

# Prevocational services and supported employment wages

Zafar E. Nazarov\*, Thomas P. Golden and Sarah von Schrader  
*Employment and Disability Institute, Cornell University, Ithaca, NY, USA*

**Abstract.** Using an observational approach, we investigate the relationship between the receipt of prevocational services and subsequent hourly wages of consumers participating in supported employment programs. To evaluate the potential impact of these services on wages of consumers, we use six years (2005–2010) of data from of the New York Integrated Supported Employment Report (NYISER) data management system. Results indicate that receipt of prevocational services has a negative correlation with hourly wages of consumers. This finding suggests that prevocational services may have detrimental effects on providers' and consumers' expectations on consumers' work ability and productivity resulting in reduced hourly wages. Furthermore, participation in prevocational services may serve as a signal to employers about consumer's productivity.

**Keywords:** Prevocational services, supported employment, hourly wages, random effect model

## 1. Introduction

Two primary approaches to preparing individuals with disabilities for employment have emerged over the past few decades – ‘train-then-place’ and ‘place-then-train’ [1]. ‘Train-then-place’ is based on an assumption that there are prerequisites to employment, and the individual with a disability should acquire a general skill set and demonstrate work readiness prior to being placed in a job. The types of services and supports typically provided include assessment services, personal adjustment, work adjustment, skill training and sheltered employment [2, 3]. These services are provided outside the normal context of integrated, competitive employment and are often referred to as prevocational services.

Supported employment is defined in the Rehabilitation Act of 1973 (7(35)) [4] as “competitive work

in integrated work settings, or employment in integrated work settings in which individuals are working toward competitive work, consistent with the strengths, resources, priorities, concerns, abilities, capabilities, interests, and informed choice of the individuals”. Supported employment services typically follow the second approach: ‘place-then-train’. The ‘place-then-train’ approach affords immediate work integration by first placing the individual in a job matched to their interests and preferences and then providing skill training specific to that job. Services under the ‘place-then-train’ approach may include capacity-based assessment of the consumer to aid in job development, on-the-job assessment and training, transportation, job site accommodations (e.g., reader and interpreter services, rehabilitation technology, personal attendance services, information and referral), long-term follow-along, and other on-the-job supports [5]. While supported employment is based on the ‘place-then-train’ approach, often pre-vocational services are offered to supported employment clients prior to placement. In this paper,

\*Address for correspondence: Zafar E. Nazarov, Employment and Disability Institute, Cornell University, 305 Dolgen Hall, Ithaca, NY 14853-3901, USA. Tel.: +1 607 255 3083; E-mail: zen2@cornell.edu.

we will explore whether this practice is associated with better employment outcomes.

Since its inception in the mid-1980s, supported employment has grown dramatically [6, 7]. According to Braddock et al. [7], participation in supported employment programs has been steadily increasing in the U.S. despite relatively static spending over the last 20 years. In 1998, the number of all consumers in supported employment was 97,100 and by 2009 the number had grown to 117,638, while in the last two decades the cost of the supported employment has been fluctuating between \$770 million and \$860 million per year. The average cost per participant has been steadily decreasing during the study period from \$9,300 in 1998 to \$6,800 in 2009. Such a substantial and systematic decline in spending per consumer requires discretionary and wise use of monetary resources to obtain a maximum return for each dollar spent.

Supported employment enforces a zero exclusion criteria [8–10], meaning eligibility is based on consumer's choice, not other criteria such as job-readiness or workability. Through supported employment all consumers interested in working have access to on-the-job services and supports they may need to learn and perform a specific job in the community. Vocational rehabilitation practitioners and researchers subscribing to a 'zero exclusion criteria' raise concerns about the effectiveness of prevocational services in supported employment (essentially using a 'train-then-place' approach). In particular, opponents of prevocational services doubt that receipt of prevocational services leads to any improvements of labor market outcomes.

To improve labor market outcomes of consumers, Wehman and Moon [11] recommend spending resources on job coaching services rather than 'pre-employment' preparation activities. In support of this approach, Lehman et al. [12] use a randomized trial to demonstrate that consumers with mental disorders who were directly placed and trained in integrated settings earned on average more than consumers who went through the standard vocational rehabilitation system. In another study that questions the effectiveness of prevocational services, Drake et al. [13] show that consumers with mental disorders who were immediately placed in integrated settings were more likely to be competitively employed than their counterparts who received prevocational services as part of a stepwise approach.

Though randomized controlled trials are associated with high internal validity, the external validity of any randomized controlled trial may be limited. Unlike

observational studies, in randomized controlled trials, treatments are not administered in real world environment and are not designed specifically to generalize a broad set of subgroups. Despite the fact that people with mental disorders represent a large fraction of supported employment consumers, findings from the aforementioned studies cannot be generalized to the whole population. In the best scenario, these findings can be used in drawing inferences only about a specific segment of the population, those who have severe mental disorders.

Our study addresses concerns regarding the external validity of results from past studies by exploring the relationship between prevocational services and hourly wages of consumers using six years (2005–2010) of the New York Integrated Supported Employment Reporting (NYISER) data. NYISER includes quarterly data on all consumers participating in supported employment programs in New York State. Observed treatments are administered in the real world environment to a broad set of disability subgroups and are not restricted to those with severe mental disorders. The longitudinal aspect of the data allows us to estimate a dynamic model of hourly wages of consumers controlling for intra-class correlation between unobserved factors that each consumer faces each period. Wages of non-employed consumers are not observable; and to account for this censoring in the wage variable, we also estimate a model where wages and employment decisions of consumers are modeled jointly [14].

In theory, prevocational services increase non-job-specific skills that improve a consumer's attitude toward work, increase preparedness to work in a competitive environment, and consequently lead to the highest possible hourly wage. However, the inability of some consumers with disabilities to transfer the skills gained during receipt of prevocational services may eliminate any positive impact of services on future wages of consumers [11]. Moreover, it could be conjectured that providers may lower expectations of consumers' work abilities after prolonged pre-vocational services, and as a result, place consumers in lower paying jobs. Consumers may also lower their own work ability expectations after prolonged prevocational services and self select themselves into lower paying jobs [8, 9, 15, 16]. All these factors may mask the intended positive effect of prevocational services on hourly wages of consumers.

The main results of our study confirm the Lehman et al. [12] finding. After controlling for individual and job characteristics, receipt of prevocational

services and hourly wages of consumers are negatively correlated regardless of whether the wage censoring issue is accounted in the empirical model or not.

## 2. Model

The main objective of this study is to estimate the effect of prevocational services on hourly wages of consumers participating in supported employment programs. We propose the following linear random effect model:

$$W_{it} = X_{it}\beta + P_i\gamma + \sum_{j=2}^P w_j + \mu_i + \varepsilon_{it} \quad (1)$$

$$\text{where } \mu_i \sim N(\mu, \sigma_\mu^2) \quad (2)$$

$$\varepsilon_{it} \sim N(0, \sigma_e^2) \quad (3)$$

$$\text{cor}(\mu_i + \varepsilon_{it}, \mu_i + \varepsilon_{is}) = \frac{\sigma_\mu^2}{\sigma_\mu^2 + \sigma_e^2} \quad \text{for } s \neq t \quad (4)$$

The dependent variable,  $W$ , in Equation (1) above is the log of the hourly wage rate.  $X$  includes various individual and job characteristics such as age, age squared, the sequence of the current job (i.e., indicating if this is their first, or later, job in the supported employment system), the sequence of the current job squared, gender, an indicator whether the employer pays the wage, type of occupation, primary disability type, and an indicator for the consumer's duration in the program (1 to 4 months, 5 to 8 months, 9 to 12 months, 12 to 16 months, and more than 16 months). In the following paragraphs, we describe our motivation for including these elements in the model.

We expect that consumer's age positively relates to the log of hourly wage rate. Because we do not observe consumer's education in the data and as a result we do not have any variable that captures the educational attainment in the above model, we also expect that the age effect would partially capture the positive effect of education on wages, assuming that years of schooling increases with consumer's age. Unfortunately, we don't observe the total work experience of consumers in the data, but we use a combination of two different factors to capture the effect of work experience on wages. First, we believe that the job sequence strongly correlates with the level of work experience. The majority of supported employment consumers do not have any prior work experience and the number of previous jobs held during

participation in the supported employment program can indicate on increasing experience in working. Second, consequently, the time spent in the program also informs us regarding each consumer's work experience.

In our empirical model, we also include gender, assuming that it would capture gender specific idiosyncratic differences in wages. The consumers participating in supported employment initially are in a very specific labor market, different from the one faced by individuals without disabilities. In such a specific labor market, we suspect that there are limited possibilities for any discrimination based on a consumer's gender primary due to a zero exclusion criteria enforced by supported employment programs. However, with increasing experience in supported employment, consumers become more integrated into a competitive work environment and are faced with all of the same discriminatory issues that exist in the competitive labor market.

We also expect that, on average, wages paid by provider agencies will be lower than wages paid by employers. To capture this in our model, we introduce in the wage equation an indicator for who pays the wage to the consumer in a given period.

The vector  $X$  also contains sets of occupational and disability indicators. We use a three-digit occupational code to combine consumers into four occupational groups such as professional, sales and clerical, processing and production, and service. This allows us to control for differences in wages across different occupational groups. Finally, information about each consumer's primary disability allows us to break down the sample of consumers into five groups by type of impairments and functional limitations. These five groups are consumers with mental retardations, mental health problems, visual or hearing impairments, physical limitations, and learning disabilities. These categorizations allow us to capture the differential effects of impairments and functional limitations on a consumer's productivity. In the empirical model, we introduce the set of indicators for each occupational and disability group. For each categorization, we omit the indicator of the first group.

The primary variables of interest in the empirical model are included in vector  $P$ . In particular, we introduce a single variable that would identify the relationship between prevocational services on hourly wages of consumers.  $P$  contains information regarding whether the individual participated in sheltered workshop prior to moving to supported employment services.

Finally, the equation contains two uncorrelated error terms:  $\mu_i$  is the individual specific random effect on wages and  $\varepsilon_{it}$  is time-specific random shock. Both are assumed to be normally distributed with means  $\mu$  and 0 and variances  $\sigma_\mu^2$  and  $\sigma_\varepsilon^2$ , respectively. The combined error is correlated over  $t$  for a given  $i$  with the correlation coefficient represented by (4).

To estimate the wage equation given by (1), we have to restrict our sample only for those consumers who were employed and received positive wages in a given quarter. This implies, consumers who participated in supported employment programs, but who were never placed in jobs or whose wages were not observable in a particular quarter should be dropped from the sample. To address the censoring issue in the wage variable, we use the following bivariate sample selection model:

$$W_{it}^* = Z_{it}\beta_1^2 + P_i\gamma_1^2 + \sum_{j=2}^P w_j + \varpi_{it}^W \quad (5)$$

$$E_i^* = Z_{it}\beta_2^2 + P_i\gamma_2^2 + \sum_{j=2}^P w_j + \varpi_{it}^E \quad (6)$$

$$\begin{aligned} W_{it} &= W_{it}^*, E_{it} = 1 & \text{if } E_{it}^* > 0 \\ W_{it} &= 0, E_{it} = 0 & \text{if } E_{it}^* \leq 0 \end{aligned} \quad (7)$$

$$\begin{pmatrix} \varpi_{it}^W \\ \varpi_{it}^E \end{pmatrix} \sim NID \left( \begin{pmatrix} 0 \\ 0 \end{pmatrix}, \begin{pmatrix} \sigma_1^2 & \sigma_{12} \\ \sigma_{12} & 1 \end{pmatrix} \right) \quad (8)$$

The above model estimates the wage equation including also consumers with missing wages. Statistical significance of  $\sigma_{12}$  will justify the use of this more complex modeling technique. If selection into employment can be explained by not only observed characteristics included in vector  $X$ , but also by some unobserved to researchers factors, then estimate of  $\gamma$  in model 1 will be certainly biased. We include in vector  $Z$  all variables included in  $X$  except variables related to job specific characteristics such as occupation, job sequence and whether wages paid by employer. The latter set of variables is not observable for consumers with missing wages<sup>1</sup>.

The above two empirical models both explicitly assume that the unobserved individual specific effect is uncorrelated with all characteristics included in  $X/Z$  and  $P$ . If the same unobserved factors affect both prevocational service placement and wages, then the previous assumption will be undoubtedly violated. Our identification strategy will produce the unbiased estimate if the prevocational service placement can be solely explained by consumer's observed characteristics included in  $X/Z$ . Specifically, our informal survey of the number of vocational rehabilitation practitioners revealed that the type of disability can be important factor in the placement decision, which is a part of vector  $X/Z$ . For example, our data confirms that consumers with developmental disabilities have a higher likelihood of receiving prevocational services. Furthermore, the practitioners pointed out that severity of the functional limitation or impairment can be another important factor in the placement decision. Unfortunately, severity of disability is not observable in the data. However, using the sample of consumers drawn from the RSA-911 data, we observe that almost 95% of consumers participating in supported employment programs are recognized as consumers with substantial disabilities. Thus, exclusion of the latter variable from the wage equation shouldn't much affect our estimate. Our survey of vocational rehabilitation practitioners also revealed that in many instances the placement decision is under discretion of the provider of VR services. This implies that in many cases placement can be solely explained by some provider-specific characteristics. Taking into consideration that we can only identify providers' names in the data and we do not observe any other providers' characteristics, to control for possible correlation between  $P$  and provider-specific effects on wages, we introduce in both models a set of provider fixed effects,  $w_j$ . The latter should take into account any provider idiosyncratic factors in the placement decision.

Even after that our identification strategy may still not allow us to obtain the 'true' average effect of prevocational services on wages. Instead, if  $P$  correlates with unobserved individual factors such as motivation or previous experience and if our model does not properly control for such correlation, then one would undoubtedly receive a naïve estimate for the effect of prevocational services on wages,  $\gamma$ . Because of our belief that individual motivation is not the major factor associated with the placement decision, we think that the size and especially direction of the estimate of  $\gamma$  without controlling for this factor is an informative tool for future policy interventions.

<sup>1</sup> For purpose of identification, in theory, vector  $Z$  in Equation (6) should contain at least one variable not included in vector  $Z$  in Equation (5) [17]. However, the parameters of the wage equation in (6) could also be identifiable due to a non-linear structure of Equation (6). We couldn't come up with a good exclusion restriction; therefore, our identification strategy solely relies on non-linearity in Equation (6).

### 3. Data

The main data source of this study is the New York Integrated Supported Employment Report (NYISER) data system. NYISER is a data system created to capture detailed information on consumers receiving supported employment services offered by providers contracted with Adult Career and Continuing Education Services-Vocational Rehabilitation (ACCES-VR), the Office for People with Developmental Disabilities (OPWDD), and the Office of Mental Health (OMH) in New York State. For this study we use six years of longitudinal data on all consumers of supported employment services who were in the system during the period January 2005–October 2010. The employment information on each consumer is updated quarterly. The employment fields in NYISER include information on the current employer's name, placement date, occupational code, weekly working hours, wage rate, an indicator of whether wages are paid by the current employer, and the sequence number of the current employer. This employer-related information allows us to track each consumer's employment history for the duration of supported employment services.

The NYISER system includes 44,272 consumers who received a variety of employment services in New York from January 2005 to October 2010. Due to the left-censoring issue, we could not identify whether 14,936 consumers who entered the system before January 2005 received prevocational services. The left-censoring issue becomes apparent due to the fact that we do not observe consumers and the services they received before January 2005. Furthermore, due to the right-censoring issue, we could not identify the exact date of the case closure for 8,896 consumers who continued receiving services in October 2010. Therefore, our main sample selection criteria were to leave in the sample only those consumers who started receiving supported employment services on or after January 1, 2005 and completed receiving then before October 2010. This resulted in a final sample of 20,440 consumers.

As is discussed in our model, the main variables of interest are whether one received any prevocational services, and hourly wages. If the consumer reported participation in sheltered workshops in any quarter, we set the indicator of receipt of prevocational services equal to one and otherwise to zero. Using this strategy, we identified that 804 of 20,440 consumers in our sample received prevocational services in the form of participation in sheltered workshops. Finally, the NYISER data system contains the hourly wage rate

Table 1  
Descriptive statistics of baseline variables for the complete sample

Variable	All	Train-then-Place	Place-then-Train
<i>Disability categories</i>			
Mental retardation	32.64%	68.44%	31.02%
Mental health	44.38%	24.77%	45.26%
Blind/deaf/hearing	3.96%	1.70%	4.07%
Physical	4.05%	1.24%	4.18%
Learning disability	14.96%	3.85%	15.47%
<i>Occupation categories</i>			
Professional	6.99%	1.17%	7.36%
Sales & clerical	26.59%	20.36%	26.99%
Services	16.55%	22.49%	16.17%
Processing & production	49.79%	55.98%	49.40%
<i>Other characteristics</i>			
Hourly wage rate	\$7.29	\$6.33	\$7.35
Sequence of the job	1.67	2.05	1.65
Male	57.10%	55.43%	57.18%
Age (years)	32.80	37.31	32.60
Total # of quarters in the system	5.69	6.86	5.64
Employer pays wage	85.90%	66.34%	87.14%
# of consumers	20,440	804	19,556

Note: The sample consists of 20,440 consumers who entered the NYISER system on or after January 1, 2005 and then completed receiving supported employment services before October 2010. Statistics for "Hourly wage rate", "Sequence of the job", "Employer pays wage", "Occupation" are computed using the sample of consumers whose wages and employment status are observable (10,604 consumers) after entering the supported employment program.

for working consumers. We set wages of 167 consumer-quarter observations from our sample to missing if hourly wages were either above \$60 or below \$1. This resulted in subsample of 10,604 consumers with 57,584 wage records, which we use to estimate the wage equation given by (1).

In our final sample, as shown in Table 1, consumers with mental retardation and mental health conditions are two largest groups of consumers. These two groups of consumers include more than 77 percent of all consumers participating in supported employment programs in New York. Almost 15 percent of all consumers have difficulties in acquiring the knowledge and skills expected of those of the same age. Consumers with visual and hearing impairments and consumers with physical disabilities together comprise almost eight percent of all consumers.

Of those who receive supported employment services, almost 49.79 percent are placed in processing and production occupations. Approximately, 27 percent of consumers are in sales and clerical, over 16 percent in service and seven percent in professional positions.

Table 1 also demonstrates that 57 percent of the sample is male and the average consumer's age is

Table 2  
Hourly wages by baseline characteristics used in estimation of the wage equation

Variable	Wage		Variable	Wage	
	Mean	S.D.		Mean	S.D.
<i>Disability categories</i>			<i>Age groups</i>		
Mental retardation	6.82	1.74	15–22	6.94	1.41
Mental health	7.71	2.77	23–29	7.07	1.70
Blind/deaf/hearing	8.26	2.83	30–39	7.46	2.63
Physical	7.52	2.61	40–49	7.60	2.76
Learning disability	7.11	1.44	50–59	7.66	2.91
<i>Occupation categories</i>			60+	7.42	2.95
Professional	9.28	4.09	<i>Years in the system</i>		
Sales & clerical	7.47	2.35	First year	7.27	2.42
Services	7.18	1.96	Second year	7.34	2.30
Processing & production	6.95	1.80	Third year	7.26	1.99
<i>Who paid wage?</i>			Fourth year	7.28	1.97
Employer	7.46	2.21	Fifth year	7.35	2.09
Agency & others	6.26	2.46	<i>Sequence of the job</i>		
<i>Gender</i>			First job	7.35	2.44
Male	7.29	2.30	Second job	7.28	2.06
Female	7.29	2.27	Third job	7.19	1.99
<i>Any prevocational services?</i>			Fourth job	6.93	1.56
Yes	6.33	1.67	5+ job	7.02	1.69
No	7.35	2.39			

Note: Estimates are computed using the sample of consumers participating in the supported employment programs whose were placed on jobs and whose wages and employment status are observable (10,604 consumers) in the NYISER system.

approximately 33 years. On average, each consumer has slightly less than two jobs while receiving supported employment services for about six quarters. The average hourly wage rate is \$7.29 and wages are paid by employers 86 percent of the time. In our analysis, we normalize wages to January 2005 dollars using the Consumer Price Index Research Series (CPI-U-RS) from the Bureau of Labor Statistics. Finally, about 4 percent of consumers receive prevocational services prior to supported employment services.

Table 1 also compares baseline characteristics between two groups of individuals: those who participated in supported employment services directly (place-then-train) and those who first were placed in sheltered workshops (train-then-place) before receiving supported employment services. The basic mean comparison reveals that consumers with intellectual disabilities are more likely to be assigned to “train-then-place” employment model, while consumers with mental health disorders and learning disabilities are less likely to be assigned to the same employment model. Consumers who are directly assigned to “place-then-train” model are more likely to be placed in high paid occupations such as professional and sales and clerical occupations, and they are less likely to be placed in low paid occupations such as service and processing and production occupations. Recipients of prevocational

services are less likely to be males and paid by employers, substantially be older, more frequently change jobs under the program, and stay longer in the system than the counterparts. Finally, Table 1 reveals that on average consumers who receive prevocational services earn less than their counterparts by \$1.02 per hour.

Of the disability groups, the highest earners are consumers with visual and hearing impairments. Table 2 shows that the average consumer with one of these impairments earns slight more than \$8 per hour. Among high earners are also consumers who have mental health problems, \$7.71 per hour. Consumers with physical limitations and with learning disabilities are mid-range earners with hourly wages of \$7.52 and \$7.11, respectively. Finally, the lowest earners are in the group of consumers with mental retardation, \$6.82.

Those who are involved in professional occupations have the highest hourly wage rates, \$9.28 per hour. On average, the lowest hourly wage rates are paid to consumers who are in processing and production occupations, \$6.95 per hour. For those who receive supported employment services in New York the mid-range paid jobs are in clerical, sales, and service occupations: \$7.47, and \$7.18, respectively.

Table 2 also demonstrates that on average female consumers are paid similar hourly wages than male. Also, wages paid directly by employers are more than

\$1.20 per hour higher than wages paid by agencies. In Table 2, it can be clearly seen the parabolic relationship between age and hourly wages and between hourly wages and the sequence of the job. Therefore, in the empirical model these variables are entered as the second order polynomials. There is no clear relationship between years in the NYISER system and hourly wage rate. Therefore, in the empirical model, we introduce experience in the program as measured by the number of quarters in the NYISER system by the set of dummies as presented in Table 2.

We recognize the fact that our empirical model may miss several important individual characteristics such as education and race/ethnicity that may simultaneously affect consumer's productivity and receipt of prevocational services. Both variables are present in the NYISER data system, but the response rates for these variables are extremely low (about 6–10 percent). The low response rates can be explained by the fact that both education and race/ethnicity are not part of Chapter 515 annual report on interagency efforts on integrated employment in New York. According to Chapter 515 of the Laws of 1992, each agency participating in the NYISER data system must annually prepare a report of the employment outcomes achieved by their consumers. Agencies have less interest in consumer characteristics which are not included in the Chapter 515 report and as a result, agencies do not require providers to complete these two fields.

We believe that omission of these two characteristics should not affect the main estimates in our analysis. First, consumers who receive the supported employment services are those who have very severe impairments and functional limitations. In most cases, the impairments and functional limitations of these consumers prevent them from pursuing primary and post-secondary education. Therefore, we expect that this segment of the population has a highly concentrated distribution of educational attainment at or below a high school diploma. To prove that our conjecture about the shape of the distribution of educational attainment of consumers participating in support employment is a valid one, we created the distribution of education attainment for supported employment consumers using 2006–2009 years of RSA-911. The latter is the administrative data which is created by combining federally mandated reports that each state's vocational rehabilitation agency submit annually for the preceding fiscal year. The distribution demonstrates that slightly more than 83 percent of supported employment consumers nationally have educational attainment equal

to or less than a high school diploma. Only 13 percent of consumers have taken some college classes and less than four percent actually have a college diploma. Using the same sample of supported employment consumers drawn from RSA-911, we also checked whether race plays any role in the selection into the prevocational services. The simple logistic analysis with the dependent variable of whether a consumer received any job readiness training (includes training for appropriate work behaviors, getting to work on time, appropriate dress and grooming) demonstrates that the odds ratio for African American and white consumers are not statistically different, while these two groups have substantially lower odds ratios compared to Latino and other ethnic groups. Taking into account that African American and white consumers represent the two largest groups of consumers comprising about 90 percent of all consumers, we believe that the selection into prevocational services should not be driven substantially by consumer's race or ethnicity. As a result, we do not expect that omission of these two variables from our empirical model will substantially bias our main estimates. All details of these analyses are available upon request.

#### 4. Results

In Table 3, we present results from a random-effect Generalized Least Squares regression and bivariate sample selection model with the log of the hourly wage rate as the dependent variable. The main difference between the two specifications is that in estimation of the wage equation the first specification does not include consumers with missing wages.

The first row of Table 3 demonstrates that after controlling for a set of consumer and job characteristics, the effect of prevocational services on wages is negative and statistically significant. When we control for consumers with zero wages, the estimate of receipt of prevocational services does not change in magnitude. In particular, the estimates for receipt of prevocational service in the first row of Table 3 show that wages of those who received prevocational services is on average 7.6 percent less than the wages of counterparts. Because both models provide qualitatively similar estimates for the coefficient of prevocational services in the wage equation and because of the statistical insignificance of the estimate for correlation between error terms (0.502 with  $p$ -value = 0.293) in the wage and selection equations

Table 3  
Effects from the wage equation (the log of the hourly wage rate as a dependent variable)

Characteristics	Model 1 (RE)			Model 2 (Heckit)		
	Est.	S.E.	Z	Est.	S.E.	Z
<i>Pre-vocational services</i>						
Received any services	-0.076***	0.011	7.2	-0.076***	0.017	4.6
<i>Occupation type (base Professional)</i>						
Sales & clerical	-0.071***	0.005	14.1			
Services	-0.031***	0.006	5.6			
Processing & production	-0.077***	0.005	15.5			
<i>Disability type (base Mental Retardation)</i>						
Mental health	0.052***	0.007	7.6	0.041***	0.010	4.1
Blind/Deaf/Hearing	0.009	0.017	0.5	0.008	0.019	0.4
Physical	0.068***	0.013	5.1	0.033	0.031	1.1
Learning disability	0.055***	0.007	7.4	0.059***	0.008	7.3
<i>Other characteristics</i>						
Gender (Male)	0.014***	0.004	3.2	0.020**	0.008	2.6
Age	0.002*	0.001	1.9	0.005***	0.002	3.0
Age squared*100	-0.001*	0.000	1.7	-0.006***	0.000	2.7
Sequence of the job	0.02***	0.002	11.4			
Sequence of the job squared	-0.001***	0.000	4.9			
Employer pays wage	0.123***	0.003	36.1			
In program 5–8 quarters	-0.001	0.001	0.4	0.056	0.044	1.3
In program 9–12 quarters	-0.006***	0.001	3.9	0.070	0.063	1.1
In program 13–16 quarters	-0.008***	0.002	4.0	0.080	0.071	1.1
more than 16 quarters	-0.001	0.003	0.4	0.091	0.075	1.2
Constant	1.740***	0.043	40.9	1.694***	0.086	19.7
# of observations	57584			94577		
# of consumers	10604			20440		

Note: Both models are estimated with provider fixed effects. Model 1 represents a random effect GLS regression (RE). The estimate of the variance of the individual specific random effect is 0.215, the estimate of time-specific random effect is 0.089 and correlation between two effects is 0.853. The model is estimated using only the sample of consumers who have non-zero wages in a given quarter. Model 2 represents a bivariate sample selection model (Heckit). The estimate of the variance of the error term in the wage equation is 0.258; correlation between errors in the selection and wage equations is 0.502 (although statistically insignificant). The model is estimated using the whole sample of consumers. \*statistically significant at the level of 10%, \*\*statistically significant at the level of 5%, \*\*\*statistically significant at the level of 1%.

in Model 2, further in the paper, we will only discuss findings from a random-effect Generalized Least Squares regression.

Table 3 also demonstrates that most parameters of characteristics included in  $X$  are significant at conventional levels. Results show that male consumers earn about 1.5 percent more than female consumers. The hourly wage rate increases with consumer age until age 43 and then the hourly wage rate starts declining with age. The number of jobs also positively affects the hourly wage rate, and after ten job changes, the effect becomes negative. Employers pay almost twelve percent more than agencies. The highest paid jobs are in professional occupations with wage differentials compared with other groups in the range of 3–7 percent. The lowest paid consumers are those with mental retardation and sensory/communicative impairments; the wage differential compared with other groups is in the range of 5–7 percent. Finally, the estimate of intra-class correla-

tion of combined error terms is very large and positive, 0.85, implying that the individual-specific component of the error is much more important than the idiosyncratic component.

The fact that prevocational services may have a detrimental impact on earnings of consumers has been suspected by a few practitioners of VR services in the past [11]. Two studies found evidence of a negative relationship between these variables based on randomized controlled trials but focus only on the consumers with severe mental disorders [12, 13]. Until now, the relationship between earnings of consumers and prevocational services has not been investigated using broader groups of consumers who received services in the real world environment.

Though our empirical study provides sufficient evidence that prevocational services are negatively correlated with wages of consumers, it is unclear what mechanisms pull wages downward. We are left with



three possible explanations that we mentioned previously in the introduction section of the paper.

First, it may be the case that prevocational services lower providers' expectations on work abilities of consumers. For example, lack of societal expectation regarding employment capacity of individuals with disabilities may contribute to lower expectations of certain providers – creating a condition whereby any employment is better than no employment. Provider expectations could also be influenced by their daily interactions with consumers in prevocational work settings where there is not a strong incentive for the consumer to perform at competitive levels. Consequently, this phenomenon may over time decrease the provider's perceptions of the consumer's full employment potential.

Second, prevocational services might lower expectations of consumers themselves and increase their willingness to accept lower wages. Similar to providers, multiple factors could contribute beyond the provision of prevocational services to this lowered expectation on the part of the consumer. The continuum-based nature of prevocational services may contribute to consumers gaining a perception that access to full employment is gradual and occurs over time and over multiple job placements. Finally, individuals subjected to ongoing segregation over time may develop lower expectations regarding full employment and settle for less than their ideal job.

Third, the simple descriptive analysis shows that in 86 percent of cases wages are paid by employers, implying that employers have a direct impact on wage formation. Often disability service providers have long-standing relationships with the local labor market. Over time, employers could develop decreased expectations regarding the service provider's labor pool. Subsequently, an employer could also associate receipt of prevocational services as a signal of a job candidate's low productivity due to severe impairments or functional limitations. However, without being able to compare wages received by individuals with disabilities who received prevocational services with commensurate wages for the same positions within the employment site, it is impossible to establish whether receipt of prevocational services has any impact or correlation on employers or their perceptions and expectations.

We also estimate the model for different disability groups to verify whether the effect of prevocational services differs substantially across these groups. Table 4 demonstrates that for the three largest disability groups,

Table 4  
The coefficient of the receipt of prevocational services in the wage equation by disability group

Description	Mental retard	Mental health	Blind & deaf	Physical	Learning
Estimate	−0.050***	−0.055***	−0.150	−0.414***	−0.103**
Standard errors	0.013	0.023	0.098	0.146	0.012
# of observations	22601	22635	2489	1692	8167
# of individuals	3822	4485	415	342	1540

Note: Estimates of the receipt of prevocational services are from the random effect GLS regressions (RE) estimated separately for each disability group. All models are estimated using only the sample of consumers who have non-zero wages in a given quarter. \*\*statistically significant at the level of 5%, \*\*\*statistically significant at the level of 1%.

groups which consist of consumers with mental retardations, mental health problems, and learning disabilities, the effect of prevocational services varies between 5.0 and 10.3 percent. It is worthwhile to note that the effect of prevocational services computed with the pooled sample lies within this range. The effect of prevocational services for other groups is even more negative. For example, the receipt of prevocational services decreases wages of blind or deaf consumers by 15 percent, consumers with physical disability by 41 percent.

## 5. Conclusion

The objective of this paper is to investigate the effect of prevocational services on hourly wages of consumers who received supported employment services either through 'train-then-place' or 'place-then-train' program approaches. The current literature is based on studies that use randomized controlled trials with limited external validity. No study in the literature uses an observational approach that explores this important relationship. We fill this gap by employing six years (2005–2010) of the New York Integrated Supported Employment Report data system, which consists of all consumers who have ever received supported employment services in New York in the study period.

Results show that after controlling for individual and job characteristics, receipt of prevocational services and hourly wages of consumers are negatively correlated. This finding suggests that those consumers who received prevocational services prior to job placement would have lower wages than the counterparts. This finding also suggests that receipt of prevocational services may have a detrimental effect on providers,

consumers, and/or employers expectations on consumers' work ability and productivity.

Due to limitations in the data, empirical evidence is not available to determine the extent to which prevocational training and skills acquired in sheltered work centers, were relevant or directly-related to supported employment jobs into which individuals were placed. Further, the extent to which the training received and skills acquired in the work center setting were transferrable to the supported employment setting is unknown. However, we do not believe that the potential lack of direct or indirect relationship between prevocational training provided and skills acquired, as it relates to supported employment job secured, explains the existing wage differential between two groups. In particular, in the absence of any changes in consumer/producer expectations due to receipt of prevocational services, and holding observed characteristics equal, consumers employed in sheltered workshops before receiving supported employment services should be at least as productive as consumers who did not receive prevocational training in sheltered work center setting. Thus, having a variable that indicates on a training/skill mismatch in the model shouldn't alter the main coefficient of interest. However, as mentioned earlier, due to the absence of such variables in the data, we cannot provide empirical evidence for the above supposition.

Taking into consideration that only consumers participating in supported employment programs in New York are represented in this study, the question whether the findings of this study could be generalized to the whole population of supported employment consumers in U.S. remains open. Eligibility requirements and curriculum of supported employment programs can drastically differ across states. Most importantly, consumers of supported employment programs across states face different macroeconomic conditions. However, the fact that New York is the third largest state after California and Texas allows us to have a substantial number of consumers representing each major disability group entitled to prevocational and supported employment services. This provides evidence that this particular study despite limitations has a high level of external validity.

An area for subsequent research is the extent that the above discussed factors, such as lowered provider/consumer expectation or employer discrimination, contribute to the wage gap between the two groups. The inability to control in the regression analysis for unobserved variables that capture

provider/consumer time varying expectations on work ability or employer's attitude toward recipients of prevocational services may dictate using more complex statistical techniques such as instrumental variable, quasi- or fully structural approaches. However, practically these methods could be unfeasible due to current data limitations. These methods require researchers to identify a set of instruments that strongly correlates with receipt of prevocational services but at the same time has a limited impact on consumers' productivity. In reality, identifying the instruments that would satisfy the above criteria is not a trivial task within the NYISER system.

Additionally, this study shows that prevocational services may have no positive impact on labor market participation as it relates to hourly wages. Furthermore, the simple descriptive analysis demonstrates that a large fraction of consumers who initially received prevocational services does not transition into the second stage of 'train-then-place' module. In particular, a large fraction of consumers exits the program without even trying employment in an integrated setting. In light of this evidence, why do prevocational services continue to be valued and offered? An important area of study will be to identify the policy and organizational factors that sustain the systems that continue to offer prevocational services.

It is clear that disability services and supports are in a constant state of evolution and development. This study has provided clear evidence of certain types of services and supports which do not appear to positively contribute to labor market participation as it relates to hourly wages. In light of these findings, it is hoped that continued dialogue and study will occur that continues to identify those evidence-based practices which do effectively support people with disabilities in achieving employment commensurate with their non-disabled peers.

## **Acknowledgments**

This research was supported by a grant from the U.S. Department of Health and Human Services, Center for Medicare and Medicaid Services to the New York State Office of Mental Health and their management partners, Cornell University's Employment and Disability Institute and the Burton Blatt Institute at Syracuse University, for a Comprehensive Employment Systems Medicaid Infrastructure Grant.

## References

- [1] Corrigan PW. Place-then-train: An alternative service paradigm for persons with psychiatric disabilities. *Science and Practice*. 2001;18:334-49.
- [2] Corbiere M, Lecomte T. Vocational services offered to people with several mental illness. *Journal of Mental Health*. 2009;18(1):38-50.
- [3] Cochrane JJ, Goering P, Rogers JM. Vocational programs and services in Canada. *Canadian Journal of Community Mental Health*. 1991;10:51-63.
- [4] Rehabilitation Act of 1973. P.L. 99-506. 7(35). Available from <http://www2.ed.gov/policy/speced/leg/rehabact.doc>
- [5] Dutta A, Gervery R, Chan F, Chou CC, Ditchman N. Vocational rehabilitation services and employment outcomes for people with disabilities: A United States study. *Journal of Occupational Rehabilitation*. 2008; Doi: 10.1007/s10926-008-9154-z.
- [6] Wehman P, Kregel J. At the crossroads: Supported employment a decade later. *Journal of the Association for Persons with Severe Handicaps*. 1995;20:286-99.
- [7] Braddock et al. Coleman Institute And Department Of Psychiatry, University of Colorado. 2011. Available from The State of the States in Developmental Disabilities website: <https://www.cu.edu/ColemanInstitute/stateofthestates/>
- [8] Bond G, Becker D, Drake R, Vogler K. A fidelity scale for the individual placement and support model of supported employment. *Rehabilitation Counseling Bulletin*. 1997;40(4):265-84.
- [9] Bond G, Drake R, Mueser K, Becker D. An update on supported employment for people with severe mental illness. *Psychiatric Services*. 1997;48(3):335-45.
- [10] Becker D, Smith J, Tanzman B, Drake R, Tremblay T. Fidelity of supported employment programs and employment outcomes. *Psychiatric Services*. 2001;52:834-6.
- [11] Wehman P, Moon S. Vocational Rehabilitation and Supported Employment, Baltimore, London, Toronto, Sydney: Paul H Brooks Publishing Co; 1988, pp. 1-20.
- [12] Lehman A, Goldberg R, Dixon L, McNary S, Postrada L, Hackman A, McDonnell K. Improving employment outcomes for persons with severe mental illnesses. *Arch Gen Psychiatry*. 2002;59:165-72.
- [13] Drake R, McHugo G, Bebout R, Becker D, Harris M, Bond G, Quimby E. A randomized clinical trial of supported employment for inner-city patients with severe mental disorders. *Arch Gen Psychiatry*. 1999;56:627-33.
- [14] Heckman J. Sample Selection Bias as a Specification Error. *Econometrica*. 1979;47(1):153-61.
- [15] Crowther R, Marshall M, Bond G, Huxley P. Helping people with severe mental illness to obtain work: Systematic review, *British Medical Journal*. 2010;322:204-8.
- [16] Crowther R, Marshall M, Bond G, Huxley P. Vocational rehabilitation for people with severe mental illness (review), *The Cochrane Library* 2007, Issue 1.
- [17] Verbeek M. *A Guide to Modern Econometrics*, Chichester, England: John Wiley & Sons Ltd; 2004, p. 148.