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Toward a successful vocational rehabilitation in adults with disabilities: Does residential arrangement matter?

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ABSTRACT

The objective of this study was to assess whether successful vocational rehabilitation (that is, obtaining employment) among people with disabilities was affected by residential arrangement. Five groups of residential placement were considered: individuals living in a private residence, community or group residential, correctional and rehabilitation facilities, nursing home/mental health facilities, and homeless/shelter/other type of residential arrangement. The study involved a total of 46,570 vocational rehabilitation consumers aged 18 to 65 at referral in a Midwestern state. Statistical modeling was performed using quasibinomial logistic regression. It was found that compared to individuals living in private residences, those in correctional or rehabilitation facilities were at increased odds of successful rehabilitation, whereas those living in homeless/shelter/other residential arrangement and those living in nursing homes/mental health facilities were in significantly decreased odds of being rehabilitated. Individuals living in community or group residential, however, had no statistical difference in vocational rehabilitation outcomes compared to individuals living in private residences. The implications for rehabilitation research and practice are discussed.

KEYWORDS

Adults with disabilities; quasibinomial logistic regression; residential arrangement; vocational rehabilitation

Approximately 19% (56.7 million) of the total U.S. population have some form of disability (U.S. Census Bureau, 2011) (Note: Persons with a disability are those who have a physical, mental, or emotional condition that causes serious difficulty with their daily activities.) One major problem that people with disabilities constantly face is unemployment. Of about 35% of the working-age individuals with disabilities, only 30.2% are actually working (U.S. Department of Labor, Bureau of Labor Statistics, 2013, April). Individuals with disabilities tend to remain unemployed for longer periods of time than their counterparts without disability, and when they are employed, they typically earn less money (U.S. Census Bureau, American Community Survey, 2013). The results of these large-scale population studies, unfortunately, exclude institutionalized people

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such as those living in adult correctional facilities and nursing homes (Note: All previously mentioned statistics are based on only civilian noninstitutionalized population 16 years old and over.). In the United States, nearly 1.5 million people live in nursing homes (Jones, Dwyer, Bercovitz, & Strahan, 2009), and about 1 in 13 males and 1 in 33 females with disabilities reside in correctional facilities (Stapleton, Honeycutt, & Schechter, 2012).

In part to mitigate the unemployment problem of people with disabilities, the federal government started the vocational rehabilitation (VR) program. This program provides—among many others—individualized and supportive services to assist persons with disabilities obtain jobs that match their skills and abilities (U.S. Department of Education, n.d.). The U.S. Government Accountability Office [GAO] (2005) reported that of the 650,000 individuals exiting the state VR programs in fiscal year 2003, one third (217,557) obtained a new job or maintained their existing job for at least 90 days after receiving services (these are the criteria for successful rehabilitation). On the other hand, the relationships between living arrangements and employment outcomes for individuals with disabilities receiving VR services has not been examined in the research literature to date. This study tries to address this significant missing link in the literature by examining the relationship between different types of residential arrangements for people with disabilities and whether they were successfully employed after receiving VR services.

The Rehabilitation Act of 1973 was a landmark law that played a critical role in promoting employment opportunities for individuals with all types of significant disabilities who qualify for VR services. The VR program can support individuals transitioning from institutions into community living through the home services program, which funds personal care attendants, home modifications, and equipment, and supports their attainment of employment and other rehabilitation goals. The state VR program plays a critical role in helping people with disabilities receive services that enable them to work. Employment is broadly defined as both competitive jobs in the mainstream labor market and supported employment. In the context of VR service delivery, however, there are multiple factors that could influence rehabilitation outcomes. Research has suggested important differences in rehabilitation outcomes on the basis of consumers' demographic and VR service variables.

For example, a national longitudinal study (Hayward & Schmidt-Davis, 2003) found that in terms of disability type, VR consumers with sensory disabilities, orthopedic impairments and mental retardation were more likely than those with other types of disabilities to obtain employment. They also report that being non-White or seeking help for postsecondary education decreased the odds of employment. Similarly, in an analysis of a Midwestern State's VR outcomes, Balcazar, Oberoi, Suarez-Balcazar, and Alvarado (2012)

found that African Americans had a significantly lower rate of acceptance for VR services as well as successful employment outcomes when compared to White consumers of VR services. In a study of employment outcomes for African Americans with mental illness receiving VR services, Lukyanova, Balcazar, Oberoi, and Suarez-Balcazar (2014) also found that African Americans had significantly more closures after referral and thus, lower access to VR services; they also were closed as nonrehabilitated more often than Whites. However, none of the preceding studies assessed the odds of employment associated with the VR consumers' residential arrangements.

The preferred and most common form of living arrangement for persons with disabilities is living independently in the community (U.S. Census Bureau, 2007). In many instances, independent living refers to residing in a private house or apartment. Community or group residential and supported living arrangements have also been established for those individuals who are not able to live independently in a private home. This type of residential arrangement differs from private residences in terms of structure, ownership, level of supervision, and services and degree of autonomy provided to its residents. Community or group residential refer to houses that accommodate four to six people, where extensive paid staff support is provided to the residents, both in the home and when leaving to use community-based facilities (Bibby and Clement, 2009). A systematic review of the literature conducted by Kozma, Mansell, and Beadle-Brown (2009) found that in the United States, community-based semi-independent or supported living arrangements promote more community integration and more participation than do facilities or institutions like nursing homes (see e.g., Heller, Miller, & Factor, 1998; Howe, Horner, & Newton, 1998; Stancliffe & Lakin, 2006).

A recent government report estimated that at least 43% of the homeless adults staying in a shelter had a self-reported disability, and the most prevalent was mental illness (National Council on Disability [NCD], 2010). Stapleton et al. (2012) argue that a close examination of group residential arrangements reveal two significant trends for people with disabilities: (a) an increase in their representation in jails and prisons (correctional facilities); and (b) efforts at moving out of restrictive institutions.

According to the *Livable Communities for Adults with Disabilities* report (NCD, 2004, December 2), "the availability of affordable, appropriate, and accessible housing is crucial for people with disabilities; those who have stable housing are able to achieve other important life goals, such as obtaining an education, job training, and employment" (p. 7). A qualitative study of the future aspirations of persons with disabilities 12 years after deinstitutionalization found that many of them expressed a desire to pursue employment, education, and personal relationships (Forrester-Jones et al., 2002).

This study tries to fill several important gaps in the literature. First, it presents a demographic profile of individuals with disabilities in different

types of residential arrangements. Although Stapleton et al. (2012) presented statistics for persons with disabilities living in group quarters, they did not differentiate between persons with disabilities living in institutional and noninstitutional group residential arrangements and lumped everybody as those living in group quarters. Thus, the differentiation among group residential arrangements based on their type and structure as presented in this article is crucial because the experiences of persons with disabilities living in correctional facilities are going to be very different from those living in institutions designed to serve persons with disabilities. Second, this study is the first of its kind to present findings from a predictive model of how residential arrangements of persons with disabilities influence their employment outcomes after participating in the state VR program.

We designed this study to assess the relationship between residential arrangement and vocational rehabilitation outcomes among adults with disabilities. The interest was in finding out whether the types of residence would stand as a significant risk factor in the presence of other preservice factors, such as demographic backgrounds, type of impairment, functional limitations, and other referral factors, which were more intuitively related to vocational rehabilitation outcomes. In addition, we aimed at evaluating whether the relationship of interest was mediated by service factors such as the types of service people with disabilities received.

Methods

Data source

Our analysis was based on the data from a VR program in a Midwestern state. Information from each VR consumer was originally collected as a part of the agencies' service record and was maintained in an integrated database by the state-level agency. We were granted access to retrieve the de-identified records spanning from 2004 to 2013. For the purpose of analysis, we restricted data extraction to consumers aged 18–65 at referral, who were not involved in transition services for youth with disabilities after their acceptance in the VR program, and whose cases had been closed following a period of participating in a VR service plan. The purpose of the selected age range was to avoid homogeneity with respect to residential arrangement (in younger and older populations) and to guarantee that the individuals were in productive ages (such that assessing employment outcomes of vocational training would be relevant). We excluded consumers receiving transition services due to the different nature of that program. We also selected only those individuals whose cases were closed after receiving a VR service plan in order to ensure the availability of outcome measures. Of the 210,112 persons in the database, 46,570 met our criteria and were selected for analyses.

Variables

Throughout the study, the unit of analysis was the individual VR “case.” A consumer is considered one VR case until his or her case is closed. The VR record for each person noted the residential arrangement at program intake following a standard categorization: private residence, community residential or group home, adult correctional facility, rehabilitation facility, halfway house, substance abuse treatment center, nursing home, mental health facility, homeless/shelter, and other unclassified type of living arrangement. To improve the statistical power of our analysis, we collapsed these categories of residential arrangements into five major groups: private residence, community or group residential, correctional or rehabilitation facilities (including halfway house and substance abuse treatment facilities), nursing or mental health facilities, and homeless/shelter/other.

Rehabilitation status at closure was the study outcome measure. It was a binary variable with category “(successfully) rehabilitated” if the person obtained and maintained employment for at least 90 days, and “not rehabilitated” if otherwise. The covariates for residential arrangement as the primary predictor were age at referral, gender, education at referral, ethnicity (using not mutually exclusive Black and Hispanic indicators, such that a person was allowed to have both), primary impairment, functional limitation, referral source, and year of referral to VR program.

We used fiscal year of the institution where the data originated instead of calendar year with respect to admission time; for example, the referral year of 2010 implies the calendar year from July 2009 to June 2010. The types of primary impairment among the consumers in our sample included intellectual, learning, mental, and physical/orthopedic disabilities, as well as traumatic brain injury. In terms of functional limitation, the study evaluated both qualitative and quantitative aspects: existence of any limitation in communication, interpersonal skill, mobility, self-care, self-direction, or work tolerance, and in addition, the number of functional limitations for each person. Referral source was divided into: self-referral, agency (incorporating one-stop employment/training centers, welfare agency, and Social Security Administration offices), community rehabilitation programs, physician/medical referral, school, and other sources.

Apart from these preservice factors, the study also analyzed several types of services that the consumers received. Note that due to our goal of establishing a predictive model, we only included the types of services that allowed us to keep the good fit of the regression model. Of the total of 22 VR services offered for the consumers in our dataset, we only accommodated four that had a plausible influence on the model fit, which were maintenance, transportation, rehabilitation technology/assistive device, and miscellaneous training services.

All independent variables were treated as categorical, except for age at referral. Selection of the covariates was driven by the need of building a predictive model for the relationship between residential arrangement and rehabilitation status at closure.

Statistical analysis

We conducted the statistical analysis in three phases. The first phase was descriptive, aimed at finding which and how the covariates should be adjusted for in the multivariable modeling. Second, we assessed the statistical nature of the observed relationship between residential arrangement and rehabilitation status at closure. More precisely, we used a set of regression equations to evaluate whether the effect of residential arrangement on the outcome was mediated by service factors (represented by the types of service the consumers received). Finally, we designated the statistical model for rehabilitation status at closure using the information from the preceding steps. In particular, because we found that there was no mediation in the relationship of interest, we regressed rehabilitation status at closure on residential arrangements with all other independent variables serving as covariates. The final model was run using quasibinomial logistic regression. This quasi-likelihood approach was taken due to a slight ²¹ overdispersion (about 1.28) in the selected model. Model fit was judged using the Hosmer–Lemeshow goodness-of-fit test.

Results

Our data ²¹ were, not surprisingly, given the age criterion for selection, dominated by individuals who had completed at least High School or equivalent degree at the time they were referred. There were slightly more males than females. In terms of age, the sample consisted of two major groups: young adults with peak age of 18–30 years old, and middle-age persons who were mostly between 41 and 50 years old. Less than one third of them were Black, and only 6% were Hispanic (recall that records for each person could report both, which was the way ³⁶ the original data were collected). Table 1 provides the detailed characteristics of people with disabilities involved in the study.

Mental disability was the type of impairment found on almost 30% of the cases, whereas physical/orthopedic disability was the second-most common impairment (14.8%). The majority of individuals had three or more forms of functional limitation. More than 50% of them were self-referred, though referrals from community rehabilitation programs and sources other than physician/medical centers, agencies, or schools, were also fairly frequent (between 15 and 20%). Approximately 25.2% of the cases were recently referred, that is, sometime between 2010 and 2013 (note that, as previously described, we used July to June the following calendar year for our year of referral). Among the VR services that we considered for analysis,

Table 1. Characteristics of the cases across different residential arrangements.

Variable*/categories	Private Residence (n = 42,286)		Community or Group Residential (n = 2,496)		Correctional or Rehabilitation Facilities (n = 877)		Homeless/ Shelter/ Other (n = 567)		Nursing or Mental Health Facilities (n = 344)		Total (n = 46,570)	
	n	(%)	n	(%)	n	(%)	n	(%)	n	(%)	n	(%)
Demographic background												
Age at referral												
18–30	13,435	(31.8)	706	(28.3)	190	(21.7)	122	(21.5)	57	(16.6)	14,510	(31.2)
31–40	8,472	(20.0)	556	(22.3)	264	(30.1)	126	(22.2)	82	(23.8)	9,500	(20.4)
41–50	11,208	(26.5)	780	(31.2)	315	(35.9)	191	(33.7)	116	(33.7)	12,610	(27.1)
51–65	9,171	(21.7)	454	(18.2)	108	(12.3)	128	(22.6)	89	(25.9)	9,950	(21.4)
Gender												
Female	19,355	(45.8)	979	(39.2)	571	(65.1)	227	(40.0)	108	(31.4)	21,240	(45.6)
Male	22,931	(54.2)	1,517	(60.8)	306	(34.9)	340	(60.0)	236	(68.6)	25,330	(54.4)
Education												
Secondary or lower, Special Education	6,974	(16.5)	692	(27.7)	317	(36.1)	149	(26.3)	63	(18.3)	8,195	(17.6)
HS graduate or equivalent	17,506	(41.4)	1,186	(47.5)	342	(39.0)	241	(42.5)	129	(37.5)	19,404	(41.7)
Higher than HS	17,806	(42.1)	618	(24.8)	218	(24.9)	177	(31.2)	152	(44.2)	18,971	(40.7)
Black ethnicity												
Non-Black	29,700	(70.2)	1,607	(64.4)	349	(39.8)	344	(60.7)	197	(57.3)	32,197	(69.1)
Black	12,586	(29.8)	889	(35.6)	528	(60.2)	223	(39.3)	147	(42.7)	14,373	(30.9)
Hispanic ethnicity												
Non-Hispanic	39,586	(93.6)	2,403	(96.3)	838	(95.6)	538	(94.9)	332	(96.5)	43,697	(93.8)
Hispanic	2,700	(6.4)	93	(3.7)	39	(4.4)	29	(5.1)	12	(3.5)	2,873	(6.2)
					Primary impairment							
Intellectual Learning	5,263	(12.4)	610	(24.4)	45	(5.1)	53	(9.3)	16	(4.7)	5,987	(12.9)
Mental	5,818	(13.8)	101	(4.0)	30	(3.4)	70	(12.3)	4	(1.2)	6,023	(12.9)
Physical/Orthopedic	11,173	(26.4)	1,389	(55.6)	393	(44.8)	264	(46.6)	251	(73.0)	13,470	(28.9)
Traumatic Brain Injury	6,691	(15.8)	80	(3.2)	32	(3.6)	55	(9.7)	24	(7.0)	6,882	(14.8)
	1,088	(2.6)	18	(0.7)	5	(0.6)	6	(1.1)	7	(2.0)	1,124	(2.4)



transportation service was received by 16.9% cases, yet the other services only catered to less than 10% of the cases.

Table 1 also breaks the characteristics of the sample into the five residential groups. With regard to referral source, people with disabilities living in a private residence and community or group residential followed the overall pattern of the data. The only exception was those from community or group residential settings who were primarily referred by community rehabilitation programs (55.2%) instead of self-referral (23.5%). Notable differences to the general pattern were evident for individuals on the other three living arrangements. Individuals from correctional or rehabilitation facilities, which included halfway houses and substance abuse treatment facilities, tended to be females (65.1%), of education at most High School (75.1%), and were predominantly Black (60.2%; compared to only 30.9% for the overall cases, or between 30 and 43% on the other residential arrangements).

Inadequacy in interpersonal skills and self-direction really stood out as dominant functional limitations in this group, with respective numbers of individuals of 681 (77.7%) and 613 (69.9%). On the other hand, those in nursing home and mental health facilities, and people with disabilities who were homeless or who lived in shelters and other un-classified types of residential arrangements were more concentrated in older ages (in particular, 41–50 age group) with many fewer people aged 18–30 at the time of referral, which was a deviation from the overall trend. More than 70% of the persons in our sample residing in nursing homes and mental health facilities were reported as having mental impairments, which was over 2.5 times larger than the overall proportion for all residential groups.

We could not prove that the relationship between residential arrangement and the outcome of vocational rehabilitation was mediated by service factors, or in particular, the VR services the persons in our sample received. The results of the regression equations with the types of service as the dependent variable and the residential arrangement as the independent variable were not statistically significant; they were also not in the same direction as those seen for the models using vocational rehabilitation outcome as the dependent variable. Figure 1 depicts the difference between the structures of the relationship that we hypothesized and that supported by the data. For simplicity of presentation, we do not show the results of this stage of analysis. The types of service were eventually used as covariates for residential arrangement.

The effect of residential arrangement on vocational rehabilitation outcome was, nevertheless, strongly evident in this study (see Table 2). Taking the persons in our sample living in private residences as reference, there were increased odds of successful rehabilitation among those in correctional or rehabilitation facilities after controlling for the rest of residential groups and other covariates (*odds ratio, OR, 2.02*, with 95% *confidence interval, CI = [1.73, 2.35]*). In contrast, the cases in homeless/shelter/other residential

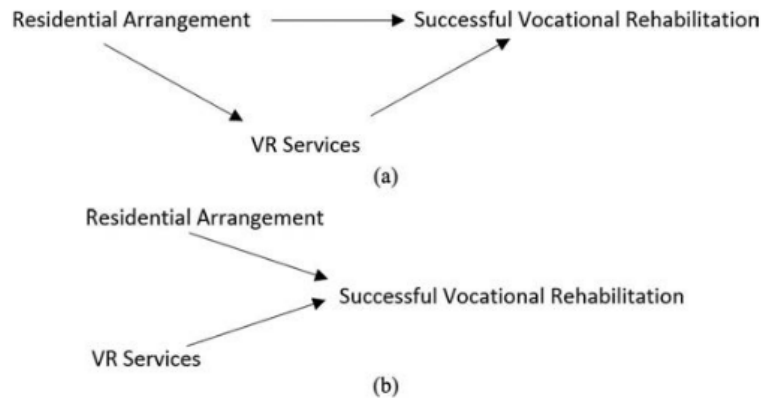


Figure 1. The structure of the relationship: (a) hypothesized; (b) supported by the data.

Table 2. Conditional odds ratios of being vocationally rehabilitated across different residential arrangements***.

Residential arrangement category	Odds ratio [95% CI]	p-value
Private Residence (reference)	1.00	
Community or Group Residential	0.96 [0.88, 1.05]	0.381
Correctional or Rehabilitation Facilities	2.02 [1.73, 2.35]	<0.001
Homeless/Shelter/Other	0.77 [0.65, 0.91]	0.003
Nursing or Mental Health Facilities	0.39 [0.30, 0.49]	<0.001

Note. CI =confidence interval.

*Adjusted for age at referral, gender, education at referral, ethnicity, types of impairment, functional limitations, referral source, year of admission, and services received.

**Fitted using quasibinomial logistic regression; Hosmer-Lemeshow chi-square test = 11.00 (8 df, p = 0.202).

arrangement had 23% lower odds (95% CI = [0.65, 0.91]) of being rehabilitated, and those living in nursing homes and mental health facilities had 61% lower odds (95% CI = [0.30, 0.49]) of being rehabilitated, as compared to people in private residences, and adjusted for the effects of other variables. Those individuals living in community or group residential placements, however, showed no statistical difference in vocational rehabilitation outcomes when compared with the individuals living in private residences. The individuals living in private residences represented the largest proportion of the dataset, and thus may be regarded as representative of the general population. This is why they were used as the standard for comparison. All variables shown in Table 1 were used as covariates, including the types of service and several interactions that were found to improve the model fit. The Hosmer-Lemeshow chi-square test was 11.00 (8 degrees of freedom, p = 0.202), indicating a good fit of the selected model.

Discussion

The results of this analysis suggest that residential arrangement is a significant risk factor for vocational rehabilitation outcomes (i.e., employment) among

adults with disabilities in this study. Its effect remained strong even after preservice and service factors were adjusted for. Thus, for instance, those in nursing homes and mental health facilities may be expected to have worse outcomes irrespective of what services they received during vocational rehabilitation. In contrast, adults with disabilities living in correctional or rehabilitation facilities would have more favorable outcome under the same services.

There are several factors that may explain our findings. For instance, the individuals in correctional or rehabilitation facilities, which included halfway houses and substance abuse treatment facilities, could have received additional services and supports (other than those from the VR program) not obtained by those in other residential arrangements. This may be in the form of case manager being placed in their facility to accommodate their confinement status. In addition, they tended to be younger than the rest of the residential groups, with 51.8% cases aged 40 or less. As such, their chances of getting employment was higher. Another possible explanation is that their disabilities were less severe. Almost a half of the consumers in correctional or rehabilitation facilities had at most two forms of functional limitation, and they tended to have relatively lower percentages of mental and physical disabilities.

The opposite characteristics of the consumers in our sample who were living in a shelter or homeless, and those in nursing homes and mental health facilities, might have contributed to their poor outcome. They consisted more of older people, had a relatively higher likelihood of being impaired mentally and physically, and were greatly limited in their everyday function. Nursing homes are also varied in their autonomy of managing the clients in a way that the ability of the people with disabilities to achieve successful rehabilitation is compromised.

It is interesting to note that the relationship between residential arrangement and vocational rehabilitation outcome was not mediated by the types of VR service the adults with disabilities received. We emphasize though that this finding does not suggest that the VR services were less effective in helping the people in our sample to achieve successful rehabilitation. In fact, we still adjusted our model for these service variables. What the study results indicate is that the mechanism by which people in different residential arrangements achieve their outcome may have worked independently from the types of VR service they received.

Limitations

The study had a few limitations worth mentioning. First, it did not explore how the individuals in the database were selected into the VR plan. Assessment on the early stages of the consumers' progression in the VR program

may provide more actual explanations of the discrepancy of outcomes across groups in different residential arrangements. Future research may address this shortcoming. Second, we did not track any changes in place of residence over time because the number of individuals in our sample with multiple living arrangements was small and the idea was beyond the scope of this study.

However, we plan to examine the data to see if, for example, moving from a nursing home to a group residential facility has an impact on the rehabilitation outcome of those involved. Third, the investigators had no control on how the data were collected and entered. To minimize any measurement error, we employed rigorous algorithms to clean and analyze our dataset. Nevertheless, there were still data entry errors that rendered several cases unusable. This is to be expected as the original data were entered by many individuals over an extended period of time. We are making recommendations to the data administrator in the agency in order to create changes in the data entry process that could limit these errors. Finally, the available data have no information that was collected directly from counselors or consumers. Future research could explore more detail about the consumers' perspectives with regards to their places of residence and how they contribute or hinder their rehabilitation process.

Implications for future research

It was unfortunate to find that Black consumers did worse than any other racial group in all residential placements. Future research could examine this issue further through qualitative interviews to get their perspective about possible reasons for the disparity. Similarly, individuals with mental illness had worse rehabilitation outcomes than those without, regardless of the residential placement. This suggests the need to continue to expand supported employment programs for this population and also examine negative attitudes in the community that often contribute to their poor employment outcomes. On a positive note, it is encouraging to find a trend where higher educational levels had better rehabilitation outcomes regardless of the place of residence. This finding should contribute to encourage VR providers to support educational goals as individuals with disabilities pursue their vocational careers.

To conclude, it is important to consider the residential arrangement of adults with disabilities in designing a VR plan to ensure successful outcomes. Greater attention needs to be exercised on those living in nursing home and mental health facility, as well as on homeless individuals or people who reside in shelter, as they are in a greater likelihood to fail the VR program. The study supports pursuing the de-institutionalization of individuals with severe disabilities at least with regards to their rehabilitation outcomes. This is what community psychologists refer to as the social relevance of our research.

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