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Group-Based Trajectory Analysis of Longitudinal Employment Patterns and Predictors for Adults With Visual Impairments

Jennifer L. Cmar, Ph.D., COMS*

Michele C. McDonnall, Ph.D., CRC

The National Research & Training Center on Blindness & Low Vision

Mississippi State University, Mississippi State, MS, United States

*Correspondence concerning this manuscript should be addressed to Jennifer L. Cmar, The National Research & Training Center on Blindness & Low Vision, P.O. Box 6189, Mississippi State, MS 39762. Email: jcmar@colled.msstate.edu

Abstract

BACKGROUND: A substantial gap in employment rates has been documented between people with and without visual impairments, but most employment-related research for people with visual impairments has focused on employment at one time point.

OBJECTIVE: The purpose of this study was to examine longitudinal employment trajectories by visual impairment and investigate factors associated with trajectories for people with visual impairments.

METHOD: The data source was the 2014 Panel of the Survey of Income and Program Participation. Participants were 816 adults with visual impairments and a matched comparison group of 816 adults without visual impairments. We used group-based trajectory modeling to estimate employment trajectories, identify predictors of trajectory group membership, and explore the impact of health on employment trajectories.

RESULTS: Visual impairment was associated with a lower probability of membership in the Rising, Declining, and High employment trajectory groups compared to the Low group. Predictors of trajectory group membership included disability benefit receipt, non-visual disabilities, gender, race, age, and education. Fair or poor health was associated with decreases in all four trajectories over time.

CONCLUSION: Visual impairment is a risk factor for not working across multiple years. Disability benefit receipt was the strongest predictor of trajectory group membership for this population.

Keywords: visual impairment, vision disability, blind, low vision, employment, longitudinal studies, health

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1. Introduction

The World Health Organization estimates that 1.2 billion people globally have an uncorrectable visual impairment; in other words, they are blind or experience low vision that cannot be corrected with surgery or glasses (World Health Organization, 2022). Visual impairment results in an economic burden that has received considerable attention and has been estimated for the United States (Frick et al., 2007; Rein et al., 2006; Wittenborn et al., 2013), many other countries (Chakravarthy et al., 2017; Köberlein et al., 2013), and globally (Marques et al., 2021). A substantial component of this burden is lost productivity, as many people with visual impairments do not work. Although visual impairment is more common in older adults, people of all ages experience it. The prevalence of visual impairment in the United States among working-age adults is estimated to be 2.1% (U.S. Census Bureau, 2022a).

A substantial gap in the employment rates between people with visual impairments and people without visual impairments exists around the world. It is perhaps most well-documented in the United States, where this gap has been tracked across multiple national surveys since 1976 (Kirchner & Peterson, 1979; McDonnall & Sui, 2019). In 2021, the employment rate for people with visual impairments in the United States was 48.2% compared to 76.5% for people without disabilities (U.S. Census Bureau, 2022b). An employment gap between people with and without visual impairments has also been documented in many other countries and regions of the world (Brunes & Heir, 2022; Chai et al., 2023; Marques et al., 2021). Two studies focused on the relationship between visual impairment and being out of the labor force (not working or seeking employment) and unemployment (not working but seeking work) (McDonnall & McKnight,

2021; Sherrod et al., 2014). Both studies found that people with visual impairments were significantly less likely to be in the labor force than people without visual impairments, but they were not more or less likely to be unemployed.

Most research related to employment among people with visual impairments has focused on employment status at one time point. Little information is available about employment status over time for this population; only a few studies have addressed continuity of employment or utilized longitudinal employment data. Two such studies found that people with visual impairments were less likely than people without visual impairments to hold permanent jobs (work continuously over a year) (Kirchner & Peterson, 1980; McDonnall et al., 2022a), and another study documented that 28% of older adults (ages 55–69 years) and more than 10% of adults (ages 18–54 years) with visual impairments who were employed at the first interview were not employed 1 year later (Kirchner et al., 1999). In addition to assessing continuity of employment over a 1-year period, McDonnall and colleagues (2022a) evaluated longitudinal data and determined that only 17.3% of people with visual impairments worked continuously over a 4-year period. They reported descriptive information about longitudinal work patterns but did not compare results for the general population or investigate predictors of the work patterns.

Many other studies have investigated predictors of employment for people with visual impairments. A few variables have consistently been associated with employment, with education level having the most consistent, and often largest, association (Brunes & Heir, 2022; Clements et al., 2011; Goertz et al., 2010, 2017; Lund & Cmar, 2019a, 2019b, 2020; Marques et al., 2019). As would be expected, higher levels of education are associated with higher rates of employment (McDonnall & Tatch, 2021). The presence of additional disabilities or comorbidities is another variable frequently associated with lower levels of employment for

people with visual impairments (Brunes & Heir, 2022; Clements et al., 2011; Goertz et al., 2010, 2017; Lund & Cmar, 2019b; McKnight et al., 2021). Although not investigated as often, receipt of government disability benefits has also been consistently associated with employment, with people who received these benefits much less likely to be employed than those who did not receive benefits (Crudden & McKnight, 2022; Lund & Cmar, 2019b; McDonnall et al., 2022b; McKnight et al., 2021).

Health is another variable that has been investigated less frequently but has often been associated with employment when considered. People with visual impairments who experience poorer health have typically had lower levels of employment than those in good or better health (Cimarolli & Wang, 2006; Crudden et al., 2023; Kirchner et al., 1999; McDonnall, 2010), although one study did not find health to be a predictor of employment for people with visual impairment based on measured visual acuity, while it was for people with presenting (correctable) visual impairment due to uncorrected refractive errors (McDonnall & McKnight, 2021). Another study determined that health was not a statistically significant predictor of employment for people who worked prior to experiencing disability, although it approached significance ($p < .10$) (McKnight et al., 2021). When evaluating the causes of being out of the labor force, a majority of people with visual impairments identified poor health as their reason (Crudden & McKnight, 2022). Greater health-related quality of life has also been associated with employment among people with visual impairments (Marques et al., 2019).

Other demographic variables have been evaluated regarding their relationship with employment for people with visual impairments, but results have been much less consistent. Although female gender has often been associated with lower rates of employment, there was no relationship between gender and employment in several studies (Goertz et al., 2010; Lund &

Cmar, 2019a, 2019b, 2020). Findings regarding relationships between employment and (a) race, (b) ethnicity, and (c) age have been even less consistent (Goertz et al., 2010; Lund & Cmar, 2019a, 2019b, 2020), suggesting that there is no association between these variables and the likelihood of employment for people with visual impairments.

Only two studies were identified that utilized longitudinal analysis methods to study predictors of employment for people with visual impairments, and both focused on transition-age youth (Connors et al., 2014; McDonnall, 2010). Both studies also employed a common approach to longitudinal analyses: estimating one average trajectory for the entire sample and using random effects to capture individual variability. A potential problem with this type of analysis is that it may mask patterns of change for subgroups (Andruff et al., 2009; Nagin, 2005). An alternative approach that resolves this issue is trajectory modeling, which includes growth mixture modeling and group-based trajectory modeling (GBTM). This approach allows researchers to identify distinct groups of people who follow similar patterns of change for a specified outcome over time (Nagin, 2005; Nagin & Odgers, 2010). GBTM has been used to investigate longitudinal employment trajectories of several populations (Christiansen & Moan, 2022; Helgesson et al., 2018; Hou et al., 2012; Kuitto et al., 2019; Leinonen et al., 2019; Sun & Chen, 2017), but it has not been used to examine longitudinal employment trajectories of people with visual impairments.

The purpose of this study was to investigate longitudinal employment trajectories among adults with visual impairments in the United States and compare their employment patterns to those of people without visual impairments. Further, we sought to identify variables that are associated with the employment trajectories of people with visual impairments. We utilized two research questions to guide our study:

(1) How do the employment trajectories of people with visual impairments compare to the trajectories of people without visual impairments?

(2) What factors are associated with employment trajectories for people with visual impairments?

2. Method

2.1 Data source and sample

For this study, we utilized publicly available data from the 2014 Panel of the Survey of Income and Program Participation (SIPP), an ongoing longitudinal survey administered by the U.S. Census Bureau. SIPP covers various topics, such as demographic characteristics, disabilities, health, program participation, employment, and income. The disability section includes six questions that coincide with the standard disability questions used in other U.S. government surveys. These questions cover the following functional disabilities: (a) deafness or serious difficulty hearing; (b) blindness or serious difficulty seeing; (c) serious difficulty concentrating, remembering, or making decisions; (d) serious difficulty walking or climbing stairs; (e) difficulty dressing or bathing; and (f) difficulty doing errands alone.

The 2014 SIPP Panel included four waves of data collection from the same respondents through annual interviews beginning in February 2014 (U.S. Census Bureau, 2019). The reference period for each interview was the previous calendar year. SIPP interviewers used an event history calendar to capture detailed, month-level information from respondents about key events that occurred during the reference year. Therefore, the full 2014 SIPP Panel dataset contains monthly records for many variables spanning up to 48 consecutive months from 2013–2016. The Census Bureau used a two-stage stratified sampling design to select the 2014 SIPP

sample, which included 53,070 households representing the civilian noninstitutionalized U.S. population (U.S. Census Bureau, 2019).

Our analysis sample consisted of 1,632 respondents who were 18–65 years old in Wave 1, divided into two groups based on self-reported visual impairment. We first identified the Visual Impairment group (n = 816), which included all respondents who reported blindness or serious difficulty seeing in Wave 1 and in all subsequent waves for which they had data. Then, we identified the Comparison group (n = 816), which comprised a matched sample of respondents who participated in all four waves and did not report blindness or serious difficulty seeing in any wave. We matched respondents based on these criteria: (a) gender (male, female), (b) age group (18–25, 26–30, 31–35, 36–40, 41–45, 46–50, 51–55, 56–60, 61–65), and (c) number of non-visual disabilities (0, 1, 2 or more). After identifying all suitable matches, we randomly selected one Comparison case from the pool of potential matches for each Visual Impairment case. Table 1 provides demographic information based on Wave 1 values for the full sample and each group.

[Table 1 near here]

2.2 Variables

2.2.1 Dependent variable

The dependent variable was *monthly employment status* (0 = not employed, 1 = employed). For this variable, we defined "employed" as working for pay during the specified month, including working for an employer or self-employment.

2.2.2 Independent variables

Fair or poor health was a time-varying covariate that indicated respondents' self-reported health status in Waves 1–4 (0 = excellent, very good, or good; 1 = fair or poor). The

other independent variables were time-invariant and measured in Wave 1. We used dichotomous variables to represent gender, race, and ethnicity: *female gender* (0 = male, 1 = female), *White race* (0 = Black, Asian, or other race; 1 = White), and *Hispanic ethnicity* (0 = not Spanish, Hispanic, or Latino; 1 = Spanish, Hispanic, or Latino). *Age* was a continuous variable, which was grand-mean centered based on values from the first month of Wave 1. *Social Security Disability Insurance (SSDI) receipt* and *Supplemental Security Income (SSI) receipt* were dichotomous variables that indicated whether respondents received federal disability benefits at the beginning of Wave 1 (0 = no, 1 = yes). In the United States, the SSDI program provides monthly cash benefits to people with an established work history based on their previous earnings, whereas the SSI program provides monthly cash benefits to people with little to no income. Both programs are administered by the U.S. Social Security Administration and require beneficiaries to have a qualifying disability that limits their ability to work and is expected to last for 1 year or longer. Two dichotomous variables represented the highest postsecondary education degree that respondents received (0 = no, 1 = yes): *associate degree* (from a 2-year college) and *bachelor's degree or higher* (i.e., a bachelor's, master's, professional, or doctorate degree). *Visual impairment* was a dichotomous variable that signified whether the respondent reported blindness or serious difficulty seeing (0 = no, 1 = yes). *Number of non-visual disabilities* was a discrete variable constructed from responses to the other five disability questions from the SIPP interviews. This variable indicated the number of functional disabilities (i.e., hearing, cognitive, ambulatory, self-care, and independent living difficulties) that respondents reported, with possible values ranging from 0–5.

2.3 Data analysis

To estimate longitudinal employment trajectories, we conducted GBTM using a custom

SAS procedure called Proc Traj (Jones et al., 2001). GBTM is a specialized application of finite mixture modeling that uses maximum likelihood estimation to identify groups of individuals with similar longitudinal trajectories (Nagin, 2005). This modeling approach assumes a binary logit probability distribution for dichotomous dependent variables. We used the dropout extension of Proc Traj to account for participant attrition in the models when necessary (Haviland et al., 2011), allowing the probability of dropout to vary across trajectory groups based on the previous value of the dependent variable.

We estimated three basic trajectory models with monthly employment status as the dependent variable and month as the time variable (i.e., number of months since baseline) using data from the full sample, the Visual Impairment group, and the Comparison group. We used the following two-stage process to build the basic models: (a) determine the number of trajectory groups by estimating models with different numbers of quadratic trajectories, ranging from one to a predetermined value; and (b) specify the shape of each trajectory by removing the highest-order non-significant quadratic and linear effects (Nagin, 2005). We compared Bayesian Information Criteria (BIC) values for competing models using an approximation of the log Bayes Factor (Jones et al., 2001). In addition to using objective criteria (i.e., BIC values) for model selection, we considered model parsimony and comprehensibility by evaluating whether each trajectory captured distinct features of the data and comprised at least 5% of the sample (Nagin, 2005). To evaluate the adequacy of the models, we used the following diagnostic criteria: (a) close correspondence between the group membership probabilities and the proportion of the sample assigned to the groups, (b) average posterior probability of assignment of at least .70 for all groups, and (c) odds of correct classification greater than 5.0 for all groups (Nagin, 2005). We computed descriptive statistics for demographic and socioeconomic variables to examine the

characteristics of people with visual impairments by trajectory group based on posterior probability-based group assignments from the basic Visual Impairment group model.

To identify factors associated with employment trajectories, we used Proc Traj to specify two multinomial logit models, following the recommended method of estimating the coefficients jointly with the trajectories (Nagin, 2005). We first estimated a multinomial logit model with visual impairment as a predictor of trajectory group membership using data from the full sample. Then, we used data from the Visual Impairment group to build another multinomial logit model that included nine time-invariant predictors of trajectory group membership and one time-varying covariate (i.e., fair or poor health). We estimated employment trajectories for specified values of health over time and generated graphs of the predicted trajectories to illustrate how changes in health would alter the trajectories for people with visual impairments. Using coefficients from the multinomial logit models, we computed odds ratios with 95% confidence intervals for all time-invariant predictors of trajectory group membership. We conducted Wald tests of the equality of coefficients to examine the differential impact of statistically significant predictors across trajectory groups (Jones & Nagin, 2007).

3. Results

When building the basic model for the full sample, each increase in the number of trajectory groups from one to five yielded an improvement in model fit, but the five-group model included one group that comprised less than 5% of the sample. Therefore, we rejected the five-group model in favor of the more parsimonious four-group model. The final model had four quadratic trajectories that reflect distinct patterns of employment: (a) Low, (b) Rising, (c) Declining, and (d) High. The four employment trajectories are displayed in Figure 1, with solid lines representing the observed trajectories and dotted lines representing the predicted

trajectories.

[Figure 1 near here]

The Low trajectory group had very low employment rates across all four waves; most people in this group did not work at all during the study time frame. The Rising group had a steep upward employment trajectory, characterized by a steady increase in employment rates from moderately low in Wave 1 to high in Wave 4. The Declining group had a steep downward employment trajectory, with high employment rates in Wave 1 that decreased sharply and steadily before leveling out near zero in Wave 4. The High group had a relatively stable employment trajectory, characterized by high employment rates across all four waves.

The final, basic models for the Visual Impairment and Comparison groups yielded four trajectories with similar employment patterns to those identified for the full sample. The Visual Impairment group model had three quadratic trajectories and one flat trajectory (the linear and quadratic effects were not significant for the High trajectory), and the Comparison group model had four quadratic trajectories. The predicted trajectories from both models are depicted in Figure 2, with dashed lines representing the trajectories for people with visual impairments and dotted lines representing the trajectories for people without visual impairments. Compared to people without visual impairments, people with visual impairments were more likely to be assigned to the Low trajectory group and less likely to be assigned to the Rising, Declining, and High groups (see Table 2). The diagnostic statistics reported in Table 2 support the adequacy of all three basic models and indicate high accuracy of the group assignments according to Nagin's criteria (Nagin, 2005).

[Figure 2 near here]

[Table 2 near here]

Table 3 provides estimates from the four-group multinomial logit model with visual impairment as a predictor of trajectory group membership. In this model, the Low group is the reference group. All three coefficient estimates for visual impairment were negative and statistically significant, indicating that visual impairment decreased the probability of membership in the Rising, Declining, and High groups relative to the Low group. The Wald test of the equality of the visual impairment coefficients for the Rising, Declining, and High trajectory groups was not significant (χ^2 (2) = 0.03, p = .98), which implies that visual impairment did not differentiate between membership in those three groups.

[Table 3 near here]

Table 4 presents the baseline characteristics of people with visual impairments by trajectory group assignment. Individuals assigned to the Low group were the oldest, had the highest rates of SSDI and SSI receipt, and were the most likely to have two or more additional disabilities and report fair or poor health. Individuals assigned to the Rising group were the youngest and the most likely to be Hispanic. Individuals in the Declining group were the most likely to be female and have an associate degree. Individuals in the High group were the most likely to be male, White, and not Hispanic; have a bachelor's degree or higher; and report good or better health. The High group also had the lowest rates of SSDI and SSI receipt.

[Table 4 near here]

Table 5 provides model estimates from the analysis of factors associated with employment trajectories for people with visual impairments, with the Low group serving as the reference group. Controlling for the other predictors, SSDI receipt, SSI receipt, and number of non-visual disabilities significantly decreased the probability of membership in the Rising, Declining, and High groups relative to the Low group. The Wald test of the equality of the non-

visual disabilities coefficients for the Rising, Declining, and High trajectory groups was significant (χ^2 (2) = 7.12, p = .03), which indicates that number of non-visual disabilities differentially predicted membership in those three groups. However, disability benefit receipt did not differentiate between membership in the Rising, Declining, and High groups according to the non-significant Wald tests for SSDI receipt (χ^2 (2) = 2.98, p = .23) and SSI receipt (χ^2 (2) = 3.46, p = .18). Relative to the Low group: older age decreased the probability of membership in the Rising group, female gender decreased the probability of membership in the High group, and White race and having a bachelor's degree or higher increased the probability of membership in the High group.

[Table 5 near here]

Fair or poor health was associated with a significant decrease in all four employment trajectories over time (Table 5), but it had the most substantial impact on the Rising and Declining trajectories. To illustrate the impact of health on the Rising trajectory, Figure 3 depicts three sub-trajectories: (a) the group average based on observed values for all members of that group, (b) the predicted trajectory (based on model estimates) for people who reported fair or poor health in Waves 1–4, and (c) the predicted trajectory (based on model estimates) for people who reported fair or poor health in Wave 1 and good or better health in Waves 2–4. For a change from fair or poor health at Month 11 to good or better health at Month 12, the expected employment rate increased by about 23 percentage points and continued an upward trajectory over subsequent months, remaining higher than the predicted trajectory for people with ongoing fair or poor health.

[Figure 3 near here]

[Figure 4 near here]

Figure 4 depicts three sub-trajectories for the Declining group: (a) the group average based on observed values for all members of that group, (b) the predicted trajectory for people who reported good or better health in Waves 1–4, and (c) the predicted trajectory for people who reported good or better health in Wave 1 and fair or poor health in Waves 2–4. For a change from good or better health at Month 11 to fair or poor health at Month 12, the expected employment rate decreased by about 40 percentage points and continued to decline until reaching zero at the end of Wave 3.

4. Discussion

The purpose of this study was to investigate longitudinal employment trajectories of people with visual impairments. We utilized 4 years of monthly employment data to model longitudinal employment trajectories, compare employment trajectories of people with and without visual impairments, and identify factors associated with employment trajectories for people with visual impairments. We found that people with and without visual impairments had similar employment patterns, consisting of Low, Rising, Declining, and High trajectories. Most people with visual impairments were in the Low employment trajectory group, meaning that they did not work at all during the 4-year period of the study. In addition, people with visual impairments were more likely to be in the Low employment trajectory group than people without visual impairments. Factors that differentiated trajectory group membership for people with visual impairments were federal disability benefit receipt, number of non-visual disabilities, age, gender, race, and having a bachelor's degree or higher. Furthermore, self-reported health was associated with changes in all four employment trajectories for people with visual impairments.

Our study is unique for several reasons. First, we compared longitudinal employment trajectories between people with visual impairments and a matched sample of people without

visual impairments. Matching participants on gender, age, and number of non-visual disabilities was important to create a sample that was comparable on certain characteristics that would not be similar if the entire general population was utilized as a comparison group, as typically done in previous research. Second, this study is the first investigation of predictors of longitudinal employment trajectories for adults with visual impairments, which adds to the literature by focusing on factors associated with employment over time rather than at a single time point. Third, we utilized trajectory modeling to analyze the data, an approach that has not been used in other studies focusing on this population. A key advantage of the trajectory modeling approach was its ability to capture multiple distinct employment patterns.

Despite matching on three relevant traits, our comparison sample differed from our visual impairment sample on several characteristics that are important to employment. People with visual impairments were more likely to be in poorer health, members of a minority group, less educated, and receiving disability benefits. These differences may explain the fact that visual impairment was a risk factor for not working for multiple consecutive years. Research has documented that older adults with visual impairments are significantly more likely to experience chronic conditions, and that older adults with a visual impairment and a chronic condition are more likely to experience fair or poor health than older adults without visual impairments who have the same chronic condition, even when controlling for confounding factors (Crews et al., 2017). Visual impairment is also a comorbidity of conditions that typically result in poorer health for older adults (e.g., diabetes, multiple sclerosis, stroke) (Court et al., 2014; Crews et al., 2017). Those previous studies focused on adults aged 65 years or older, but the same may be true for working-age adults, particularly those in the upper age range of our sample.

Our findings raise the question of whether lower employment rates are related to visual impairment itself or to the chronic conditions and poor health more commonly experienced by people with visual impairments. For people for whom visual impairment is a comorbidity of another serious condition, their primary challenge to work may not be their visual impairment. Recent research investigating reasons for being out of the labor force for working-age adults with visual impairments suggests that poor health and chronic conditions may be primary factors (Crudden et al., 2023; Crudden & McKnight, 2022). These studies found that the majority of adults with visual impairments who were out of the labor force either reported being unable to work (Crudden et al., 2023) or reported that they were not working due to health reasons (Crudden & McKnight, 2022). The current study supports these and other previous findings (Cimarolli & Wang, 2006; Kirchner et al., 1999; McDonnall, 2010) regarding the importance of good health to employment for people with visual impairments.

Although fair or poor health does not preclude people from working, it was strongly associated with employment trajectories, and 74% of people who reported fair or poor health at Wave 1 consistently did not work during the 4-year period. People in the Rising trajectory group whose health improved to good or better at Wave 2 were projected to join or rejoin the workforce sooner than those who remained in fair or poor health. Conversely, people in the Declining trajectory group who experienced fair or poor health at Wave 2 were projected to leave the workforce sooner than those who remained in good or better health. Still, our findings confirm that long-term employment is possible even for people who perceive themselves to be in fair or poor health.

Another finding from this study that supports previous research is the association between other disabilities and employment for people with visual impairments (Brunes & Heir,

2022; Clements et al., 2011; Goertz et al., 2010, 2017; Lund & Cmar, 2019b; McKnight et al., 2021). Our study documents that the number of non-visual functional disabilities has an increasing impact on the odds of being in the Low employment trajectory group. The impact of the number of non-visual disabilities on the odds of being in the Low trajectory group differed for the High employment trajectory compared to the Rising and Declining trajectories. For all three groups compared to the Low employment trajectory group, the effect of having one non-visual disability was small. The odds of being in the Low trajectory group continued to increase as the number of non-visual disabilities increased, but this effect was the strongest for comparisons between the Low and High trajectory groups. This finding indicates that people with visual impairments and multiple non-visual disabilities were much more likely to be in the Low trajectory group than the other three groups, particularly the High group.

Receipt of disability benefits had the strongest relationship with employment trajectories. Individuals who received disability benefits had tremendously higher odds of being in the Low employment trajectory group than in any of the other trajectory groups, but, not surprisingly, the odds were the largest compared to the High trajectory group. This finding is not unexpected given that SSDI receipt is contingent upon limited work earnings and SSI receipt is contingent upon having limited income and assets. Once people start receiving these disability benefits, very few terminate them due to work (Levere et al., 2018). A few other studies have documented similarly large odds ratios associated with lack of employment and disability benefit receipt among people with visual impairments (Crudden & McKnight, 2022; McKnight et al., 2021). Smaller effects of disability benefit receipt have been observed in studies of state-federal vocational rehabilitation consumers (McDonnall, 2016; Steinman et al., 2013), which may reflect

differences in characteristics between people who do versus do not seek these services and receive the benefits of these services (Giesen & Hierholzer, 2016; O'Neill et al., 2015).

Although our study documents that disability benefit receipt, number of non-visual disabilities, and health are all independently associated with employment trajectory, these variables are also closely related to each other. Many people with visual impairments who receive disability benefits may have additional conditions which negatively impact their health. A study of SSDI and SSI recipients who had recently been employed found that the unpredictability of their health was a substantial barrier to future work; health concerns and concerns about health insurance discouraged them from pursuing full-time work that would cease benefits (O'Day et al., 2016). Another study documented the various and complex factors that impact SSDI beneficiaries' decisions about returning to work (Taylor & Blackburn, 2020). Because many beneficiaries have a limited understanding of work incentives and options for retaining health insurance after benefit cessation (O'Day et al., 2016), they need accurate information and support to make informed decisions about work. Programs that offer financial and benefits counseling may encourage recipients to consider pursuing employment (Taylor & Blackburn, 2020). Benefits counseling may be especially beneficial for people with visual impairments who have poor health, chronic conditions, or both.

Finally, our results also support previous research documenting the importance of education for employment of people with visual impairments (Brunes & Heir, 2022; Clements et al., 2011; Goertz et al., 2010, 2017; Lund & Cmar, 2019a, 2019b, 2020; Marques et al., 2019). Having a bachelor's degree or higher level of education was associated with membership in the High trajectory group. In other words, when controlling for other factors, having a college degree predicted consistent employment across the 4-year time period of the present study. This finding

emphasizes the importance of earning at least a bachelor's degree to obtaining and retaining employment for people with visual impairments, regardless of health status. Professionals should encourage and support people with visual impairments in getting a college degree, as the association between higher education and employment for this population is clear and consistent.

4.1 Limitations

Although this study makes several unique contributions to the literature on employment for people with visual impairments, a number of limitations should be acknowledged. First, visual impairment was determined by self-report of being blind or having serious difficulty seeing, and self-reported visual impairment may not consistently match measured visual acuity. In addition, other relevant information about each person's visual impairment (e.g., level of visual impairment, age of onset) was not available in the SIPP dataset. Given the large pool of SIPP respondents without visual impairments, we required members of the Comparison group to have four waves of data, which allowed us to exclude people who developed blindness or serious difficulty seeing after Wave 1 or who reported other changes in vision across waves. This sample restriction resulted in a higher prevalence of missing data in the Visual Impairment group; however, we accounted for attrition in the GBTM analyses to minimize any potential bias. Due to limitations of the data, we were unable to include some variables as time-varying in the model (e.g., number of non-visual disabilities, education), even though they could change over time. Furthermore, seam bias (i.e., disproportionate reporting of changes during the transition between waves) is a common issue in longitudinal surveys that may have affected our estimates, despite the Census Bureau's continued efforts to mitigate it in SIPP (U.S. Census Bureau, 2019).

4.2 Future research directions

Further investigation of employment trajectories of people with visual impairments using

other data sources is needed to confirm and extend our findings. It is important to continue to evaluate employment longitudinally, as the employment rate observed during one month of this study overestimates employment over time for this population. It would be valuable to account for level of visual impairment and other vision-related information in future longitudinal employment studies. It would also be valuable to evaluate earnings over time for employed people with visual impairments. Our findings related to the impact of health and non-visual functional disabilities suggest the need to investigate employment separately for younger people and older people within the working-age range, as more chronic conditions and health problems typically occur as people age. Finally, some people in fair or poor health are employed, and they work consistently over time. Future research could investigate this group to determine what motivates and enables these individuals to continue to work despite health problems.

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Conflict of interest

The authors declare they have no conflict of interest.

Ethics statement

This study involved secondary analysis of publicly available, deidentified data and therefore, did not require Institutional Review Board approval.

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Informed consent

Not applicable because analyses were conducted retrospectively on existing deidentified data.

References

Andruff, H., Carraro, N., Thompson, A., Gaudreau, P., & Louvet, B. (2009). Latent class growth modelling: A tutorial. *Tutorials in Quantitative Methods for Psychology*, *5*(1), 11–24. https://doi.org/10.20982/tqmp.05.1.p011

Brunes, A., & Heir, T. (2022). Visual impairment and employment in Norway. *BMC Public Health*, *22*(1), Article e648. https://doi.org/10.1186/S12889-022-13077-0/TABLES/4

Chai, Y. X., Gan, A. T. L., Fenwick, E. K., Sui, A. Y., Tan, B. K. J., Quek, D. Q. Y., Qian, C., Wong, T. Y., Cheng, C.-Y., Lamoureux, E. L., & Man, R. E. K. (2023). Relationship between vision impairment and employment. *British Journal of Ophthalmology*, *107*(3), 361–366. https://doi.org/10.1136/bjophthalmol-2021-319655

Chakravarthy, U., Biundo, E., Saka, R. O., Fasser, C., Bourne, R., & Little, J. A. (2017). The economic impact of blindness in Europe. *Ophthalmic Epidemiology*, *24*(4), 239–247. https://doi.org/10.1080/09286586.2017.1281426

Christiansen, S. G., & Moan, I. S. (2022). Employment trajectories among those treated for alcohol use disorder: A register-based cohort study. *Addiction*, *117*(4), 913–924. https://doi.org/10.1111/add.15726

Cimarolli, V. R., & Wang, S. (2006). Differences in social support among employed and unemployed adults who are visually impaired. *Journal of Visual Impairment & Blindness*, *100*(9), 545–556. https://doi.org/https://doi.org/10.1177/0145482X0610000906

Clements, B., Douglas, G., & Pavey, S. (2011). Which factors affect the chances of paid employment for individuals with visual impairment in Britain? *Work*, *39*(1), 21–30. https://doi.org/10.3233/WOR-2011-1147

Connors, E., Curtis, A., Emerson, R. W., & Dormitorio, B. (2014). Longitudinal analysis of factors associated with successful outcomes for transition-age youths with visual impairments. *Journal of Visual Impairment & Blindness*, *108*(2), 95–106. https://doi.org/https://doi.org/10.1177/0145482X1410800202

Court, H., McLean, G., Guthrie, B., Mercer, S. W., & Smith, D. J. (2014). Visual impairment is associated with physical and mental comorbidities in older adults: A cross-sectional study. *BMC Medicine*, *12*(1), Article e181. https://doi.org/10.1186/s12916-014-0181-7

Crews, J. E., Chou, C. F., Sekar, S., & Saaddine, J. B. (2017). The prevalence of chronic conditions and poor health among people with and without vision impairment, aged ≥65 years, 2010–2014. *American Journal of Ophthalmology*, *182*, 18–30. https://doi.org/10.1016/J.AJO.2017.06.038

Crudden, A., McDonnall, M., & Tatch, A. (2023). Unable to work? Characteristics of people with blindness and low vision who are out of the labor force. *Disability and Health Journal*, *16*(3), Article e101438. https://doi.org/10.1016/J.DHJO.2022.101438

Crudden, A., & McKnight, Z. (2022). Out of the labor force due to health reasons? An analysis of the Survey of Income and Program Participation regarding persons with visual impairments. *International Journal of Rehabilitation Research*, *45*(3), 237–242. https://doi.org/10.1097/MRR.0000000000000528

Frick, K. D., Gower, E. W., Kempen, J. H., & Wolff, J. L. (2007). Economic impact of visual impairment and blindness in the United States. *Archives of Ophthalmology*, *125*(4), 544–550. https://doi.org/10.1001/ARCHOPHT.125.4.544

Giesen, J. M., & Hierholzer, A. (2016). Vocational rehabilitation services and employment for SSDI beneficiaries with visual impairments. *Journal of Vocational Rehabilitation*, *44*(2), 175–189. https://doi.org/10.3233/JVR-150789

Goertz, Y. H. H., Houkes, I., & Bosma, H. (2017). Factors associated with participation on the competitive labour market of people with visual impairments in The Netherlands. *Work*, *58*(3), 251–261. https://doi.org/10.3233/WOR-172629

Goertz, Y. H. H., van Lierop, B. A. G., Houkes, I., & Nijhuis, F. J. N. (2010). Factors related to the employment of visually impaired persons: A systematic literature review. *Journal of Visual Impairment & Blindness*, *104*(7), 404–418. https://doi.org/10.1177/0145482x1010400704

Haviland, A. M., Jones, B. L., & Nagin, D. S. (2011). Group-based trajectory modeling extended to account for nonrandom participant attrition. *Sociological Methods and Research*, *40*(2), 367–390. https://doi.org/10.1177/0049124111400041

Helgesson, M., Tinghög, P., Wang, M., Rahman, S., Saboonchi, F., & Mittendorfer-Rutz, E. (2018). Trajectories of work disability and unemployment among young adults with common mental disorders. *BMC Public Health*, *18*(1), Article e1228. https://doi.org/10.1186/s12889-018-6141-y

Hou, W. H., Sheu, C. F., Liang, H. W., Hsieh, C. L., Lee, Y., Chuang, H. Y., & Cheng, Y. T. (2012). Trajectories and predictors of return to work after traumatic limb injury: A 2-year follow-up study. *Scandinavian Journal of Work, Environment and Health*, *38*(5), 456–466. https://doi.org/10.5271/sjweh.3287

Jones, B. L., & Nagin, D. S. (2007). Advances in group-based trajectory modeling and an SAS procedure for estimating them. *Sociological Methods & Research*, *35*(4), 542–571. https://doi.org/10.1177/0049124106292364

Jones, B. L., Nagin, D. S., & Roeder, K. (2001). A SAS procedure based on mixture models for estimating developmental trajectories. *Sociological Methods and Research*, *29*(3), 374–393. https://doi.org/10.1177/0049124101029003005

Kirchner, C., & Peterson, R. (1979). Statistical brief #5: Employment: Selected characteristics. *Journal of Visual Impairment & Blindness*, *73*(6), 239–242. https://doi.org/https://doi.org/10.1177/0145482X7907300605

Kirchner, C., & Peterson, R. (1980). Worktime, occupational status, and annual earnings: An assessment of underemployment. *Journal of Visual Impairment & Blindness*, *74*(5), 203–205. https://doi.org/10.1177/0145482X8007400511

Kirchner, C., Schmeidler, E., & Todorov, A. (1999). *Looking at employment through a lifespan telescope: Age, health, and employment status of people with serious visual impairment*. Rehabilitation Research and Training Center on Blindness and Low Vision.

Köberlein, J., Beifus, K., Schaffert, C., & Finger, R. P. (2013). The economic burden of visual impairment and blindness: A systematic review. *BMJ Open*, *3*(11), Article e003471. https://doi.org/10.1136/BMJOPEN-2013-003471

Kuitto, K., Salonen, J., & Helmdag, J. (2019). Gender inequalities in early career trajectories and parental leaves: Evidence from a Nordic welfare state. *Social Sciences*, *8*(9), Article e253. https://doi.org/10.3390/socsci8090253

Leinonen, T., Solovieva, S., Husgafvel-Pursiainen, K., Laaksonen, M., & Viikari-Juntura, E. (2019). Do individual and work-related factors differentiate work participation trajectories

before and after vocational rehabilitation? *PLoS ONE, 14*(2), Article e0212498. https://doi.org/10.1371/journal.pone.0212498

Levere, M., Hyde, J. S., Liu, S., & Becker, F. (2018). *Disability beneficiary work activity, 2002–2014: Evidence from the Social Security Administration's Disability Analysis File (DAF)*. Mathematica Policy Research. https://www.mathematica.org/publications/disability-beneficiary-work-activity-2002-2014-evidence-from-the-social-security-administrations

Lund, E. M., & Cmar, J. L. (2019a). A systematic review of factors related to employment outcomes in adults with visual impairments. *Journal of Visual Impairment & Blindness, 113*(6), 493–517. https://doi.org/10.1177/0145482X19885211

Lund, E. M., & Cmar, J. L. (2019b). Factors related to employment outcomes in vocational rehabilitation consumers with visual impairments: A systematic review. *Journal of Visual Impairment & Blindness, 113*(6), 518–537. https://doi.org/10.1177/0145482X19885277

Lund, E. M., & Cmar, J. L. (2020). A systematic review of factors related to employment in transition-age youth with visual impairments. *Rehabilitation Psychology, 65*(2), 122–136. https://doi.org/10.1037/rep0000303

Marques, A. P., Macedo, A. F., Lima Ramos, P., Moreno, L. H., Butt, T., Rubin, G., & Santana, R. (2019). Productivity losses and their explanatory factors amongst people with impaired vision. *Ophthalmic Epidemiology, 26*(6), 378–392. https://doi.org/10.1080/09286586.2019.1632904

Marques, A. P., Ramke, J., Cairns, J., Butt, T., Zhang, J. H., Muirhead, D., Jones, I., Tong, B. A. M. A., Swenor, B. K., Faal, H., Bourne, R. R. A., Frick, K. D., & Burton, M. J. (2021). Global economic productivity losses from vision impairment and blindness. *EClinicalMedicine, 35,* Article e100852. https://doi.org/10.1016/J.ECLINM.2021.100852

McDonnall, M. C. (2010). Factors predicting post-high school employment for young adults with visual impairments. *Rehabilitation Counseling Bulletin*, *54*(1), 36–45. https://doi.org/10.1177/0034355210373806

McDonnall, M. C. (2016). The relationship between vocational rehabilitation professional's interactions with businesses and employment outcomes for consumers who are blind or visually impaired. *Rehabilitation Counseling Bulletin*, *59*(4), 203–212. https://doi.org/10.1177/0034355215586389

McDonnall, M. C., Cmar, J. L., & McKnight, Z. S. (2022a). Beyond employment rates: Continuity of employment for people with visual impairments. *Journal of Visual Impairment & Blindness*, *116*(2), 275–280. https://doi.org/10.1177/0145482X221091827

McDonnall, M. C., Cmar, J. L., & McKnight, Z. S. (2022b). Beyond employment rates: Social Security disability benefit receipt and work among people with visual impairments. *Journal of Visual Impairment & Blindness*, *116*(3), 396–403. https://doi.org/10.1177/0145482X221108902

McDonnall, M. C., & McKnight, Z. S. (2021). The association between presenting visual impairment, health, and employment status. *Journal of Visual Impairment & Blindness*, *115*(3), 204–214. https://doi.org/https://doi.org/10.1177/0145482X211016570

McDonnall, M. C., & Sui, Z. (2019). Employment and unemployment rates of people who are blind or visually impaired: Estimates from multiple sources. *Journal of Visual Impairment & Blindness*, *113*(6), 481–492. https://doi.org/10.1177/0145482X19887620

McDonnall, M. C., & Tatch, A. (2021). Educational attainment and employment for individuals with visual impairments. *Journal of Visual Impairment & Blindness*, *115*(2), 152–159. https://doi.org/10.1177/0145482X211000963

McKnight, Z. S., Crudden, A., & McDonnall, M. C. (2021). Personal characteristics associated with working after disability onset for people with visual impairments. *Journal of Visual Impairment & Blindness*, *115*(2), 95–105. https://doi.org/10.1177/0145482x211000960

Nagin, D. S. (2005). *Group-based modeling of development*. Harvard University Press.

Nagin, D. S., & Odgers, C. L. (2010). Group-based trajectory modeling in clinical research. *Annual Review of Clinical Psychology*, *6*, 109–138. https://doi.org/10.1146/annurev.clinpsy.121208.131413

O'Day, B., Martin, F., Burak, H., Freeman, G., Feeney, K., Lim, G., Kelley, E., & Morrison, K. (2016). *Employment experiences of young adults and high earners who receive Social Security disability benefits: Findings from semistructured interviews*. Mathematica Policy Research. https://www.mathematica.org/publications/employment-experiences-of-young-adults-and-high-earners-who-receive-social-security-disability

O'Neill, J., Mamun, A. A., Potamites, E., Chan, F., & da Silva Cordoso, E. (2015). Return to work of disability insurance beneficiaries who do and do not access state vocational rehabilitation agency services. *Journal of Disability Policy Studies*, *26*(2), 111–123. https://doi.org/10.1177/1044207315583900

Rein, D. B., Zhang, P., Wirth, K. E., Lee, P. P., Hoerger, T. J., McCall, N., Klein, R., Tielsch, J. M., Vijan, S., & Saaddine, J. (2006). The economic burden of major adult visual disorders in the United States. *Archives of Ophthalmology*, *124*(12), 1754–1760. https://doi.org/10.1001/ARCHOPHT.124.12.1754

Sherrod, C. E., Vitale, S., Frick, K. D., & Ramulu, P. Y. (2014). Association of vision loss and work status in the United States. *JAMA Ophthalmology*, *132*(10), 1239–1242. https://doi.org/10.1001/jamaophthalmol.2014.2213

Steinman, B. A., Kwan, N., Boeltzig-Brown, H., Haines, K., Halliday, J., & Foley, S. M. (2013). Agency decision-making control and employment outcomes by vocational rehabilitation consumers who are blind or visually impaired. *Journal of Visual Impairment & Blindness, 107*(6), 437–451. https://doi.org/10.1177/0145482x1310700606

Sun, S., & Chen, F. (2017). Women's employment trajectories during early adulthood in urban China: A cohort comparison. *Social Science Research, 68,* 43–58. https://doi.org/10.1016/j.ssresearch.2017.09.005

Taylor, A. B., & Blackburn, N. (2020). "It makes me feel part of the society": Return-to-work decisions of SSDI beneficiaries. *Journal of Vocational Rehabilitation*, *53,* 319–333. https://doi.org/10.3233/JVR-201108

U.S. Census Bureau. (2019). *Survey of Income and Program Participation: 2014 Panel users' guide*. U.S. Department of Commerce, Economic and Statistics Administration, U.S. Census Bureau.

U.S. Census Bureau. (2022a). *2021 American Community Survey 1-year estimates: Disability characteristics.* https://data.census.gov/cedsci/table?q=S1810%3A DISABILITY CHARACTERISTICS&g=0100000US&tid=ACSST1Y2021.S1810

U.S. Census Bureau. (2022b). *2021 American Community Survey 1-year estimates: Employment status by disability status and type, Table B18120*. https://data.census.gov/cedsci/table?q=B18120%3A EMPLOYMENT STATUS BY DISABILITY STATUS AND TYPE&g=0100000US&tid=ACSDT1Y2021.B18120

Wittenborn, J. S., Zhang, X., Feagan, C. W., Crouse, W. L., Shrestha, S., Kemper, A. R., Hoerger, T. J., & Saaddine, J. B. (2013). The economic burden of vision loss and eye

disorders among the United States population younger than 40 years. *Ophthalmology, 120*(9), 1728–1735. https://doi.org/10.1016/j.ophtha.2013.01.068

World Health Organization. (2022). *Blindness and vision impairment*. https://www.who.int/news-room/fact-sheets/detail/blindness-and-visual-impairment

Tables

Table 1

Baseline demographic characteristics for the study sample

Variable	All (*N* = 1,632)		Visual Impairment (*n* = 816)		Comparison (*n* = 816)	
	n	%	*n*	%	*n*	%
Gender						
Male	722	44.2	361	44.2	361	44.2
Female	910	55.8	455	55.8	455	55.8
Race						
White	1,234	75.6	595	72.9	639	78.3
Black	285	17.5	161	19.7	124	15.2
Other	113	6.9	60	7.4	53	6.5
Hispanic ethnicity	220	13.5	125	15.3	95	11.6
Education						
Less than high school	331	20.3	191	23.4	140	17.2
High school diploma or equivalent	917	56.2	472	57.8	445	54.5
Associate degree	139	8.5	66	8.1	73	9.0
Bachelor's degree or higher	245	15.0	87	10.7	158	19.4
Number of non-visual disabilities						
0	548	33.6	274	33.6	274	33.6
1	322	19.7	161	19.7	161	19.7
2 or more	762	46.7	381	46.7	381	46.7
SSDI receipt	361	22.1	194	23.8	167	20.5
SSI receipt	213	13.1	127	15.6	86	10.5
Health						
Excellent or very good	405	24.8	162	19.9	243	29.8
Good	417	25.6	200	24.5	217	26.6
Fair or poor	810	49.6	454	55.6	356	43.6
Employed at Month 0	661	40.5	289	35.4	372	45.6
Age (*M*, *SD*)	48.45	12.74	48.45	12.70	48.46	12.78

Note. SSDI = Social Security Disability Insurance; SSI = Supplemental Security Income.

Table 2

Diagnostic information for basic group-based trajectory models

Trajectory group	Group membership probability	Proportion assigned	Number assigned	Average posterior probability	Odds of correct classification
Full sample model (N = 1,632)					
Low	.504	.505	824	.996	222.92
Rising	.088	.086	141	.984	653.35
Declining	.083	.082	134	.977	476.13
High	.326	.327	533	.995	374.50
Visual Impairment group model (n = 816)					
Low	.566	.567	463	.995	166.22
Rising	.080	.076	62	.989	1,066.78
Declining	.072	.072	59	.957	290.24
High	.283	.284	232	.991	282.41
Comparison group model (n = 816)					
Low	.444	.444	362	>.999	2,502.27
Rising	.095	.094	77	.997	3,075.75
Declining	.101	.102	83	.991	1,026.36
High	.360	.360	294	.999	2,217.85

Table 3

*Group-based trajectory model with visual impairment predicting employment trajectory group membership (*N = *1,632)*

Variable	Estimate	*SE*	*t*	*p*	*OR* [95% CI]
Employment trajectories					
Low					
Intercept	-4.689	0.326	-14.39	<.001	
Month	-0.176	0.032	-5.48	<.001	
Month^2	0.004	0.001	6.58	<.001	
Rising					
Intercept	-1.436	0.100	-14.36	<.001	
Month	0.016	0.011	1.47	.141	
Month^2	0.002	0.000	6.71	<.001	
Declining					
Intercept	1.519	0.116	13.13	<.001	
Month	-0.046	0.013	-3.61	<.001	
Month^2	-0.002	0.000	-6.01	<.001	
High					
Intercept	3.930	0.182	21.60	<.001	
Month	0.073	0.017	4.39	<.001	
Month^2	-0.002	0.000	-7.00	<.001	
Predictors of trajectory group membership					
Rising (vs. Low)					
Intercept	-1.48	0.12	-11.91	<.001	
Visual impairment	-0.53	0.19	-2.83	.005	0.59 [0.41, 0.85]
Declining (vs. Low)					
Intercept	-1.53	0.13	-11.83	<.001	
Visual impairment	-0.54	0.19	-2.79	.005	0.58 [0.40, 0.85]
High (vs. Low)					
Intercept	-0.18	0.08	-2.29	.022	
Visual impairment	-0.51	0.11	-4.49	<.001	0.60 [0.48, 0.75]

Note. OR = odds ratio; CI = confidence interval.

Table 4

Baseline characteristics of people with visual impairments by employment trajectory group

Variable	Low (*n* = 463)		Rising (*n* = 62)		Declining (*n* = 59)		High (*n* = 232)	
	n	%	*n*	%	*n*	%	*n*	%
Gender								
Male	196	42.3	29	46.8	22	37.3	114	49.1
Female	267	57.7	33	53.2	37	62.7	118	50.9
Race								
White	325	70.2	43	69.4	44	74.6	183	78.9
Black	103	22.3	11	17.7	11	18.6	36	15.5
Other	35	7.6	8	12.9	4	6.8	13	5.6
Hispanic ethnicity	68	14.7	15	24.2	13	22.0	29	12.5
Education								
Less than high school	132	28.5	15	24.2	14	23.7	30	12.9
High school diploma or equivalent	264	57.0	38	61.3	33	55.9	137	59.1
Associate degree	31	6.7	5	8.1	7	11.9	23	9.9
Bachelor’s degree or higher	36	7.8	4	6.5	5	8.5	42	18.1
Number of non-visual disabilities								
0	80	17.3	29	46.8	30	50.9	135	58.2
1	89	19.2	16	25.8	9	15.3	47	20.3
2 or more	294	63.5	17	27.4	20	33.9	50	21.6
SSDI receipt	176	38.0	6	9.7	3	5.1	9	3.9
SSI receipt	120	25.9	3	4.8	3	5.1	1	0.4
Health								
Excellent or very good	39	8.4	21	33.9	16	27.1	86	37.1
Good	88	19.0	13	21.0	19	32.2	80	34.5
Fair or poor	336	72.6	28	45.2	24	40.7	66	28.5

Age (*M*, *SD*)	51.14	11.78	39.84	14.69	45.69	13.83	46.08	12.05

Note. SSDI = Social Security Disability Insurance; SSI = Supplemental Security Income.

Table 5

*Group-based trajectory analysis of factors associated with employment trajectories for people with visual impairments (*n *= 816)*

Variable	Estimate	*SE*	*t*	*p*	*OR* [95% CI]
Employment trajectories with health as time-varying covariate					
Low					
Intercept	-3.023	0.305	-9.92	<.001	
Month	-0.387	0.066	-5.86	<.001	
Month^2	0.008	0.001	5.85	<.001	
Fair or poor health	-2.782	0.496	-5.61	<.001	
Rising					
Intercept	-0.716	0.141	-5.09	<.001	
Month	0.012	0.016	0.79	.428	
Month^2	0.001	0.000	3.76	<.001	
Fair or poor health	-1.092	0.114	-9.61	<.001	
Declining					
Intercept	3.996	0.347	11.51	<.001	
Month	-0.039	0.036	-1.07	.283	
Month^2	-0.005	0.001	-4.40	<.001	
Fair or poor health	-2.603	0.246	-10.57	<.001	
High					
Intercept	4.708	0.235	20.00	<.001	
Fair or poor health	-1.075	0.284	-3.78	<.001	
Predictors of trajectory group membership					
Rising (vs. Low)					
Intercept	-0.98	0.36	-2.75	.006	
Female gender	0.04	0.29	0.13	.900	1.04 [0.59, 1.84]
White race	-0.02	0.31	-0.05	.960	0.98 [0.53, 1.82]
Hispanic ethnicity	0.61	0.34	1.77	.077	1.84 [0.94, 3.62]
Age (centered)	-0.05	0.01	-4.23	<.001	0.95 [0.93, 0.98]
SSDI receipt	-1.61	0.50	-3.20	.001	0.20 [0.07, 0.54]
SSI receipt	-2.22	0.62	-3.59	<.001	0.11 [0.03, 0.36]
Associate degree	0.49	0.50	0.98	.328	1.63 [0.61, 4.36]
Bachelor’s degree or higher	-0.33	0.61	-0.54	.590	0.72 [0.22, 2.37]
Number of non-visual disabilities	-0.32	0.10	-3.14	.002	0.72 [0.59, 0.89]
Declining (vs. Low)					
Intercept	-1.42	0.45	-3.16	.002	
Female gender	-0.06	0.35	-0.18	.860	0.94 [0.48, 1.85]
White race	0.44	0.41	1.08	.278	1.55 [0.70, 3.44]
Hispanic ethnicity	0.31	0.44	0.70	.484	1.36 [0.58, 3.20]

Age (centered)	0.00	0.02	0.22	.825	1.00 [0.97, 1.03]
SSDI receipt	-1.95	0.55	-3.54	<.001	0.14 [0.05, 0.42]
SSI receipt	-1.71	0.63	-2.73	.006	0.18 [0.05, 0.62]
Associate degree	0.91	0.54	1.68	.094	2.49 [0.86, 7.22]
Bachelor's degree or higher	0.24	0.58	0.41	.681	1.27 [0.41, 3.94]
Number of non-visual disabilities	-0.32	0.12	-2.72	.007	0.73 [0.58, 0.92]
High (vs. Low)					
Intercept	0.51	0.26	1.98	.048	
Female gender	-0.42	0.21	-1.97	.049	0.66 [0.43, 1.00]
White race	0.51	0.24	2.09	.037	1.66 [1.03, 2.67]
Hispanic ethnicity	-0.29	0.31	-0.92	.357	0.75 [0.41, 1.38]
Age (centered)	-0.01	0.01	-1.39	.165	0.99 [0.97, 1.00]
SSDI receipt	-2.65	0.40	-6.58	<.001	0.07 [0.03, 0.16]
SSI receipt	-4.21	1.16	-3.63	<.001	0.01 [0.00, 0.14]
Associate degree	0.68	0.40	1.70	.089	1.97 [0.90, 4.30]
Bachelor's degree or higher	0.91	0.32	2.87	.004	2.49 [1.34, 4.66]
Number of non-visual disabilities	-0.59	0.08	-7.31	<.001	0.56 [0.48, 0.65]

Note. OR = odds ratio; CI = confidence interval; SSDI = Social Security Disability Insurance; SSI = Supplemental Security Income.

Figures

Figure 1

Observed and predicted employment trajectories for people with and without visual impairments (N = 1,632)

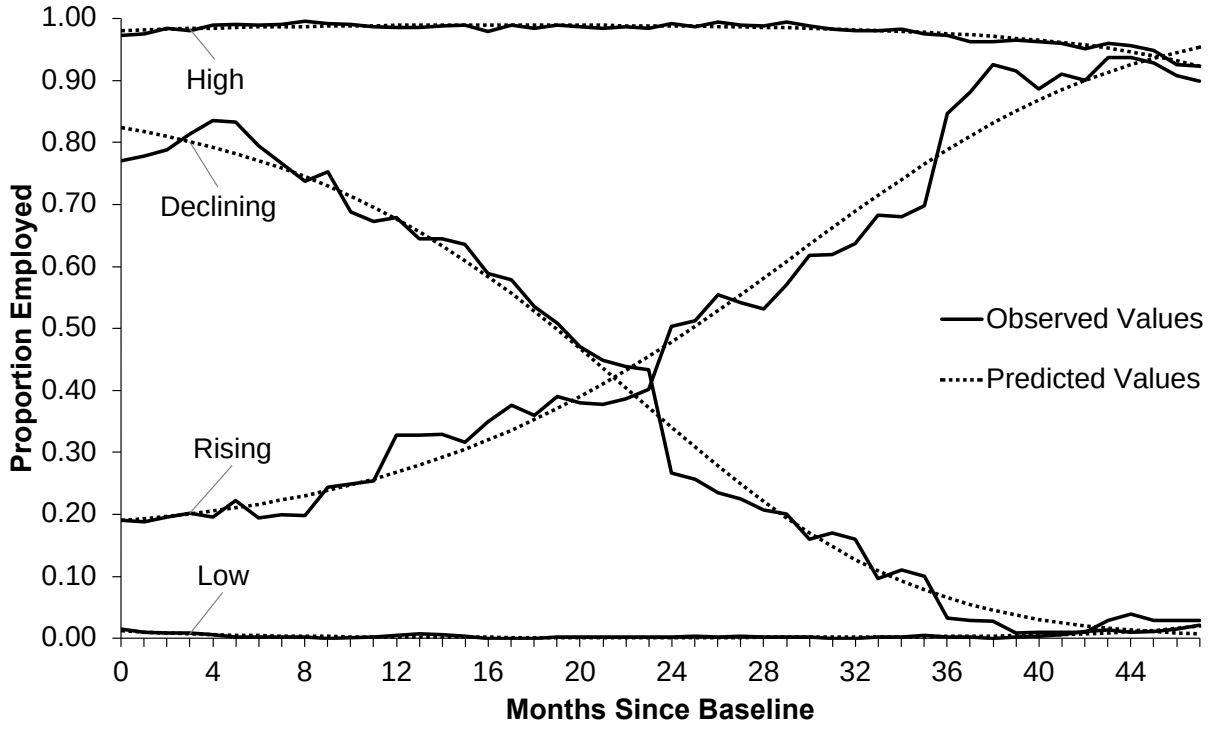

Figure 2

*Predicted employment trajectories for people with visual impairments (*n = *816) and a matched comparison group (*n = *816)*

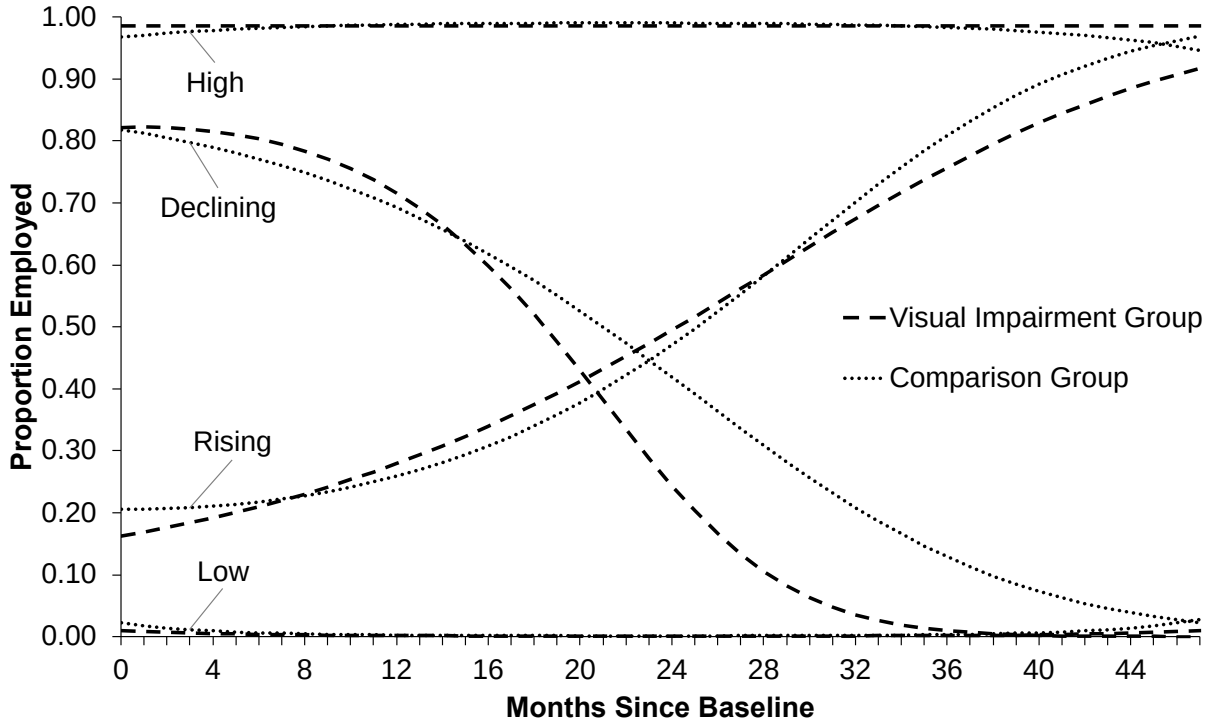

Figure 3

Estimated impact of health on employment for people with visual impairments in the rising trajectory group

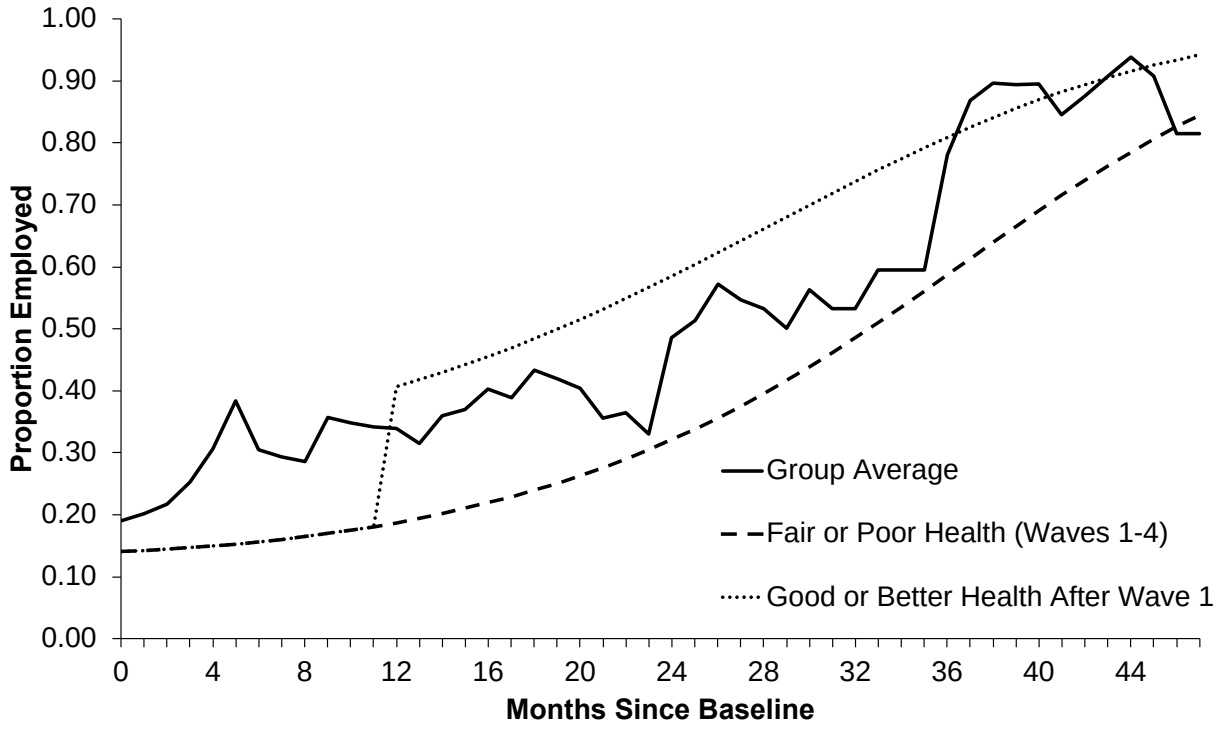

Figure 4

Estimated impact of health on employment for people with visual impairments in the declining trajectory group