

# Risk factors for failure to enter vocational rehabilitation services among individuals with disabilities

*by* Filma Langi 8

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26

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6

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## RESEARCH ARTICLE

## Risk factors for failure to enter vocational rehabilitation services among individuals with disabilities

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65

5

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## ABSTRACT

**Purpose:** To investigate the risk factors for failure of individuals with disabilities to enter the vocational rehabilitation (VR) programme, including the cases where they had been formally accepted but were yet to receive any service.

**Methods:** We used prospective cohort data from a Midwestern US state, and analysed 126,251 and 94,517 individuals, respectively, for acceptance and admission into VR services. Statistical analysis was conducted using Poisson regression models with robust variance estimator.

**Results:** Individuals with blind/visual disability, had prior history of employment, and who received public support tended to have lower risks of non-acceptance and non-admission. Being non-White, at higher education, ever/currently married, and with physical/orthopaedic disability appeared to increase the risks of both outcomes. The adjusted relative risk of non-acceptance was 0.58 (95% confidence interval: 0.52, 0.64) if the individuals had 4 or more functional limitations as compared with those with fewer limitations. This factor was not significant for VR admission.

**Conclusion:** Disability factors, demographic determinants, and certain miscellaneous characteristics were associated with the risks of non-acceptance and non-admission into VR.

## ARTICLE HISTORY

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## KEYWORDS

Disability; vocational rehabilitation; acceptance; admission; Poisson regression

### ► IMPLICATION FOR REHABILITATION

- Individuals with disabilities are more likely to be unemployed than the population without disabilities, and they are thus more prone to adverse health effects of unemployment.
- Vocational rehabilitation (VR) is a proven intervention to improve employment outcomes among individuals with disabilities.
- Our study indicates that the complexity of the selection process for entering VR and various factors beyond disability may prevent individuals to benefit from the VR programme.
- Rehabilitation programme authorities need to monitor and simplify the selection process into VR services and, together with rehabilitation practitioners, promote a selection process that pays careful attention on the factors that are related to individual risk of failure for entering VR.

## Introduction

Unemployment is a public health problem. It has been consistently related to morbidity,[1–9] health services utilization,[10–12] and even mortality.[13–16] Individuals with disabilities, a group which represent 12.6% of the institutionalized civilian population in the USA in 2013,[17] are at greater risk of these adverse outcomes because they tend to have higher unemployment rate than the population without disabilities.[17–19] This is particularly concerning, since at the same time they have been debilitated by significant physical or mental limitations.

Vocational rehabilitation (VR) has been suggested as an effective intervention to improve employment outcomes among adults [20–23] and youth [24,25] with disabilities. It consists of a spectrum of services designed to enable individuals with disabilities to prepare for, engage in, or retain paid employment. The selection process of public-sector VR services, unfortunately, is complicated and not free of bias.[26–28]

The state-federal VR system is the primary provider of VR services in the USA. It operates through VR agencies across the

country. Eligibility to enter the VR programme is typically determined by the existence of serious health conditions that prevent a person from getting employment but still allow him/her to benefit from VR services. There are two primary stages to pass before applicants receive any service: eligibility determination and development of an individualized plan for employment (IPE). Individuals are “accepted” if they pass eligibility determination, and are “admitted” into VR services if the IPE is implemented. Delivery of VR services is thus synonymous with IPE implementation. Clearly, formal acceptance does not necessarily translate into admission. To enable individuals with disabilities to benefit from the VR programme, it is equally important to ensure they get accepted and admitted.

Previous studies of the selection process into VR services [26–32] have focused entirely on the acceptance stage. None to our knowledge investigated the VR admission process. The available literature is also polarized around the racial issue,[26–32] while the findings seemed contradictory among the studies. Some of them [26,31] concluded that Black Americans had a lower

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chance of VR acceptance than their White counterpart. Other investigations either found this relationship as not significant [29,30] or got an opposite association (Blacks had a better VR acceptance).[27] It had been suggested that the discrepancies might be a consequence of differing methodologies.[28] Such an assertion, however, may not be entirely supported. For instance, several studies [29–31] analysed data from the same source, which was the Rehabilitation Services Administration database or commonly known as RSA 911, using a certain variant of chi-square tests, but their results for Blacks versus Whites were still divided. Of course, it is technically less appropriate to use univariate or bivariate chi-square procedures for establishing a relationship between a variable and an outcome in the situations where confounders likely present. The need for adjusting other variables will help not only to establish a more robust association, but also to expand the research beyond racial inequality. Inclusion of the available variables that are potentially related to the VR selection process maximizes the use of data and allows the analysis to answer a more general research question (as an example, compare “What are the factors associated with VR acceptance/admission?” and “Is there any racial difference of VR acceptance/admission?”). Clearly, if race is part of the independent variables, the analysis will inclusively address the question about racial inequality. We argue that there are at least two practical advantages of expanding the assessment to include more variables than just race. First, it facilitates the development of a universal approach for mitigating the failure in entering VR services. Second, it avoids the possible risk of reverse selection bias from one group of ethnicity to another that could result from putting racial membership as a single focus of VR improvement.[31]

Several researchers [27,32] had found that male gender, education greater than high school, and having public assistance as the primary support source decreased the likelihood of VR acceptance. Despite the improvement with regard to the number of variables considered, these results failed to include other potential risk factors that had been suggested (but not studied) in another similar investigation [26] such as type and severity of disability, and work status at application. One of the studies [32] covered an extensive array of factors, but the target population was limited to those with traumatic brain injury. And the other problem with the currently established factors for VR acceptance is that their role in the subsequent VR admission has yet been explored. There is no guarantee that the effects are also significant in this later stage.

We conducted this study to examine the factors associated with the risk of failure of individuals with disabilities to enter the VR programme, including the cases where they had been formally accepted but were yet to receive any service. We particularly addressed the gaps in the literature with respect to the scope of outcomes, the potential risk factors, and the methodological approaches for establishing the relationship. Acceptance and admission were treated as separate outcomes. Investigation of the potential risk factors was expanded to various demographic variables, disability factors, and other characteristics that are related to the VR selection process. Lastly, we utilized statistical procedures that produced relative risks, which not only identified the strength and direction of relationship between the potential risk factors and outcomes, but also provided the measures of association that would allow communication of the results in a more convenient way.

## 70 Methods

### Data and study individuals

Data for the study came from a prospective cohort of individuals with disabilities of a state VR agency in the Midwestern US region.

The agency counsellors collected the information during contact with their assigned cases. Each counsellor received trainings in data collection and case reporting. The report forms were standardized throughout the agency offices. All records were maintained in an integrated database by a state-level data management office. Rigorous algorithms for data extraction in addition to close communication with personnel from the data management office and the VR agency were implemented during the analysis to ensure the accuracy of each variable.

We evaluated the records of 130,660 individuals with disabilities who were referred to the agency and whose case had been closed between 1 January 2004 and 31 December 2012 for the purpose of analysis. The first analysis (not accepted versus accepted) included individuals who proceeded to eligibility determination stage. A subset of them subsequently entered the IPE development stage, and they were considered for the second analysis consisting failed to successful admission. All procedures had been reviewed and approved by the Institutional Review Board of the University of Illinois at Chicago.

### Outcomes and risk factors

Case progression in the state-federal VR agencies is represented by status number. The statuses of interest were Status 10 and 18. Status 10 indicated formal acceptance on the basis of eligibility criteria and order of selection. The eligibility criteria included the existence of an impairment that would create a substantial impediment to employment, ability to benefit from VR services in achieving employment outcomes, and clear evidence of the need for VR services to prepare for, engage in, or retain gainful employment. It was the task of the counsellor to evaluate applicant eligibility. If the applicant was accepted, they both formulated VR services to meet the vocational goals. This was called IPE development. To enter Status 18, the IPE should be completed in writing and approved by the agency. Status 18 marked the actual admission into the VR programme, where individual with disabilities started receiving VR services as an implementation of the IPE. Classification of individual outcomes in this study was based on their records of Status 10 and Status 18. Those without Status 10 were coded “not accepted”, while the accepted cases without Status 18 were coded “not admitted”. Individuals who have these statuses were then coded as “accepted” and “admitted” cases, respectively.

Demographic variables included age, gender, race, education, marital status, and residential information. Individual age, recorded at the application interview, was categorized into 21 or younger, 22–30, 31–46, and 47 or older. Gender was a dichotomous (male and female) variable. Non-Hispanic White, Black, Hispanic (included White Hispanic), mixed of Black and White/Hispanic, and others, were used to classify race. Reported education level at application was ordered into elementary or lower, secondary, high school diploma or General Education Development (GED) certificate, and higher than high school. Each individual was also differentiated into whether they were never or ever/currently married. County of residence was classified by population size in the 2013 census: 100,000 or less; 100,001–500,000; 500,001–1,000,000; and more than 1,000,000.

Six types of primary disability were used. All were “with” vs. “without” variables. Each individual could report multiple disabilities. Classification followed that of the VR agency. Blind/visual disability included blindness and any visual impairment. Deaf/hearing disability encompassed any condition where deafness or hearing loss was predominant, deaf blindness, and other hearing impairments. Intellectual disability referred to either a cognitive

impairment related to mental retardation, or a psychosocial impairment such as autism. Learning disability<sup>23</sup> as the term used for cognitive impairment that stemmed from specific learning disabilities or attention-deficit hyperactivity disorder. Mental illness covered a variety of psychosocial and other mental impairments due to any of the following: depressive and mood disorders, neurotic anxiety, personality disorders, schizophrenia and other psychotic conditions, or other unclassified mental illness. Finally, physical<sup>33</sup> orthopaedic disability represented as mobility orthopaedic/neurological impairments, manipulation/dexterity orthopaedic/neurological disorders, both mobility and manipulation/dexterity impairments, and other orthopaedic conditions.

Severity of impairment was measured through the quantity of serious functional<sup>44</sup> limitations. The form of limitation included communication, interpersonal skills, mobility, self-care, self-direction, and work tolerance. Summation was possible because each person could have multiple forms. VR counsellors determined the form and seriousness of functional limitation based on the agency's nationwide guidelines. For instance, limitation<sup>44</sup> in mobility was assessed through the observation of physical ability to move from place to place (walking, climbing, and analogous activities) and to adjust the body into certain positions (kneeling, stooping, sitting, or standing).

Other variables for potential risk factors were those relevant to the nature of VR services. These were history of paid employment, category of referral agent, Medicare/Medicaid coverage, and the form of public support individual had.

### Statistical analysis

Each individual in our data was followed up from referral to closure. Hence, the outcome proportions reflected the cumulative risk of failing acceptance/admission into the VR programme. The use of person-time was not considered because the relevant exposure units, which were length of time for acceptance and for admission, were typically short (days) and more indicative of the VR agency performance rather than the individual risk. Models were fitted using Poisson regression with robust variance estimator<sup>[33]</sup> and the results were presented as relative risks and their 95% confidence interval. Note that the choice of Poisson regression over "the standard" logistic regression models was prompted by the fact that the outcomes were quite common (overall proportions of more than 20%), and thus, approximating the relative risks with the odds ratios would be inappropriate. This approach has been increasingly suggested in health studies with common outcomes.<sup>[34,35]</sup> Log-binomial regression models were also tried<sup>56</sup> but eventually not implemented due to convergence issues. Data management and statistical analysis were performed using R statistical software version 3.2.2.

### Results

A quarter of 126,251 individuals ( $n = 31,734$ ) who entered eligibility determination stage were not accepted to participate in the VR programme (Figure 1). Of those who were accepted and started developing IPE, 31.5% ( $n = 29,734$ ) failed to receive VR services. Table 1 provides the description of individuals in each stages.

The individuals in eligibility determination stage (VR acceptance analysis) were dominated by males, and their age distribution peaked at 0–21 and 31 or older. Most of them were either non-Hispanic Whites or Blacks, and less than 10.0% of other races. About 58.7% had education of high school diploma or higher. The proportion of ever or currently married persons was much less than half that of never married individuals. A substantial number

resided in small to moderate counties with population not larger than 500,000, despite 32.9% that lived<sup>63</sup> in a metropolitan area. Learning disability and mental illness were the most common types of disability, followed by intellectual disability and physical/orthopaedic disability, while blind/visual and deaf/hearing disabilities were each only recorded in 6.7% or less individuals. More than a quarter were severely impaired (quantified by 4 or more functional limitations). In 41.9% cases, the agent of referral appeared to be oneself. Almost 90% individuals in this stage had no prior work experience. There was a significant proportion (44.8%) under Medicare/Medicaid coverage, and 52.5% benefited from certain public support such as Supplemental Security Income (SSI) or Social Security Disability Insurance (SSDI).

Overall, the characteristics of individuals at IPE development stage (VR admission analysis) followed the patterns seen in eligibility determination. It was noted, however, that the proportions of transition-age individuals (0–21 years) and those in secondary education were slightly higher than the previous stage, which might explain a notably higher percentage of educational agency as the referral agent.

Table 2 shows that types of primary disability were associated with the risk of both non-acceptance and unsuccessful admission into VR services, even after adjusting for other variables in the model. In particular, blind/visual disability appeared to lower both risks (adjusted relative risk, RR, for non-acceptance 0.47, with 95% confidence interval, 95% CI: 0.36, 0.61; RR for non-admission 0.41, 95% CI: 0.38, 0.45), while physical/orthopaedic disability seemed to increase the risks (RR for non-acceptance 1.30, 95% CI: 1.12, 1.51; RR for non-admission 1.23, 95% CI: 1.18, 1.27). The existence of mental illness was a protective factor for non-acceptance (RR: 0.82; 95% CI: 0.72, 0.94) but a risk factor for non-admission (RR: 1.09, 95% CI: 1.06, 1.12). Intellectual disability elevated individual risk of non-acceptance. On the other hand, deaf/hearing disability and learning disability were protective for non-admission into VR services.

Severity of impairment, as expected, was associated with the risk of non-acceptance, but not with non-admission. Table 2 indicates that individuals with 4 or more functional limitations had about 42% (95% CI: 0.52, 0.64) lower risk of not getting accepted into the VR programme as compared with those with fewer functional limitations, controlling for other covariates.

Age was a significant demographic factor for VR non-admission, with a quite apparent "dose-response" relationship. For example, the adjusted risk was 0.73 (95% CI: 0.70, 0.77) for individuals 22–30 years old as compared with those 21 years old or younger (reference); this adjusted risk ratio became 0.60 (95% CI: 0.57, 0.64) in individuals 47 years old or older. On the VR acceptance side, such a dose-effect relationship was seen between residential category and the outcome. Compared with those living in a county with 100,000 people or fewer, study individuals within a county of population size (100,001–500,000), (500,001–1 million), and more than 1 million had respectively 1.34, 1.39, and 2.26 times higher risk of non-acceptance, with no 95% CI included 1.00, partialing out the effect of other factors. It is interesting to note that the association between residential category and non-admission was instead protective. The relationships with both outcomes, however, seemed to be in the same direction for race, education, and marital status. In terms of race, Black individuals, including those of mixed Black, had almost 2-fold adjusted risk of not getting accepted and also higher risk of failing admission than their Whites counterpart. A higher adjusted risk of non-admission was found as well in Hispanic group (RR: 1.11, 95% CI: 1.07, 1.16). Surprisingly, higher education translated into higher risk of failure in any outcome. Being married at the time of

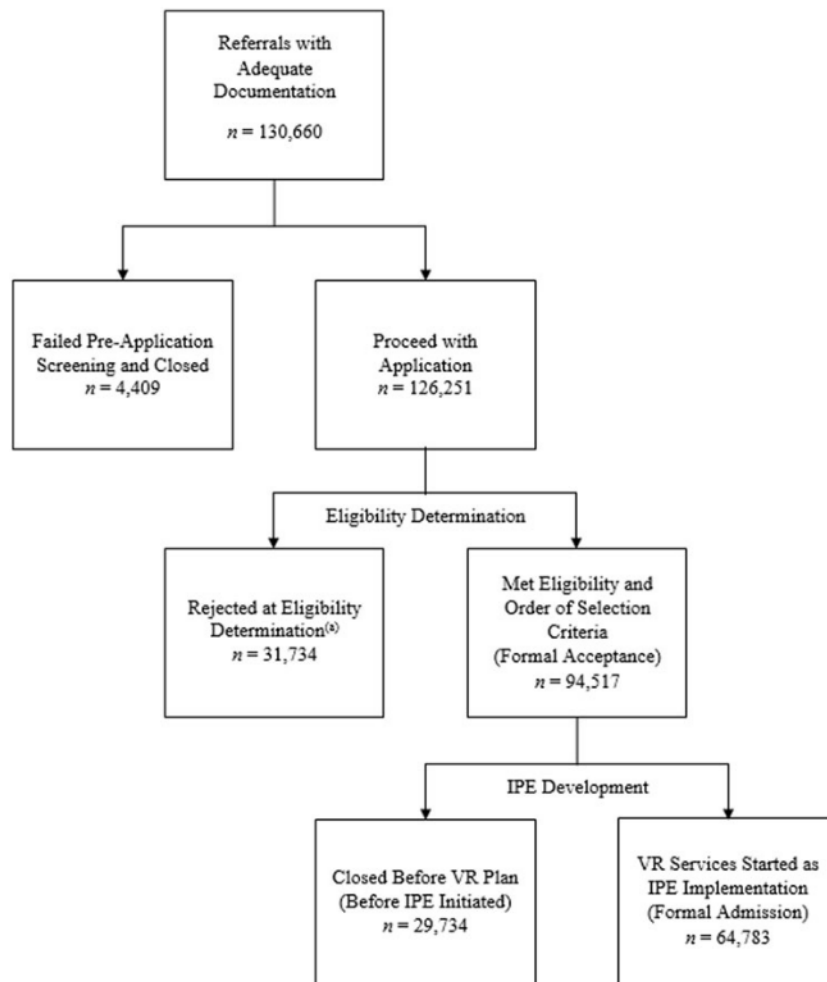


Figure 1. Individual status progression during the selection process for vocational rehabilitation (VR) services. (a) Nature of closure: ineligible ( $n = 30,164$ ), failed trial work or extended evaluation ( $n = 1140$ ), and left certified eligibility waiting list before developing individualized plan for development (IPE,  $n = 430$ ).

application also increased the adjusted risk of both non-acceptance and non-admission.

Previous exposure to paid employment reduced the individual adjusted risk of non-acceptance by approximately 16% (95% CI: 0.73, 0.97) and for non-admission by about 27% (95% CI: 0.70, 0.75) as compared with those who had never worked. The category of referral agent was also associated with the risk of both outcomes. Finally, Table 2 shows that individuals with disabilities who were covered by Medicare/Medicaid or received certain form of public support like SSI/SSDI were in significantly lower risk of being rejected in the acceptance process as compared with those without it; the association, however, appeared to be weaker for admission step.

### Discussion

Our findings indicate that disability factors, demographic determinants, and certain miscellaneous characteristics were associated with the risks of non-acceptance and unsuccessful admission into VR. In terms of VR acceptance, the role of disability factors such as type of disability and severity of impairment was clear from the

nature of eligibility criteria of this stage. The criteria, nonetheless, did not specify the type of disability or quantify the severity of impairment that would lead to sure acceptance or rejection. Accordingly, the use of these variables was still warranted as there would be potential variability of the outcome within individuals. Other significant risk factors were demographic determinants, including race, education, marital status, and category of residence. Specifically, being Black, with higher education, employed or currently married, and in a denser population area appeared to be associated with an increased risk of non-acceptance. Except for race, the association might suggest that individuals with such characteristics faced greater environmental barriers or had less incentive to proceed with VR application process, tended to be difficult for the agency to reach, or any combination of these factors. Environmental barriers for individuals in a dense neighbourhood could be a lack of transportation; living in the residential building or area that was difficult to commute; and limited access to VR agency due to the office building structure or location, or because of the imbalance between the agency resources and the number of applicants. Persons with high education might be quite confident with their ability to find job on their own that they felt

**Table 1.** Characteristics of study individuals by selection stages leading to acceptance and admission into vocational rehabilitation services.

Variable	Eligibility determination (n = 126,251)		IPE development (n = 94,517)	
	n	%	n	%
Age (year)				
21 or younger	47,068	37.3	39,591	41.9
22–30	18,493	14.6	12,876	13.6
31–46	32,348	25.6	22,446	23.7
47 or older	28,342	22.4	19,604	20.7
Gender				
Female	54,737	43.4	40,688	43.0
Male	71,514	56.6	53,829	57.0
Race				
White, non-Hispanic	75,447	59.8	58,997	62.4
Black	38,383	30.4	26,308	27.8
Hispanic, White, or non-White	8638	6.8	6427	6.8
Mixed Black	2157	1.7	1523	1.6
Other	1626	1.3	1262	1.3
Education				
No formal or elementary	6142	4.9	4575	4.8
Some secondary	45,982	36.4	37,774	40.0
HS diploma or GED	38,172	30.2	26,756	28.3
Higher than HS	35,955	28.5	25,412	26.9
Marital status				
Never married	86,708	68.7	67,397	71.3
Ever or currently married	39,543	31.3	27,120	28.7
County of residence population size				
100,000 or less	32,408	25.7	25,049	26.5
100,001–500,000	34,126	27.0	25,777	27.3
500,001–1,000,000	18,174	14.4	13,995	14.8
More than 1,000,000	41,497	32.9	29,673	31.4
With blind/visual disability <sup>a</sup>	8513	6.7	6437	6.8
With deaf/hearing disability <sup>a</sup>	7427	5.9	5937	6.3
With intellectual disability <sup>a</sup>	19,160	15.2	15,745	16.7
With learning disability <sup>a</sup>	31,596	25.0	25,823	27.3
With mental illness <sup>a</sup>	28,023	22.2	21,309	22.5
With physical/orthopaedic disability <sup>a</sup>	15,914	12.6	10,674	11.3
Severity of impairment				
1–3 functional limitations	68,994	71.3	67,152	71.1
4 or more functional limitations	27,743	28.7	27,306	28.9
History of paid employment				
Never work for paid job	111,582	88.4	82,793	87.6
Ever or currently work	14,669	11.6	11,724	12.4
Referral agent				
Self-referral	52,902	41.9	35,408	37.5
School/educational agency	36,443	28.9	32,190	34.1
Community rehab programme	13,811	10.9	11,126	11.8
Other sources	23,095	18.3	15,793	16.7
Have Medicare/Medicaid	56,613	44.8	41,734	44.2
Public support				
Not receiving public support	54,312	43.0	40,968	43.3
SSI-Disabled	39,017	30.9	28,992	30.7
SSDI, SSI-Aged, SSI-Blind	27,271	21.6	20,812	22.0
Some other public support	5651	4.5	3745	4.0

IPE: individualized [29] for employment; HS: high school; GED: general education development; CI: confidence interval; SSI: Supplemental Security Income; SSDI: Social Security Disability Insurance.

<sup>a</sup>Recording multiple types of disability allowed.

less motivated to fight for VR services. Married people could have a competing family commitment or a limited resource that discouraged them from continuing with VR application. Racial disparities, however, would be more indicative of biased practices within the agency, as it had been proposed in the previous studies,[26–32] than individual barriers to be successful in the application. The risk of non-acceptance was also associated with several miscellaneous risk factors. Previous or recent experience with paid

**Table 2.** Relative risk of non-acceptance and non-admission into vocational rehabilitation services based on models fitted using Poisson regression with robust variance estimator.

Risk factors	Not accepted RR (95% CI)	Not admitted RR (95% CI)
Age (year)		
21 or younger	1.00	1.00
22–30	1.01 (0.84, 1.22)	0.73 (0.70, 0.77)
31–46	1.00 (0.84, 1.20)	0.66 (0.63, 0.69)
47 or older	0.95 (0.78, 1.16)	0.60 (0.57, 0.64)
Gender		
Female	1.00	1.00
Male	0.95 (0.88, 1.03)	1.00 (0.98, 1.01)
Race		
White, non-Hispanic	1.00	1.00
Black	1.93 (1.76, 2.13)	1.23 (1.20, 1.26)
Hispanic, White, or non-White	1.16 (0.98, 1.37)	1.11 (1.07, 1.16)
Mixed Black	1.77 (1.37, 2.30)	1.33 (1.25, 1.40)
Other	0.86 (0.58, 1.29)	0.97 (0.88, 1.06)
Education		
No formal or elementary	1.00	1.00
Some secondary	1.39 (1.09, 1.78)	1.34 (1.26, 1.41)
HS diploma or GED	1.51 (1.17, 1.94)	1.03 (0.98, 1.10)
Higher than HS	1.46 (1.13, 1.90)	1.10 (1.03, 1.17)
Marital status		
Never married	1.00	1.00
Ever or currently married	1.20 (1.06, 1.36)	1.17 (1.13, 1.21)
County of residence population size		
100,000 or less	1.00	1.00
100,001–500,000	1.34 (1.16, 1.54)	1.07 (1.04, 1.09)
500,001–1,000,000	1.39 (1.18, 1.63)	0.77 (0.75, 0.80)
More than 1,000,000	2.26 (1.98, 2.59)	0.88 (0.85, 0.90)
With blind/visual disability	0.47 (0.36, 0.61)	0.41 (0.38, 0.45)
With deaf/hearing disability	0.82 (0.67, 1.00)	0.76 (0.72, 0.80)
With intellectual disability	1.28 (1.14, 1.44)	0.98 (0.95, 1.01)
With learning disability	0.91 (0.80, 1.03)	0.87 (0.85, 0.90)
With mental illness	0.82 (0.72, 0.94)	1.09 (1.06, 1.12)
With physical/orthopaedic disability	1.30 (1.12, 1.51)	1.23 (1.18, 1.27)
Severity of impairment		
1–3 functional limitations	1.00	1.00
4 or more functional limitations	0.58 (0.52, 0.64)	1.01 (0.99, 1.03)
History of paid employment		
Never work for paid job	1.00	1.00
Ever or currently work	0.84 (0.73, 0.97)	0.73 (0.70, 0.75)
Referral agent		
Self-referral	1.00	1.00
School/educational agency	1.20 (1.00, 1.43)	1.39 (1.34, 1.45)
Community rehab programme	0.65 (0.54, 0.77)	0.51 (0.48, 0.54)
Other sources	1.00 (0.88, 1.14)	0.98 (0.95, 1.02)
Have Medicare/Medicaid	0.68 (0.62, 0.74)	1.06 (1.04, 1.08)
Public support		
Not receiving public support	1.00	1.00
SSI-Disabled	0.79 (0.71, 0.88)	0.97 (0.94, 0.99)
SSDI, SSI-Aged, SSI-Blind	0.79 (0.69, 0.90)	0.92 (0.90, 0.95)
Some other public support	0.93 (0.76, 1.15)	1.05 (1.00, 1.11)

[29] adjusted relative risk; HS: high school; GED: general education development; CI, confidence interval; SSI, Supplemental Security Income; SSDI, Social Security Disability Insurance.

employment appeared to decrease the risk, likely through the confidence built on the agency side regarding the potential success of the applicants with employment histories. For applicants who were subjected to trial work before acceptance, any work experience would definitely be an advantage to achieve a positive outcome. With regard to referral agent, the risk of non-acceptance was relatively higher among those referred from a school or educational agency. This might be partly due to budget constraint of the agency. VR services for this group of referrals often entailed a contractual, capital-intensive arrangement.[24] In contrast,

individuals referred from community rehabilitation programmes had a relatively lower risk of non-acceptance. The programmes they were involved with had possibly helped them prepare for the selection process and it thus explained their better performance. Availability of Medicare/Medicaid benefits and certain public support in general tended to protect individuals from failing acceptance. It is pretty straightforward to explain this phenomenon, as the financial backbones of any state-federal VR agency are governmental supports and individual insurance plans. Therefore, applicants with these resources would be given preference.

The strength and direction of association between the same risk factors and VR admission suggested that acceptance and admission did not necessarily represent the same process of selection. Among disability factors, severity of impairment became not significant. This would be attributable to the fact that eligibility was no longer an issue at this stage. Age was now a significant protective factor, with protection against unsuccessful admission got higher as the age group increased. The relationship might indicate a better IPE development among the older VR candidates, and this led to an improved admission rate. A non-significant effect of age in the acceptance stage was a good sign of the absence of age discrimination. In terms of residential category, if residing in large-population counties was a bad indicator for acceptance, it became a good sign of admission. One possible explanation was that individuals in big counties tended to live in the proximity of major branches of the VR agency. This might encourage the already-accepted individuals to stay in the touch with their counsellors during IPE development; on the other hand, the counsellors might be more motivated to check the progress of individuals they served. Other notable differences were in the role of financial supports. These factors were fairly protective for non-acceptance, but became much less in non-admission. In fact, individuals with Medicare/Medicaid appeared to be in a slightly increased risk of failing admission. It could be that these individuals had less motivation to develop their IPE for fear of losing the Medicare/Medicaid supports.

There were several limitations of this study. The measure of outcomes inherited the weaknesses of vague criteria implemented in VR. While the use of VR Case Status 10 and 18 worked well to distinguish those who were technically accepted and admitted, they might not be representative of individuals who were truly eligible and who were able to appropriately developed IPE. Another limitation was the lack of information about the reasons for closure in the original data, which prohibited the effort to further explore the circumstances around individual failure and success. The secondary-data nature of the analysis also brought some constraint in terms of variables selection, though compared with the previous studies this had a more comprehensive list of variables. Additionally, the data source did not provide any information about the respective counsellors, such as gender, age, education, or year of experience, which may be used to expand our understanding of the risk factors for non-acceptance and non-admission. However, the study had a number of strengths. First, it was a prospective cohort study that allowed establishment of causal relationship. Second, it had significantly large samples. Third, the researchers had exclusive access to the parties that originally stored and managed the data, assuring that any questions or concerns regarding the variables could be clarified, and any conflicting entries could be reconciled for the majority of cases.

Implications of the study are at two levels. At administration and policy level, there is a need to separately monitor the procedures for accepting and admitting applicants into VR services, and to ensure that the personnel involved in the process receive

periodical trainings for handling the case. Racial disparities, for instance, are likely a product of insufficient monitoring. A great discussion about the avenues to intervene racial stereotypes and prejudices in VR had been provided in a previous study.[26] One of the solutions that the investigator proposed was an increased contact with the people of the minority racial group, such that a mutual understanding may grow between VR and these individuals. Formulation of anti-discrimination policies targeting the practices within the VR selection process is also recommended. More training of VR personnel to address racial stereotypes and prejudices in VR may also help preventing racial inequalities in both VR acceptance and admission. Other than race, any demographic barrier to access VR has to be dealt with. This may include a communication with the public transport authority to ensure that there is a reliable means of transportation for people with disabilities connecting VR offices and the coverage area, particularly in a densely populated area. Among the communities with demographic characteristics at risk of failure of entering VR services, it is perhaps necessary to conduct an outreach programme and distribute the information about how to access VR and the physical buildings, and the steps to apply. Though balancing the resources and the demands for VR services will always be an enormous challenge in practice, it often targets the root of the problem and is definitely reasonable to consider. In addition, there should be a mechanism in the VR system that raises awareness of the counsellors when people with characteristics at risk apply for services. This mechanism ideally prompts the counsellors to make appropriate efforts to ensure that the eligible applicants get what they deserve. It is equally important to address any negative attitude of the counsellors toward applicants with characteristics at risk (such as the perception that these applicants are difficult cases and likely to end in failure), for example, through trainings and enforcement of suitable policies. And the last thing, the role of disability factors signifies the importance of assuring that VR counsellors are equipped with skills and knowledge to appropriately determine the type and severity of impairment, and the functional limitation of a person with disabilities; an active involvement of health professionals may be worth considering. At the practical level, rehabilitation practitioners engaged in VR will have to participate in promoting and advocating a selection process that pays careful attention on the factors that are related to the risk of failure for entering VR. The established relationship between VR, employment, and public health outcomes implies that an improvement of VR will eventually lead to better public health outcomes.

Future research may include a further exploration on the exact mechanism of how each factor affects VR acceptance/admission. We only provide here our educated assumptions about the process underlying the observed relationship. It will be the task of subsequent researches to assess them and support or disapprove our arguments. In terms of which factor to study, we believe that all the significant factors deserve due attention. For instance, it is interesting to investigate the complex role of education. This study showed an interestingly inverse association: a higher education means a lower VR acceptance/admission. Though we have argued that the personal incentive to success might be the aetiology, there is no certainty until a proper investigation (probably qualitative in nature) is undertaken. And while the study on racial differences is quite abundant, there are still areas of improvement, such as how race interacts with other factors.

The essential contribution of this study to VR research, therefore, is the introduction of the idea of treating VR admission as a separate selection process following VR acceptance. We believe that this will help solving the absorption rate problem of eligible people with disabilities into the services without compromising



the purpose, capacity, and intended outcomes of VR. In providing the factors associated with VR admission, we also expand the understanding of VR acceptance process by taking into account several variables that were rarely utilized in the past research, such as population size of residence, referral source, type and severity of impairment, and public support, which will allow the alternative stratifications of the vulnerable groups. At the moment, group stratification in the VR selection process seems to be dominated by racial category.[26–31]

2



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25

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