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Orientation and Mobility Skills and Outcome Expectations as Predictors of Employment for Young Adults with Visual Impairments

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Structured abstract: *Introduction:* Youths with visual impairments attend post-secondary school at high rates, yet these individuals have low rates of employment. In this study, factors associated with post-school employment were investigated in a nationally representative sample of youths with visual impairments. *Methods:* In a secondary analysis of data from the National Longitudinal Transition Study–2, multivariate logistic regression analyses were conducted to investigate employment outcomes for youths with visual impairments based on orientation and mobility skills and outcome expectations. *Results:* Youths with high community travel scores were significantly more likely to be employed in Wave 4 (up to six years post–high school; $B = .25$, $p = .003$) and those with high outcome expectations were significantly more likely to be employed in Wave 5 (up to eight years post–high school; $B = .33$, $p = .04$). *Discussion:* Results suggest that independently traveling to places outside the home, using public transportation, and arranging airplane or train trips predict post-school employment for youths with visual impairments. Positive self-beliefs about work for pay, financial self-support, and independent living were also associated with employment. *Implications for practitioners:* Professionals can support students in gaining these vital skills by providing community experiences, positive role models, and verbal encouragement. Research-based predictors of employment should be considered when planning transition services for adolescents with visual impairments.

Despite intervention efforts, the employment rates of individuals with visual impairments in the United States remain inexcusably low. Data show that approximately 38% of working-age adults with visual

This article is based on the author's master's thesis. The author wishes to thank Cheryl Kamei-Hannan of California State University, Los Angeles, and Connie Kasari of University of California, Los Angeles, for their guidance and support in conducting this research. The author also expresses appreciation to committee members from the National Leadership Consortium in Sensory Disabilities for their instrumental feedback in the early stages of this project.

impairments are employed, compared to 76% of adults without disabilities (Erickson, Lee, & von Schrader, 2014). This discrepancy in employment rates is also apparent among young adults, since 38% of young adults with visual impairments were employed versus 73% of young adults without disabilities (McDonnall, 2010a).

Many children and adolescents with visual impairments receive services from teachers of students with visual impairments and orientation and mobility (O&M) specialists in areas of the expanded core curriculum (ECC, Hatlen, 1996) to aid in preparation for life beyond high school. Additionally, the Individuals with Disabilities Education Act (2004) requires that adolescents receive transition services to facilitate movement from school to post-school activities. Despite their receipt of specialized services and high educational attainment, individuals with visual impairments are less likely to be employed than individuals in the general population during high school, while attending postsecondary school, and after graduation (McDonnall, 2010a).

Countless variables may contribute to the paths that young adults with visual impairments take as they transition from high school to post-school adult life. One variable is O&M, which encompasses the concepts, skills, and techniques necessary for safe, efficient, and graceful travel under all environmental conditions (Jacobson, 2013). O&M skills are essential for preparing adolescents with visual impairments for adult roles, including employment. Self-efficacy beliefs (judgments of one's ability to control life events) and outcome expectations (beliefs that one's actions will produce a desired result) also play a role in the transition to post-school employment (Bandura, 1977; Lent, Brown, & Hackett, 1994).

The National Secondary Transition Technical Assistance Center (NSTTAC) identified 16 predictors of post-school employment for students with disabilities, based on a comprehensive literature review conducted by Test and colleagues (2009). The evidence-based predictors identified by NSTTAC include career awareness, community experiences, exit exam requirements or high school diploma status, inclusion in general education, interagency collaboration, occupational courses, paid employment or work experiences, parent involvement, program of study, self-care or independent living skills, self-determination or self-advocacy, social skills, student supports, transition programs, vocational education, and work study (Rowe et al., 2014).

Mazzotti, Rowe, Cameto, Test, and Morningstar (2013) recognized a need to disaggregate data by disability category to establish predictors of post-school outcomes for students with specific disabilities. For students with visual impairments, some factors associated with employment were identified in recent studies using large national datasets. Variables aligned with NSTTAC's evidence-based predictors are (a) career awareness (Giesen & Cavenaugh, 2012; Wolffe & Kelly, 2011); (b) high school completion (Connors, Curtis, Wall Emerson, & Dormitorio, 2014); (c) work experiences (Connors et al., 2014; Giesen & Cavenaugh, 2012; McDonnall, 2010b,

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2011; McDonnall & Crudden, 2009; McDonnall & O'Mally, 2012); (d) parental involvement (McDonnall, 2010b); (e) independent living skills (Monson, 2009); (f) self-determination (Giesen & Cavenaugh, 2012; McDonnall & Crudden, 2009; Monson, 2009); and (g) social skills (Botsford, 2013; McDonnall, 2011; Monson, 2009; Wolffe & Kelly, 2011; Zebehazy & Smith, 2011). Additional variables that are correlated with employment include O&M (McDonnall, 2011; Wolffe & Kelly, 2011); assistive technology (Giesen & Cavenaugh, 2012; Wolffe & Kelly, 2011); postsecondary education (McDonnall, 2010b, 2011); mathematic and verbal aptitude (McDonnall, 2010b; McDonnall & Crudden, 2009); and health (McDonnall, 2010b).

This emerging body of research contributes to the understanding of factors associated with post-school employment, yet additional inquiry is needed to further the knowledge base regarding this complex issue. Large-scale databases, including the National Longitudinal Transition Study–2 (NLTS2), offer a rich source of post-school outcome data. An indispensable dataset for transition research, NLTS2 not only captures the "experiences of youth[s] with disabilities while they are in school and receiving critical transition services, but also as they transition to adulthood" (Mazzotti et al., 2013, p. 147).

Relationships between O&M and employment were investigated using data from Waves 3 and 4 (four to six years post–high school) of NLTS2 (McDonnall, 2011; Monson, 2009; Wolffe & Kelly, 2011). Monson (2009) found that O&M skills and services did not predict post-school employment in Wave 3. Wolffe and Kelly (2011) found significant relationships between O&M services and participation in employment or postsecondary education in Wave 3, but not in Wave 4; however, students with complete blindness who used braille and received O&M services were more likely to be employed in Wave 4. McDonnall (2011) found that independent travel skills predicted full-time, but not part-time employment, in Wave 4. Although these findings appear contradictory, inconsistencies may be attributed to differences in (a) inclusion criteria, (b) variable selection, (c) statistical methods, and (d) methods for addressing missing data.

NLTS2 participants were asked about their aspirations related to future independence. Of students with visual impairments, 93% expected to "definitely" work for pay after high school. Only 69% expected to "definitely" be financially self-supporting, and 69% expected to live independently (Wagner, Newman, Cameto, Levine, & Marder, 2007). For children with and without disabilities, self-efficacy and outcome expectations were predictive of positive post-school outcomes (Betz & Voyten, 1997; Lindstrom, Doren, & Miesch, 2011). Positive self-beliefs facilitated academic and vocational success and influenced perceptions of goal attainment (Berry & Domene, 2013).

Investigation of in-school predictors such as O&M skills and outcome expectations can provide a more comprehensive understanding of factors that contribute to positive employment outcomes. NSTTAC identified a need for more high-quality correlational research that (a) disaggregates data by disability category, (b) examines in-school predictors of post-school outcomes, (c) evaluates predictors

over multiple time points, and (d) uses NLTS2 data (Test, Fowler, Kohler, & Kortering, 2013). Thus, the aim of the current study is to investigate associations between O&M skills, outcome expectations, and employment in a nationally representative sample of youths with visual impairments through secondary analysis of data from NLTS2. The following research questions are addressed:

1. Do campus travel skills, community travel skills, and outcome expectations predict employment up to six years after high school for youths with visual impairments (controlling for age and level of vision)?
2. Do campus travel skills, community travel skills, and outcome expectations predict employment up to eight years after high school for youths with visual impairments (controlling for age and level of vision)?

Method

Participants

NLTS2 used a stratified clustered random sampling process to produce a nationally representative sample of students with disabilities (see Wagner, Kutash, Duchnowski, & Epstein, 2005). Participants included approximately 11,270 adolescents who received special education services. Approximately 1,000 students were sampled from each of 12 federally identified disability categories. Participants were 13 to 16 years old and in at least 7th grade in December 2000 (SRI International, 2000). NLTS2 is a restricted-use dataset; therefore, all sample sizes presented in the following sections were rounded to the nearest 10.

The analysis sample was restricted to students with: (a) a primary disability of visual impairment, (b) data from at least one School Program Survey, and (c) data from at least one Parent/Youth Survey. At the time of the Wave 1 Parent Survey, participants (unweighted $n = 510$) were 14 to 18 years old. Sixty-eight percent of participants had low vision and 34% had a secondary disability.

Procedure

SRI International conducted NLTS2 over five time periods, referred to as *waves*, beginning with the 2000–2001 academic year. Variables included in the present study were extracted from the School Program Survey and Parent/Youth Survey. Independent variables were taken from Wave 1 (2000–2001; 7th to 12th grades) and Wave 2 (2002–2003; 9th grade to 2 years post-graduation). Dependent variables were taken from Wave 4 (2006–2007; up to 6 years post-graduation) and Wave 5 (2008–2009; up to 8 years post-graduation).

Measures and variables

Variables from the NLTS2 database that best represented the constructs of interest were selected for inclusion in this study. Demographic variables were obtained from the Wave 1 Parent Survey. O&M skills in the school campus environment were assessed using the 10-item Teaching Age-Appropriate Purposeful Skills (TAPS) campus environment checklist (Pogrund et al., 1995). Campus travel skills were rated on a three-point ordinal scale: 1 = not very well, 2 = pretty well, and 3 = very well. O&M skills in the community were evaluated based on three parent-reported items that represented the independence in community settings of

Table 1
Items and Cronbach's alphas for scales.

Scale	Alpha
Campus travel	.95
Travel using a sighted guide	
Travel indoors using routes learned by rote	
Travel to school buildings using routes learned by rote	
Create new routes between familiar places indoors	
Travel to an unfamiliar location in a building	
Travel to an unfamiliar location in another building	
Locate an unfamiliar place using numbering systems	
Orient self to a room	
Solicit help to orient self to a building	
Community travel	.83
Get to places outside the home	
Use public transportation to get around town	
Arrange a plane or train trip to go out of town	
Outcome expectations	.61
Likelihood of getting a paid job	
Likelihood of supporting self financially	
Likelihood of living independently	

participants. Community travel variables were measured on a four-point ordinal scale: 1 = not at all well, 2 = not very well, 3 = pretty well, and 4 = very well. Three items reported by the youths studied represented the expectations for future independence of the participants. Responses were initially rated on a four-point ordinal scale: 1 = definitely will, 2 = probably will, 3 = probably won't, and 4 = definitely won't, but variables were reverse coded for consistency in the present study. Table 1 lists specific items included in each scale. Employment outcome measures came from a dichotomous youth-reported item from Waves 4 and 5: "Do you have a paid job now, other than work around the house?"

Data analysis

Preliminary analyses were conducted to examine descriptive statistics for each variable. Individual scores were summed to create campus travel, community travel, and outcome expectations scales, and the internal consistency of each scale was evaluated using Cronbach's alpha (see Table 1). Frequencies and patterns of missing values were examined, and missing data for individual variables ranged from 0% to 56%.

To adjust for the missing data, multiple imputation (a statistical technique used to analyze datasets with missing values) was conducted using SAS statistical software (v9.2). The SAS multiple imputation procedure was used to produce 40 complete datasets by replacing each missing value with a random sample of probable values to produce unbiased estimates that generalize to the population of interest (Rubin, 1987; Yuan, 2010). The time series plots, autocorrelation plots, and multiple imputation degrees of freedom were investigated to assess the stability of the multiple imputation estimates, and all diagnostic measures were acceptable (Graham, 2012).

Descriptive statistics were examined for campus travel skills, community travel skills, outcome expectations, and employment by level of vision and additional disabilities. Pearson's correlations were used to evaluate linear relationships between each predictor and outcome variable. Bivariate logistic regressions were conducted to evaluate the significance of each predictor for inclusion in the multivariate models. Finally, two binomial multiple

logistic regressions were performed to predict the probability of employment based on campus travel skills, community travel skills, and outcome expectations, holding age and level of vision constant. NLTS2's stratified clustered sampling design was accounted for through (a) adjustment of standard errors using the SURVEYMEANS, SURVEYFREQ, and SURVEYLOGISTIC procedures; and (b) inclusion of the appropriate cross-wave sampling weight (*wt_AnyPYProg*), provided by SRI International.

Results

Campus travel

The campus travel scale consisted of 10 items, with possible scores ranging from 10 to 30. For the full sample, the mean campus travel score was 24.26 (SE = .37). Among students with no additional disabilities, those with low vision had the highest scores (M = 26.71, SE = .40), and those with total blindness scored slightly lower (M = 23.61, SE = .97). For students with additional disabilities, students with low vision scored 22.36 (SE = .82), and students with total blindness scored 19.31 (SE = .93).

Community travel

The community travel scale consisted of three items, with possible scores ranging from 3 to 12. The full sample mean for community travel was 7.69 (SE = .21). Students with low vision and no additional disabilities scored highest (M = 8.75, SE = .24), followed by those with total blindness and no additional disabilities (M = 7.95, SE = .34). Scores were lower for students with low vision and additional disabilities (M = 7.03, SE = .32), and students with total blindness and additional disabilities (M = 4.75, SE = .53).

Outcome expectations

The outcome expectations scale consisted of three items, with possible scores ranging from 3 to 12. The mean for the full sample was 10.70 (SE = .11). Students with low vision and no additional disabilities had the highest scores (M = 11.21, SE = .09), followed by students with total blindness and no additional disabilities (M = 11.16, SE = .27), students with low vision and additional disabilities (M = 9.82, SE = .21), and students with total blindness and additional disabilities (M = 9.60, SE = .40). Table 2 contains a summary of campus travel, community travel, and outcome expectations scores.

Employment

Overall, 37% of young adults with visual impairments were employed in Wave 4 (up to six years post–high school) and 40% were employed in Wave 5 (up to eight years post–high school). Figure 1 shows employment for subgroups across waves. Regardless of multiple disability status, youths with low vision had higher employment rates than those with total blindness. Furthermore, employment rates for all subgroups were slightly higher in Wave 5 than in Wave 4.

Correlational analysis

Table 3 depicts correlations between predictor and outcome variables. The strongest correlations were found between community travel skills and Wave 4 employment (r = .38, $p < .001$), and outcome expectations and Wave 5 employment (r = .29, $p < .001$).

Table 2
Weighted means by vision and additional disabilities.

Variable	Mean	*SE*	95% CI	Min.	Max.
Campus travel					
Full sample	24.26	.37	23.54, 24.98	23.95	24.63
Low vision, no add dis	26.71	.40	25.92, 27.49	26.20	26.94
Low vision, add dis	22.36	.82	20.75, 23.98	21.22	23.34
Blind, no add dis	23.61	.97	21.70, 25.53	22.17	24.74
Blind, add dis	19.31	.93	17.49, 21.13	18.26	20.15
Community travel					
Full sample	7.69	.21	7.27, 8.11	7.56	7.88
Low vision, no add dis	8.75	.24	8.28, 9.22	8.49	9.01
Low vision, add dis	7.03	.32	6.40, 7.66	6.81	7.26
Blind, no add dis	7.95	.34	7.27, 8.62	7.79	8.18
Blind, add dis	4.75	.53	3.71, 5.79	4.51	4.94
Outcome expectations					
Full sample	10.70	.11	10.48, 10.92	10.59	10.85
Low vision, no add dis	11.21	.09	11.04, 11.38	11.10	11.30
Low vision, add dis	9.82	.21	9.41, 10.24	9.58	10.04
Blind, no add dis	11.16	.27	10.63, 11.68	10.74	11.45
Blind, add dis	9.60	.40	8.82, 10.39	8.89	10.35

Weighted n = 9,940; "add dis" = additional disabilities.

Wave 4 employment

Preliminary bivariate regression analyses revealed two significant predictors of employment in Wave 4 (up to six years post–high school): (a) community travel (B = .26, p = .001) and (b) vision (B = .81, p = .03). Community travel was included in the multivariate model, along with two control variables, vision and age. Holding age and vision constant,

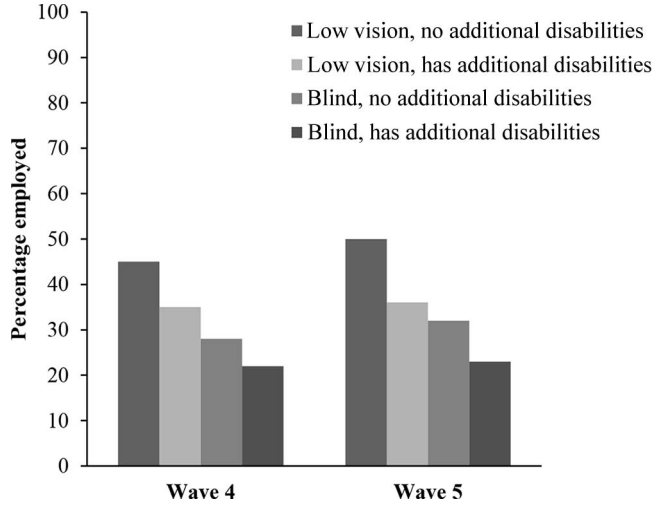

Figure 1. Employment rates for youths with visual impairments. The bar graph depicts a breakdown of employment rates by vision and additional disabilities for Waves 4 and 5 of the National Longitudinal Transition Study–2.

Table 3
Correlations between variables used in regression analyses.

Variable	Wave 4 employment	Wave 5 employment
Campus travel	.13	.26***
Community travel	.38***	.12
Outcome expectations	.06	.29***
Vision	.19***	.25***
Age	.14*	.17**

*$p < .05$, **$p < .01$, ***$p < .001$.

the results (shown in Table 4) indicated that youths with high community travel scores were significantly more likely to be employed in Wave 4 ($B = .25$, $p = .003$, $OR = 1.28$). Thus, the predicted odds of employment in Wave 4 increase by 28% for each one-unit increase in scores on the community travel scale.

Wave 5 employment

Preliminary bivariate logistic regression results indicated that three variables significantly predicted employment in Wave 5 (up to eight years post–high school): (a) outcome expectations ($B = .36$, $p = .03$), vision ($B = .81$, $p = .05$), and campus travel ($B = .09$, $p = .02$). Campus travel and community travel were included in the multivariate model, along with two control variables, vision and age. As shown in Table 4, the final model did not include campus travel, as this variable was not significant in the multivariate model. Holding age and vision constant, youths with high scores on the outcome expectations scale were significantly more likely to be employed in Wave 5 ($B = .33$, $p = .04$, $OR = 1.40$). Thus, the predicted odds of employment in Wave 5 increase by 40% for each one-unit increase in scores on the outcome expectations scale.

Discussion

In the study presented here, predictors of post-school employment were examined in a nationally representative sample of adolescents with visual impairments. Controlling for age and vision, youths with high ratings on community travel skills were significantly more likely to be employed up to six years post–high school, and youths with high outcome expectations were significantly more likely to be employed up to eight years post–high school. These findings are consistent with prior research that indicated that independent travel skills are associated with employment for youths with visual

Table 4
Logistic regression results.

Parameter	EST	*SE*	95% CI	*t*	*p*	Odds ratio
Wave 4						
Intercept	−6.88	3.12	−13.04, −.72	−2.21	.03	
Community travel	.25	.08	.09, .41	3.04	.003	1.28
Vision	.48	.39	.28, 1.24	1.24	.21	1.62
Age	.25	.17	−.08, .58	1.51	.13	1.29
Wave 5						
Intercept	−8.61	3.75	−16.03, −1.19	−2.30	.02	
Outcome expectations	.33	.16	.02, .65	2.04	.04	1.40
Vision	.72	.40	−.07, 1.50	1.77	.08	2.08
Age	.25	.16	−.06, .56	1.62	.11	1.29

impairments (McDonnall, 2011; Wolffe & Kelly, 2011). This study provides a more comprehensive picture of the association between O&M and employment by distinguishing between the O&M skills necessary for travel on a school campus and the skills needed for independent travel in the community. Prior research has shown that outcome expectations predict post-school success for youths with disabilities (Lindstrom et al., 2011). Findings from this study support the association between positive outcome expectations and post-school employment for students with visual impairments.

The variables that did not predict employment in this study warrant further discussion. Campus travel skills did not significantly predict the likelihood of employment six to eight years post–high school. Although several of the campus travel variables (for instance, travel to an unfamiliar location in a building) appear to be important for employment, others (for instance, travel indoors using routes learned by rote) represent rote learning that may not be applicable to settings beyond the school campus. On the other hand, the community travel variables may represent an overall sense of independence (McDonnall, 2011) and a complex skill set that has high relevance and applicability to employment settings.

An unexpected finding was that community travel skills and outcome expectations did not significantly predict the likelihood of employment in both regression models. Future research could clarify and extend these results by accounting for other forms of engagement that may precede employment for these youths (for example, postsecondary education) and methodological issues related to measurement of O&M skills. NLTS2 did not use a validated observational measure of O&M skills; thus, parents and professionals may have misrepresented students' skills. Furthermore, since data collection for O&M-related variables took place during the first two waves of NLTS2, the current study did not account for fluctuations in O&M skills that could have occurred in the four to eight years that passed between measurement of O&M skills and employment outcomes for these youths.

Implications for practice

Federal reform efforts could "produce unintended and potentially negative consequences for youth[s] with disabilities preparing for adult roles in the community" (Lindstrom et al., 2011, p. 432). With the current emphasis of policy on academic rigor and accountability, the importance of authentic community experiences in natural environments cannot be overlooked. Results of this study suggest that independently traveling to places outside the home, using public transportation, and arranging airplane or train trips are predictive of later employment for adolescents with visual impairments. These experiences can be facilitated through avenues such as off-campus O&M instruction, transition programs, and summer programs, and can be further supported by family involvement.

The distinction between possession of knowledge and skills and actual usage of the skills under demanding conditions is largely dependent on one's efficacy beliefs (Bandura, 1993). Accordingly, people with similar skills may "perform poorly, adequately, or extraordinarily, depending on whether their self-beliefs of efficacy enhance or impair their motivation and

problem-solving efforts" (Bandura, 1988, p. 279). Families and professionals play important roles in promoting self-efficacy and encouraging high, realistic outcome expectations for students with visual impairments.

Self-efficacy is influenced by (a) performance accomplishments; (b) vicarious experiences; (c) verbal or social persuasion; and (d) emotional arousal or psychological responses to threatening situations (Bandura, 1977). To promote high self-efficacy and positive outcome expectations, professionals can promote performance accomplishments through age-appropriate and challenging experiences. Successfully employed individuals with visual impairments can serve as role models for students. Professionals can help students build confidence by providing verbal feedback that emphasizes students' progress and strengths (Bandura, 1993). Professionals should also address negative psychological responses (for instance, fear and anxiety), as these responses may undermine self-efficacy.

Limitations

Secondary analysis of large-scale survey research has known limitations, including missing data, limited depth of information, and the inability of the researcher to control the content of the questions asked. Consequently, this study was constrained by the variables available in the NLTS2 dataset, as well as by high rates of missing data. The best available representations of each construct were selected from the dataset, but these variables may not be the best indication of a given construct. For example, a direct observational measure of O&M skills may provide a more accurate account of students' skills. Despite these limitations, the present study's strengths include its generalizability, large sample size, and use of multiple imputation to account for missing data.

Future research could build on the strengths of NLTS2, such as its sample and scope, while providing greater depth of focus in areas of the ECC, including O&M. Inquiry into quality, content, and consistency of O&M instruction could provide insight into instructional factors that promote O&M skill development and future outcomes. Moreover, further investigation of self-efficacy and outcome expectations among this population may lead to an increased understanding of factors associated with positive outcomes. Additional examination of NSTTAC's evidence-based predictors of post-school success can aid in determining key program characteristics for students with visual impairments.

Moving forward, empirically supported predictors should be incorporated into transition services for students with visual impairments, as they "provide information about secondary transition program characteristics that are empirically linked to improved post-school success for students with disabilities" (Mazzotti, Test, & Mustian, 2014, p. 9). To advance the field of visual impairment and improve post-school outcomes, these efforts need to be documented and disseminated through rigorous empirical research.

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