ANALYSIS OF THE ARIZONA DEPARTMENT OF ECONOMIC SECURITY'S ----------------- ---------- PROGRAM

EXECUTIVE SUMMARY

This report presents an analysis of the ---------------------------- (--) program administered by --------------------------- ------------------------------- (---) of the Arizona Department of Economic Security (DES). The study aims to identify key factors influencing successful employment outcomes for individuals with disabilities and uncover potential areas for program enhancement.

Key findings include:

1. Demographic factors significantly impact outcomes:

    o Clients aged 35-44 show lower success rates.

    o Hispanic/Latino and Black/African American clients face greater challenges, though not statistically significant.

    o Clients with hearing impairments have higher success rates, while those with cognitive/mental impairments show lower rates.

2. Program factors play a crucial role:

    o The number of services and amount of funds allocated positively impact outcomes, with diminishing returns at higher levels.

    o Job Search Assistance and Other Services significantly increase success probability.

    o Job Readiness Training, Miscellaneous Training, and Technical Assistance Services are associated with decreased success rates.

3. Service effectiveness varies across disability types:

    o Visual and physical impairments benefit strongly from combined Job Search Assistance & Job Readiness Training.

    o Cognitive impairments show unique benefits from standalone Job Search Assistance.

    o Hearing impairments benefit distinctly from Diagnosis & Treatment services.

The analysis used multiple statistical methods to ensure robust and comprehensive insights. These findings provide a foundation for tailoring -- services to maximize positive employment outcomes for individuals with disabilities.

1. INTRODUCTION

The ---------------------------- program is a vital initiative designed to support individuals with disabilities in securing employment. This analysis was conducted to better understand the factors that contribute to successful outcomes and identify areas where the program can improve.

The study analyzed data from over 3,000 -- clients, including approximately 1,300 with successful employment outcomes and 1,700 with unsuccessful outcomes. By examining a range of variables such as client demographics,

disability types, services received, and program investments, we sought to uncover the key determinants of success in the -- program.

Our analytical approach combined traditional statistical methods with advanced techniques, allowing us to capture both straightforward and complex relationships in the data. This comprehensive methodology provides a nuanced understanding of how various factors interact to influence employment outcomes.

Key areas of focus in this analysis include:

1. The impact of demographic factors and client characteristics on employment success.

2. The effectiveness of specific -- services and program decisions.

3. How service effectiveness varies across different disability types.

This report aims to provide data-driven insights that can inform decision-making and policy adjustments within the -- program. The findings presented here offer a roadmap for enhancing the program's ability to support individuals with disabilities in achieving successful employment outcomes, ultimately contributing to their independence and integration into the workforce.

2. PURPOSE AND OBJECTIVES

The primary goal of this analysis is to enhance the effectiveness of the ---------------------------- program in Arizona by providing data-driven insights into the factors that influence successful employment outcomes for individuals with disabilities. To achieve this overarching aim, we established the following specific objectives:

1. Identify key characteristics that differentiate successful and unsuccessful -- clients:

    o Analyze demographic factors such as age, race, and disability type to understand their impact on employment outcomes.

    o Examine how client characteristics interact with program services to influence success rates.

2. Evaluate the effectiveness of various -- services and program elements:

    o Assess the impact of the number of services provided and the amount of funds allocated to each client.

    o Determine which specific services (e.g., Job Search Assistance, Job Readiness Training) are most effective in promoting successful employment outcomes.

    o Investigate potential interaction effects between different services to identify synergistic combinations.

3. Conduct a subgroup analysis to understand how service effectiveness varies across disability types:

    o Compare the impact of services for clients with cognitive, visual, physical, and hearing impairments.

    o Identify which services are most beneficial for each disability subgroup to enable more tailored program delivery.

4. Uncover potential programmatic changes to address shortfalls and improve overall success rates:

    o Identify services or approaches that may be less effective or potentially counterproductive.

o Suggest areas where resource allocation could be optimized based on the analysis findings.

5. Provide a comprehensive analytical framework to support ongoing program evaluation and improvement:

o Utilize multiple statistical and machine learning methods to ensure robust and reliable insights.

o Establish a methodology that can be replicated in future analyses to track program improvements over time.

By addressing these objectives, this study aims to equip DES decision-makers with the insights needed to refine the -- program, ultimately enhancing its ability to support individuals with disabilities in achieving successful employment outcomes. The findings will serve as a foundation for evidence-based policy adjustments and targeted interventions, contributing to the overall goal of promoting workforce integration and independence for individuals with disabilities in Arizona.

3. DATA AND METHODOLOGY

The analysis is based on a comprehensive dataset containing information on over 3,000 individual -- clients. This data was sourced from Libera for clients from the years 2023 to 2024. Key aspects of the data include:

- Total sample size: 3,000+ -- clients

- Successful Employment Outcomes: Approximately 1,300 clients

- Unsuccessful Employment Outcomes: Approximately 1,700 clients

The dataset includes various indicators and variables, such as:

- Client demographics (e.g., age, race)

- Disability type

- Program services received

- Number of services received per client

- Dollar amount of encumbered benefit dollars set aside for each client

To thoroughly analyze the factors contributing to successful employment outcomes in the -- program, we used three different statistical methods. Each method offers unique insights, allowing us to build a comprehensive understanding of the program's effectiveness.

1. Linear Probability Model (LPM): This straightforward method helps us understand how different factors directly affect the likelihood of successful employment. It's easy to interpret, showing us how each variable (like age or type of service) increases or decreases the probability of success.

2. Logistic Regression Model: This model is specifically designed for yes/no outcomes like employment success. It provides a more nuanced view of how factors influence success rates, especially when the relationships aren't simple straight lines.

3. XGBoost Machine Learning Model: This advanced technique can uncover complex patterns in the data that simpler methods might miss. It's particularly good at finding unexpected combinations of factors that lead to success or failure.

By using these three methods together, we can:

- Confirm findings across different approaches, increasing our confidence in the results.

- Identify both obvious and subtle factors influencing employment outcomes.

- Provide a well-rounded view of what makes the ---------------------------- program successful.

This approach allows us to offer robust, data-driven recommendations for improving the program's effectiveness in helping individuals with disabilities achieve employment success.

4. RESULTS AND FINDINGS

Our analysis of the -- program has yielded valuable insights into the factors influencing successful employment outcomes. I present our findings in three main sections: overall model findings, impact of specific services and programmatic decisions, and subgroup analysis based on disability types.

4.1 OVERALL FINDINGS

The Linear Probability Model (LPM) identified several factors that significantly influence the likelihood of achieving a successful employment outcome in the ---------------------------- program.

4.1.1 DEMOGRAPHIC FACTORS AND CLIENT CHARACTERISTICS

1. Age:

    1. Clients aged 35-44 have a marginally significant lower probability of successful employment, with their likelihood being about 4.5 percentage points lower compared to the reference group (those under 25).

    2. Other age groups did not show statistically significant differences.

2. Race:

    1. Hispanic/Latino clients demonstrated a substantial negative coefficient (-0.36), suggesting they might face greater challenges in achieving successful outcomes. However, this finding was not statistically significant at conventional levels.

    2. Black/African American clients also showed a negative coefficient (-0.04), indicating a potential decrease in the likelihood of successful outcomes. While this finding approached statistical significance, it did not meet the conventional threshold for significance.

Table 1. Significant Factors

| Factor	Impact on Likelihood of Employment
Demographic Factors	
Hearing Impairments	Positive
Age 35-44	Negative
Cognitive/Mental Impairments	Negative
Hispanic/Latino	Negative (not statistically significant)
Black/African American	Negative (not statistically significant)
Program Factors	
Total Services	Positive (with diminishing returns)
Encumbered Funds	Positive (with diminishing returns)
Specific Services	
Job Search Assistance	Positive
Other Services	Positive
Job Search Assistance + Job Readiness Training (Interaction)	Positive
Job Readiness Training	Negative
Miscellaneous Training	Negative
Technical Assistance Services	Negative
Transportation Services	Negative

3. Disability Type:

    1. Clients with hearing impairments have a significantly higher probability (about 14.3 percentage points of achieving successful employment outcomes compared to the reference group (those with physical disabilities).

    2. Clients with cognitive/mental impairments show a marginally significant lower probability of success, with their likelihood being about 4.2 percentage points lower.
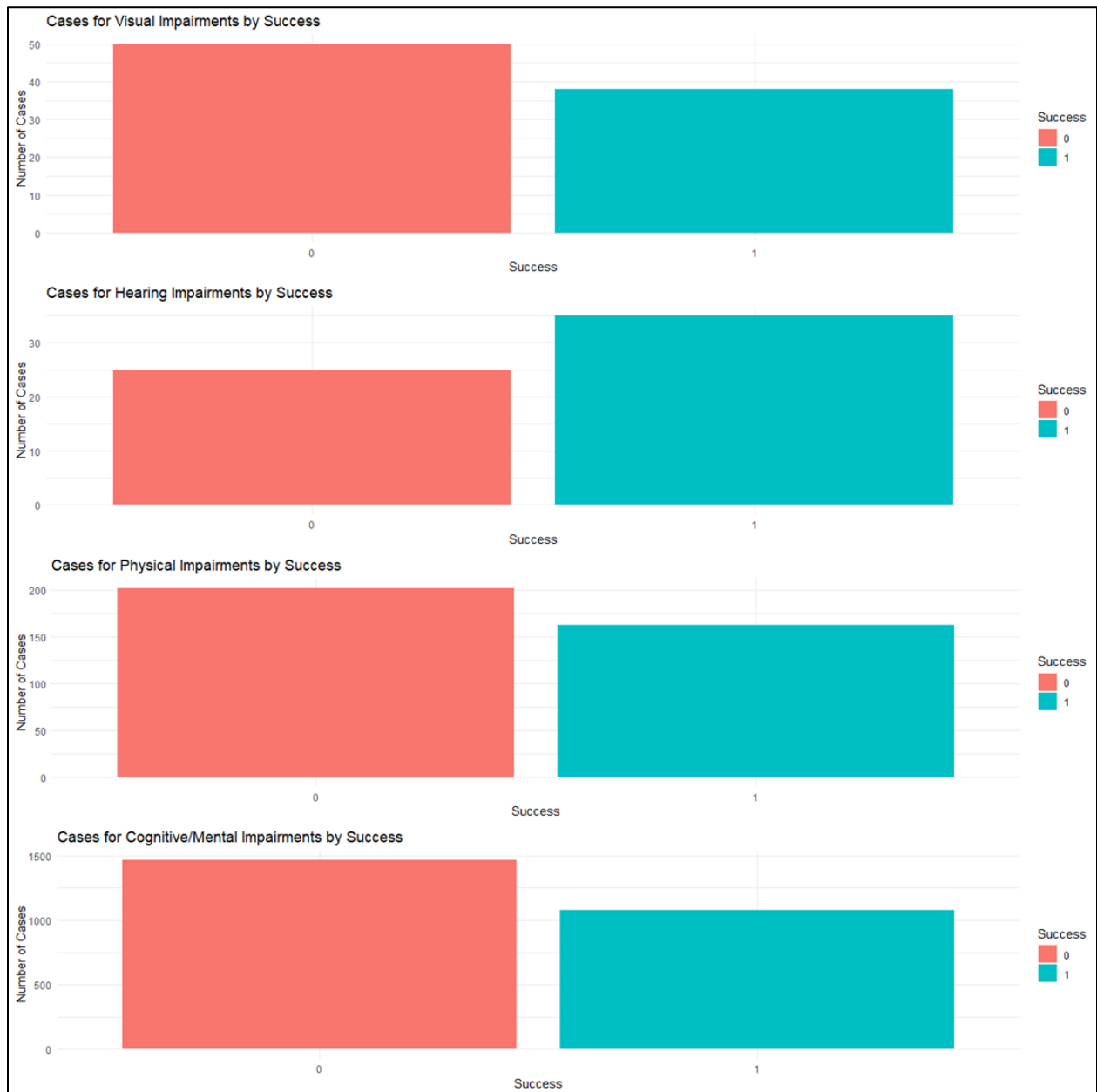
1. Total Services:

    o The number of services a client receives has a significant positive impact on success. Each additional service increases the probability of success by about 3 percentage points. However, there's a small but significant negative quadratic term, suggesting diminishing returns as the number of services increases.

Impact of # of Services Provided on Likelihood of Success
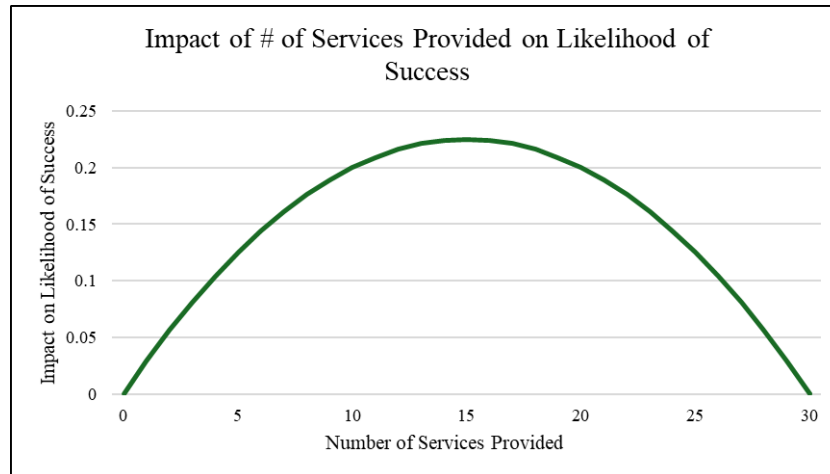
2. Encumbered Funds:

    o The amount of funds encumbered for a client has a significant positive impact. Each additional dollar increases the probability of success, but there's also a small negative quadratic term, indicating diminishing returns for very high amounts.

3. Specific Services:

    o Job Search Assistance significantly increases the probability of success (about 16.8 percentage points).

    o Other Services show a significant positive impact (about 19.4 percentage points).

    o Job Readiness Training is associated with a significant decrease in success probability (about 25.4 percentage points).

    o Miscellaneous Training is associated with a significant decrease in success probability (about 20.7 percentage points).

    o Technical Assistance Services (including self-employment) show a significant negative association (about 25.7 percentage points lower).

    o Transportation services are associated with a lower probability of success (about 9.4 percentage points).

4. Synergistic Effect: There's a significant positive interaction effect (about 23 percentage points) between Job Search Assistance and Job Readiness Training, indicating that clients that receive both services benefit substantially in obtaining employment.

4.2 SUBGROUP ANALYSIS BY DISABILITY TYPE

Our subgroup analysis revealed important differences in the effectiveness of various services across four main disability categories. This nuanced understanding can help tailor interventions more effectively for each group.

4.2.1 COGNITIVE IMPAIRMENTS

Clients with cognitive impairments show distinct patterns in service effectiveness:

1. Job Search Assistance & Job Readiness Training combined have a positive impact (0.14), though less pronounced than the overall population effect (0.23).

2. Other Services show a stronger positive impact (0.23) compared to the overall population (0.19).

3. Job Search Assistance alone has a stronger positive effect (0.24) than for the overall population (0.17).

4. Diagnosis & Treatment of Impairments has a slightly more negative effect (-0.09) compared to the overall population (-0.07).

5. Miscellaneous Training has a negative impact (-0.16), though less severe than the overall effect (-0.20).

6. Job Readiness Training shows a negative effect (-0.18), but less pronounced than the overall population (-0.25).

7. Technical Assistance Services Including Self-Employment show a negative effect (-0.23), slightly less than the overall population (-0.26).

4.2.2 VISUAL IMPAIRMENTS

Clients with visual impairments demonstrate unique service effectiveness patterns:

1. Job Search Assistance & Job Readiness Training combined have a very strong positive impact (1.07), significantly higher than the overall population (0.23).

2. Other Services have an exceptionally strong positive impact (0.96), far exceeding the overall population effect (0.19).

4.2.3 PHYSICAL IMPAIRMENTS

Clients with physical impairments show the following patterns:

1. Job Search Assistance & Job Readiness Training combined have a strong positive impact (0.49), higher than the overall effect (0.23).

2. Miscellaneous Training has a more pronounced negative effect (-0.27) compared to the overall population (-0.20).

3. Job Readiness Training shows a stronger negative impact (-0.41) than the overall population (-0.25).

4.2.4 HEARING IMPAIRMENTS

Clients with hearing impairments demonstrate a unique pattern:

1. Diagnosis & Treatment of Impairments has a positive effect (0.31), contrasting sharply with the negative impact for the overall population (-0.07).

Effect Sizes of Service Types By Disability Type
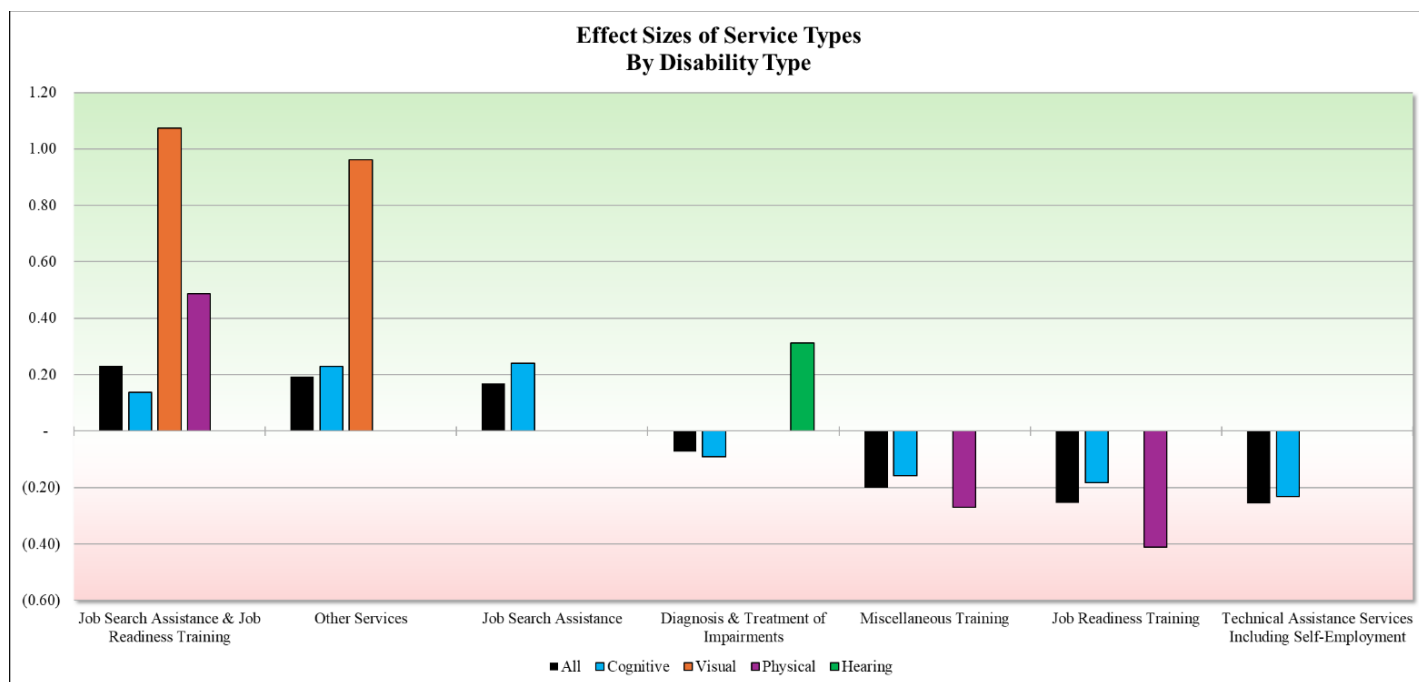
5. DISCUSSION AND CONCLUSION

This analysis of the Arizona Department of Economic Security's ---------------------------- (--) program has revealed insights into the factors influencing successful employment outcomes for individuals with disabilities. By examining data from over 3,000 -- clients and employing multiple statistical methods, we have identified key areas for program enhancement and tailored service delivery.

5.1 SUMMARY OF KEY FINDINGS

1. Demographic Factors:

   o Age impacts success rates, with clients aged 35-44 showing lower probabilities of successful employment.

   o While not statistically significant, Hispanic/Latino and Black/African American clients likely face greater challenges in achieving successful outcomes.

   o Clients with hearing impairments demonstrate higher success rates, while those with cognitive/mental impairments show lower rates of success.

2. Program Factors:

   o The number of services and amount of funds allocated positively impact outcomes, though with diminishing returns at higher levels.

   o Job Search Assistance and Other Services significantly increase the probability of success.

- o Job Readiness Training, Miscellaneous Training, and Technical Assistance Services are associated with decreased success rates when provided in isolation.

- o A significant positive interaction effect exists between Job Search Assistance and Job Readiness Training when provided together.

3. Disability-Specific Service Effectiveness:

   - o Cognitive Impairments: Benefit most from standalone Job Search Assistance and Other Services.

   - o Visual Impairments: Show exceptionally strong positive outcomes from combined Job Search Assistance & Job Readiness Training, as well as Other Services.

   - o Physical Impairments: Benefit strongly from combined Job Search Assistance & Job Readiness Training, but show negative effects from standalone Job Readiness Training and Miscellaneous Training.

   - o Hearing Impairments: Uniquely benefit from Diagnosis & Treatment of Impairments services.

5.2 RECOMMENDATIONS

Based on these findings, we recommend the following actions to enhance the effectiveness of the -- program:

1. Tailored Service Packages:

   - o Develop disability-specific service packages that leverage the most effective interventions for each group. For example, prioritize combined Job Search Assistance & Job Readiness Training for clients with visual and physical impairments.

2. Age-Specific Interventions:

   - o Create targeted support programs for clients aged 35-44 to address their unique challenges in achieving successful employment outcomes.

3. Cultural Competence:

   - o Investigate and address potential barriers faced by Hispanic/Latino and Black/African American clients, possibly through culturally sensitive outreach and support programs.

4. Service Optimization:

   - o Increase the provision of Job Search Assistance across all disability groups, as it consistently shows positive effects.

   - o Reevaluate the delivery of standalone Job Readiness Training, Miscellaneous Training, and Technical Assistance Services to improve their effectiveness or consider providing them in combination with other services.

5. Resource Allocation:

   - o Implement a tiered service model that accounts for the diminishing returns of multiple services and high fund allocation, ensuring efficient use of resources while maximizing client outcomes.

6. Synergistic Service Combinations:

- Promote the combined use of Job Search Assistance and Job Readiness Training, particularly for clients with visual and physical impairments, to leverage their positive interaction effect.

7. Disability-Specific Focus:

    - For clients with hearing impairments, emphasize Diagnosis & Treatment services as a key component of their -- program.

    - For clients with cognitive impairments, prioritize standalone Job Search Assistance and Other Services while minimizing potentially counterproductive interventions.

8. Continuous Evaluation:

    - Establish an ongoing monitoring system to track the effectiveness of these recommendations and allow for data-driven adjustments to the program over time.

5.3 CONCLUSION

This analysis provides a robust foundation for evidence-based decision-making in the Arizona -- program. By implementing these recommendations, the ---- can enhance its ability to support individuals with disabilities in achieving successful employment outcomes. The tailored approach to service delivery, informed by client characteristics and disability types, promises to improve the program's overall effectiveness and efficiency.

As the -- program evolves, continued data collection and analysis will be crucial for refining these strategies and identifying new opportunities for improvement. By maintaining a commitment to data-driven program management, ---- can ensure that its ----------------------------- program remains responsive to the diverse needs of individuals with disabilities, ultimately fostering greater workforce integration and independence for this important population.

6. APPENDIX

6.1 ORDINARY LEAST SQUARES REGRESSION

Before delving into the specific models used in this analysis, it's important to understand the foundational concept of Ordinary Least Squares (OLS) regression, which forms the basis of the Linear Probability Model and is a cornerstone of many statistical analyses.

OLS regression is a method for estimating the parameters in a linear regression model. The goal is to find the line of best fit that minimizes the sum of the squared differences between the observed values and the predicted values.
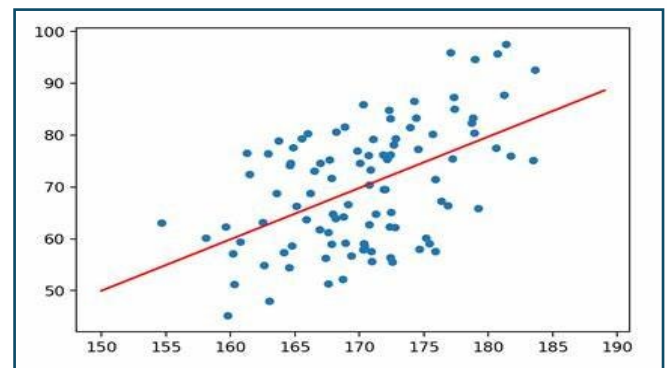

Illustration of OLS regression. The blue points represent individual data points while the red line shows the 'best fit' line to represent the data

Basic OLS Model:

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + ... + \beta_k X_k + \varepsilon$$

Where:

- Y is the dependent variable

- $X_1, X_2, ..., X_k$ are independent variables

- β_0 is the intercept

- β_1, β_2, ..., β_k are the coefficients for each independent variable

- ε is the error term

The OLS method estimates the β coefficients by minimizing the sum of squared residuals:

minimize $\Sigma(Y_i - (\beta_0 + \beta_1 X_{1i} + \beta_2 X_{2i} + ... + \beta_k X_{ki}))^2$

Key properties of OLS estimators:

1. Best Linear Unbiased Estimators (BLUE) under the Gauss-Markov assumptions

2. Consistent estimators

3. Asymptotically normal

Assumptions of OLS:

1. Linearity: The relationship between X and Y is linear

2. Independence: Observations are independent of each other

3. Homoscedasticity: Constant variance of residuals

4. Normality: Residuals are normally distributed

5. No multicollinearity: Independent variables are not highly correlated with each other

OLS regression provides a framework for understanding how changes in independent variables affect the dependent variable, making it a powerful tool for analyzing data in social sciences and policy research. The Linear Probability Model, discussed in section A.1, extends this concept to binary outcomes, while logistic regression and machine learning models build upon these foundations to address more complex relationships in the data.

6.2 IN-DEPTH EXPLANATION OF STATISTICAL METHODS USED

LINEAR PROBABILITY MODEL (LPM)

The Linear Probability Model is a regression model used to estimate the probability of a binary outcome based on various independent variables.

Model Specification: $P(Y = 1) = \beta_0 + \beta_1 Age + \beta_2 Race + \beta_3 DisabilityType + \beta_4 ServicesReceived + \beta_5 NumberOfServices + \beta_6 EncumberedDollars + \varepsilon$

Where:

- Y is the binary outcome (1 for successful employment, 0 otherwise)

- β_0 is the intercept

- β_1 to β_6 are the coefficients for each independent variable

- ε is the error term

The LPM uses Ordinary Least Squares (OLS) regression, allowing for straightforward interpretation of coefficients as marginal effects. Each β coefficient represents the change in probability of successful employment for a one-unit change in the corresponding variable, ceteris paribus.

Limitations:

- Can predict probabilities outside the [0,1] range

- Assumes constant marginal effects

- Heteroskedasticity in error terms

Despite these limitations, the LPM provides a valuable baseline for understanding variable relationships.

LOGISTIC REGRESSION MODEL

To address the LPM's limitations and provide a more statistically appropriate model for binary outcomes, we employed logistic regression.

Model Specification: $\log(P(Y = 1) / (1 - P(Y = 1))) = \beta_0 + \beta_1 Age + \beta_2 Race + \beta_3 DisabilityType + \beta_4 ServicesReceived + \beta_5 NumberOfServices + \beta_6 EncumberedDollars$

Where:

- $P(Y = 1)$ is the probability of successful employment

- β_0 is the intercept

- β_1 to β_6 are the coefficients for each independent variable

The model uses maximum likelihood estimation to determine the best-fitting set of regression coefficients. Interpretation involves odds ratios, where $\exp(\beta_i)$ represents the change in odds of successful employment for a one-unit change in the i-th variable, holding all other variables constant.

Advantages:

- Produces valid predicted probabilities between 0 and 1

- Allows for non-linear relationships between independent variables and the probability of success

- Provides interpretable odds ratios

Limitations:

- Assumes a linear relationship between independent variables and the log-odds of the outcome

- Sensitive to highly correlated independent variables

XGBOOST MACHINE LEARNING MODEL

To capture complex, non-linear relationships in the data, we utilized XGBoost (eXtreme Gradient Boosting), an advanced implementation of gradient boosting machines.

Methodology: XGBoost builds a series of decision trees, with each subsequent tree attempting to correct the errors of the previous ones. It uses gradient descent to minimize a loss function:

$$L = \Sigma(l(y_i, \hat{y}_i) + \Sigma \Omega(f_k))$$

Where:

- l is the loss function (e.g., logistic loss for binary classification)

- y_i is the true label

- $\hat{y}_i$ is the predicted label

- $\Omega(f_k)$ is a regularization term to prevent overfitting

Advantages:

- Captures complex interactions between variables

- Provides superior predictive performance

- Offers feature importance rankings

- Handles missing data and outliers effectively

Limitations:

- Less interpretable than traditional statistical models

- Requires careful tuning of hyperparameters to avoid overfitting

MODEL COMPARISON AND INTEGRATION

The multi-model approach allows for:

1. Validation of findings across methodologies

2. Leveraging of each model's strengths

3. Identification of discrepancies requiring further investigation

4. Synthesis of insights for a holistic view of factors contributing to successful employment outcomes

This integrated approach enhances the reliability of our findings and offers a nuanced perspective on the complex interplay of factors affecting employment outcomes for individuals with disabilities. The combination of traditional statistical methods and advanced machine learning techniques positions us to uncover both obvious and subtle patterns in the data, ultimately leading to more informed recommendations for program improvements.

6.3 LINEAR PROBABILITY AND LOGISTIC REGRESSION RESULTS TABLE

Table 1 below presents the results from both the linear probability model and logistic regression model used to conduct this analysis. As can be seen by looking at the coefficients reported from each model, the effects are fairly consistent across models.

Table 2: Linear Probability and Logistic Regression Model Results

Variable	Linear Probability Model		Logistic Regression Model (marginal)	
	Coefficient	Std. Error	Coefficient	Std. Error
Programmatic				
Total Services	0.030***	(0.01)	0.034***	(0.01)
Total Services²	-0.001***	(0.00)	-0.001***	(0.00)
Encumbered from Account	0.000***	(0.00)	0.000**	(0.00)
Encumbered from Account²	-0.000**	(0.00)	-0.000*	(0.00)
Basic Academic Remedial or Literacy Training	-0.16	(0.34)	-2.839	(85.48)
Diagnosis & Treatment of Impairments	-0.074*	(0.04)	-0.082	(0.04)
Disability-Related Skills Training	-0.005	(0.03)	-0.005	(0.04)
Four-Year College or University Training	0.031	(0.06)	0.034	(0.07)
Graduate College or University	0.095	(0.12)	0.098	(0.13)
Information & Referral Services	-0.064	(0.08)	-0.062	(0.12)
Interpreter Services	0.136	(0.19)	0.163	(0.24)
Job Readiness Training	-0.253***	(0.03)	-0.423***	(0.05)
Job Search Assistance	0.168***	(0.03)	0.184***	(0.03)
(Job Readiness Training x Job Search Assistance)	0.230***	(0.04)	0.390***	(0.06)
Junior or Community College Training	-0.007	(0.06)	0.007	(0.07)
Maintenance	-0.012	(0.03)	-0.014	(0.04)
Miscellaneous Training	-0.207***	(0.06)	-0.257***	(0.07)
Occupational/Vocational Training	-0.072	(0.04)	-0.086	(0.05)
On-the-Job TrainingTRUE	0.217	(0.46)	3.007	(131.41)
Other Services	0.194***	(0.03)	0.222***	(0.04)
Personal Assistance Services	0.328	(0.47)	3.125	(131.41)
Rehabilitation Technology	0.041	(0.04)	0.041	(0.05)
Technical Assistance Services Including Self-Employment	-0.257*	(0.10)	-0.326*	(0.14)
Transportation	-0.094*	(0.04)	-0.108*	(0.04)
Characteristics of Claimants				
Hearing Impairments	0.143*	(0.07)	0.175*	(0.08)
Visual Impairments	-0.067	(0.06)	-0.087	(0.07)
Cognitive/Mental Impairments	-0.042	(0.03)	-0.049	(0.03)
25-34	-0.013	(0.02)	-0.017	(0.03)
35-44	-0.045	(0.03)	-0.053	(0.03)
45-54	0.006	(0.03)	0.005	(0.03)
55-64	0.013	(0.03)	0.014	(0.03)
65+	-0.001	(0.04)	0	(0.04)
Native Hawaiian/Pacific Islander	0.072	(0.12)	0.086	(0.14)
American Indian/Native Alaskan	-0.029	(0.05)	-0.033	(0.05)
Asian	-0.029	(0.06)	-0.031	(0.07)
Black/African American	-0.04	(0.03)	-0.046	(0.03)
Hispanic/Latino	-0.368	(0.47)	-3.206	(131.41)
Model Statistics				
Observations	3,133		3,133	
R² | Null Deviance	0.145		4,286	
Adjusted R² | Residual Deviance	0.134		3,768	
F Statistic | AIC	13.460* (df = 39; 3093)		3,848	

Note:

* p<0.1; ** p<0.05; *** p<0.01