



Predicting employment after Vocational Rehabilitation using observable customer characteristics

AUTHORS

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The Vocational Rehabilitation program

The VR program provides support and services to people with disabilities who want to work.

VR services range from the provision of specialized equipment and transportation to work to the provision of supported employment experiences.

The program is a federal-state partnership: state VR agencies administer the program with oversight from the Rehabilitation Services Administration in the U.S. Department of Education. Approximately 80% of VR funding is federal, with the remainder provided by state governments.

States either have one VR agency that serves everyone (a combined agency) or two, with one serving blind applicants and another serving all other applicants. If a state VR agency does not have enough resources to serve all eligible applicants, it must prioritize serving people with the most significant disabilities.

Introduction

The Vocational Rehabilitation (VR) program offers tailored services and supports to help people with disabilities obtain or retain employment and become economically self-sufficient. About one-third of eligible VR customers who applied for services in 2014 were employed when they exited the program, but the remainder exited the program either without receiving services or without a successful employment outcome. Understanding what customer characteristics at application were correlated with exiting the program without a successful employment outcome can help VR staff and administrators improve outcomes by allocating additional time and resources toward at-risk applicant groups.

In a recently published study, we analyzed VR program data using machine learning techniques to explore how customer characteristics predict key program outcomes (Hill et al. 2022). We focused on two outcomes—employment status and service receipt status at program exit. Employment at program exit is the best single measure of success in the VR program. Understanding which eligible applicants eventually receive VR supports is also critical because VR cannot improve employment outcomes for people it does not serve.

Data and Methods

We analyzed case-level VR administrative data from the RSA-911 Case Service Report. These data contain information about customer characteristics at application, services received, and outcomes at program exit. The analysis included all eligible applicants in 2014 at general or combined agencies in the 50 states or District of Columbia who exited the program no later than June 2019. This population included 490,225 people—approximately 87 percent of all 2014 applicants. Customers were grouped for analysis into one of three outcome groups: (1) exit the program without receiving services, (2) exit the program after receiving services but without employment, and (3) exit the program with employment after receiving services.

We used Classification and Regression Tree (CART) models to explore how customer characteristics at application were related to employment and service receipt status at program exit. CART (Breiman et al. 1984) is a machine learning technique that partitions the data into groups based on characteristics that are predictive of the outcomes to be studied. To begin, CART identifies the characteristic that best separates the data into two groups with average outcomes that are most dissimilar. The two groups are then further partitioned based on other characteristics, with the process repeating until meeting a stopping condition. The resulting sequence of partitions is visualized as a "tree" structure in which the expected outcome for a customer can be found by following his or her path from the top of the tree to the bottom.

Vocational Rehabilitation service path

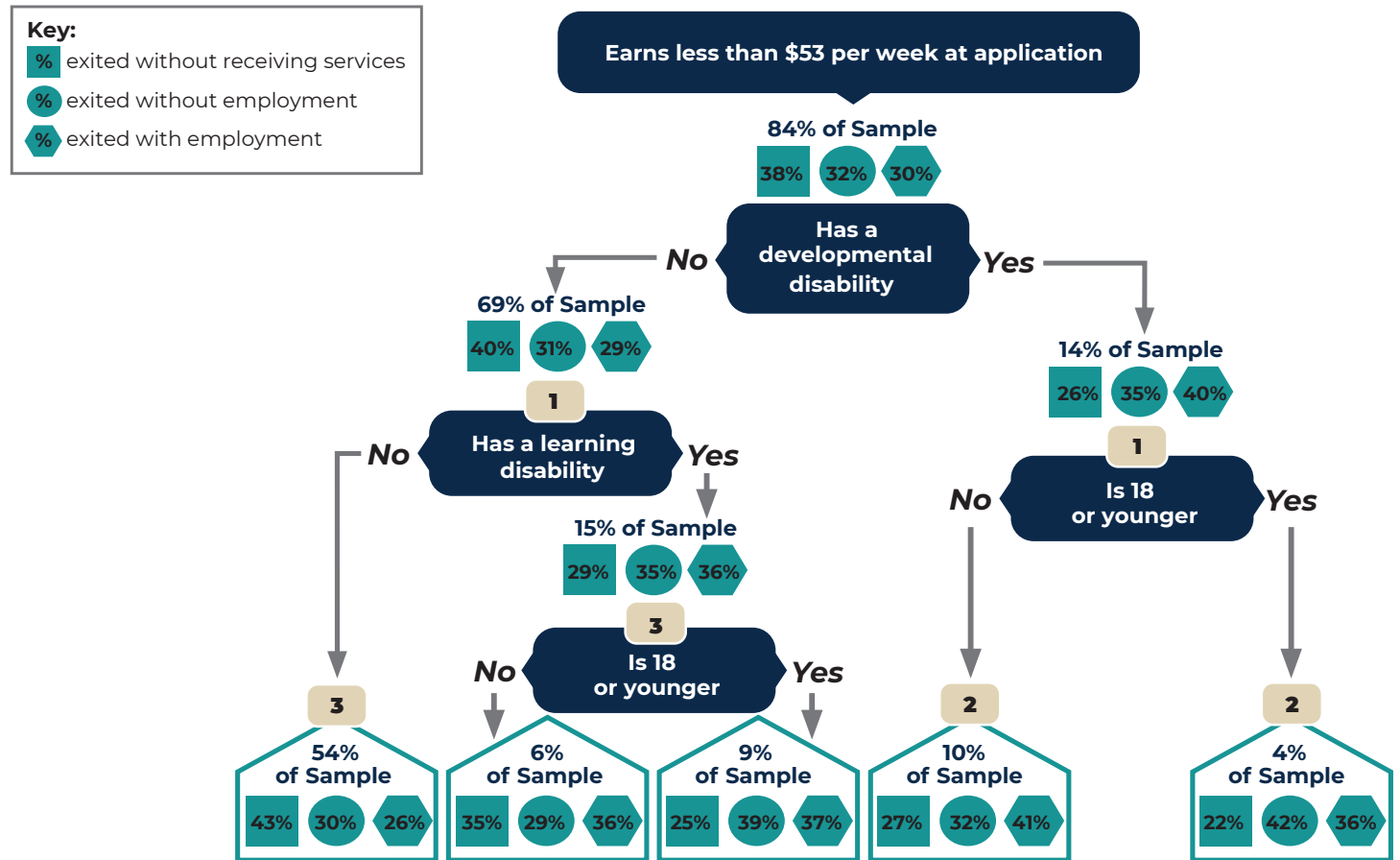
Application for VR services is voluntary, and services are tailored to meet a customer's employment barriers and goals. When someone applies, VR staff first determine whether the applicant is eligible for the program. Eligible applicants are, then, either placed on a waitlist (if agency resources are limited) or assessed for services. After assessing a customer's employment goals and barriers, a VR counselor drafts an individualized plan for employment (IPE) that describes the services the agency can provide for the customer to achieve his or her employment goals. VR services start after the customer agrees to and signs the IPE.

Results

Earnings of at least \$53 per week most strongly predicted program exit with an employment outcome (the earnings threshold was chosen by the model but is low enough to suggest that any paid employment is the best predictor of VR outcomes). Among VR customers who earned more than \$53 per week (16 percent of the sample were in this group), 58% exited with an employment outcome, whereas 30% of those who earned below \$53 per week did. The tree does not branch further among those earning at least \$53 per week, indicating that paid employment is the best predictor of VR outcomes.

The following figure presents the branches of the CART for the group of 2014 applicants who earned less than \$53 per week at application.

Classification and Regression Tree (CART) model predicting outcomes at VR exit



1 Customers who earn less than \$53 per week at application are further divided by CART into groups by disabling condition and age. Those who have a developmental disability are more likely than those who do not to exit with employment (40% vs. 29%) and they are less likely to exit without receiving services (26% in this group vs. 40% among low earners without a developmental disability).

2 The CART splits low earners with a developmental disability by age. Those who are older than 18 are more likely than customers ages 14-18 to exit with employment (41% vs. 36%) and more likely to exit without receiving services (27% vs. 22%). Those ages 14-18 are less likely than the average customer to exit without receiving services (22% vs. 36%) and much more likely to exit after receiving services without employment (42% vs. 30%), while closing with employment is about the same (36% vs. 35%).

3 Low earners without a developmental disability are further divided by learning disability and age. Customers without a learning disability are most likely to exit without receiving services (43%) and least likely to exit with employment (26%). Customers with a learning disability are less likely to exit without receiving services, but roughly equally likely to exit with and without employment. Those age 18 or younger are roughly equally likely to exit without employment after receiving services (39%) or exit with employment (37%), while those older than 18 are roughly equally likely to exit with employment (36%) or to exit without receiving services (35%).

Discussion

Consistent with prior studies, we found a strong link between employment status at application and key outcomes at program exit (Mann et al. 2017; Martin et al. 2020; Honeycutt et al. 2017). Customers who are employed at application are much more likely to exit the program employed. Employment status at application is such a strong predictor that, among those employed at application, no other characteristic is a meaningful outcome predictor. Conversely, those not employed at application have relatively poorer program outcomes and characteristics that are correlated with outcomes.

Among customers not employed at application, having a developmental disability is predictive of outcomes. Unemployed customers with developmental disabilities who were age 18 or younger were no more likely than the average applicant and less likely than older customers with the same characteristics to exit the program employed. All else equal, older customers with developmental disabilities might be better prepared to enter the workforce than school-age customers. Awareness of the age disparity in outcomes among customers with developmental disabilities could allow counselors to provide more tailored training services to younger customers. Recent work suggests that customers with intellectual disabilities benefit most from specific employment-related services, including job counseling and occupational training (Young et al. 2021).

Customers not employed at application and who have neither a developmental nor a learning disability—who comprise 54 percent of the analysis sample—are among the most likely to exit the program without receiving services. Though the members of this group are not monolithic, the results reveal that they have very different program outcome rates than customers with those conditions. At the program level, administrators should consider what makes customers with developmental and learning disabilities more likely to receive services than others and how other groups of customer applicants might become more likely to be served.

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