attrition

The number of interviews for each participant included in the analysis ranged from one to five (baseline and four semiannual follow-up interviews), with a mean of 4.3 ( $SD = 1.1$ ) per participant. Of 1273 participants, 65% completed all five interviews, 14% completed four, 9% completed three, 9% completed two, and the remaining 3% completed one interview. The clinical and demographic characteristics of those completing all five interviews were compared with those of all others to ascertain any bias related to attrition. The only significant differences were related to gender and age: 68% of women completed all five interviews, compared with 62% of male participants ( $p < 0.05$ ); and on average, completers were 1 year older than noncompleters (i.e. 39 vs. 38-year-old;  $p < 0.05$ ). The multivariate models were adjusted for the potential influence of these differences and included a covariate representing the number of assessments completed by each subject.

### Analyses

Data analyses included calculation of frequency distributions and correlations among independent and dependent variables. The multivariate analyses were conducted using random-effects logistic regression modeling, one of a group of statistical techniques described as random regression models (RRMs). Several notable advantages of RRM in analyzing longitudinal and multisite data include RRM's superiority in dealing with serial correlation, individual heterogeneity, missing observations, and inclusion of time-varying with fixed covariates (Gibbons et al., 1993). RRM also provides

estimates of the effect of each participant clinical characteristic on each vocational outcome across the entire 24-month study period, controlling for the effects of the other variables in the model, including linear and nonlinear time (month and month squared, respectively).

## RESULTS

### Participant Characteristics

Table 1 describes EIDP participants' clinical and demographic characteristics at baseline. Approximately half of the participants had a schizophrenia spectrum diagnosis (51%); other major diagnoses in the cohort were major depression (22%) and bipolar disorder (17%). Regarding psychiatric symptoms as measured by the PANSS, the mean and median (minimum/maximum) for each of the three subscales were approximately 14 (7/33) for positive symptoms, 16 (7/37) for negative symptoms, and 34 (16/62) for general psychopathology. At baseline, over half (55%) rated their functioning as fair/poor (versus good/excellent). Forty percent had a clinically determined co-occurring medical condition or disability, and just over half (56%) had a co-occurring substance use diagnosis or self-reported use of alcohol and/or drugs. Almost all (97%) participants reported being prescribed one or more psychiatric medications, and at baseline, 21% reported nonadherence to these medications. About one quarter (24%) had experienced a psychiatric hospitalization in the 6 months prior to study baseline. Almost two thirds

**TABLE 1.** Participant Clinical and Demographic Baseline Characteristics ( $N = 1273$ )

Variable	Percent
Any schizophrenia spectrum diagnosis	51%
Psychiatric symptomatology <sup>a</sup>	Median, mean ( $SD$ ) minimum/maximum
Positive symptoms	14, 14.4 (5.1) 7/33
Negative symptoms	16, 16.2 (5.5) 7/37
General psychopathology	34, 34.3 (8.8) 16/62
Self-reported functioning fair/poor (vs. good/excellent)	55%
Any physical or cognitive comorbidity	40%
Co-occurring substance use disorder	56%
Self-reported nonadherence to medications	21%
Any psychiatric hospitalization within 6 mo prior to baseline	24%
Any paid work in 5 y prior to study baseline	64%
Less than a high school education	35%
White/Caucasian	50%
Male	53%
Age	Median, mean ( $SD$ ) minimum/maximum 38 y, 38.4 y (9.4) 18/76 y

<sup>a</sup>Measured by the PANSS (Kay et al., 1987). Higher scores indicate more symptoms.

**TABLE 2.** Correlations Among Major Study Variables: Baseline Participant Characteristics and Employment Outcomes Across Study

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Schizophrenia spectrum diagnosis (1)	—										
Positive symptoms <sup>a</sup> (2)	.18**	—									
Negative symptoms <sup>a</sup> (3)	.10**	.29**	—								
General psychopathology symptoms <sup>a</sup> (4)	-.01	.64**	.55**	—							
Self-rated fair-poor functioning (5)	-.07*	.10**	.18**	.28**	—						
Comorbid condition (6)	-.03	.11**	.09**	.10**	.01	—					
Co-occurring substance use (7)	.04	.17**	.04	.13**	.06*	.02	—				
Medication nonadherence (8)	-.02	.06*	.11**	.11**	.10**	.03	.08**	—			
Recent psychiatric hospitalization (9)	.05	.13**	.01	.10**	.05	-.01	.12**	-.04	—		
Competitive employment (10)	-.04	-.13**	-.07*	-.11**	-.01	-.12**	.00	-.02	-.03	—	
Worked 40 hours or more in a month (11)	-.09**	-.15**	-.11**	-.12**	.01	-.05	-.05	-.04	-.08**	.59**	—

\* $p < 0.05$ ; \*\* $p < 0.01$ .

<sup>a</sup>Measured by the PANSS (Kay et al., 1987). Higher scores indicate more symptoms.

(64%) had done any work for pay in the 5 years prior to study baseline; over one third (35%) had less than a high school education; half (50%) were Caucasian, 29% were African American, and 15% were Hispanic/Latino. Just over half of EIDP participants (53%) were male; the average and median age (minimum/maximum) was 38 years (18/76).

Table 2 shows the unadjusted Pearson correlations among the independent and dependent variables used in this analysis. Positive, negative, and general psychopathology symptom scores on the PANSS were negatively correlated with both CE and W40 ( $p < 0.05$ ). Having a co-occurring condition was negatively correlated with CE ( $p < 0.01$ ), while a diagnosis of schizophrenia was negatively correlated with W40 ( $p < 0.01$ ). There were statistically significant correlations among the participant clinical characteristics, but none of these relationships were large enough to indicate multicollinearity based on published guidelines (i.e.  $r < .65$ ; Myers, 1990, p. 368–371; Stevens, 1996, p. 76–77). Positive and negative psychiatric symptoms were positively correlated with all other clinical characteristics except recent psychiatric hospitalization. General symptoms were positively correlated with all other clinical characteristics except schizophrenia diagnosis. Although the two dependent variables were positively correlated with each other, their moderate relationship ( $r < .65$ ) indicated that they represent distinct dimensions of labor force participation.

Table 3 summarizes the results of random-effects logistic regression models for the two dependent variables, CE and W40. The main effects tested are related to the impact of the clinical factors, including diagnosis, psychiatric symptoms, functioning, comorbid medical conditions/disabilities, comorbid substance use, medication adherence, and recent psychiatric hospitalization. The models also included a factor for linear time (months 1 to 24 of program participation) and time squared (i.e. month\*month, a quadratic term to test for the nonlinearity of the trends in outcomes), as well as the set of covariates (demographic features, prior employment history, study condition, study site, and the number of assessments completed) previously described. In the model predicting CE, linear time (month) is positive and significant, with

an odds ratio (OR) of 1.20 ( $p < 0.001$ ). This finding indicates that, with each month of study participation, subjects' likelihood of achieving competitive employment increased by approximately 20%. At the same time, nonlinear time (month<sup>2</sup>) is statistically significant ( $p < 0.001$ ), with an odds ratio less than 1, indicating that the positive slope of the time trend attenuated slightly over the course of the study. Higher than median PANSS scores for positive symptoms were associated with greater likelihood of achieving CE (OR = 1.09;  $p < 0.05$ ), while higher than median negative symptom score was associated with a lesser likelihood of achieving CE (OR = 0.81;  $p < 0.001$ ). Self-reported fair/poor functioning was significantly associated with a lesser likelihood of

**TABLE 3.** Results of Random Effects Logistic Regression Models<sup>a</sup>

Variable	Odds Ratios and $p$ Values	
	Competitive Employment (CE)	Worked 40 Hours or More (W40)
Linear time (program month)	1.20***	1.28***
Quadratic time (month*month)	0.99***	0.99***
Schizophrenia spectrum diagnosis	0.89	0.59***
Higher than median positive PANSS score	1.09*	0.96
Higher than median negative PANSS score	0.81***	0.79***
Higher than median general psychopathology PANSS score	0.96	0.80***
Self-rated fair/poor functioning	0.72***	0.75***
Any comorbid health condition	0.83**	1.15*
Any comorbid substance use	0.49***	0.89
Any medication nonadherence	1.00	0.88**
Any recent psychiatric hospitalization	0.72***	0.68***

\* $p < 0.05$ ; \*\* $p < 0.01$ ; \*\*\* $p < 0.001$ .

<sup>a</sup>Both models control for study site, study condition, number of assessments, prior employment history, age, gender, race, and education.

achieving CE (OR = 0.72;  $p < 0.001$ ). Presence of a co-occurring medical condition or disability was significantly associated with a lesser likelihood of achieving CE (OR = 0.83;  $p < 0.01$ ), and those with co-occurring substance use were only half as likely to achieve CE as those without (OR = 0.49;  $p < 0.001$ ). Psychiatric hospitalization in the 6 months prior to the month in which the dependent variable was measured (changing over time) also was associated with lesser likelihood of achieving CE (OR = .72;  $p < 0.001$ ). Diagnoses of schizophrenia spectrum disorder, PANSS general psychopathology symptom scores, and self-reported non-adherence to medications were not significantly associated with likelihood of CE in this model.

In the multivariate analysis of W40, the effects of time were similar to those seen in the CE model. Linear time (month) was positive and significant (OR = 1.28;  $p < 0.001$ ), with a nonlinear attenuation of the positive slope with each additional month in the study (OR = 0.99;  $p < 0.001$ ). However, unlike CE, having a diagnosis of schizophrenia was significantly associated with considerably lesser likelihood of W40 (OR = .59;  $p < 0.001$ ). In this model, negative symptoms were again negatively associated with an employment outcome (OR = 0.79;  $p < 0.001$ ); additionally, general psychopathology symptoms also were associated with a lesser likelihood of W40 (OR = 0.80;  $p < 0.001$ ). Also consistent with the model for CE, having fair/poor self-rated functioning was associated with lesser likelihood of W40 (OR = 0.75;  $p < 0.001$ ). Contrary to the CE model, however, having a co-occurring health or developmental condition was associated with a greater likelihood of this employment outcome (OR = 1.15;  $p < 0.05$ ). Both self-reported nonadherence to psychiatric medications and recent psychiatric hospitalization were associated with lesser likelihood of subsequent W40 (OR = 0.88;  $p < 0.01$ ; and OR = 0.68;  $p < 0.001$ , respectively). Neither positive symptom PANSS scores nor substance use was significant in the model for W40.

## DISCUSSION

The major finding of this study was the association of several clinical factors with positive vocational outcomes, controlling for experimental versus control condition assignment, study attrition, subjects' demographic features, and study site. In addition, while some clinical factors were consistently associated with vocational outcomes, others were not. These differences may be related to the differing nature of the two outcome variables, in that CE represents job quality while W40 represents work intensity. There also were differences in the pattern of the relationships revealed between clinical characteristics and the employment outcomes at the univariate and multivariate levels in these analyses, suggesting that these relationships are complex. Nonetheless, the findings generally are consistent with prior research and suggest ways in which clinical knowledge can be used to promote the use of vocational services and to improve employment outcomes.

Diagnosis of schizophrenia was not significantly associated with achieving CE, and this is consistent with prior

research indicating that symptoms and functioning are more important predictors of vocational outcomes than diagnosis itself. On the other hand, having a schizophrenia spectrum diagnosis was associated with lesser likelihood of working at a relatively intense level (i.e. 40 or more hours in a month), even when controlling for symptoms and functioning. It may be that a diagnosis of schizophrenia is associated with factors that limit work intensity, such as taking antipsychotic medications with sedating effects. However, the finding that negative symptoms were associated with lesser likelihood of both CE and W40 also is consistent with findings in prior research suggesting that aspects of illness severity, compared with diagnosis, may have different effects on employment outcomes. For example, negative symptoms such as low motivation and blunted affect may impede vocational success, perhaps by interfering with one's ability to search for employment, complete work assignments, work to industry standard, or interact with coworkers (Bond and Meyer, 1999; Cook and Razzano, 2000). While previous studies have found that positive symptoms are not strongly or consistently associated with poorer employment outcomes (e.g. Bond and Meyer, 1999), findings in this evaluation support the idea that higher levels of positive symptoms were associated with a greater likelihood of achieving better quality jobs, but not with greater work intensity. However, this may be an artifact of either the low correlational relationship between positive and negative symptoms or the poorer outcomes reported among people with higher levels of negative symptoms. In these analyses, general psychopathology symptoms were associated with lesser likelihood of working more hours (i.e. higher job intensity), although not with the quality of work obtained (i.e. competitive employment).

The consistent relationship between low levels of self-rated functioning and both employment outcomes supports the inclusion of patients' own assessments of functional impairment as a predictor of vocational need and advisability of providing ongoing support in work roles (O'Malia et al., 2002). Self-reported assessments are easier and less expensive to administer than many clinical assessments and have the potential to engage clinicians and consumers in an interactive, collaborative process of evaluation and treatment planning (Campbell, 1996). This finding is especially timely given the growing amount of attention being paid to self-directed care and recovery in community mental health services by consumers, as well as providers and policy-makers (Cook and Jonikas, 2002). Another clinical characteristic consistently associated with lesser likelihood of CE and W40 is recent psychiatric hospitalization. Thus, individuals who have been recently hospitalized may require intensified support for their efforts to obtain employment, along with specialized outreach to engage or re-engage them in vocational programs.

Co-occurring medical conditions or disabilities, as well as substance use, were negatively associated with the likelihood of obtaining competitive work in this study. A considerable amount of research has suggested that cognitive disabilities and deficits are a significant barrier to employment among those with severe mental illness (McGurk and

Mueser, 2004; Twamley et al., 2003), and that co-occurring medical conditions have the potential to impact social roles negatively (Dixon et al., 2001). The significance of co-occurring disabilities, either physical or cognitive, in these analyses supports the need for specialized services if individuals are to move beyond sheltered work opportunities (Dixon et al., 2001). It may also be that the greater likelihood of this subgroup to work 40 hours in a month reflects the fact that they worked in noncompetitive settings that also were less demanding.

Substance use also was a barrier to achieving competitive employment in this study, but not a deterrent to employment intensity. Like those with co-occurring physical or developmental disabilities, people with co-occurring substance use may need additional attention and support services to achieve better-paying, integrated jobs located within community settings. Finally, self-reported medication nonadherence was not related to likelihood of competitive employment but did affect work intensity. This suggests that adherence to psychiatric medication regimens may have helped study participants to work more hours, although not necessarily at higher quality jobs.

Another finding of this study is that, regardless of the type or intensity of clinical indicator, both of the employment outcomes improved over time among the participants. All of the participants in this analysis entered the study unemployed but seeking paid work, with varying levels of work experience, education, and severity of psychiatric disability. Following program entry, the overall likelihood of achieving either of these two employment outcomes increased over time, regardless of clinical factors. This finding is consistent with a continually growing body of evidence-based literature demonstrating that people with severe mental illness are able to work in the community (Crowther et al., 2001).

Findings from this study reflect the impact of psychiatric illness features on the ability of individuals to obtain and retain competitive jobs and confirm the results of prior studies showing that clinical factors influence the ability to seek employment, successfully participate in job interviews, meet industry standard employment expectations, resolve work-related concerns, and handle social situations in the workplace (McGurk and Meltzer, 2000; Mueser et al., 1986; Westermeyer and Harrow, 1987). These findings also support the need for service providers to be sensitive to subtle fluctuations in clinical status and how these might differentially affect multiple dimensions of their patients' vocational performance. As demonstrated in this study, patients may require support and/or tailoring of services to address individual patterns of clinical impairment, including identification of strategies to improve functioning, promote medication adherence, address co-occurring disabilities, reduce rehospitalization, and provide assistance finding jobs where persistent symptoms are less conspicuous. In addition, special care should be taken to develop appropriate vocational options and employment opportunities that address the unique needs of individuals with diagnoses of schizophrenia and other schizophrenia-spectrum disorders.

One limitation of this study concerns the generalizability of its findings. EIDP participants were selected from specific sites in certain regions of the United States rather than drawn from a national probability sample of individuals with psychiatric disabilities. Despite this, the present study adds to the current literature regarding the impact of different clinical factors on employment outcomes. Results from the study also build upon those in previous investigations by identifying the impact of clinical indicators among a more diverse study population, namely one comprised of at least 50% racial and ethnic minority group members, as well as one with equitable gender representation. The EIDP also is the first multisite, longitudinal investigation to examine labor force participation over a 2-year follow-up period, thereby addressing another common methodological limitation of research in this area. In addition, it is one of the first large-scale investigations to include in its operationalization of employment outcomes more refined criteria for competitive employment, including those used by the US Department of Labor, thereby allowing its findings to be applied in more general social and economic contexts, rather than within the field of mental health and rehabilitation services alone. Finally, use of RRM, one of the most sophisticated and powerful techniques in multivariate analysis, not only expands the state of the science methodologically but also ensures that findings from the EIDP can be interpreted with a substantial amount of scientific rigor.

## CONCLUSION

Supported employment programs have been shown to be effective in promoting employment among people with severe mental illness (Bond et al., 2001a; Cook et al., 2005; Crowther et al., 2001). Yet even evidence-based best practices in supported employment do not successfully engage all consumers in competitive employment. Thus, it is essential to understand more fully subgroup variations in employment outcomes, identify predictors of employment, including clinical factors, and tailor services to fit consumers' needs better to improve the effectiveness of vocational programming. For example, self-rated functioning is a useful predictor of employment outcomes and could be adopted as an easily administered tool for both clinicians and consumers in determining service needs. Likewise, as negative psychiatric symptoms have been shown to be an ongoing barrier to employment, these illness features should be considered in developing jobs and designing workplace accommodations for people with mental illness working in the community. It also is important to prevent the disruption to life and employment caused by psychiatric rehospitalization and to swiftly reintegrate those who experience hospitalization by providing support for labor force re-entry as soon as patients are ready. People with severe mental illness are as heterogeneous a group as the general population, and service providers must be aware of how clinical factors affect community reintegration, including labor force participation. Yet despite this heterogeneity, study findings suggest that all people with severe mental illness can and should be given opportunities to realize their employment potential fully.

## ACKNOWLEDGMENTS

This study is part of the EIDP, a multisite collaboration among eight research demonstration sites, a coordinating center, and the Center for Mental Health Services (CMHS), Substance Abuse and Mental Health Services Administration (SAMHSA). This research was funded by Cooperative Agreement No. SM51820 from CMHS/SAMHSA. The views expressed herein are those of the authors and do not necessarily reflect the policy or position of any federal agency.

## REFERENCES

- Anthony WA, Blanch A (1987) Supported employment for persons who are psychiatrically disabled: An historical and conceptual perspective. *Psychiatric Rehabilitation Journal*. 11:5–23.
- Anthony WA, Rogers ES, Cohen M, Davies RR (1995) Relationships between psychiatric symptomatology, work skills and future vocational performance. *Psy Serv*. 46:353–358.
- Arns P, Linney JA (1995) Relating functional skills of severely mentally ill clients to subjective and societal benefits. *Psy Serv*. 46:260–265.
- Bell MD, Bryson G (2001) Work rehabilitation in schizophrenia: Does cognitive impairment limit improvement? *Schizophr Bull*. 27:269–279.
- Bell MD, Greig T, Gill P, Whelahan H, Bryson G (2002) Work rehabilitation and patterns of substance use among persons with schizophrenia. *Psy Serv*. 53:63–69.
- Bond GR (2004) Supported employment: Evidence for an evidence-based practice. *Psy Rehab J*. 27:377–383.
- Bond GR, Becker DR, Drake RE, Rapp CA, Meisler N, Lehman AF, Bell MD, Blyler CR (2001a) Implementing supported employment as an evidence-based practice. *Psy Serv*. 52:313–322.
- Bond GR, Meyer PS (1999) The role of medications in the employment of people with schizophrenia. *J Rehabil*. 65:9–16.
- Bond GR, Resnick SG, Drake RE, Xie H, McHugo GJ, Bebout RR (2001b) Does competitive employment improve non-vocational outcomes for people with severe mental illness? *J Consult Clin Psychol*. 69:489–501.
- Campbell J (1996) Toward collaborative mental health outcomes systems. In DM Steinwachs, LM Flynn, et al. (Eds), *Using Client Outcomes Information to Improve Mental Health and Substance Abuse Treatment: New Directions for Mental Health Services* (No 71, pp 69–78). San Francisco (CA): Jossey-Bass.
- Centers for Medicare and Medicaid Services in their Demonstration Program Demonstration to Maintain Independence and Employment (June 7, 2000, CFDA No. 93:779).
- Cook JA, Carey MA, Razzano LA, Burke JK, Blyler CR (2002) The Pioneer: The Employment Intervention Demonstration Program. *New Dir Eval*. 94:31–44.
- Cook JA, Jonikas JA (2002) Self-determination among mental health consumers/survivors: Using lessons from the past to guide the future. *J Dis Policy Stud*. 13:87–95.
- Cook JA, Leff HS, Blyler CR, Gold PG, Goldberg RW, Mueser KT, Toprac MG, McFarlane WR, Shafer MS, Blankertz LE, Dudek K, Razzano LA, Grey DD, Burke-Miller JB (2005) Results of a multi-site randomized implementation effectiveness trial of supported employment interventions for individuals with severe mental illness. *Arch Gen Psychiatr*. 62:505–512.
- Cook JA, Pickett SA (1995) Recent trends in vocational rehabilitation for people with psychiatric disability. *Am Rehabil*. 20:2–12.
- Cook JA, Razzano LA (2000) Vocational rehabilitation for persons with schizophrenia: Recent research and implications for practice. *Schizophr Bull*. 26:87–103.
- Cook JA, Rosenberg H (1994) Predicting community employment among persons with psychiatric disability: A logistic regression analysis. *J Rehabil Admin*. 18:6–22.
- Cramer JA, Rosenheck R (1998) Compliance with medication regimens for mental and physical disorders. *Psy Serv*. 49:196–201.
- Crowther RE, Marshall M, Bond GR, Huxley P (2001) Helping people with severe mental illness to obtain work: Systematic review. *BMJ*. 322:204–208.
- Daneluzzo E, Arduini L, Rinaldi O, Di Domenico M, Petrucci C, Kalyvoka A, Rossi A (2002) PANSS factors and scores in schizophrenic and bipolar disorders during an index acute episode: A further analysis of the cognitive component. *Schizophr Res*. 56:129–136.
- Dixon L, Goldberg R, Lehman AF, McNary S (2001) The impact of health status on work, symptoms and functional outcomes in severe mental illness. *J Nerv Ment Dis*. 189:17–23.
- Drake RE, Becker DR, Bond GR (2003) Recent research on vocational rehabilitation for persons with severe mental illness. *Curr Opin Psychiatry*. 16:451–455.
- Drake RE, Mueser KT, McHugo GJ (1996) Clinician rating scales: Alcohol Use Scale (AUS), Drug Use Scale (DUS) and Substance Abuse Treatment Scale (SATS). In LI Sederer, B Dickey (Eds), *Outcomes Assessment in Clinical Practice* (pp 113–116). Baltimore (MD): Williams & Wilkins.
- Drake RE, Osher FC, Noordsy DL, Hurlbut SC, Teague GB, Beaudett MS (1990) Diagnosis of alcohol use disorders in schizophrenia. *Schizophr Bull*. 16:57–67.
- Drebing C, Fleitas R, Moore A, Krebs C, VanOrmer A, Penk W, Seibyl C, Rosenheck R (2002) Patterns in work functioning and vocational rehabilitation associated with coexisting psychiatric and substance use disorders. *Rehabilitation Counseling Bulletin*. 46:5–13.
- Gaudino EA, Matheson LN, Mael FA (2001) Development of the Functional Assessment Taxonomy. *J Occup Rehabil*. 11:155–175.
- Gibbons RD, Hedeker D, Elkin I, Watermaux C, Kraemer HC, Greenhouse JB, et al. (1993) Some conceptual and statistical issues in analysis of longitudinal psychiatric data: Application of NIMH Treatment of Depression Collaborative Research Program dataset. *Arch Gen Psychiatry*. 50:739–750.
- Goethe JW, Dornelas EA, Fischer EH (1996) A cluster analytic study of functional outcome after psychiatric hospitalization. *Comparative Psychiatry*. 37:115–121.
- Hammer MB, Frueh BC, Ulmer HG, Arana GW (1999) Psychotic features and illness severity in combat veterans with chronic posttraumatic stress disorder. *Biological Psychiatry*. 45:846–852.
- Haywood TW, Kravitz HM, Grossman LS, Cavanaugh JL, Davis JM, Lewis DA, et al. (1995) Predicting the “revolving door” phenomenon among patients with schizophrenic, schizoaffective and affective disorders. *American Journal of Psychiatry*. 152:856–861.
- Kay SR, Fiszbein A, Opler LA (1987) The Positive and Negative Syndrome Scale (PANSS) for schizophrenia. *Schizophr Bull*. 13:261–276.
- Khatiri N, Romney DM, Pelletier G (2001) Validity of self-report about quality of life among patients with schizophrenia. *Psy Ser*. 52:534–535.
- Koenigsberg HW, Reynolds D, Goodman M, New AS, Mitropoulou V, Trestman RL, Silverman J, Siever LJ (2003) Risperidone in the treatment of schizotypal personality disorder. *Journal of Clinical Psychiatry*. 64:628–634.
- Kregel J, Wehman P, Banks PD (1989) The effects of consumer characteristics and type of employment model on individual outcomes in supported employment. *J Appl Behav Anal*. 22:407–415.
- Lehman AF (1988) A quality of life interview for the chronically mentally ill. *Eval Prog Plan*. 11:51–62.
- Lehman AF (1995) Vocational rehabilitation in schizophrenia. *Schizophr Bull*. 21:645–656.
- McGurk SR, Meltzer HY (2000) The role of cognition in vocational functioning in schizophrenia. *Schizophr Res*. 45:175–184.
- McGurk SR, Mueser KT (2004) Cognitive functioning, symptoms and work in supported employment: A review and heuristic model. *Schizophr Res*. 68:1–27.
- Meisler N, Blankertz L, Santos AB, McKay C (1997) Impact of assertive community treatment on homeless persons with co-occurring severe psychiatric and substance use disorders. *Community Mental Health Journal*. 33:113–122.
- Meyer PS, Bond GR, Tunis SL, McCoy ML (2002) Comparison between atypical and traditional antipsychotics in work status for clients in a psychiatric rehabilitation program. *Journal of Clinical Psychiatry*. 63:108–116.
- Mueser KT, Foy DW, Carter MJ (1986) Social skills training for job maintenance in a psychiatric patient. *Journal of Counseling Psychiatry*. 33:360–362.
- Mueser KT, Salyers MP, Mueser PR (2001) A prospective analysis of work in schizophrenia. *Schizophr Bull*. 27:281–296.
- Myers R (1990) *Classical and Modern Regression With Applications* (2nd ed, pp 368–371). Boston (MA): Duxbury Press.

- Noordsy DL, O'Keefe C (1999) Effectiveness of combining atypical antipsychotics and psychosocial rehabilitation in a community mental health center setting. *Journal of Clinical Psychiatry*. 60:47–51.
- O'Malia L, McFarland BH, Barker S, Barron NM (2002) A level-of-functioning self-report measure for consumers with severe mental illness. *Psy Serv*. 53:326–331.
- Pickett-Schenk SA, Cook JA, Jonikas JA, Banghart M (In press) Business as usual: Work experiences of homeless persons with mental illness. In WH Fisher (Ed), *Research in Community Mental Health* (Vol 13, *Employment for Persons With Severe Mental Illness*). Oxford, UK: Elsevier.
- Polak P, Warner R (1996) The economic life of seriously mentally ill people in the community. *Psy Serv*. 47:270–274.
- Rogers ES, Anthony WA, Toole J, Brown MA (1991) Vocational outcomes following psychosocial rehabilitation: A longitudinal study of three programs. *J Vocat Rehabil*. 1:21–29.
- Salyers MP, McHugo GJ, Cook JA, Razzano LA, Drake RE, Mueser KT (2001) Reliability of instruments in a cooperative, multisite study: Employment intervention demonstration program. *Ment Health Serv Res*. 3:129–140.
- Stevens J (1996) *Applied Multivariate Statistics for the Social Sciences* (3rd ed, pp 76–77). Mahwah, New Jersey: Lawrence Erlbaum & Associates.
- Tsang H, Lam P, Ng B, Leung O (2000) Predictors of employment outcomes for people with psychiatric disabilities: A review of the literature since the mid-80s. *J Rehabil*. 66:19–25.
- Twamley EW, Jeste DV, Lehman AF (2003) Vocational rehabilitation in schizophrenia and other psychotic disorders: A literature review and meta-analysis of randomized controlled trials. *J Nerv Ment Dis*. 191:515–523.
- Westermeyer JF, Harrow M (1987) Factors associated with work impairments in schizophrenic and nonschizophrenic patients. In RR Grinker Sr., M Harrow (Eds), *Clinical Research in Schizophrenia: A Multidimensional Approach* (pp 280–298). Springfield (IL): Charles C. Thomas.
- Weweiorski NJ, Fabian ES (2004) Association between demographic and diagnostic factors and employment outcomes for people with psychiatric disabilities: A synthesis of recent research. *Ment Health Serv Res*. 6:9–21.
- Ziegler DM, Peachey TJ (2003) A study of treatment outcomes from atypical antipsychotic medications in the Virginia public system of community care. *Community Mental Health Journal*. 39:169–182.

### END NOTE

<sup>1</sup>Under this definition, transitional employment placements such as those provided through International Center for Clubhouse Development Clubhouses were not coded as CE. Multisite analyses (not shown) using an alternative definition of CE that included transitional employment placements did not substantially alter the results reported here. See the Final Report for the Massachusetts EIDP site at [http://www.fountainhouse.org/pdfs/samhsa\\_final.pdf](http://www.fountainhouse.org/pdfs/samhsa_final.pdf) for further details on the site-specific analysis using this alternative definition.