

**Analysis of Time in Rehabilitation and Incidence of Successful Rehabilitation within
Individuals with Disabilities Receiving Occupational/Vocational Training**

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Abstract

OBJECTIVE. To investigate the incidence of successful rehabilitation, defined as 90 successive days in employment, within individuals with disabilities receiving occupational/vocational training (OVT) service.

METHOD. The follow-up records between January 1, 2004 and December 31, 2012 of 5,313 individuals aged 15-55 who obtained OVT in the vocational rehabilitation (VR) program of the State of Illinois were examined. Cox regression models were used to analyze the effect of study factors on VR outcomes.

RESULTS. After controlling for the other factors, males (incidence ratio [IR] 1.11, 95% CI 1.03-1.20), individuals with learning disability (IR 1.14, 95% CI 1.03-1.26), had existing employment (IR 1.40, 95% CI 1.26-1.56), and persons who were referred from educational institutions (IR 1.17, 95% CI 1.01-1.36) or community agencies (IR 1.30, 95% CI 1.14-1.48) appeared to have a relatively high incidence of successful rehabilitation. In contrast, those who lived in densely populated areas (IR ranged from 0.56 to 0.89), had physical disability (IR 0.77, 95% CI 0.68-0.88), had disability of most significant degree (IR 0.85, 95% CI 0.79-0.93), and persons with Supplemental Security Income/ Social Security Disability Insurance supports (IR 0.84, 95% CI 0.76-0.94), tended to have a lower incidence of rehabilitation than their counterparts.

CONCLUSION. The incidence of successful rehabilitation seems to be related to the demographic, disability, and pre-service characteristics, but not necessarily the provider factors.

Keywords: disability epidemiology, vocational rehabilitation, occupational training, survival analysis

Introduction

Vocational rehabilitation (VR) for decades has been part of the standard intervention to mitigate barriers to acquiring, retaining, or returning to meaningful occupation among people with disabilities. Its effectiveness is documented across various demographics [1–5]. VR also has public health importance, as the persons involved are those with chronic or permanent health conditions, and unemployment among them may impact health services utilization, morbidity, and mortality within the population [6–13]. One potential challenge of researching VR outcomes is the vast variety of services a person may get. For instance in the United States, each accepted individual in the state VR system can receive different types of service during the program, from one to over twenty [1,14,15]. Selection of these services is usually a judgment call of the respective rehabilitation counselor based on the individual situations and needs [15,16]. Such variations are also complicated by non-mutually exclusive nature of some services. Several VR services are delivered in a similar format and only differed by their intermediate goals [1]. Given this condition, it becomes appropriate to consider a separate analysis on the group of individuals with a particular service in order to minimize selection and measurement bias.

Approximately 35% of people with disabilities served nationwide by the state VR agencies in 2014 - 2016 received occupational/vocational training (OVT) service [17]. This makes it one of the major training services on the VR program. In terms of outcomes, the same data reported that about 6 of 10 individuals with OVT were able to get employed when their case was closed. While this number is representative of the overall VR services, it still can be improved. The previous studies [1,3,15,18–21] have confirmed about the benefits of OVT on rehabilitation outcomes. They were inconsistent, however, on which related characteristics would promote or prevent a successful employment. For instance, some investigators [1]

indicated that the effects of OVT depend on disability status, while others [3,15,18–21] argued regarding the significance of various individual demographic and pre-service variables. None of these studies, nevertheless, specifically targets the population who receive OVT service in their VR program. As a consequence, little is known about how the persons with OVT actually achieve their outcomes. In particular, the literature discussing the factors that may contribute to a successful rehabilitation within this population is relatively sparse.

Another issue is the time element. OVT in the state VR program is typically a long-term care [20]. Yet the studies of rehabilitation outcomes that included OVT service were rarely able to account for the time component in their analysis. To certain extent, it is perhaps a data source limitation. Publicly accessible databases, such as the RSA-911 [17], are cross-sectional reports and provide no obvious avenue to conduct longitudinal analysis at individual level. This is very unfortunate, because population-based datasets are a great resource for learning the characteristics associated with the outcomes that are more generalizable than the findings from restricted study settings (such as clinics, hospitals, and nursing homes). Incorporation of time element has been proven instrumental to a number of researchers [22–25] for identifying the rehabilitation outcomes and stratifying the individuals based on the associated factors.

This study is conducted to address the literature gap regarding the VR outcomes of individuals with disabilities receiving OVT. We explore the opportunity of evaluating population-based, longitudinal VR data from the whole State of Illinois, which not only allow us to conduct the analysis at individual level, but also taking the time component into the statistical modeling. There are two research questions of the study:

1. What is the incidence (number of new cases over time of exposure) of successful rehabilitation among people with OVT service?

2. Which of the demographic, disability, pre-service, and provider factors in each individual have the potential for affecting the time to successful rehabilitation?

Methods

Data and Population

The data were derived from the records of the VR services program in the State of Illinois. Access to the databases was provided by the Department of Human Services - Division of Rehabilitation Services as the state VR agency. We retrieved the follow-up data of de-identified individuals who received OVT as part of their individualized plan for employment (IPE). The inclusion criteria were: application for VR services on January 1, 2004 or later; age 15-55 at application; confirmation of OVT service in the IPE; and, starting date of IPE by December 31, 2012. Since IPE implementation takes place after the application accepted, those who started the program before 2004 were automatically excluded. In terms of age criterion, it should be noted that 15 years old is the minimum age requirement for employment in the State of Illinois. We also excluded the cases starting their IPE after 2012 because there were only a few observations available in our data beyond that year. To be eligible for the VR program, a person must show a substantial physical or mental impairment due to one or more disabilities, has a serious limitation of the functional capacities, and requires VR services for at least six months or longer. Additionally, the person should be expected to benefit from the VR program in preparing for, engaging in, or retaining gainful employment. An assigned counselor would evaluate the applicant's eligibility for services. If determined eligible, applicant and counselor developed together an IPE that contained VR services to meet the vocational goals. Once the IPE was approved by the VR agency, an accepted applicant would start receiving rehabilitation services

as part of the IPE implementation. The VR program in the State of Illinois offered a broad spectrum of services (up to 22), including OVT.

Occupational/vocational training or OVT service was an in-class, non-degree training of occupational, vocational, or job skills designed to prepare individuals for engaging in a recognized occupation. There were several alternatives of its provision [26]. The agency might provide OVT directly through their VR counselors, or outsourced it to certain public or private provider under an interagency or a third-party agreement. The latter included the state educational agency, public and private community rehabilitation programs (CRPs), or profit and non-profit organizations. Collaboration with the state educational agency was primarily on a contractual basis. Provision of OVT service by CRPs and other organizations was based on either a contract or a cooperative agreement with the state VR agency.

An individual VR case was closed as “successfully rehabilitated” if the person had been able to maintain employment that was consistent with strengths, resources, priorities, concerns, abilities, capabilities, interests, and informed choice, which were documented in the IPE, for at least 90 consecutive days. In addition, the respective counselor had to be in agreement with the individual with disabilities about his/her satisfactory performance with regards to the employment outcome. Case closure without reaching the employment outcome after IPE implementation was regarded as unsuccessful rehabilitation. All study procedures had been reviewed and approved by the institutional review board of the University of Illinois at Chicago.

Study Variables

The outcome of interest was successful rehabilitation. A person without this outcome was considered a “censored” observation. This included those people closed without successful rehabilitation. In survival analysis, this technical term refers to an observation that would have

the event of interest had the study period been extended to (theoretically) infinity. Hence, the assumption of this study was that each individual could achieve successful rehabilitation if they had sufficiently long time in rehabilitation. That is, their case was not closed before they fulfill the success criteria or they did not prematurely exit the VR program either because they died or loss to follow-up. Time in rehabilitation (the analog of survival time in survival analysis) was the time interval between the start date of IPE implementation and one of the following: the closure date if the individual VR case was closed, the time of death for those who died, or the end of study period if the person was loss to follow-up. The time metric was person-months.

We used the findings of related studies [1,2,14,16] to select most of the covariates. Demographic variables included age, gender, race, education, marital status, and population size of residential county. All were based on the information at VR services application. Disability status was measured by the type and significance of disability condition. Each individual might report multiple types of the following: (a) intellectual or developmental disability (IDD), which referred to either a cognitive impairment caused by mental retardation, or a psychosocial impairment such as autism; (b) learning disability, which covered any cognitive impairment due to specific learning disabilities or attention-deficit hyperactivity disorder; (c) mental illness, the impairment that included a variety of psychosocial and mental disabilities caused by depressive and mood disorders, neurotic anxiety, personality disorders, schizophrenia and other psychotic conditions, or other unclassified mental disorders; and (d) physical-orthopedic disability, the type covering any mobility orthopedic/neurological impairment, manipulation/dexterity orthopedic/neurological disorder, or both mobility and manipulation/dexterity impairments, and other orthopedic conditions that was not a result of traumatic brain injury. The significance of individual disability was verified on application, and categorized into: “significant” disability, if

the person was seriously limited in one functional capacity (the data source classified several forms of limitation in functional capacities, including communication, interpersonal skills, mobility, self-care, self-direction, and work tolerance) and required one or more substantial VR services apart from the routine services (which were counseling and guidance, and information and referral); “very significant”, if the person had two seriously limited functional capacities; and “most significant”, if the disability seriously limited three or more of the person’s functional capacities [27]. We then decided to collapse the categories significant and very significant into one category. Pre-service factors, such as work status at application, referral agent, personal income, Medicaid/Medicare coverage, and Supplemental Security Income or Social Security Disability Insurance (SSI/SSDI) benefits, also served as covariates. To control some variations due to changes in policy and external environment, the multivariate analysis was adjusted for the starting year of IPE. Lastly, we included two variables to represent the provider factors. The first was the OVT service provider, which has been described above during the OVT description, and the other was the funding source of OVT service. VR funds came primarily from the federal allocation for the state VR services program. The original data, however, did not provide further specification about the funds from “non-VR sources” and “other”, though it was understood that the agency also received grants, certain waivers’ payments, and other state-federal funds for VR-related programs.

Statistical analysis

Kaplan-Meier estimator for survival function [28] facilitated the calculation of median months to rehabilitation and its 95% pointwise confidence interval (CI) in the study. Survival function in this study was interpreted as the cumulative probability of staying in the rehabilitation program. The difference of survival function between each category of the study

factors was compared using the log-rank test [29,30]. The association between the study factors and successful rehabilitation was quantified through Cox proportional hazards models [31], and the results were reported as incidence ratios and their 95% CI [32]. We applied the Efron method [33] to handle ties in the regression models. The Schoenfeld residual plot of each predictor [34] and the test for proportional hazards assumption of the Cox regression were used to examine the proportionality. All plots indicated that this assumption was fairly acceptable. Except for the year IPE started, significance of disability, and certain categories of education (higher than secondary) and referral agent (community, other sources), the test was not significant at the 0.05-significance level. Data management and statistical analyses were conducted entirely in R version 3.3.3.

Results

A total of 3,155 of 5,313 individuals (59.4%) in our analysis successfully achieved the target employment. Accounting for the time in rehabilitation, the overall (or, crude) cumulative incidence of successful rehabilitation was about 3.4 per 100 person-months. That is, an average of 3.4 new cases of successful rehabilitation observed every 100 months of follow-up. The median time in rehabilitation among all individuals was 20 (95% CI 19, 21) months.

Table 1 presents the characteristics of study individuals, the fraction that was successfully rehabilitated, and the median time in rehabilitation by each characteristic. In almost three quarters of individuals, the disability was of most significant category. The proportion of successful rehabilitation varied widely by characteristics, either above or below the overall proportion 59.4%. And except for IDD, the difference in the median months in rehabilitation between categories of each characteristic was strongly significant.

The incidence of successful rehabilitation stratified by the study variables varied from 2.1 per 100 person-months to 8.7 per 100 person-months (Table 2). The same table also shows that the effect of several variables on the incidence rate was apparently confounded by the other variables. For example, the unadjusted effect of the categories in education and service provider was clearly significant (the 95% CI did not include 1.00), but became not so when the other variables in the model were accounted for. Table 2 then indicates that individuals 25-40 years old, males, those with learning disability, employed at application, and referred by either educational institutions or community programs, had a relatively high incidence of successful rehabilitation. On the other hand, the incidence was lower on residents in a densely populated area, people with physical disability, those having most significant disability, and individuals with SSI/SSDI supports, as compared to their counterparts. Regarding residence, people with disabilities in a large urban area of population more than 1 million had an incidence of successful rehabilitation about 44% (95% CI 37%, 50%) lower than those living in small counties with 100,000 residents or fewer.

Discussion

Our study highlights the benefit of formally incorporating time element into the VR outcome evaluation. Without it, some important information can be masked. Here, there were indeed slightly more than half individuals of the study achieved the desired outcome, but the incidence was quite rare. Using a little arithmetic, it indicates that only about 4 (that is, $3.4 * 108 / 100$) new cases of successful rehabilitation observed each 9 years (108 months) of follow-up. Such rarity of success over time suggests a substantial area for improvement on the OVT service and the VR program. It is in this respect that it becomes critical to identify the associated factors,

so as to increase the capacity for improving the incidence of successful rehabilitation. Interested readers may consult most textbooks in basic epidemiology for the differences between conventional proportion and incidence. In short, the first simply measures the ratio between the number of people with outcome of interest and the total of individuals (overall or within a characteristic group); meanwhile, the term incidence is used for describing the number of new events of interest in a population within specified period of time. Certain outcomes, such as successful rehabilitation in our study, may occur on a large conventional proportion of the population, but because the time of achieving outcome is sufficiently long, the incidence proportion (or, cumulative incidence) is low. Death outcome is another example, where eventually every person dies (100% population), and yet the overall mortality rate is typically low when life expectancy of individuals within the population is high.

The positive impact of prior employment, certain routes of referral, and the type of impairment (particularly learning disability) on the outcome may reflect the advantages of those with such characteristics in entering the VR program. A better preparedness of people with working experience and those referred by educational institution and community agency had likely led to a relatively high incidence of successful rehabilitation. Referrals from schools would also be young individuals, which increased the chance for success. The same advantage might be the case for persons with learning disability, who were expected to be diagnosed and treated at young ages. Individuals with such disability could as well benefit from less limiting condition with respect to achieving the employment goal as compared to the other impairment types in the study. The higher incidence in males than females, however, has to be interpreted with concern. The existence of gender disparity may signal an underlying inequality issue in OVT that requires a proper management. It might be necessary to note that there is no information about pregnancy

status or baby nursing on our data, and thus, we did not censor women based on these maternal situations. Another variable that seemed to increase the incidence was the year IPE started. Individuals who started their IPE after 2010 appeared to have relatively much higher chance of successful rehabilitation. Our further assessment, nevertheless, indicated that this was most likely due to far shorter period of follow-up that tended to result in a smaller denominator for cumulative incidence calculation, than any actual change in the program or external environment during this time period.

An adequate attention to the factors with negative effects is equally essential. This study demonstrated that one of such factors was living in a very densely populated area. Several reasons might contribute to it, including a strenuous caseload among VR counselors, a stiff competition in the local job markets, the community perception in such demography, and the composition of VR users residing in the large city that were dominated by people from minority background, with limited education, and lack of job experience. If these are indeed the underlying conditions, then densely populated areas could serve as proxy for overall socio-economic status or employment opportunities. Another preventive factor of successful rehabilitation was physical disability. In much part, the phenomenon might be attributed to the natural limitation for employment posed by such impairment. We also noted that the study individuals with physical disability were mostly older adults (aged 41 – 55), which could factor in the challenges to enter the job market. Meanwhile, biological barriers to employment would have similarly explained the low incidence rate of people that had a most significant level of disability. However, it was somehow interesting to understand why it happened among individuals with SSI/SSDI benefits. We did not find any observed characteristics of them that could be related to such relatively low rate. It was suspected that the availability of SSI/SSDI

supports might have built an attitude of “avoiding” employment among the beneficiaries, because it could lead to termination of their supports; hence, their incidence rate was lower than the non-beneficiaries.

Provision of OVT by non-VR providers seemed to be associated with a low incidence ratio of successful employment in the unadjusted analysis. This relationship, however, became not significant as the other variables were adjusted for in the multiple regression analysis. We consider it important to emphasize such finding; VR authorities and practitioners may routinely run single variable tabulation and perhaps unadjusted analysis in practice, without further assessment of the confounding effect from the other variables, which could lead to erroneous conclusion about the effect of OVT providers on the VR success rate. Of course, it is very tempting to claim that one way of services provision is better than the others.

There are limitations of this study. Some details about OVT in the original data, such as effective training hours and total cost, could not be used as they were extremely restricted on a few hundred individuals for the reason beyond our ability to confirm or to make sense of it. We did hope, nonetheless, that the time in rehabilitation services as we applied implicitly in the analysis had well approximated the effective training time. It was also unfortunate that the available data did not provide further information concerning the classroom implementation of OVT for each provider; it thus impossible to assess the effect of variability in this respect on the incidence of successful rehabilitation. We were additionally limited in terms of the data about the assigned VR counselors, which might help explaining the observed associations. Another limitation was due to the measure of outcome. The study followed the VR standard definition (IPE-conformed employment for at least ninety consecutive days), because it guaranteed us the least bias of outcome measurement using the available data. Such decision certainly restricted the

ability of the study to extend the findings on the employment that did not meet the outcome criteria. Meanwhile, we could not assess specific aspects of the employment that met the VR criteria, such as benefits, productivity, and activity restrictions in the workplace. It was also not feasible to analyze the information after the closure, such as how long the job was held or what was the long-term effect of rehabilitation services. Lastly, our data provided a well-defined population. Yet they may not always be representative of individuals with disabilities in various settings of OVT service.

The study findings have several implications for VR practice and research. First, more efforts are seemingly required to improve the long-term output of VR services. It can be difficult to justify the use of resources if the program has an overall rate of only four cases of employment in nine person-year of rehabilitation. Second, it is a recommended practice to take into account the time component within the analysis of VR services, whenever possible. Despite the extra complication, a time-considerate assessment can be rewarding as it captures the problems with considerable consequences on practice and the use of resources that are otherwise masked. The third implication concerns the potential intervention that could improve the incidence of successful rehabilitation in OVT service. This should include a more extensive outreach towards individuals in the densely populated geography and those with characteristics that appear to be preventive against employment. It may be necessary to sort out an appropriate caseload for each VR counselor in the metropolitan area, to routinely evaluate the competition in the local job market, and to regularly adjust the OVT curriculum within the training centers and schools so as to maintain the competitiveness of people with disabilities for employment. The counselors must also be trained to conduct services free of gender and racial bias, and they need to be informed about and encouraged to pay careful attention on the individuals with characteristics that seem to

benefit less from OVT service and the VR program. Additionally, the current results suggest a close monitoring of the progress of people with most significant disability, physical disability, and SSI/SSDI supports, as they are among the most vulnerable groups to end up not so well after the rehabilitation program. Finally, the results imply several issues for further research. For instance, what are the factors that related to a relatively higher achievement among individuals with learning disability? It seems also reasonable to probe the extent of impact of the VR counselors' characteristics and caseload (particularly in the metropolitan area) on the incidence of successful rehabilitation, or the nature of relationship between the incidence rate and the job market situation, and the effect of variability in the classroom implementation of OVT on the results. Other interesting topics include an exploration about the alternative measures for VR employment outcome, further assessment about specific aspects in workplace of the employment that meet the VR criteria, the cost-effectiveness of OVT service, and the individual employment post-OVT service and VR program.

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Table 1. Characteristics of Study Individuals (N = 5,313) and Estimates of Median Months in Rehabilitation

	No. in Group	No. Rehabilitated	Months in Rehabilitation	
Characteristics	(% Total)	(% Group)	Median (95% CI)	<i>p</i> ^a
<i>Demographic Variables</i>				
Age (year)				
15 - 17	1376 (25.9)	919 (66.8)	16 (14,17)	<0.001
18 - 24	1314 (24.7)	780 (59.4)	20 (18,22)	
25 - 40	1240 (23.3)	696 (56.1)	23 (21,25)	
41 - 55	1383 (26.0)	760 (55.0)	23 (21,25)	
Gender				
Female	2250 (42.3)	1272 (56.5)	22 (21,23)	<0.001
Male	3063 (57.7)	1883 (61.5)	19 (18,20)	
Race				
Non-Hispanic White	3203 (60.3)	2193 (68.5)	17 (16,17)	<0.001
Black	1703 (32.1)	756 (44.4)	27 (26,30)	
Hispanic	357 (6.7)	175 (49.0)	24 (20,31)	
Other	50 (0.9)	31 (62.0)	23 (15,50)	
Education				
Lower than Secondary, Special Education	184 (3.5)	104 (56.5)	22 (18,29)	<0.001
Secondary Education	2270 (42.7)	1414 (62.3)	17 (16,18)	
HS Diploma or GED	1565 (29.5)	905 (57.8)	21 (19,23)	
Higher than Secondary	1294 (24.4)	732 (56.6)	25 (23,28)	
Residential County Population				
100,000 or fewer	1695 (31.9)	1274 (75.2)	15 (14,16)	<0.001
100,001 – 500,000	992 (18.7)	674 (67.9)	17 (16,20)	
500,001 – 1,000,000	836 (15.7)	461 (55.1)	18 (16,21)	
More than 1,000,000	1789 (33.7)	746 (41.7)	32 (29,35)	
<i>Disability Status</i> ^b				
With Intellectual or Developmental Disability	819 (15.4)	480 (58.6)	20 (18,23)	0.378
With Learning Disability	1761 (33.1)	1218 (69.2)	15 (14,16)	<0.001
With Mental Illness	1004 (18.9)	472 (47.0)	24 (22,26)	<0.001
With Physical Disability	548 (10.3)	296 (54.0)	25 (22,29)	<0.001
Significance of Disability				
Significant or Very Significant	1573 (29.6)	1038 (66.0)	15 (14,16)	<0.001
Most Significant	3740 (70.4)	2117 (56.6)	23 (22,24)	
<i>Pre-Service Factors</i>				
Employed at Application Referral Agent	643 (12.1)	540 (84.0)	14 (12,16)	<0.001

Table 1. Characteristics of Study Individuals (N = 5,313) and Estimates of Median Months in Rehabilitation

	No. in Group	No. Rehabilitated	Months in Rehabilitation	
Characteristics	(% Total)	(% Group)	Median (95% CI)	<i>p</i> ^a
Self-referral	2107 (39.7)	1125 (53.4)	25 (23,26)	<0.001
Elementary/Secondary/Post-secondary	519 (9.8)	317 (61.1)	20 (17,22)	
Community	1925 (36.2)	1267 (65.8)	16 (15,17)	
Physician or Medical	662 (12.5)	387 (58.5)	20 (17,22)	
Other Sources	100 (1.9)	59 (59.0)	30 (19,40)	
Have Personal Income	458 (8.6)	331 (72.3)	16 (15,18)	<0.001
Medicaid/Medicare Coverage				
None	2900 (54.6)	1930 (66.6)	17 (17,18)	<0.001
Medicaid	1461 (27.5)	730 (50.0)	24 (22,26)	
Medicare	512 (9.6)	252 (49.2)	26 (24,30)	
Both Medicaid-Medicare	440 (8.3)	243 (55.2)	23 (20,30)	<0.001
Have SSI/SSDI	2087 (39.3)	988 (47.3)	27 (26,30)	
IPE Starting Year				
2004	754 (14.2)	395 (52.4)	29 (27,34)	<0.001
2005	551 (10.4)	343 (62.3)	22 (20,26)	
2006	831 (15.6)	508 (61.1)	22 (20,24)	
2007	787 (14.8)	457 (58.1)	23 (21,26)	
2008	640 (12.0)	402 (62.8)	21 (18,24)	
2009	621 (11.7)	369 (59.4)	21 (18,24)	
2010	517 (9.7)	312 (60.3)	16 (15,18)	
2011	429 (8.1)	273 (63.6)	12 (11,13)	
2012	183 (3.4)	96 (52.5)	8 (7, 9)	
Provider Factors				
Service Provider				
VR Agency or Public Provider	3450 (64.9)	2135 (61.9)	18 (17,20)	<0.001
Community Rehabilitation Program	1235 (23.2)	686 (55.5)	22 (20,24)	
Other	628 (11.8)	334 (53.2)	25 (24,27)	
Source of Service Funds				
VR Funds	3978 (74.9)	2270 (57.1)	21 (20,22)	<0.001
Combination VR/Other	899 (16.9)	599 (66.6)	17 (15,19)	
Non-VR Sources	436 (8.2)	286 (65.6)	20 (17,24)	

NOTE: CI, Confidence Interval; VR, Vocational Rehabilitation; HS, High School; GED, General Education Development; SSI, Supplemental Security Income; SSDI, Social Security Disability Insurance; IPE, Individualized Plan for Employment

^a Log-rank test. ^b Multiple reports on type of disability were allowed.

Table 2. The Effect of Study Factors on Incidence of Successful Rehabilitation based on Cox Proportional Hazards Models

Variable	Incidence per 100 Person- Months	Unadjusted Incidence Ratio (95% CI)	Adjusted Incidence Ratio (95% CI)
Age (year)			
15 - 17 (<i>reference</i>)	4.4	1.00	1.00
18 - 24	3.5	0.77 (0.70 , 0.85)	0.97 (0.87 , 1.09)
25 - 40	3.0	0.66 (0.59 , 0.72)	1.18 (1.00 , 1.38)
41 - 55	2.8	0.61 (0.56 , 0.67)	1.18 (1.00 , 1.39)
Gender			
Female (<i>reference</i>)	3.1	1.00	1.00
Male	3.6	1.20 (1.11 , 1.28)	1.11 (1.03 , 1.20)
Race			
Non-Hispanic White (<i>reference</i>)	4.1	1.00	1.00
Black	2.4	0.57 (0.52 , 0.62)	0.90 (0.81 , 0.99)
Hispanic	2.7	0.66 (0.56 , 0.76)	0.91 (0.77 , 1.08)
Other	3.0	0.71 (0.50 , 1.01)	0.94 (0.66 , 1.35)
Education			
Secondary Education (<i>reference</i>)	4.0	1.00	1.00
Lower than Secondary, Special Education	3.1	0.76 (0.62 , 0.93)	1.12 (0.90 , 1.39)
HS Diploma or GED	3.2	0.79 (0.72 , 0.85)	1.04 (0.92 , 1.18)
Higher than Secondary	2.7	0.64 (0.58 , 0.70)	0.88 (0.77 , 1.01)
Residential County Population			
100,000 or Fewer (<i>reference</i>)	4.6	1.00	1.00
100,001 – 500,000	3.8	0.80 (0.73 , 0.88)	0.89 (0.81 , 0.99)
500,001 – 1,000,000	3.8	0.83 (0.74 , 0.92)	0.86 (0.76 , 0.96)
More than 1,000,000	2.1	0.43 (0.39 , 0.47)	0.56 (0.50 , 0.63)
With Intellectual or Developmental Disability	3.5	1.04 (0.95 , 1.15)	1.05 (0.94 , 1.17)
With Learning Disability	4.5	1.62 (1.51 , 1.74)	1.14 (1.03 , 1.26)
With Mental Illness	2.7	0.77 (0.70 , 0.85)	0.93 (0.83 , 1.03)
With Physical Disability	2.6	0.73 (0.64 , 0.82)	0.77 (0.68 , 0.88)
Significance of Disability			
Significant or Very Significant (<i>reference</i>)	4.4	1.00	1.00
Most Significant	3.0	0.65 (0.60 , 0.70)	0.85 (0.79 , 0.93)
Employed at Application	4.8	1.53 (1.40 , 1.68)	1.40 (1.26 , 1.56)
Referral Agent			
Self-referral (<i>reference</i>)	2.7	1.00	1.00
Elementary/Secondary/Post-secondary	4.3	1.65 (1.52 , 1.79)	1.17 (1.01 , 1.36)
Community	3.6	1.38 (1.21 , 1.56)	1.30 (1.14 , 1.48)
Physician or Medical	2.6	0.93 (0.71 , 1.20)	0.88 (0.68 , 1.15)
Other Sources	3.3	1.23 (1.10 , 1.38)	1.07 (0.95 , 1.20)

Table 2. The Effect of Study Factors on Incidence of Successful Rehabilitation based on Cox Proportional Hazards Models

Variable	Incidence per 100 Person-Months	Unadjusted Incidence Ratio (95% CI)	Adjusted Incidence Ratio (95% CI)
Have Personal Income	4.2	1.30 (1.16 , 1.45)	1.12 (0.98 , 1.28)
Medicaid/Medicare Coverage			
None (<i>reference</i>)	3.9	1.00	1.00
Medicaid	2.9	0.73 (0.67 , 0.80)	0.89 (0.81 , 0.97)
Medicare	2.8	0.71 (0.62 , 0.81)	1.07 (0.91 , 1.25)
Both Medicaid-Medicare	2.6	0.66 (0.58 , 0.75)	0.94 (0.80 , 1.11)
Have SSI/SSDI	2.5	0.59 (0.55 , 0.64)	0.84 (0.76 , 0.94)
IPE Starting Year			
2004	2.3	1.00	1.00
2005	3.0	1.35 (1.17 , 1.56)	1.40 (1.21 , 1.62)
2006	3.1	1.41 (1.23 , 1.60)	1.32 (1.15 , 1.51)
2007	3.0	1.37 (1.19 , 1.56)	1.24 (1.08 , 1.42)
2008	3.6	1.69 (1.47 , 1.94)	1.51 (1.31 , 1.75)
2009	3.6	1.70 (1.48 , 1.97)	1.48 (1.27 , 1.72)
2010	4.3	2.13 (1.83 , 2.48)	1.81 (1.54 , 2.12)
2011	6.1	3.26 (2.78 , 3.83)	2.59 (2.19 , 3.06)
2012	8.7	6.22 (4.94 , 7.83)	4.62 (3.63 , 5.87)
Service Provider			
VR Agency or Public Provider (<i>reference</i>)	3.6	1.00	1.00
Community Rehabilitation Program	3.1	0.86 (0.79 , 0.94)	0.97 (0.89 , 1.07)
Other	2.7	0.74 (0.66 , 0.83)	0.90 (0.80 , 1.01)
Source of Service Funds			
VR Funds (<i>reference</i>)	3.2	1.00	1.00
Combination VR/Other	4.1	1.30 (1.19 , 1.43)	0.93 (0.84 , 1.03)
Non-VR Sources	3.5	1.08 (0.95 , 1.22)	0.90 (0.79 , 1.02)

NOTE: CI, Confidence Interval; VR, Vocational Rehabilitation; HS, High School; GED, General Education Development; SSI, Supplemental Security Income; SSDI, Social Security Disability Insurance; IPE, Individualized Plan for Employment