

Effectiveness of Supported Employment for Individuals with Schizophrenia: Results of a Multi-Site, Randomized Trial

Judith A. Cook¹, Crystal R. Blyler², Jane K. Burke-Miller¹, William R. McFarlane⁹,
H. Stephen Leff³, Kim T. Mueser⁴, Paul B. Gold⁵, Richard W. Goldberg⁶,
Michael S. Shafer⁷, Steven J. Onken⁸, Kate Donegan¹⁰, Martha Ann Carey¹¹,
Lisa A. Razzano¹, Dennis D. Grey¹, Susan A. Pickett-Schenk¹, Caroline Kaufmann¹²

Abstract

Background: Prior studies of supported employment efficacy for individuals with schizophrenia have yielded mixed results, with some finding poorer outcomes for those with this diagnosis and others finding no differences. **Aims:** This multi-site effectiveness trial examined the relative impact of diagnosis with schizophrenia and evidence-based practice supported employment on the likelihood of competitive employment. **Method:** At seven U.S. sites, 1,273 outpatients with severe mental illness were randomly assigned to either an experimental supported employment program or to a comparison/services as usual condition and followed for two years. Data collection involved semi-annual, in-person interviews, and weekly recording of all paid employment by vocational and research staff. Mixed-effects random regression analysis was used to examine the effects of study condition, schizophrenia diagnosis, and their interaction, on the likelihood of competitive employment. **Results:** Subjects in experimental group programs and those with diagnoses other than schizophrenia (predominantly bipolar disorder and major depression) were significantly more likely to be competitively employed than those in control programs and those with diagnoses of schizophrenia. However, an interaction effect between study condition and diagnosis was observed in which experimental group treatment ameliorated the negative effects of diagnosis on employment outcome. **Discussion:** Evidence-based supported employment interventions are superior to services as usual/comparison programs in assisting individuals with schizophrenia to attain competitive employment. Given recent evidence of this model's effectiveness outside the U.S. and interest in its promotion internationally, it has global potential to further the recovery potential of individuals with psychiatric disabilities.

Key Words: Schizophrenia, Supported Employment, Competitive Employment, Randomized Trial, Multi-Site Trial

¹ Department of Psychiatry, University of Illinois at Chicago

² Center for Mental Health Services, Rockville, MD

³ Human Services Research Institute and Harvard Medical School
Dept. of Psychiatry at Cambridge Health Alliance, Cambridge, MA

⁴ Dartmouth University, Concord, NH

⁵ Medical University of South Carolina, Charleston, SC

⁶ Department of Psychiatry, University of Maryland School of Medicine,
Baltimore, MD

⁷ Arizona State University, Phoenix, AZ

⁸ University of Hawaii, Honolulu, HI

⁹ Maine Medical Center, Portland, ME

¹⁰ Behavioral Health Consultant, Philadelphia, PA

¹¹ Azusa Pacific University, Azusa, CA

¹² Private Consultant, Pittsburgh, PA

Address for correspondence: Dr. Judith A. Cook,
University of Illinois at Chicago,
Department of Psychiatry, 1601 West Taylor Street, 4th Floor,
M/C 912, Chicago, IL 60612
Phone: 312-355-1696; Fax: 312-355-4189; E-mail: cook@ripco.com

Submitted: September 17, 2007; Revised: December 4, 2007;
Accepted: December 19, 2007

Introduction

Worldwide and in the U.S., employment rates of individuals with schizophrenia are far lower than those with other diagnoses or the general population. In recent reviews of European literature, between 15 to 20% of all noninstitutionalized, working-age individuals with schizophrenia were employed compared with 62 to 71% of nonaffected populations (1, 2). In the U.S., data from the 1994-1995 National Health Interview Survey on Disability (3) indicate that, among working age adults with mental health disabilities, only 17% of those with schizophrenia, paranoia, or delusional disorder were employed, compared to 33% of those with other mental health disabilities, and 77% of the nondisabled population. In the multi-site Schizophrenia Care and Assessment Program, a prospective, longitudinal treatment study of 1,643 individuals with schizophrenia at six

sites, 22% of participants were employed at study baseline (4).

Despite these poor outcomes, a number of studies suggest that an evidence-based practice called supported employment helps people with schizophrenia return to work (5). Rinaldi and colleagues (6) studied a supported employment program in London for forty patients with first-episode psychosis in which the proportion competitively employed rose from 10% at baseline to 28% at six months and 22% at twelve months. McGurk et al. (7) report the outcomes of thirty outpatients with schizophrenia receiving supported employment and found that 50% worked competitively during a two-year follow-up.

While supported employment services can enhance vocational outcomes, some research suggests that individuals with schizophrenia may benefit less from this model than do those with other forms of severe mental illness. In a meta-analysis of vocational outcome studies following supported employment as well as other rehabilitation models (8), patients with schizophrenia were significantly less likely than those with other disorders to attain competitive employment and less likely to be employed three months after placement. For example, a survival analysis of longitudinal outcomes of ninety supported employment clients (9) found 12-month competitive employment proportions of 19% among those with schizophrenia and schizoaffective disorders, compared to 46% among those with affective disorders and 57% among those with personality disorders. However, the number of studies included in the meta-analysis was small and some studies found no significant differences by diagnosis.

In summary, supported employment appears to be effective for individuals with schizophrenia spectrum disorders. What is not well understood is the model's differential effectiveness for those with schizophrenia versus other severe disorders in diverse populations, multiple locales, and different program structures. This study hypothesized: 1) the existence of an interaction effect on work outcomes between diagnosis and receipt of supported employment; and, 2) that in analyses stratified by diagnosis, supported employment would be associated with competitive work regardless of diagnosis.

Methods

Study Participants

The Employment Intervention Demonstration Program (EIDP) began in 1995 with eight U.S. study sites including the states of Maryland, Connecticut, South Carolina, Pennsylvania, Arizona, Massachusetts, Maine, and Texas (10). Eligibility criteria were: diagnosis, duration, and disability requirements for severe and persistent mental illness as defined by the U.S. Government Center for Mental Health Services (11); age 18 years or older; willingness to work; and, written

informed consent. Patients were enrolled via provider referral, self-referral, family-referral, word of mouth, and, at the Massachusetts site, advertisements in newspapers. The total eligible study participant pool was 10,653; out of this group, 2,883 were invited to participate (excluding Massachusetts, which could not provide this information). Across all sites, including Massachusetts: 1,750 people agreed to participate; 1,655 completed the first interview; and 1,648 were randomized. For those who agreed to participate but were never randomized, reasons included subsequent patient refusal, ineligibility (based on age, unwillingness to work, or lack of informed consent), and patients lost to follow-up.

Out of 1,648 respondents who were randomized, the present analysis included 1,273 people -- with subjects excluded for three reasons. The first was being employed at baseline, including all 182 Pennsylvania participants since their model focused on serving already-employed patients, and twenty-eight participants at other sites who were later determined to have been employed at the time of study entry. The second exclusion omitted a control condition ($n=65$) at the Connecticut site (the only site to use a 3-arm design), to create uniformity in cross-site statistical analyses comparing two conditions at each site. The third exclusion was complete absence of vocational outcome data among one-hundred subjects. Recruitment began February 1996 and ended May 2000, with participants receiving monetary stipends that varied by site and interview from \$10 to \$20. The 1,273 subjects came from: Maine ($n=108$), Connecticut ($n=133$), Massachusetts ($n=166$), Maryland ($n=197$), South Carolina ($n=142$), Texas ($n=233$), and Arizona ($n=294$). Human subjects' protections and confidentiality safeguards were reviewed and approved by each site's institutional review board.

Planned Interventions

Supported Employment

The study was designed as a randomized implementation effectiveness trial (12) in which sites tested different models of supported employment and compared them to control conditions. The experimental condition was always a form of enhanced best-practice supported employment (13) compared to either services-as-usual or an "unenhanced" version of the experimental model. At Maryland, Connecticut, and South Carolina the experimental condition was Individual Placement and Support (14), where multidisciplinary provider teams engaged in rapid job search, placement into competitive jobs, and provision of training and ongoing support. The Massachusetts site used the Program of Assertive Community Treatment vocational model (15), with services provided exclusively in the community through a team of psychiatrists, nurses, case managers, and vocational specialists who placed patients in competitive employment and pro-

vided continuous employment support. The Texas, Maine, and Arizona sites used experimental models developed especially for the EIDP. The Texas model included supported employment services with social network enhancements designed to create more balanced and reciprocal interpersonal networks. In Maine, the model used family-aided assertive community treatment teams working with an employer consortium of the area's major businesses to develop job opportunities and workplace supports. Arizona's integrated treatment team was comprised of psychiatrists, case managers, rehabilitation counselors, employment specialists, job developers, and benefits specialists emphasizing rapid job placement and ongoing support for job retention. Further detail about each site's experimental condition is available at the study's web site <http://www.psych.uic.edu/eidp/>.

Control Conditions

Ethical considerations barred a "no treatment" control condition, since subjects entered the study expressing willingness to work. Four sites used a "services as usual" control condition (Arizona, Connecticut, Maryland, and South Carolina) where subjects received whatever services were typically available. A fifth site (Massachusetts) used the Clubhouse model (16), in which facility-based services were provided according to a work-ordered day, with patients and staff working together on jobs in the program and in the community. The final sites used "unenanced" versions of their experimental conditions, eliminating the social network component offered in Texas, and the employer consortium activities in Maine. Since some control conditions involved delivery of employment services, the measured effect of the experimental condition may be weaker than what might have been observed had all the control conditions been no-treatment conditions.

Measures

Dependent Variable

The outcome was competitive employment, defined as a job that: 1) pays minimum wage or higher; 2) is located in a mainstream, socially integrated setting; 3) is not set aside for persons with disabilities; and, 4) is held independently (i.e., not agency owned). This outcome evaluates subjects' ability to vie with nondisabled workers for a job in the open labor market.

Independent Variables

The first independent variable was study condition. All of the models in the experimental condition followed criteria established at the study's outset for best-practice supported employment: 1) integrated services delivered by a multidisciplinary team which met three or more times per week to plan and coordinate employment interventions with

case management and psychiatric treatment; 2) placement into competitive employment; 3) development of jobs tailored to patients' career preferences; 4) a job search process that began immediately upon program entry; and, 5) provision of on-going vocational supports.

The second independent variable was primary diagnosis on Axis I of the *Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition (DSM-IV)* (17). This was assessed at two of the sites (MD, CT) using the Structured Clinical Interview for the *DSM-IV* (SCID) (18) administered by trained interviewers. Case record abstraction at the remaining five sites (AZ, ME, TX, MA, SC) used *DSM-IV* diagnoses made by qualified individuals at baseline or less than twelve months prior to baseline and obtained from patient charts. Schizophrenia diagnosis was defined as *DSM-IV* code 295.xx (schizophrenia spectrum disorders). Over one-half (51%) of all participants had a diagnosis of either schizophrenia (33%) or schizoaffective disorder (18%). Another 24% had a primary diagnosis of major depression, 16% were diagnosed with bipolar disorder, and 3% with dysthymia. The remaining 6% had other diagnoses, with no one disorder affecting more than 1% of participants, including: post-traumatic stress disorder, anxiety disorders, delusional disorder, and obsessive-compulsive disorder. Because diagnosis was measured in two different ways, we conducted analyses of symptom patterns among patients with schizophrenia diagnoses obtained via SCID versus case record abstraction. We found highly similar patterns; that is, regardless of method used, participants with schizophrenia diagnoses had significantly higher cognitive and positive symptoms, significantly lower depressive symptoms, and no significant difference on negative and excitement symptoms.

Control Variables

Dichotomous variables included gender (male), race/ethnicity (Caucasian), education (high school graduate), self-reported use of alcohol or street drugs, co-occurring mental retardation or developmental disability, disability beneficiary status (receiving Social Security income and/or Supplemental Security Disability income), and prior work history (number of months worked in the five years prior to baseline). Age was measured in ten-year intervals and age at first psychiatric hospitalization was measured in years, with current age substituted for those never hospitalized. Lifetime months hospitalized came from case records, using zero for those never hospitalized.

Physical health was assessed using the General Health Subscale of the Medical Outcomes Study Short Form-36 (19) with Cronbach's alpha of .75, a mean of 58 (out of 100), and standard deviation (SD) of 23.8. The Positive and Negative Syndrome Scale (PANSS) (20) assessed depressive symptoms, positive symptoms, negative symptoms, cognitive

Table 1 Baseline Characteristics* by Diagnosis of Schizophrenia (n=1,273)

Characteristic	Diagnosis of Schizophrenia [†] 51% (n=648)	Other DSM-IV Diagnoses [‡] 49% (n=625)	Statistic	p Value
Experimental study condition	51% (333)	50% (315)	$\chi^2=0.1$	ns
Male	64% (415)	42% (263)	$\chi^2=61.6$	<.001
White	41% (268)	59% (368)	$\chi^2=39.1$	<.001
Education (high school+)	46% (382)	54% (442)	$\chi^2=18.4$	<.001
SSA disability benefits	85% (539)	59% (361)	$\chi^2=104.7$	<.001
MR/DD	18% (119)	15% (95)	$\chi^2=2.3$	ns
Self-report substance abuse	23% (150)	23% (142)	$\chi^2=0.1$	ns
Completed all interview waves	63% (394)	66% (430)	$\chi^2=1.5$	ns
	Mean (SD)	Mean (SD)	Statistic	p Value
Age in years	38 (9)	39 (10)	$t=1.9$	ns
Months worked in prior 5 years	9 (14)	17 (17)	$t=8.4$	<.001
MOS general physical health	60 (22)	55 (25)	$t=-4.3$	<.001
Positive work motivation	19 (4)	20 (4)	$t=2.9$	<.01
Age at first hospitalization in years	24 (8)	27 (10)	$t=6.0$	<.001
Lifetime months hospitalized	19 (32)	8 (18)	$t=-6.7$	<.001
PANSS Cognitive	16 (6)	13 (5)	$t=-9.7$	<.001
PANSS Negative	13 (5)	13 (5)	$t=-1.6$	ns
PANSS Depressive	15 (5)	17 (6)	$t=8.7$	<.001
PANSS Positive	11 (5)	9 (4)	$t=-8.4$	<.001
PANSS Excitement	11 (4)	11 (4)	$t=1.0$	ns

* Data are given as percentage (number) of participants or mean (standard deviation [SD]). Numbers may vary because of missing data. SSA indicates Social Security Administration; MR/DD indicates Mental Retardation/Developmental Disability; MOS indicates Medical Outcomes Study; PANSS indicates Positive and Negative Syndrome Scale.

[†] DSM-IV code 295.xx (schizophrenia spectrum disorders).

[‡] Other DSM-IV disorders: 24% major depression, 16% bipolar disorder, 3% dysthymia, 6% other disorders with no one diagnosis exceeding 1% (e.g., post-traumatic stress disorder, anxiety disorders, delusional disorder, and obsessive-compulsive disorder).

ns=not significant

symptoms, and symptoms of excitement (21-24). PANSS interviewer interrater reliability was monitored on an ongoing basis both within and across study sites; periodic refresher training occurred via monthly teleconferences with the scale's coauthor (L. Opler). An independent psychometric evaluation of PANSS interrater reliability (25) found good to excellent reliability, with total sample intraclass correlation coefficients (ICCs) from .71 to .87, and mean ICCs for Positive symptoms = .92 (SD=0.05), General symptoms = .83 (SD=0.15), and Negative symptoms = .81 (SD=0.16).

Work motivation was measured by a six-item scale developed for this study (26), using items from published work motivation scales that were pilot tested with 251 psychiatrically disabled outpatients. Scores ranged from 6 to 24, with a mean of 19.3 (SD=3.8) and Cronbach's alpha = .73, with higher scores representing higher levels of work motivation.

Procedures

Follow-Up Rates and Attrition Analysis

Of the 1,273 participants, 824 (65%) completed five interviews, 173 participants (14%) completed four, 122 (9%)

completed three, 111 (9%) completed two, and 43 (3%) completed one. A dichotomous indicator variable for those completing five interviews was included in multivariate models to control for differential attrition.

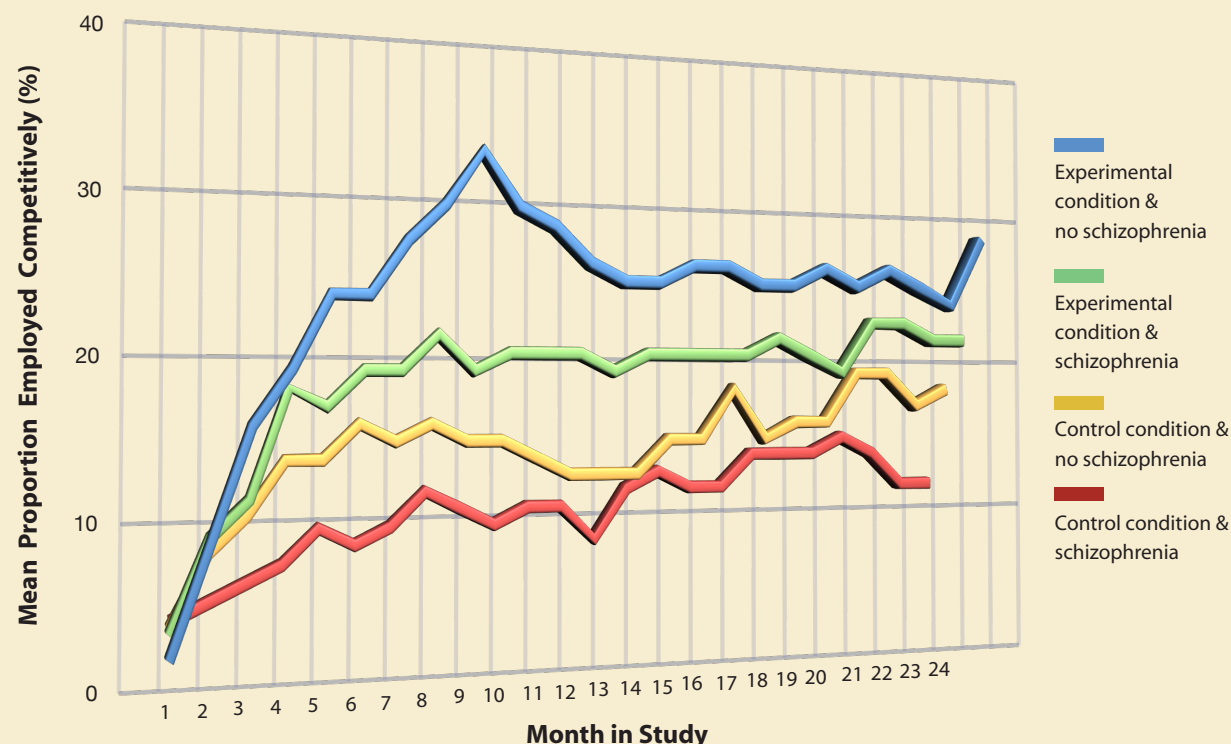
Masking and Contamination

No attempt was made to mask interviewers to study condition assignment given the nature of some interview items and the fact that study condition was associated with separate programs. However, interview staff was completely separate from clinical/vocational staff, and interviewers had no stake in the study's outcome. To avoid contamination, no preliminary results were released until all data collection was completed.

Supported Employment Fidelity

A supported employment fidelity assessment applicable across models was developed and administered independently by research staff at the point of each program's maturity. All experimental conditions exhibited high levels of fidelity to the model (27). As a "manipulation check" of fidelity (28, 29), the amounts and types of vocational services de-

Figure 1 Mean Proportion of Participants Employed Competitively per Month of Study Participation by Diagnosis of Schizophrenia and Study Condition



livered were compared for the two-year study period across all sites. Experimental group subjects received significantly greater amounts than controls of ten different employment services ($p < .001$), with no significant differences in clinical services received (30).

Statistical Analysis

Multivariate mixed-effects logistic regression was used to analyze the data due to its ability to handle serial correlation, individual heterogeneity, missing data, and inclusion of both fixed and random effects (31, 32). Analyses were run using MIXOR software (33). First, the effects of schizophrenia spectrum diagnosis, study condition, and their interaction were tested, controlling for client characteristics, study site, and attrition. Next, the sample was stratified by diagnosis, and the model was rerun. Average proportional odds ratios were calculated for each model variable from MIXOR parameter estimates.

Results

Participant Demographic and Clinical Characteristics

Table 1 presents the demographic and clinical characteristics of study subjects by whether they had a schizophrenia spectrum diagnosis versus other *DSM-IV* diagnoses.

Proportion in Competitive Employment by Study Condition and Schizophrenia Diagnosis

Figure 1 shows unadjusted mean proportions of patients competitively employed over twenty-four months for: those with schizophrenia treated in experimental programs; those with schizophrenia in control programs; those with other diagnoses in experimental programs; and those with other diagnoses in control programs. Beginning with month three, a distinct pattern emerged in which experimental subjects *without* schizophrenia did best, followed by experimental subjects *with* schizophrenia. The proportion in competitive employment was lowest for control subjects with schizophrenia, and somewhat higher for control subjects with nonschizophrenia diagnoses. Visual inspection revealed that these trends were maintained throughout the remainder of the twenty-four-month study period, despite a convergence of the four groups toward the end of the study.

Effects of Study Condition and Diagnosis on Likelihood of Competitive Employment

Multivariate analyses are presented in Table 2, including an interaction term for study condition by schizophrenia diagnosis. Results indicate significant main effects for treatment group and diagnosis, and their interaction. Experi-

Table 2 Mixed Effects Logistic Regression Analysis of Competitive Employment over 24 Months (n=1,273) by Schizophrenia Spectrum Diagnosis and Study Condition, Controlling for Study Site and Attrition

Variable	Estimate* (Standard Error)	Odds Ratio [†]	p Value
Time	0.19 (.01)	1.21	<.001
Time-squared	-0.01 (<.01)	0.99	<.001
Schizophrenia spectrum diagnosis [‡]	-0.40 (.13)	0.67	<.01
Experimental study condition	1.33 (.12)	3.79	<.001
Schizophrenia x study condition interaction	0.61 (.16)	1.83	<.001
Male	0.12 (.08)	1.12	.16
White	-0.07 (.10)	0.93	.43
Age	-0.05 (<.01)	0.96	<.001
Education	0.23 (.03)	1.26	<.001
Social Security Administration benefits	-0.69 (.10)	0.50	<.001
Prior months worked	0.02 (<.01)	1.02	<.001
Self-report substance abuse	0.14 (.05)	1.14	<.01
General physical health	<-0.01 (<.01)	0.99	<.05
Intellectual/developmental disability	-0.39 (.11)	0.68	<.001
Work motivation	0.06 (.01)	1.06	<.001
Age of first hospitalization	-0.26 (.06)	0.77	<.001
Lifetime months hospitalized	0.06 (.05)	1.07	.16
PANSS Cognitive symptoms	-0.01 (.01)	0.99	<.05
PANSS Negative symptoms	-0.02 (<.01)	0.98	<.001
PANSS Positive symptoms	-0.02 (.01)	0.98	<.01
PANSS Depressive symptoms	-0.03 (<.01)	0.97	<.001
PANSS Excitement symptoms	0.05 (.01)	1.05	<.001

* Unstandardized random regression (MIXOR) estimate where sign indicates direction of effect.

† Average proportional odds ratio.

‡ DSM-IV code 295.xx (schizophrenia spectrum disorders).

mental condition subjects were significantly more likely to work competitively, while subjects with schizophrenia were less likely to do so. The interaction term for diagnosis and study condition was significant, indicating an advantage for those with schizophrenia treated in the experimental programs versus all other groups combined. The likelihood of competitive employment increased significantly over time, and the effects of time were curvilinear, as shown by the significant time-squared estimate. Thus, the increase in competitive employment experienced by experimental group subjects was attenuated over time, as observed in Figure 1.

Multivariate Analyses Stratified by Diagnosis

Table 3 presents the multivariate model stratified by diagnosis. Comparing results across the two groups, the effect of the experimental study condition was significant and positive for both, with experimental subjects more likely to work competitively than controls. Also consistent across the two groups were positive associations with prior work history, and negative associations with depressive symptoms. Among subjects with schizophrenia only, those with higher levels of positive symptoms were less likely, and those with

Table 3 Mixed Effects Logistic Regression Analyses, Stratified by Diagnosis, of Competitive Employment over 24 Months among all Study Participants (n=1,273), Controlling for Study Site and Attrition

Variable	Diagnosis of Schizophrenia* 51% (n=648)		Other DSM-IV Diagnoses† 49% (n=625)	
	Est‡ (SE) Odds Ratio§	p Value	Est‡ (SE) Odds Ratio§	p Value
Time	0.15 (.02) 1.16	<.001	0.19 (.02) 1.21	<.001
Time-squared	<-0.01 (<.01) 0.99	<.001	- 0.01 (<.01) 0.99	<.001
Experimental study condition	1.57 (.28) 4.83	<.001	1.40 (.25) 4.07	<.001
Male	0.18 (.26) 1.19	.49	0.06 (.25) 1.07	.79
White	-0.39 (.29) 0.68	.18	0.43 (.28) 1.54	.13
Age	<-0.01 (.01) 1.00	.78	-0.02 (.01) 0.98	.06
Education	-0.03 (.10) 0.97	.78	0.24 (.09) 1.27	<.05
SSA benefits	-0.59 (.32) 0.56	.06	0.10 (.27) 1.11	.70
Prior months worked	0.04 (.01) 1.04	<.001	0.03 (.01) 1.03	<.001
Self-report substance abuse	<.01 (.12) 1.00	1.00	0.20 (.13) 1.22	.13
General physical health	<-0.01 (<.01) 1.00	.16	<-0.01 (<.01) 1.00	.73
Intellectual/developmental disability	-0.37 (.36) 0.69	.30	0.34 (.33) 1.41	.30
Work motivation	0.02 (.03) 1.03	.46	0.07 (.03) 1.07	<.05
Age of first hospitalization	0.03 (.19) 1.03	.87	0.02 (.16) 1.03	.87
Lifetime months hospitalized	-0.07 (.13) 0.94	.61	-0.24 (.14) 0.79	.08
PANSS Cognitive symptoms	-0.02 (.01) 0.98	.15	-0.01 (.01) 0.99	.57
PANSS Negative symptoms	-0.02 (.01) 0.98	.10	-0.03 (.01) 0.98	.06
PANSS Positive symptoms	-0.04 (.02) 0.96	<.05	<.001 (.02) 1.00	.99
PANSS Depressive symptoms	-0.03 (.01) 0.97	<.01	-0.04 (.01) 0.96	<.01
PANSS Excitement symptoms	0.06 (.02) 1.06	<.01	0.01 (.02) 1.01	.41

* DSM-IV code 295.xx (schizophrenia spectrum disorders).

† Other DSM-IV disorders: 24% major depression, 16% bipolar disorder, 3% dysthymia, 6% other disorders with no one diagnosis affecting more than 1% (e.g., post-traumatic stress disorder, anxiety disorders, delusional disorder, and obsessive-compulsive disorder).

‡ Unstandardized random regression (MIXOR) estimate where sign indicates direction of effect.

§ Average proportional odds ratio.
SE=standard error

higher levels of excitement symptoms were more likely, to be competitively employed. Among the subjects with diagnoses other than schizophrenia (most of whom were diagnosed with bipolar disorder or major depressive disorder), higher education and greater work motivation were associated with greater likelihood of competitive employment.

Discussion

The results of this analysis confirm the effectiveness of evidence-based practice supported employment for individuals with schizophrenia. Those with this diagnosis were

more likely to work competitively when they received coordinated services from interdisciplinary teams in programs emphasizing rapid job search for employment in socially integrated settings, ongoing support with no time limits, and placements in their preferred fields. Not only did individuals with schizophrenia fare comparatively well in evidence-based practice supported employment programs, they *outperformed their counterparts with other diagnoses* in control condition programs. This is particularly noteworthy since, at study baseline, individuals with schizophrenia had significantly higher levels of symptoms, greater number of months

hospitalized over their lifetimes, younger ages of illness onset, lower education, poorer work histories, and lower work motivation than those without schizophrenia.

In addition to diagnosis, three types of symptoms influenced the vocational outcomes of individuals with schizophrenia in this study. The first was positive symptoms, which had a negative impact on the likelihood of competitive employment. Positive symptoms have been associated with poorer vocational performance in prior studies of individuals with schizophrenia (34-36) and may reflect social stigma of coworkers, supervisors and others that negatively impact vocational performance. Second, depressive symptoms also had a negative impact on competitive employment for both those with and without schizophrenia. This link between vocational outcomes and depressive symptoms for individuals with schizophrenia was also found in a study of supported employment by McGurk and colleagues (37). Here, those receiving supported employment plus cognitive training showed significantly greater improvement in PANSS depression subscale scores than did those receiving supported employment alone. As speculated by these authors, reduction in depressive symptoms may result from improved employment outcomes or it may influence the likelihood of vocational success. Third, the positive association between symptoms of excitement and competitive employment among those with schizophrenia was unexpected and somewhat puzzling. It may be that such behaviors represent the ability to advocate for oneself and one's job performance. For those whose syndromes are usually accompanied by disturbance of volition and social avoidance, these behaviors may enable individuals to successfully vie with others for competitive employment. This illness-contextual argument is bolstered by the fact that symptoms of excitement were not associated with greater likelihood of employment for those with diagnoses other than schizophrenia. However, further research is needed to explore this association and understand its implications.

Our results also confirm the critical importance of prior work history for individuals with schizophrenia. This may be because they enter the vocational rehabilitation process at a significant disadvantage in work experience. Their vocational histories often consist of sporadic work attempts (38), a succession of entry level jobs (39), high quit rates and frequent employer terminations through firing or layoff (40), restraint of earnings due to public disability income work disincentives (41), and other employment experiences characterized by failure and hopelessness (42, 43). Individuals may benefit from interventions early in the illness course that ameliorate career disruptions that are difficult to overcome after long periods of unemployment. They may also benefit from lengthy and intensive periods of on-the-job training, job tryouts, career mentoring, and greater support

in early stages of a job, when work and work norms may be unfamiliar. While prior work history was important for both groups, since those with schizophrenia start off with significantly poorer vocational backgrounds, their need may be that much greater.

There are a number of study limitations that should be noted. First, participants did not constitute a nationally representative sample of adults with severe mental illness, limiting generalizability of results. Second, variations among the different supported employment models tested in the experimental condition, as well as the wide array of programs included in the control conditions, limit our ability to address questions of efficacy though not implementation effectiveness. Third, our fidelity measures were developed and applied *ex post facto*, limiting our ability to longitudinally assess adherence to specific supported employment model ingredients. Fourth, each experimental supported employment program was implemented at the study's outset, while analysis of mature programs might have produced different results. Fifth, after study baseline, interviewers were not blinded to study condition assignment, although most information was self-reported by participants and vocational data were reported by both vocational staff and participants. Sixth, we were not able to perform the SCID at all sites, and use of *DSM-IV* diagnoses from patients' case records at the remaining sites is a less rigorous method of obtaining valid and reliable diagnoses.

Conclusions

In conclusion, while there were many significant differences at baseline between those with and without schizophrenia (e.g., lifetime months hospitalized, positive symptoms, education, receipt of public disability income), multivariate analysis revealed that these differences did not fully account for the negative effect of a schizophrenia diagnosis on attainment of competitive employment. A significant interaction effect between diagnosis and study condition revealed that those with schizophrenia receiving supported employment had outcomes significantly better than all other participants combined. Thus, provision of supported employment helps to ameliorate some of the barriers faced by people with schizophrenia, and points to the importance of offering supported employment services to all patients. Given recent evidence of this model's effectiveness outside the U.S. (44, 45) and interest in its promotion internationally (46), it has great potential to further the recovery potential of individuals with psychiatric disabilities worldwide.

Acknowledgments

This study is part of the Employment Intervention Demonstration Program (EIDP) funded by Cooperative Agreement No. SM51820 from the Center for Mental Health

Services (CMHS), Substance Abuse and Mental Health Services Administration (SAMHSA). The study also is part of the University of Illinois at Chicago National Research and Training Center on Psychiatric Disability (NRTC) funded by Cooperative Agreement No. H133B050003B from the U.S. Department of Education, National Institute on Disability & Rehabilitation Research, and 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

1. Marwaha S, Johnson S. Schizophrenia and employment - a review. *Soc Psychiatry Psychiatr Epidemiol* 2004;39(5):337-349.
2. Marwaha S, Johnson S, Bebbington P, Stafford M, Angermeyer MC, Brugha T, et al. Rates and correlates of employment in people with schizophrenia in the UK, France and Germany. *Br J Psychiatry* 2007;191:30-37.
3. Kaye HS. Disability watch volume 2: the status of people with disabilities in the United States. Washington (D.C.): Disability Rights Advocates, Inc.; 2001.
4. Slade E, Salkever D. Symptom effects on employment in a structural model of mental illness and treatment: analysis of patients with schizophrenia. *J Ment Health Policy Econ* 2001;4(1):25-34.
5. Bond GR, Drake RE, Becker DR, Mueser KT. Effectiveness of psychiatric rehabilitation approaches for employment of people with severe mental illness. *J Disabil Policy Stud* 1999;10(1):18-52.
6. Rinaldi M, McNeil K, Firn M, Koletsi M, Perkins R, Singh SP. What are the benefits of evidence-based supported employment for patients with first-episode psychosis? *Psychiatr Bull* 2004;28:281-284.
7. McGurk SR, Mueser KT. Cognitive functioning, symptoms, and work in supported employment: a review and heuristic model. *Schizophr Res* 2004;70(2-3):147-173.
8. Wewiorski NJ, Fabian ES. Association between demographic and diagnostic factors and employment outcomes for people with psychiatric disabilities: a synthesis of recent research. *Ment Health Serv Res* 2004;6(1):9-21.
9. Fabian ES. Longitudinal outcomes in supported employment: a survival analysis. *Rehabil Psychol* 1992;37(1):23-35.
10. Cook JA, Carey MA, Razzano LA, Blyler C. The pioneer: the employment intervention demonstration program. *New Dir Eval* 2002;94:31-44.
11. Manderscheid RW, Sonnenschein MA. Mental health, United States. Washington (D.C.): U.S. Government Printing Office; 1992.
12. Gordia L. Epidemiology. Philadelphia (PA): W.B. Saunders Co.; 2000.
13. Bond GR, Becker DR, Drake RE, Rapp CA, Meisler N, Lehman AF, et al. Implementing supported employment as an evidence-based practice. *Psychiatr Serv* 2001;52(3):313-322.
14. Drake RE, McHugo GJ, Bebout RR, Becker DR, Harris M, Bond GR, et al. A randomized clinical trial of supported employment for inner-city patients with severe mental illness. *Arch Gen Psychiatry* 1999;56(7):627-633.
15. Russert M, Frey JL. The PACT vocational model: a step into the future. *Psychosoc Rehabil J* 1991;14:7-18.
16. Beard JH. The rehabilitation services of Fountain House. In: Test MA, editor. *Alternatives to mental hospital treatment*. New York: Plenum Press; 1987.
17. American Psychiatric Association. *Diagnostic and statistical manual of mental disorders*, fourth edition. Washington (D.C.): American Psychiatric Association; 1994.
18. First MB, Spitzer RL, Gibbon M, Williams JBW. *Structured clinical interview for Axis I DSM-IV disorders*. Research version-patient edition (SCID-I/P, Ver. 2.0). New York (NY): New York State Psychiatric Institute, Biometrics Research Department; 1996.
19. Ware JE, Sherbourne CD. The MOS 36-item short-form health survey (SF-36). I. Conceptual framework and item selection. *Med Care* 1992;30(6):473-483.
20. Kay SR, Fiszbein A, Opler LA. The Positive and Negative Syndrome Scale (PANSS) for schizophrenia. *Schizophr Bull* 1987;13(2):261-276.
21. Fresan A, De la Fuente-Sandoval C, Loyzaga C, Garcia-Anaya M, Meyenberg N, Nicolini H, et al. A forced five-dimensional factor analysis and concurrent validity of the Positive and Negative Syndrome Scale in Mexican schizophrenic patients. *Schizophr Res* 2005;72(2-3):123-129.
22. Lancon C, Auquier P, Nayt G, Reine G. Stability of the five-factor structure of the Positive and Negative Syndrome Scale. *Schizophr Res* 2000;42(3):231-239.
23. Lindenmayer JP, Grochowski S, Hyman RB. Five-factor model of schizophrenia: replication across samples. *Schizophr Res* 1995;14(3):229-234.
24. Lykouras L, Oulis P, Psarros K, Daskalopoulou E, Botsis A, Christodoulou GN, et al. Five-factor model of schizophrenic psychopathology: how valid is it? *Eur Arch Clin Neurosci* 2000;250(2):93-100.
25. Salyers MP, McHugo GJ, Cook JA, Razzano LA, Drake RE, Mueser KT. Reliability of instruments in a cooperative, multisite study: employment intervention demonstration program. *Ment Health Serv Res* 2001;3(3):129-139.
26. Pickett SA, Cook JA, Carey MA. Creating and testing a work motivation scale for a multi-site vocational study. Report to the Steering Committee, Employment Intervention Demonstration Program, University of Illinois at Chicago. 1997.

27. Cook JA, Leff HS, Blyler CR, Gold PB, Goldberg RW, Mueser KT, et al. Results of a multisite randomized trial of supported employment interventions for individuals with severe mental illness. *Arch Gen Psychiatry* 2005;62(5):506-512.
28. Havassy BE, Shopshire MS, Quigley LA. Effects of substance dependence on outcomes of patients in a randomized trial of two case management models. *Psychiatr Serv* 2000;51(5):639-644.
29. Lehman AF, Goldberg R, Dixon LB, McNary S, Postrado L, Hackman A, et al. Improving employment outcomes for persons with severe mental illnesses. *Arch Gen Psychiatry* 2002;59(2):165-172.
30. Cook JA, Lehman AF, Drake R, McFarlane WR, Gold PB, Leff HS, et al. Integration of psychiatric and vocational services: a multisite randomized, controlled trial of supported employment. *Am J Psychiatry* 2005;162(10):1948-1956.
31. Gibbons RD, Hedeker D, Elkin I, Waternaux C, Kraemer HC, Greenhouse JB, et al. Some conceptual and statistical issues in analysis of longitudinal psychiatric data. Application to the NIMH treatment of Depression Collaborative Research Program dataset. *Arch Gen Psychiatry* 1993;50(9):739-750.
32. Gibbons RD, Hedeker D. Random effects probit and logistic regression models for three-level data. *Biometrics* 1997;53(4):1527-1537.
33. Hedeker D, Gibbons RD. MIXOR: a computer program for mixed-effects ordinal regression analysis. *Comput Methods Programs Biomed* 1996;49(2):157-176.
34. McGurk SR, Mueser KT, Harvey PD, LaPuglia R, Marder J. Cognitive and symptom predictors of work outcomes for clients with schizophrenia in supported employment. *Psychiatr Serv* 2003;54(8):1129-1135.
35. Racenstein JM, Harrow M, Reed R, Martin E, Herbener E, Penn DL. The relationship between positive symptoms and instrumental work functioning in schizophrenia: a 10 year follow-up study. *Schizophr Res* 2002;56(1-2):95-103.
36. Salkever DS, Karakus MC, Slade EP, Harding CM, Hough RL, Rosenheck RA, et al. Measures and predictors of community-based employment and earnings of persons with schizophrenia in a multisite study. *Psychiatr Serv* 2007;58(3):315-324.
37. McGurk SR, Mueser KT, Pascaris A. Cognitive training and supported employment for persons with severe mental illness: one-year results from a randomized controlled trial. *Schizophr Bull* 2005;31(4):898-909.
38. Baron RC. Employment policy: financial support versus promoting economic independence. *Int J Law Psychiatry* 2000;23(3-4):375-391.
39. Cook JA, Razzano LA. Discriminant function analysis of competitive employment outcomes in a transitional employment program for persons with severe mental illness. *J Vocat Rehabil* 1995;5:127-139.
40. MacDonald-Wilson KL, Rogers ES, Ellison ML, Lyass A. A study of the social security work incentives and their relation to perceived barriers to work among persons with psychiatric disability. *Rehabil Psychol* 2003;48:301-309.
41. Cook JA. Job ending among youth and adults with severe mental illness. *J Ment Health Adm* 1992;19(2):158-169.
42. Gioia D. Career development in schizophrenia: a heuristic framework. *Community Ment Health J* 2005;41(3):307-325.
43. Lewine RR. Social class of origin, lost potential, and hopelessness in schizophrenia. *Schizophr Res* 2005;76(2-3):329-335.
44. Latimer EA, Lecomte T, Becker DR, Drake RE, Duclos I, Piat M, et al. Generalisability of the individual placement and support model of supported employment: results of a Canadian randomised controlled trial. *Br J Psychiatry* 2006;189:65-73.
45. Rinaldi M, McNeil K, Firn M, Koletsis M, Perkins R, Singh SP. What are the benefits of evidence-based supported employment for patients with first-episode psychosis? *Psychiatr Bull* 2004;28:281-284.
46. DeUrries BJ. Brief report about supported employment situation and legislation in 14 European countries. Derry, Northern Ireland: European Union of Supported Employment. [accessed 2006 Aug 26]. Available from: <http://www.euse.org/DocFdocs/20-docFDoc11082004121829.pdf>