

Effects of local unemployment rate on vocational outcomes in a randomized trial of supported employment for individuals with psychiatric disabilities

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Abstract. The purpose of this study was to explore the effects of local unemployment rates on evidence-based supported employment (SE) programs tailored for people with psychiatric disabilities. Participants ($n = 1,273$) from 7 states in the US were randomly assigned to experimental SE or services as usual/comparison conditions and followed for 24 months. Mixed-effects random regression analysis found that both local unemployment rate and study condition were significant predictors of competitive employment and working 40 or more hours per month. An interaction between study condition and unemployment rate was found, in which participants in areas with low unemployment receiving best practice SE had consistently better outcomes than all others. However, even in areas with high unemployment, those who received evidence-based SE had outcomes superior to those in the control condition. This confirms the influence of local labor market forces on individuals with psychiatric disabilities participating in vocational rehabilitation programs. It also suggests that those who are attempting to return to work in areas with weak local economies are likely to fare especially poorly if they are not receiving high quality SE interventions. Thus, use of evidence-based SE can help to ameliorate the effects of high unemployment on work outcomes.

Keywords: Mental illness, supported employment, unemployment rate, psychiatric disability

1. Introduction

There is ample evidence that the labor market position of people with disabilities is unfavorable relative to individuals without disabilities. Workers with disabilities are also influenced by general work force trends such as unemployment rates. However, much less is

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known about these issues among individuals with psychiatric disabilities, particularly those receiving vocational rehabilitation services. This study explored the effects of the local unemployment rate on the outcomes of individuals with psychiatric disabilities who were participating in a multisite randomized trial of supported employment services. Such information could prove useful to rehabilitation providers and administrators seeking to improve programming in light of local labor market conditions.

1.1. Literature review

Data from the March 1999 Current Population Survey [CPS] [57] indicate that while 18% of working-age adults without disabilities were out of the labor force, 70% of those with disabilities and 89% of those with severe disabilities were out of the labor force. Moreover, the earnings of people with disabilities were 1/3 less (64%) than those of workers without disabilities: while only 10% of individuals without disabilities had earnings below the poverty level, 30% of workers with disabilities and 38% of those with severe disabilities had earnings below the poverty level [43].

There is also evidence that individuals with disabilities experience the same labor market trends as the general population, but that these trends are magnified for workers with disabilities [63]. While people both with and without disabilities experienced gains and losses during periods of market expansion and contraction over the past several decades, these gains and losses were proportionally larger for those with disabilities than those without disabilities. Using data from the CPS and the National Health Interview Survey Disability Supplement (NHIS-D), Yelin and Katz [64] showed that, during the recessions of the early 1980s and 1990s, people with disabilities showed substantially larger decreases in labor force participation than the decreases evidenced by those without disabilities. The authors note that labor force participation rates of those with disabilities appear to be tied to economic cycles, making them more likely to be displaced during times of economic downturn.

1.2. Individuals with psychiatric disabilities

Although the problem of unemployment and disability has received widespread attention, little research has focused on unemployment among people with psychiatric disabilities, that is, mental illnesses that result in severe and long-lasting impairments. This is so despite

the fact that large-scale, nationally representative probability surveys, such as the Health Care for Communities Study (HCCS), and NHIS-D, have estimated that unemployment rates among people with mental disorders are three to five times higher than among individuals without disabilities [54,62]. For example, Kaye's analysis of the 1994/95 NHIS-D found that the unemployment rate for working-age individuals with psychiatric disabilities was four times the rate of those without disabilities [37]. Moreover, proportions of working-age adults with mental disorders who were out of the labor force (OLF) (defined as not working and not looking for work) were substantially higher than among those with no mental disorder. For example, in the NHIS-D, 61% of working age adults with mental health disabilities were OLF, compared to only 20% of working age adults in the general population [37]. These findings mirror those among people with disabilities at large, suggesting that local economic conditions may affect labor force participation for people with mental health disorders.

As with research, comparatively little policy attention has been paid to the problem of unemployment among people with severe mental illness. However, the Surgeon General's Report on Mental Health [58] and the recently released report of the President's New Freedom Commission on Mental Health [48] both identified unemployment as one of the most serious social problems impeding the recovery of citizens with serious mental health problems. Interestingly, both reports recommended a significant increase in the amount and quality of vocational rehabilitation services for people with psychiatric disabilities. Yet, there is a dearth of research evidence on the specific effects of the local US economy on labor force participation of people with psychiatric disabilities, along with little understanding of how local labor markets in the US impact the success or failure of vocational rehabilitation efforts. One exception is the work of Catalano et al. [15], who found that unemployment among a group of individuals with severe mental illness undergoing vocational rehabilitation was not associated with the weekly incidence of initial claims for unemployment compensation in the two surrounding New Hampshire counties. However, this study did not include statistical controls for confounding variables that might be expected to influence employment outcomes and was limited to a single state.

1.3. Research-based principles of vocational rehabilitation

The last few decades have seen major developments in our understanding of best practices in the field of

vocational rehabilitation for people with a psychiatric disability, although implementation of these strategies has not been widespread [17,39]. The accumulated research evidence along with consensus among experts has resulted in the emergence of a series of principles of vocational rehabilitation for this group, rather than endorsement of any single program type or model [23]. One key principle involves *integrating vocational services with mental health services*, typically on teams in which service planning and delivery is done by clinical and vocational staff who interact frequently and coordinate their efforts [10,27,28,41,45,49]. Another principle is the use of *competitive employment placements in socially integrated settings*, rather than sub-minimum wage (i.e., sheltered workshop), subsidized, or unpaid work in settings including only workers with disabilities [8,12,22]. Studies also have shown the value of respecting *client choice and career preferences* in the kinds of job placements developed for consumers [9, 16], the need for *rapid job search and placement* as soon as possible after beginning service delivery [10, 11,13,25], and the importance of *on-going vocational support services* with no time limits given the cyclical nature of severe mental illness [14,24,31,42]. These principles underlie the “supported employment” (SE) approach to vocational rehabilitation for adults with disabilities [60]. SE services can be organized under a wide variety of service delivery models, and can incorporate elements of a number of different program and agency types [56]. These variations characterized the models tested in the multisite study.

1.4. Hypotheses

This study tested three hypotheses: 1) that study participants in areas with higher unemployment rates would have poorer vocational outcomes than those from areas with lower unemployment rates; 2) that these differences would persist despite the effects of study condition; and 3) that, along with study condition, these differences would remain significant while controlling for participants’ personal characteristics including demographic features and clinical status.

2. Method

2.1. Participant characteristics

Participants in the study were roughly evenly divided between experimental (51%) and control conditions

(49%). Just over half were male (53%). About 50% of participants were of non-minority race/ethnicity: 29% were African American, 15% Hispanic/Latino, and 6% of other race/ethnicities. The median age at study baseline was 38 years, with an average of 38.3 (s.d. = 9.4). Around a third (35%) of participants had less than a high school education, 31% had completed high school or an equivalency certificate, and 25% had some college or technical school. Although almost all participants (97%) had worked for pay at some time during their lives, more than one-third (36%) had not worked in the five years prior to participation in the Employment Intervention Demonstration Program (EIDP). Almost half (47%) had not worked for at least 24 months prior to baseline. The most prevalent *DSM-IV* Axis I diagnosis was schizophrenia (31%), followed by schizoaffective disorder (18%), major depression (22%), and bipolar disorder (17%). Thus, a full 88% of the population was diagnosed with disorders typically associated with severe impairments in role functioning. The average score for positive symptoms (such as hallucinations and delusions) on the Positive and Negative Syndrome Scale or PANSS [36] was 14.4, compared to a mean of 18.2 in the instrument’s norming sample of people with the comparatively severe diagnosis of schizophrenia. The average score for negative symptoms such as lack of affect or social withdrawal was 16.2, compared to the norming sample’s mean of 21.0. Participants reported an average of seven psychiatric hospitalizations prior to entering the EIDP (median = 4). Almost all participants (97%) were prescribed psychiatric medications at baseline; the average number of prescribed medications was three (median = 2), and the total ranged from zero to nine.

2.2. Multisite study background

The EIDP began in 1995, with the selection of eight study sites and a study Coordinating Center (CC), and was organized under a cooperative agreement funding mechanism. Researchers, a consumer representative, and federal personnel collaborated in the development and implementation of a common protocol of research instruments, uniform data collection methods, and a statistical analysis plan [19,29]. This effort was led by the CC based at the University of Illinois at Chicago (UIC), Department of Psychiatry, Center on Mental Health Services Research and Policy, in partnership with the Human Services Research Institute located in Cambridge, Massachusetts. Data used in this analysis come from seven of the eight EIDP sites. Data from

the Pennsylvania site were excluded because its model was designed to maintain employment among service recipients who entered the program already employed. Therefore, the Pennsylvania data were not appropriate for analysis of the vocational outcome measures examined in this paper, which related to *acquiring and maintaining* employment.

2.3. *Experimental supported employment models tested*

The EIDP was a multisite, randomized controlled trial study of SE interventions for individuals with psychiatric disabilities. At each site, the experimental (E) condition was a form of enhanced best practice SE. The Maryland, Connecticut, and South Carolina sites tested the IPS model [27,28], in which multi-disciplinary provider teams engage in minimal prevocational assessment, rapid job search, placement into competitive jobs, and provision of training and ongoing follow-along supports for as long as the individual requested them. The Massachusetts site used the Program on Assertive Community Treatment vocational model [2, 52] with services provided exclusively in the community through a mobile team comprised of psychiatrists, nurses, case managers, and vocational specialists who collaborate in placing clients in competitive employment and providing job training and continuous employment support. The remaining three sites used models developed especially for the EIDP. The Texas site combined “rapid placement” SE services with social network enhancements that were specifically designed to help clients create more balanced and reciprocal interpersonal networks that supported their work efforts. The Maine site used family-aided assertive community treatment teams whose vocational staff worked with an employer consortium of the area’s major businesses to develop job opportunities, workplace supports, and reasonable accommodations for workers with severe mental illness [6]. The Arizona site used an integrated treatment team comprised of psychiatrists, case managers, rehabilitation counselors, employment specialists, job developers, and benefits specialists, emphasizing rapid job placement and ongoing support for job retention and career advancement.

2.4. *Control conditions*

Due to ethical considerations, none of the sites used a “no treatment” control (C) condition. Since subjects entered the study seeking vocational rehabilitation, it

was neither possible nor desirable to prevent them from receiving employment services. Thus, as with many multisite studies, the nature of C conditions varied. Arizona, Connecticut, Maryland, and South Carolina used a services as usual C condition, in which subjects received whatever services were available in the local community. Massachusetts used the Clubhouse model [1,7], in which facility-based services were provided according to a work-ordered day, with clients and staff working together on jobs within the program as well as at transitional and competitive job placements in the community. Both Texas and Maine used an “un-enhanced” version of their E condition (i.e., no social network services in Texas and no employer consortium in Maine).

2.5. *Study protocol and data collection procedures*

Interview protocols elicited information regarding demographic characteristics, employment history, income sources and amounts, clinical symptoms, and other relevant information at the time of study enrollment (baseline) and at six-month follow up intervals for 24-months. Employment data included number of hours worked, wages earned, job duties, and benefits received, and were collected on a weekly basis from participants by researchers and vocational staff, who verified this information with case records, employers, and pay check stubs. Psychiatric symptomatology was assessed using the PANSS [36], a 30-item semi-structured rating scale administered bi-annually by trained raters who participated in monthly, study-wide PANSS inter-rater reliability rating assessments and telephone refresher training with one of the scale’s creators. An independent validity and reliability study of the PANSS found good to excellent psychometric results [53].

2.6. *Recruitment and inclusion criteria*

Each site used a slightly different method of recruitment, depending on the pool of eligible clients and the type of vocational models studied. All sites recruited participants from existing clinical populations via case manager referral, self-referral, and word-of-mouth; the Massachusetts site used newspaper advertisements in addition to these strategies. As determined by their Institutional Review Boards, all sites applied for and received approval for human subjects protection required for recruitment, informed consent, and data management procedures.

Participants were defined as those meeting the following inclusion criteria: being 18 years or older at the time of study enrollment; being willing and able to provide informed consent; having an Axis I *DSM-IV* diagnosis of mental illness; and being unemployed at time of entry into the study. Of the 1,648 total participants in the EIDP, 1,273 were included in this analysis. The 275 excluded participants included: participants with no vocational outcome data ($n = 100$); all participants from the Pennsylvania site ($n = 182$); participants in a third study condition at the Connecticut site ($n = 65$); and 28 other study participants who responded affirmatively to a baseline survey question asking whether they were doing any paid work. No EIDP participant was excluded from the analysis for any other reason, given its "intent-to-treat" methodological design.

2.7. Success of randomization procedures

In order to evaluate the equivalence of the intervention and comparison participants across sites, bivariate analyses were conducted to test for statistically significant differences in study conditions. Of 15 participant characteristics tested (including all the variables used in the present analysis), none showed a statistically significant difference between experimental and control groups.

2.8. Data quality assurance

Prior to beginning data collection, all sites attended a two-day intensive train-the-trainer event organized by the CC, at which data collection protocols were taught and practiced. The Center conducted routine checks on data quality throughout the study. These procedures included numerous logic checks as a means of identifying outlier or out-of-range values. Logic checks also were used to identify conflicting participant information within interviews, and between interviews and vocational or services data. At bi-annual meetings of the EIDP Steering Committee, the CC presented detailed reports on roughly 150 data elements (excluding outcome variables given the site-blinded nature of the study), thus allowing the group to monitor and correct potential data problems as the study progressed. In addition, monthly and then quarterly teleconference recalibration trainings for all EIDP PANSS interviewers were conducted by the CC from November 1996 through January 2000. Independent psychometric analyses of the Common Protocol instrumentation revealed that high levels of interrater and test-retest reliability were achieved and maintained [53].

2.9. Dependent variables

Two vocational outcome variables were computed for every month of the 24-month followup period. Each outcome is a fundamentally different conceptualization of employment. The first, *competitive employment* is defined as a job that: a) pays minimum wage or higher (i.e., excludes sheltered workshop employment); b) is located in a mainstream, socially integrated setting; 3) is not set-aside for people with disabilities; and 4) is held independently (i.e., not agency-owned). The second outcome variable, *work for 40 or more hours in a single month*, is an outcome used by the Centers for Medicare and Medicaid Services in its 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 a minimum number of hours of any paid work during a one-month time period. It also takes into account the fact that many people with disabilities choose not to work full-time for health reasons or to maintain their eligibility for disability benefits.

2.10. Independent variable

The independent variable in this study was the local unemployment rate for the geographic area surrounding each program. Data on unemployment rates come from the Bureau of Labor Statistics, Current Population Survey (CPS), for all counties in which study sites were located. The CPS is a nationally representative survey in which a changing sample of 60,000 households is interviewed monthly regarding labor force activities (job seeking and holding) as well as non labor force status of household members. Unemployment rates were obtained from the US Department of Labor, Bureau of Labor Statistics website www.bls.gov. Because participants entered and exited the study at different time points, monthly estimates of unemployment rate were matched to county of residence for each subject's unique 24-month followup time period. Unemployment rate was chosen as a labor market measure suitable for examining influences on paid employment because it has been found to influence outcomes of individuals with disabilities [63], including those receiving vocational rehabilitation services [44]. Unemployment rate also was chosen over other labor market measures (e.g., labor force density, occupational mix, industrial mix) because of its availability on a monthly basis, allowing for more sensitive measurement of change over time.

2.11. Covariates

Regarding demographic and clinical covariates, results of prior research suggest that a number of factors are associated with employment outcomes for both the general population and individuals with mental illness and, thus, should be included in multivariate models predicting employment. These include gender [61], race/ethnicity [22,26], education [47], psychiatric symptomatology [4,51], functioning [46], and schizophrenia spectrum diagnosis [28,30,34]. Some potential covariates were excluded from the models because of their high correlation with other variables. For example, diagnosis and functioning were excluded because of their correlation with PANSS symptoms. Other potential covariates, such as prescription of psychiatric medications, were excluded because of the lack of variance across the sample (for example, 97% of participants reported psychotropic medications at baseline). Dichotomous variables were used for gender (male), minority status (Caucasian), and education (high school or greater). For symptomatology, the PANSS yields one interval level sub-score for so-called positive symptoms (e.g., hallucinations, delusions) and another for negative symptoms (e.g., blunted affect, lack of spontaneity).

2.12. Follow-up rates and attrition analysis

As reported previously [20,21], follow-up rates did not vary significantly between participants in the E and C study conditions: at 6-month follow-up, 89% ($n = 578$) of experimental condition and 87% ($n = 546$) of comparison condition subjects completed interviews; at 12 months, 84% ($n = 547$) of experimental and 81% ($n = 504$) of comparison subjects completed interviews; at 18 months, 80% ($n = 521$) of experimental condition and 77% ($n = 481$) of comparison subjects completed interviews; and at 24 months, 79% ($n = 515$) of experimental and 76% ($n = 478$) of control condition subjects completed interviews. Of 1,273 participants, 824 (65%) completed 5 interviews, 173 participants (14%) completed 4 interviews, 122 (10%) completed 3, 111 (9%) completed 2, and the remaining 43 (3%) completed 1 interview. Those completing 5 interviews were compared to all others regarding study condition and model covariates. The only significant differences were in gender and age: 51% ($n = 420$) of completers were male vs. 58% ($n = 258$) of non-completers ($\chi^2 = 4.92$, $d.f. = 1$, $p < 0.05$); and completers were an average of one year older than non-completers (39 vs. 38 years, $t_{1270} = -2.24$, $p < 0.03$).

2.13. Statistical analysis

First, unemployment rates over time were inspected visually for each of the seven counties in which study sites were located, to assess whether sufficient variability existed over time and between sites. Next, hierarchical random regression analysis using time-varying (e.g., symptoms) and fixed covariates (e.g., study condition, gender, ethnicity) was used to examine the effect of unemployment rate on each of the two employment outcomes. Random effects logistic regression modeling, part of a family of statistical methods termed random regression modeling (RRM), was chosen to address issues commonly found in longitudinal multisite data, including: serial correlation; individual heterogeneity; missing observations; and fixed versus time-varying covariates [32].

Step 1 of the RRM was designed to test the study's first hypothesis that participants in areas with higher unemployment rates would have poorer vocational outcomes than those from areas with lower unemployment rates. Thus, in step 1, the effects of unemployment rate, time, and time squared were entered, the latter to account for non-linearity in the distributions of the dependent variables. Step 2 of the analysis tested the hypotheses that the effects of unemployment rate would persist for both experimental and control condition participants. Thus, in step 2, the effect of study condition was added to that of unemployment rate along with condition by time and condition by unemployment rate interactions. Step 3 tested the final hypothesis, that the effects of unemployment rate would remain significant while controlling for both study condition and participants' demographic and clinical characteristics. To accomplish this, the effects of client characteristics were added to the models in step 3. To examine the potential interaction of unemployment rate and study condition, in the final phase of the analysis, all participants were classified according to both study condition and residence in counties with high versus low unemployment rates (using the median as a cut-point) into four groups: 1) E condition/low unemployment rate; 2) E condition/high unemployment rate; 3) C condition low/unemployment rate; and 4) C condition/high unemployment. Indicator variables for membership in each of the last three groups were included in random regression models with client characteristics, using group one as the contrast. The software program MIXOR was used for all analyses [33], providing parameter estimates with standard errors and p-values for each model variable and the intercept.

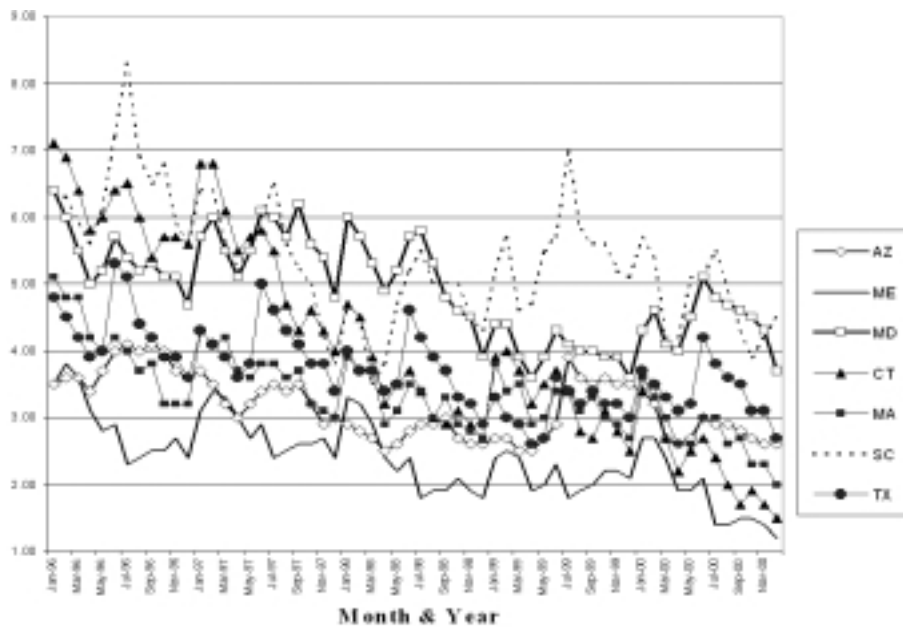


Fig. 1. Unemployment Rate (Current Population Survey) County-Wide Estimates by Calendar Month and Year for Seven Study Sites.

3. Results

3.1. Unemployment rates over time

Figure 1 shows the CPS-estimated unemployment rates for each of the 7 study sites from January 1996 (the first month of the study for the initial group of participants) through November 2000 (the last month of study participation for the final group). Over this 59-month period, there was a moderate degree of change in this rate, typically a decline of around 2 percentage points (e.g., from around 6% to 4% in Baltimore County, MD and 5% to 3% in Worcester County, MA). Particularly notable was a steeper decline at the Hartford (CT) site, from a high above 7% to a low around 1.5%. There were also noteworthy differences in unemployment rates between sites, with Cumberland County (ME) having the lowest rate for almost the entire time period and Sumter County (SC) having the highest for much of this time.

3.2. Multivariate analyses

Table 1 shows the results of the hierarchical RRM analysis. At step 1, unemployment rate was significantly and negatively related to each of the two employment outcomes. The effects of time and time-squared are included in these models because we are modeling effects over a 24-month period, and because the distri-

bution of the dependent variables is curvilinear. Time is significant in the model, indicating that participants' outcomes improved over the 24-month followup period, regardless of the unemployment rates of their local communities. Thus, step 1 results indicate that, even accounting for time and curvilinearity, the higher the unemployment rate the lower participants' likelihood of competitive employment and working 40+ hours per month.

At step 2, the relationship between unemployment rate and outcomes persisted despite controlling for study condition and condition by time, both of which were significant. Regardless of whether participants received E or C interventions, those in counties with high unemployment rates had significantly poorer employment outcomes than those in areas with low unemployment. At the same time, however, study condition also was significant in these models, as were condition by time interactions and condition by unemployment rate interactions. The positive and significant condition by time interaction indicates that the advantage of E over C condition participants increased over time throughout the 24-month study period. The positive and significant interaction of unemployment rate by condition indicates that those in counties with high unemployment rates did significantly better if they were in the E condition. Finally, the significant and negative effect of condition indicated that without accounting for time (i.e., earlier in the study) C group participants did

Table 1
Hierarchical Random-Effects Logistic Regression Analysis of Effects of Unemployment Rate (UR)
on Vocational Outcomes, Controlling for Study Condition, and Participant Characteristics

Variable	Competitive Employment ¹			Worked 40+ Hours Per Month ¹		
	Step1	Step2	Step 3	Step 1	Step 2	Step 3
Intercept	-0.13 ^c	-1.22 ^c	-0.98 ^c	-1.44 ^c	-1.32 ^c	1.47 ^c
Unemployment Rate	-0.07 ^c	-0.20 ^c	-0.20 ^c	-0.07 ^c	-0.10 ^c	-0.05 ^b
Time	0.07 ^c	0.07 ^c	0.07 ^c	0.11 ^c	0.10 ^c	0.10 ^c
Time Squared	-0.01 ^c	-0.01 ^c	-0.01 ^c	-0.01 ^c	-0.01 ^c	-0.01 ^c
Condition		-0.28 ^a	-0.26 ^a		-0.23 ^a	0.03 ^{ns}
Condition X Time		0.01 ^a	0.01 ^a		0.01 ^c	0.01 ^c
UR X Condition		0.20 ^c	0.19 ^c		0.07 ^c	0.05 ^a
Male			0.12 ^c			0.07 ^a
Caucasian			-0.07 ^a			-0.03 ^{ns}
High School			0.05 ^{ns}			0.36 ^c
Positive Symptoms			-0.01 ^c			-0.01 ^{ns}
Negative Symptoms			-0.01 ^c			-0.02 ^c

¹Random-regression (MIXOR) estimate and significance.

^a $p < 0.05$, ^b $p < 0.01$, ^c $p < 0.001$.

significantly better relative to the E group. Overall, step 2 results indicate that, even controlling for study condition, those in areas with high unemployment rates did significantly worse than those in areas with low unemployment rates. At the same time, however, even in areas with high unemployment, those in the E condition interventions achieved superior outcomes over time, compared to those in the C condition.

At step 3, with the addition of participant characteristics, unemployment rate remained a significant predictor of outcomes, as did condition by time and condition by unemployment rate interactions. In addition, several client features were significant in both models: being male was associated with better outcomes; and higher levels of negative symptoms were associated with poorer outcomes. Being Caucasian and higher levels of positive symptoms were associated with lesser likelihood of competitive employment but not with working 40 or more hours per month. Similarly, having a high school education or greater was associated with a greater likelihood of working 40 hours per month but not with achieving competitive employment.

To test whether inclusion of unemployment rate in the MIXOR analyses resulted in significantly better-fitting models, we computed χ^2 tests of differences in log-likelihood ratios in models with and without this measure. The change in log likelihood was statistically significant in both models, indicating a better – fitting model with the inclusion of unemployment rate than without it (competitive employment $\chi^2 = 32.8$, $p < 0.001$, $d.f. = 1$; worked 40+ hours/month $\chi^2 = 21.4$, $p < 0.001$, $d.f. = 1$).

Given the durability of the effects of both unemployment rate and study condition on vocational outcomes,

as well as their interaction and the effects of time, we wanted to better understand the nature of the interactions between these factors. To examine this question visually, we classified study participants into the four groups described earlier: E/low unemployment rate, E/high unemployment rate, C/low unemployment rate, and C/high unemployment rate. Figures 2 and 3 show the trends over time for each of the four groups regarding competitive employment and working 40+ hours per month respectively. Unlike Fig. 1, which used calendar month, these figures indicate time according to participants' month of study participation. Regarding competitive employment, Fig. 2 shows that, beginning around month 6, participants in the E/low unemployment rate group had better outcomes than all others and this advantage continued throughout the remainder of the study. Those in the E/high unemployment rate group had worse outcomes but also did better than participants in the two C conditions, again throughout the remainder of the study. In addition, the lines for the two C group participants were in close proximity to each other throughout most of the study. It was not until the final six months of program participation that the C/low unemployment group showed outcomes that were superior to those of the C/high unemployment participants.

Similar trends are evident in Fig. 3 regarding working 40+ hours per month. Here, once again, those in the E/low unemployment group did better than all other groups, beginning around month 7 of the study. Those in the E/high unemployment group did well during much of the study until the final 10 months, when there is considerable convergence with the outcomes of

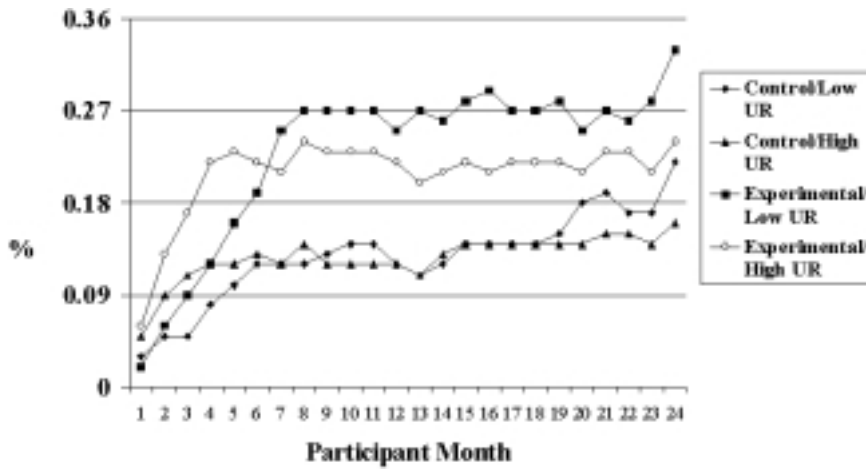


Fig. 2. Proportion in Competitive Employment by Study Condition and Unemployment Rate.

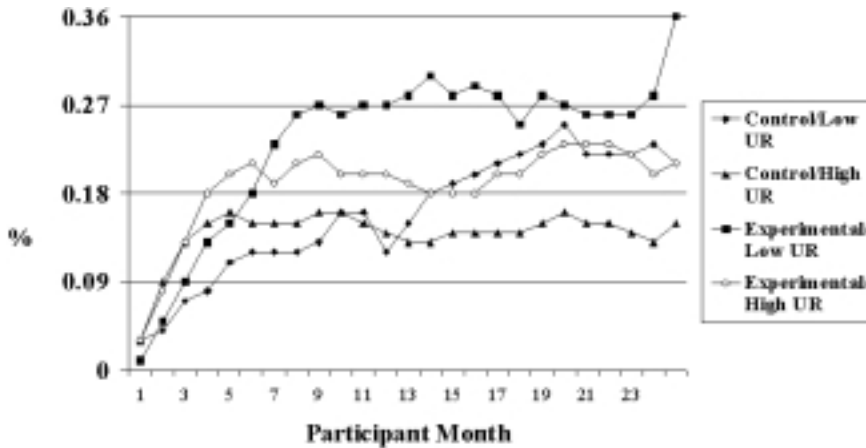


Fig. 3. Proportion Working 40+ Hours per Month by Study Condition and Unemployment Rate (UR).

those in the C/low unemployment rate group. During this same time, participants in the C/high unemployment group had noticeably worse outcomes compared to each of the other three groups.

Although instructive, these figures illustrate only zero-order, unadjusted observations. To explore the interaction of study condition and unemployment while also controlling for the effects of time and participant characteristics, we conducted further RRM analyses. We entered indicator variables for groups 2 through 4 in the multivariate model, using group 1 (E/low unemployment rate) as a contrast, and included time, time squared, and participant demographic and clinical features. As shown at the bottom of the left hand columns of Table 2, each of the three groups of participants was significantly less likely to achieve competitive employment than were the E/low unemployment subjects. This

is indicated by the negative and significant coefficients for each of the three pairings. This was so regardless of the effects of time, demographic variables, or clinical features, which acted similarly to their effects in the hierarchical RRM analyses.

The results for the second outcome – working 40+ hours per month – were highly similar, as shown in the right-hand columns of Table 2. Each of the C groups performed significantly worse than the E/low unemployment group. Here, however, the coefficient for those in E/high unemployment group was not significant, indicating no difference between E group participants in areas with high versus low unemployment rates. In this model, then, study condition appears to have a somewhat stronger effect on positive outcomes than does unemployment rate.

Table 2
Random-Effects Logistic Regression Analysis Showing Combined Effects of Unemployment Rate (UR) and Study Condition Controlling for Participant Characteristics

Variable	Competitive Employment ¹			Worked 40+ Hours Per Month ¹		
	Est	SE	Sig	Est	SE	Sig
Intercept	-3.35	0.13	***	-1.21	0.07	***
Time	0.20	0.01	***	0.11	0.01	***
Time Squared	-0.01	0.00	***	-0.01	0.00	***
Male	0.42	0.05	***	0.01	0.03	ns
Caucasian	-0.23	0.05	***	0.11	0.03	***
High School	0.13	0.06	*	0.15	0.03	***
Positive Symptoms	-0.04	0.01	***	-0.01	0.00	***
Negative Symptoms	-0.01	0.01	***	-0.03	0.00	***
Control/High UR ²	-1.33	0.08	***	-0.27	0.04	***
Control/Low UR ²	-1.93	0.09	***	-1.20	0.05	***
Experimental/High UR ²	-0.40	0.07	***	-0.03	0.04	ns

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

¹Random-regression (MIXOR) estimates, standard errors, and significance.

²With Experimental/Low UR as contrast.

4. Discussion

A major finding of this study is the link between local area unemployment and lower labor force participation of individuals with severe mental illness. Our analysis demonstrates that an economic indicator used to monitor the general labor market – the unemployment rate – is significantly associated with the likelihood of labor force participation of individuals with psychiatric disabilities. Given the clinical trials nature of the study design, in which participants were randomly assigned to E versus C vocational rehabilitation interventions, it is particularly noteworthy that the effects of unemployment rate remained significant despite controlling for study condition. In addition, the analysis demonstrates the effects of unemployment rate on two conceptually distinct employment outcomes that represent the quality and the intensity of labor force participation. Further, the effects of unemployment remain significant regardless of the participants' demographic characteristics such as gender, ethnicity and education, as well as features of their mental illness such as symptomatology. Finally, the importance of unemployment as a predictive variable is evident from the fact that longitudinal, time-varying random regression models that included the effects of unemployment rate were significantly better fitting than those that excluded this variable.

In addition, study participants in control conditions who resided in areas with high unemployment rates were at a significant disadvantage. This suggests that services-as-usual (or SE interventions not tailored specifically for psychiatric disabilities) are less effective

for individuals residing in areas with high unemployment. Those who are attempting to return to work in areas with poor local economies are likely to fare especially poorly, particularly if they are not receiving best practice SE interventions using the principles described at the beginning of this paper. This conclusion is also supported by another major finding of this research, namely, that experimental condition participation had a significant and positive effect on both employment outcomes, even controlling for the effects of unemployment rate, time, time by condition interaction, and participant characteristics. Thus, this study provides convincing empirical support for psychiatric vocational rehabilitation best practices, including the integration of clinical and employment services, availability of on-going job support, development of jobs consonant with individual's career preferences, and a focus on rapid job placement into permanent, socially integrated, competitive employment.

Although unemployment rate was associated with labor force participation regardless of participant demographic characteristics, it is notable that some of these covariates were nonetheless significant in the models. It is interesting to note that these effects largely mirror those found in studies of the general labor market [40]. Most consistently, participants with better vocational outcomes tended to be male and be better educated. Prior studies have confirmed the labor market disadvantages faced by women with disabilities in general [5,35], as well as psychiatric disabilities in particular [50]. Women who participate in vocational rehabilitation may benefit from additional services and supports such as childcare, gender-sensitive career ex-

ploration, and assistance with sexual harassment and employment discrimination issues [18,55]. The importance of education suggests that SE programs should be prepared to offer ongoing remedial and post-secondary education services and supports. This set of services, known as “supported education” [59], assists individuals with severe mental illness to enhance their levels of education in order to obtain better and higher paying jobs.

It is interesting to note the counter-intuitive finding that Caucasian ethnicity was negatively related to employment success in some models, given the volume of literature documenting the labor market disadvantages faced by members of racial and ethnic minority groups [40]. While Caucasian participants were less likely to achieve competitive employment than were members of minority groups, they were more likely to work 40+ hours per month in one model while there were no significant differences in another model. The reasons for these findings are not immediately apparent, and may be related to differences in the two types of employment outcomes studied. In any event, this requires further investigation.

Those participants with poorer vocational outcomes tended to have more severe psychiatric symptoms, including the more dramatic and noticeable positive symptoms as well as the less attention-drawing negative symptoms. This suggests that some individuals may need tailoring of SE services to meet special needs such as help finding jobs at which persistent symptoms are less obtrusive, support for dealing with medication side-effects that exacerbate certain symptoms, and reasonable accommodations (as mandated by the Americans with Disabilities Act, 1990 [3]) to alter aspects of the job or work setting that can worsen symptoms.

Some caveats to these findings are in order. Since the group studied in this research was not a nationally representative sample, results may not be generalizable to people with mental illness in the population at large. In addition, since participants were recruited into the study based on their desire to obtain paid employment, study findings are relevant only to those individuals seeking vocational rehabilitation services. Moreover, given the nature of the research as a clinical trials study, some individuals desiring SE services may have opted out of participation due to the requirement that they undergo randomization and potential assignment to a control condition. However, this is the largest multisite study to date that addresses the effectiveness of SE services for people with mental illness and, thus, it offers the advantages of statistical power as well as regional variation.

The operationalization of our study’s independent variable also had some drawbacks. Use of county level employment data may have masked within-county variations in unemployment, biasing our results. Reliance on unemployment rates also failed to capture the behavior of individuals who were out of the labor force (e.g., discouraged workers or individuals who would like to work but have not looked for a job in the past four weeks), which may be important given that this status characterizes a large proportion of individuals with severe mental illness. Unfortunately, within-county unemployment data were unavailable, and many studies rely solely on state level unemployment rates [38], making ours more sensitive than most. Finally, this study was conducted during a period of declining unemployment rates and, thus, its conclusions may be less useful in today’s more constricted labor economy. However, results of prior research suggesting that individuals with disabilities experience disproportionately worse employment outcomes in time of economic downturn [64] can be used to guide the interpretation of our study’s findings for those competing in today’s labor market.

5. Conclusion and implications

All of the participants who entered this study were unemployed and seeking paid work, with varying levels of education and severity of illness. Following program entry, their likelihood of positive employment outcomes improved significantly despite local labor force conditions. Clearly, EIDP participants were highly motivated to work and many did so, displaying noteworthy productivity by earning over 3.5 million dollars and working more than 850,000 hours during their two-year followup period. However, evidence-based services were the key to greater vocational success, and appeared to ameliorate the negative effects of high unemployment.

These findings have important implications for rehabilitation providers and administrators, as well as policy makers. The awareness that workers with this disability are influenced by local labor market conditions should influence public policies designed to assist them with their return to work. The provision of evidence-based practice services and supports appears to be especially critical during times of economic downturn, when all disabled workers’ labor force participation is threatened. Those re-entering the labor force in regions of the country with high unemployment rates are par-

ticularly vulnerable. Programs operating in these areas should ensure that they are providing evidence-based, best practice SE, given this study's finding that it can overcome the effects of a stagnant labor market. Service providers should also be cognizant of the features of their local labor economy, and engage in careful industry analysis when advising clients who are engaged in a job search. Service administrators may want to consider adjustments in the nature and intensity of employment services they provide, as well as the intensity of supportive clinical services such as case management, in times of economic downturn. Hopefully, future research studies as well as the "next generation" of SE models for people with psychiatric disabilities will apply these findings, and build on the knowledge gained in order to enhance the labor force participation of this economically disenfranchised population.

Acknowledgements

This study is part of the Employment Intervention Demonstration Program (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.

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