

In-School Predictors of Post-School Employment for Youth who are Deaf-Blind

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### In-School Predictors of Post-School Employment for Youth who are Deaf-Blind

#### **Abstract**

Youth with deaf-blindness have difficulty transitioning to adulthood and experience poor employment outcomes, yet research on this population is limited. To identify predictors of post-school employment outcomes for transition-age youth who are deaf-blind, we conducted multiple logistic regression analyses using data from Waves 1-5 of the National Longitudinal Transition Study-2. Significant predictors of post-school employment were paid high school work experiences and parent expectations. Significant predictors of continuous employment were number of additional disabilities, vocational education services, and parent expectations. Implications for practice include educating parents about employment options early in youths' lives, encouraging youth to obtain early work experiences, and ensuring that youth have access to vocational education services.

**Keywords:** deaf-blind, transition, employment, parent expectations, vocational education

### In-School Predictors of Post-School Employment for Youth who are Deaf-Blind

Deaf-blindness is a low-incidence, heterogeneous, and complex disability affecting approximately 9,574 infants, children, and youth in the U.S. (National Center on Deaf-Blindness [NCDB], 2016). The *Individuals with Disabilities Education Act* (2004) defines deaf-blindness as “concomitant hearing and visual impairments, the combination of which causes such severe communication and other developmental and educational needs that they cannot be accommodated in special education programs solely for children with deafness or children with blindness” (34 C.F.R. § 300.8[c] [2]). In addition to wide variability in their vision and hearing, many children and youth with deaf-blindness have complex medical needs, behavioral challenges, and additional disabilities (NCDB, 2016). Among all youth with disabilities, youth with deaf-blindness have the highest number and greatest severity of functional limitations and are one of the groups that have the most difficulty with post-school transitions (Lipscomb et al., 2017). These youth have consistently low rates of post-school employment and independent living (Petroff, 2001, 2010).

Research on transition-age youth who are deaf-blind is limited and research on predictors of employment for these youth is nonexistent, perhaps due to the low prevalence and high diversity of this population (NCDB, 2016; Petroff, 2010). To identify factors that may be associated with post-school employment for youth who are deaf-blind, we evaluated empirical research on youth with other disabilities. We used findings from two systematic reviews that identified predictors of post-school success for youth with disabilities (Mazzotti et al., 2016; Test et al., 2009) as a foundation for identifying possible predictors. We then reviewed research on employment outcomes for youth with a single sensory loss (i.e., those who are blind or visually impaired [B/VI] or deaf or hard of hearing [DHH]).

Test and colleagues (2009) identified 16 evidence-based predictors of post-school employment for youth with disabilities: career awareness, community experiences, exit exam requirements/high school diploma status, inclusion in general education, interagency collaboration, occupational courses, paid work experience, parental involvement, program of study, self-determination/self-advocacy, self-care/independent living, social skills, student support, transition program, vocational education, and work study. In another systematic review, Mazzotti and colleagues (2016) found additional evidence for most predictors established by Test and colleagues (i.e., all except interagency collaboration, self-determination, transition program, community experiences, occupational courses, and program of study) and they identified four new predictors: parent expectations, goal setting, youth autonomy/decision-making, and travel skills.

Several predictors of employment identified in studies focusing on transition-age youth with B/VI and DHH align with the evidence-based predictors identified in the systematic reviews (Mazzotti et al., 2016; Test et al., 2009), although those reviews only included two B/VI studies on transition-age youth (McDonnall, 2011, McDonnall & O'Mally, 2012). Longitudinal datasets such as the National Longitudinal Transition Study-2 (NLTS2) provide an ideal opportunity for researchers to study low-incidence populations; thus, most researchers used NLTS2 data in the studies on predictors of employment for youth with B/VI and DHH presented in the following sections. In the four studies that were *not* based on NLTS2, researchers used data from the Rehabilitation Services Administration (Giesen & Cavanaugh, 2012), Longitudinal Study of the Vocational Rehabilitation (VR) Services Program (McDonnall & Crudden, 2009), National Longitudinal Survey of Youth 1997 (McDonnall, 2010), and a retrospective investigation of youth and young adults who are deaf (Bullis, Bull, Johnson, & Peters, 1995).

Researchers have included work and vocational variables in post-school outcome studies of youth with B/VI and DHH. Paid work experience has the most research support among these populations (Connors, Curtis, Wall Emerson, & Dormitorio, 2014; Coyle, 2012; Giesen & Cavanaugh, 2012; McDonnall, 2010, 2011; McDonnall & Crudden, 2009; McDonnall & O'Mally, 2012). Findings regarding other vocational factors were less conclusive across sensory disability categories. For instance, career awareness predicted post-school employment for youth with B/VI (Giesen & Cavanaugh, 2012; Wolffe & Kelly, 2011), but this variable was not studied in the DHH population. Furthermore, Giesen and Cavanaugh (2012) documented positive associations between receipt of vocational services and employment of youth with B/VI; however, Cawthon, Wendel, Bond, and Garberoglio (2016) found no significant relationship between vocational coursework and employment for youth who are DHH.

Several other evidence-based predictors of post-school success had significant relationships with employment for youth who are B/VI and/or DHH. School-related predictors were high school completion (Connors et al., 2014; Coyle, 2012), inclusion in a general education classroom for more than 79% of the day (Coyle, 2012), and agency involvement (having agency personnel at Individualized Education Program [IEP] meetings; Coyle, 2012). Researchers have also explored relationships between youth autonomy, parent-related variables, and employment outcomes. Autonomy was associated with hourly wages and job advancement among youth who are DHH, but not the number of jobs held since high school (Garberoglio, Schoffstall, Cawthon, Bond, & Caemmerer, 2016). In the DHH population, parent expectations predicted post-school employment (Cawthon, Garberoglio, Caemmerer, Bond, & Wendel, 2015) and also had an indirect effect on hourly wages via autonomy (Garberoglio et al., 2016). Additionally, parental support (conceptually considered a part of parental involvement) predicted

post-school employment for youth who are B/VI (McDonnall, 2010), but parental involvement did not predict employment for those who are DHH (Cawthon et al., 2015). Other predictors of employment for youth with B/VI that coincide with the literature on youth with other disabilities are independent living skills (Monson, 2009), independent travel skills (Cmar, 2015; McDonnall, 2011; Wolffe & Kelly, 2011), self-determination (McDonnall & Crudden, 2009; Monson, 2009), and social skills (McDonnall, 2011; Monson, 2009).

We identified an additional 12 predictors of post-school employment (including several demographic variables) in the B/VI and/or DHH literature. These variables include assistive technology (McDonnall & Crudden, 2009; Wolffe & Kelly, 2011), math and verbal aptitude (McDonnall, 2010; McDonnall & Crudden, 2009), parent satisfaction (Coyle, 2012), and youth expectations (Cmar, 2015). Garberoglio, Cawthon, and Bond (2014) found no relationship between English literacy and employment for youth who are DHH; however, English literacy was a significant predictor of hourly wages. Furthermore, transportation difficulties were a negative predictor of employment (McDonnall, 2011).

Several researchers have examined relationships between demographic variables and post-school employment for youth who are B/VI and DHH. In the B/VI population, African American youth were less likely to be employed than white youth (Giesen & Cavanaugh, 2012), and Hispanic ethnicity was associated with higher odds of employment (Giesen & Cavanaugh, 2012) and more hours worked (McDonnall, 2010). Researchers have reported mixed findings in regards to gender. Zhou, Smith, Parker, and Griffin-Shirley (2013) found no relationship between gender and employment for youth with B/VI whereas Giesen and Cavanaugh (2012) found that females had lower odds of employment. Conversely, females who are DHH and attended mainstream schools were more likely to be employed (Bullis et al., 1995). Family

income had a positive association with post-school employment for youth who are B/VI and DHH (Connors et al., 2014; Garberoglio et al., 2014). Receipt of Supplemental Security Income (SSI) benefits was a negative predictor of future employment for youth with B/VI (Giesen & Cavanaugh, 2012), although McDonnall (2011) found that SSI was not a significant predictor when combined with other variables.

B/VI researchers have also studied relationships between disability and health variables and employment. Youth with B/VI and additional disabilities were less likely to have paid jobs than youth who were only B/VI (Connors et al., 2014; Giesen & Cavanaugh, 2012; Zhou et al., 2013). Youth with good to excellent self-reported health had higher odds of future employment than youth with fair or poor health (McDonnall, 2010). In addition, youth with low vision had higher rates of paid employment than youth with a more severe vision loss (Connors et al., 2014; Giesen & Cavanaugh, 2012).

Some previous NLTS2 post-school outcome studies included youth who are deaf-blind (e.g., Doren, Gau, & Lindstrom, 2012; Wagner, Newman, & Javitz, 2014); however, researchers grouped youth who are deaf-blind with youth from other disability categories so findings specific to youth with deaf-blindness cannot be disaggregated. Identification of in-school factors that predict later employment outcomes for youth with deaf-blindness can yield valuable information for shaping future educational and vocational programming for this population. The purpose of this exploratory study was to investigate predictors of post-high school employment for youth who are deaf-blind using NLTS2 data. The research questions guiding our study were:

1. What factors best predict any post-school employment for youth who are deaf-blind?
2. What factors best predict continuous post-school employment for youth who are deaf-blind?

## **Method**

### **Data Source**

We conducted a secondary analysis of data from the NLTS2, a comprehensive longitudinal study that aimed to investigate the experiences of youth with disabilities during secondary school and while they transitioned to post-school life. SRI International conducted NLTS2 from 2001-2009 with funding from the U.S. Department of Education. Data collection took place at five time points, or waves, spaced approximately two years apart. NLTS2 researchers used a two-stage stratified clustered random sampling process to identify a nationally representative sample of transition-age youth who received special education services. First, researchers selected a stratified sample of Local Education Agencies (LEA) and state-run special schools for students with visual or hearing impairments. Second, researchers randomly selected students from the LEAs and state special schools (see Wagner, Kutash, Duchnowski, & Epstein, 2005); they selected all students with deaf-blindness from the LEAs and special schools due to the low-incidence nature of this disability (Newman et al., 2011). The NLTS2 sample included roughly 11,270 youth from 12 federally identified disability categories who were 13 to 16 years old in December 2000 (SRI International, 2000).

### **Sample**

For the current study, we restricted our analysis sample to youth with deaf-blindness as their primary disability. NLTS2's primary disability categories relied on school district disability classifications, with the exception of deaf-blindness. School districts routinely assigned some students with deaf-blindness to other primary disability categories, namely hearing impairment, visual impairment, and multiple disabilities. Strictly adhering to district-assigned categories would have resulted in only 20 youth being assigned to the NLTS2 deaf-blind category (Wagner,

Newman, Cameto, Levine, & Marder, 2007); thus, NLTS2's deaf-blind category also included about 150 additional youth who had both visual and hearing impairments per school district *or* parent report. We further restricted our analysis sample to youth with available data from: (a) at least one post-high school Parent/Youth Survey and (b) the two post-school employment variables used as dependent variables in our analyses. Although the NLTS2 dataset includes approximately 170 youth with deaf-blindness, applying the inclusion criteria reduced our final analysis sample to approximately 100 (weighted  $N = 2820$ ). Because the Institute of Education Sciences manages the NLTS2 dataset, we rounded all weighted and unweighted sample sizes to the nearest 10 to comply with their restricted-use data reporting requirements.

## **Measures and Variables**

### ***NLTS2 Measures***

During NLTS2, youth with disabilities, and their parents/guardians, teachers, and other school personnel provided data through interviews, surveys, direct assessments, and transcripts. Every 2 years, parents and/or youth completed the *Parent/Youth Survey* via structured telephone interviews or by mail on topics such as youths' characteristics, secondary school experiences, and post-school outcomes. Parents completed surveys in Waves 1-5, and youth completed surveys in Waves 2-5 (if their parents said they could respond to survey questions on their own). In Waves 1-2, youth completed either a *Direct Assessment* of academic performance, self-concept, self-determination, and school motivation, or an *Alternate Assessment* of independent functioning, adaptive behavior, and problem behavior. Researchers collected *transcripts* throughout the study to obtain information about youths' courses, grades, and attendance. Various school personnel also completed mail surveys on: (a) classroom practices and youth performance; (b) youth's overall school program and in-class performance; and (c) school

characteristics, students, policies, and performance.

### ***Dependent Variables***

The two dependent variables were: *any post-high school employment* and *continuous employment*. We created both variables using any available post-school Parent/Youth Survey from Waves 2-5. We coded *any post-high school employment* as “1” if youth had a paid job after leaving high school and “0” if youth did not work after high school. For youth who worked after high school, we coded *continuous employment* as “1” if they held their longest post-high school job for more than 6 months and “0” if they did not work or worked for 6 months or less.

### ***Independent Variables***

Given the lack of research on employment outcomes for youth who are deaf-blind, we used previous research on employment predictors for transition-age youth who are B/VI, DHH, or have other disabilities to guide initial selection of independent variables. We extracted NLTS2 variables aligned with the 32 constructs identified in our literature review and used descriptive statistics to identify instances where multiple waves or measures included the same questions. When possible, we combined data from these waves/measures to minimize missing data. Most combined variables included data from Waves 1 and 2, although some incorporated data from later waves when youth were still in secondary school. After examining descriptive statistics for the combined variables, we eliminated 11 variables that had extensive (i.e., > 40%) missing data. To identify independent variables for our multivariate models, we conducted univariate analyses (i.e., chi-square for nominal/ordinal variables and logistic regression for continuous variables) between variables representing the remaining 21 constructs and the two dichotomous dependent variables. We retained nine variables (described in the following paragraphs) for further analysis based on significant relationships (at  $p < .05$ ) with either or both dependent variables.

We created four dichotomous variables for inclusion in the models. We defined *work experience* as whether youth ever worked for pay while in high school (1 = yes, 0 = no), and *vocational education services* as whether youth received career counseling, help finding a job, job skills training, or vocational education services at any time during high school per parent report (1 = yes, 0 = no). For *computer use*, parents indicated whether youth used a computer for homework/school assignments, games, and/or internet (1 = yes, 0 = no). We defined *high school diploma* as receipt of a regular high school diploma based on youths' secondary school transcripts (if available) or a variable indicating high school leaving status (1 = yes, 0 = no).

The remaining five independent variables included data from the Parent/Youth Survey. For *self-care* skills, we summed parents' ratings of how well youth dressed and fed him/herself independently (1 = not at all well, 2 = not very well, 3 = pretty well, 4 = very well [2-8 scale]). For *independent travel*, parents indicated how well youth got to places outside the home independently (1 = not at all well, 2 = not very well, 3 = pretty well, 4 = very well). We created a *communication* variable using the sum of how well youth communicated, conversed, and understood what people said (reverse coded: 1 = does not do at all, 2 = a lot of trouble, 3 = a little trouble, 4 = no trouble [4-12 scale]). We created a *parent expectations* variable using the sum of parents' ratings of the likelihood of youth getting a paid job and earning enough to be self-supporting (reverse coded: 1 = definitely won't, 2 = probably won't, 3 = probably will, 4 = definitely will [2-8 scale]). For *parent involvement* we used the sum of how often a parent/guardian attended school meetings, attended school/class events, and volunteered at school (0-12 scale, where 0 = no involvement and 12 = high involvement).

Including all potential variables in the multivariate models could produce unstable estimates given the small sample size and relatively large number of potential independent

variables (Hosmer & Lemeshow, 2000; Peduzzi, Concato, Kemper, Holford, & Feinstein, 1996). To determine the maximum number of independent variables for each model, we followed the *10 events per parameter* guidelines established by Hosmer and Lemeshow (2000) based on Peduzzi and colleagues' (1996) research, where *events* refer to the least frequently occurring outcome and *parameters* refer to the number of independent variables plus one. Based on these guidelines, we could include a maximum of four variables in the any post-high school employment model and three variables in the continuous employment model. We chose four independent variables to include in the models after conducting preliminary multiple logistic regression analyses with different combinations of significant variables from the univariate analyses. We then added the non-significant variables from the univariate analyses to the models to identify any additional variables that are important to the outcomes when considered alongside other variables (Hosmer & Lemeshow, 2000). Based on this step, we selected another variable (*additional disabilities*) for inclusion in the final analyses, defined as the number of disabilities other than the youth's primary disability reported by the parent in Wave 1. See Table 1 for Pearson's correlations among the variables considered for inclusion in the final models. The final five independent variables (all from the Parent/Youth Survey) were additional disabilities, work experience, vocational education services, parent expectations, and independent travel. <TABLE 1 here>

### **Data Analysis**

We examined frequencies and patterns of missing data; missing data ranged from 0 to 8.7% for the independent variables. Missing data patterns were non-monotone, and 86.5% of cases had complete data available for the variables of interest. Listwise deletion (complete case analysis) would reduce power for the regression analyses and potentially produce biased results. Thus, we reviewed alternatives for handling missing data and selected multiple imputation due to

its ability to produce unbiased estimates and preserve relationships between variables, while accounting for the uncertainty of the missing values (Graham, 2012; Yuan, 2010).

Data analysis using multiple imputation involves three distinct steps, which we completed with SAS (v9.4). First, we used the MI procedure to generate 20 complete datasets by substituting a random sample of missing values for each missing value (Rubin, 1987). Auxiliary variables (i.e., extra variables that are highly correlated with analysis variables that have missing data or with missingness itself) can increase multiple imputation's effectiveness by accounting for some information that is lost due to missing data (Graham, 2012). Accordingly, the imputation model included the five independent variables, two dependent variables, and two auxiliary variables: (a) functional mental skills and (b) mother, father, and/or legal guardian had some postsecondary education. Our review of the multiple imputation diagnostic measures (i.e., time series plots, autocorrelation plots, and multiple imputation degrees of freedom) indicated that the imputed estimates were stable (Graham, 2012). Next, we analyzed the 20 imputed datasets using standard statistical methods. We conducted two multiple logistic regression analyses to predict the probability of any post-high school employment and continuous employment based on in-school factors. To adjust for NLTS2's complex sampling design, we used a sampling weight (wt\_AnyPYPHS) for all analyses and obtained adjusted standard errors via SAS survey procedures. Then, we pooled the results using the MIANALYZE procedure, which produced a point estimate (i.e., the average across all imputed datasets) and standard error for each parameter according to Rubin's rules for multiple imputation inference (Rubin, 1987). The standard errors reflect the typical sampling variability and the additional between-imputation variability resulting from the missing data (Graham, 2012; Rubin, 1987). Rubin's rules require normally distributed parameters and odds ratios have a log-normal distribution; therefore, we

obtained odds ratios by applying a normalizing (logarithmic) transformation, using PROC MIANALYZE to pool the transformed estimates, and then back-transforming the estimates to their original scale (Ratitch, Lipkovich, & O’Kelly, 2013).

## Results

### Demographics and Descriptive Statistics

In Wave 1 of NLTS2, youths’ ages ranged from 13 to 17 years old ( $M = 15.38$ ,  $S.E. = 0.11$ ). Most youth were male (65.5%,  $S.E. = 4.37$ ); 63.5% ( $S.E. = 5.84$ ) were white, 22.5% ( $S.E. = 4.59$ ) were Hispanic, 12.2% ( $S.E. = 3.50$ ) were African-American, and 1.8% ( $S.E. = 1.21$ ) were Asian/Pacific Islander. For annual household income, 33.7% ( $S.E. = 3.18$ ) earned \$50,000 or more per year; 33.7% ( $S.E. = 3.71$ ) earned between \$25,001 and \$50,000; 29.8% ( $S.E. = 3.81$ ) earned \$25,000 or less; and 2.9% ( $S.E. = 1.34$ ) did not report income. Almost half (45.2%,  $S.E. = 3.32$ ) attended a school that served only students with disabilities. The majority of the sample had some degree of vision and hearing (73.0%,  $S.E. = 3.79$ ); however, 11.8% ( $S.E. = 3.73$ ) were completely deaf and had a visual impairment, 11.6% ( $S.E. = 2.48$ ) were completely blind and had a hearing impairment, and 3.5% ( $S.E. = 0.90$ ) were completely deaf and completely blind.

Parents reported that youth had 0 to 6 additional disabilities ( $M = 1.54$ ,  $S.E. = 0.17$ ). More than a third (36.8%,  $S.E. = 4.47$ ) of these youth had no additional disabilities. The most commonly reported additional disabilities were health impairment (30.2%,  $S.E. = 3.97$ ), physical or orthopedic impairment (27.8%,  $S.E. = 4.31$ ), and speech disorder (20.4%,  $S.E. = 3.35$ ). Parents reported that 62.7% ( $S.E. = 4.10$ ) of youth had hearing aids and 4.0% ( $S.E. = 1.45$ ) had cochlear implants. The most commonly reported communication method was oral speech (75.1%,  $S.E. = 4.47$ ), followed by sign language (47.7%,  $S.E. = 5.84$ ), lip reading (32.8%,  $S.E. = 4.93$ ), cued speech (12.8%,  $S.E. = 2.87$ ), and communication board/book (12.3%,  $S.E. = 3.32$ );

19.3% (S.E. = 3.83) used another (non-specified) communication method.

Most youth (68.3%, S.E. = 4.60) received vocational education services (which included one or more of the following: career counseling, vocational education courses, help finding a job, and/or job skills training) during secondary school. Of youth who received vocational education services, 92.6% (S.E. = 2.05) received them at school or through the school district. Less than half of youth (44.0%, S.E. = 3.84) held a paid job at any time while attending secondary school. Youths' independent travel skills varied, with values ranging from 1 (*not at all well*) to 4 (*very well*; M = 2.40, S.E. = 0.09). Values for parent expectations ranged from 2 to 8 (M = 5.39, S.E. = 0.16), with 2 indicating the youth definitely won't get a job at all and 8 indicating the youth definitely will obtain a job and definitely will be self-supporting.

### **Predictors of Post-High School Employment**

More than half of youth (53.8%, S.E. = 3.71) had a paid job within 8 years after leaving high school, but only 38.5% (S.E. = 4.03) held a post-high school job for more than 6 months. We built two multiple logistic regression models by entering the five independent variables (additional disabilities, work experience, vocational education services, parent expectations, and independent travel) into the models and, in an effort to produce parsimonious models with reliable estimates, removing variables that did not contribute to the models. As a result, we did not include independent travel in either of the final models.

#### ***Model 1: Any Post-High School Employment***

The multiple logistic regression model predicting any post-high school employment for youth who are deaf-blind included four variables: additional disabilities, work experience, vocational education services, and parent expectations. Work experience and parent expectations were associated with higher likelihood of post-high school employment (see Table 2). Holding

other variables constant, the odds of employment were 2.96 times higher for youth with paid work experience in high school compared to those without paid work experience. For each 1-unit increase in parent expectations, the odds of employment increased by 1.59. <TABLE 2 here>

### ***Model 2: Continuous Employment***

The multiple logistic regression model predicting continuous employment included three variables: additional disabilities, vocational education services, and parent expectations (see Table 2). The odds of continuous employment were 2.65 times higher for youth who received career counseling, help finding a job, job skills training, and/or vocational education courses in high school compared to those who did not receive any vocational education services. For each 1-unit increase in parent expectations, the odds of continuous employment increased by 1.68.

Despite additional disabilities having virtually no univariate association with the outcome variable, after adjusting for parent expectations and vocational education services, the odds of continuous employment increased as the number of additional disabilities increased. Specifically, the odds of continuous employment increased by 1.43 with each additional disability. This association only held when the model included parent expectations. When we removed parent expectations from the model, additional disabilities was no longer significant; however, parent expectations was significant regardless of the presence or absence of additional disabilities.

### **Discussion**

The purpose of this study was to examine factors predicting post-school employment outcomes for youth with deaf-blindness through secondary analysis of data from NLTS2. Results indicated that high parent expectations significantly predicted post-high school employment and continuous employment. Paid work experience in high school also predicted post-school employment. Furthermore, number of additional disabilities and receipt of vocational education

services were significant predictors of continuous employment. Our findings add to the literature on predictors of employment for transition-age youth with B/VI, DHH, and other disabilities, while providing new insight into youth who are deaf-blind.

Parental expectations of youths' future employment was the strongest predictor of both having a job after high school and holding a job for longer than 6 months. Despite differences in the sample and outcome variables, our results align with previous research indicating that parent expectations are associated with post-school employment for youth with various disabilities (Cawthon et al., 2015; Doren et al., 2012; Wehman et al., 2015). These collective results support the importance of parent expectations across disability categories and employment-related outcome variables. Still, we cannot be certain of the nature of the relationship between parent expectations and future employment, in terms of a casual versus a correlational relationship. Parent expectations were highly correlated with self-care skills, communication skills, independent travel skills, computer use, and receipt of a regular diploma (which indicates better academic skills) for our sample. Many children and youth who are deaf-blind receive specialized instruction in these skill areas and others from teachers of students with visual impairments and related service providers (Petroff, 2001, 2010). Our findings reinforce the importance of involving parents in this specialized instruction, as youth who have skills in these key areas may be more likely to have the basic skills needed to work and parents are also likely to have higher expectations for them. However, parent expectations may precede youth skills, with parents sending a message to their children early in their lives that they are capable and expected to work, resulting in youth being more likely to work after high school.

Early work experiences are a commonly identified predictor of post-high school employment in other populations of youth with disabilities (e.g., Carter, Austin, & Trainor, 2012;

Coyle, 2012; McDonnall, 2011; Wagner et al., 2014; Wehman et al., 2015), so it is not surprising that paid work experience during high school was also a significant predictor for youth who are deaf-blind. This finding is particularly important for this population, as they are one of the disability groups that are least likely to work during high school (Lipscomb et al., 2017). It is important to note that high school work experience did not predict continuous post-school employment. One possible explanation is that prior studies documenting this association have measured post-high school employment differently; most often current employment at the time of the interview was the measure (e.g., Benz, Yovanoff, & Doren, 1997; Carter et al., 2012; Doren & Benz, 1998; Doren et al., 2012; McDonnall, 2011; Papay & Bambara, 2014). We did not identify any other post-high school outcome studies that used a continuous employment variable similar to ours. Another potential explanation is that finding a job is different than keeping a job, and while having prior work experience on a resume may help one find a job, it does not necessarily equate to working in a job for a longer time period.

Having a greater number of additional disabilities also significantly predicted continuous employment. Although Wagner and colleagues (2014) found that the number of functional domains affected by disability predicted competitive employment for youth with disabilities, this finding is paradoxical of what one would expect and contrary to previous research on the B/VI population (Connors et al., 2014; Giesen & Cavanaugh, 2012; Zhou et al., 2013). In the current study, number of additional disabilities was not associated with either employment variable univariately, and it had a moderate *negative* correlation with parent expectations. Furthermore, number of additional disabilities was not a significant predictor in the model unless we also included parent expectations. These findings suggest that number of additional disabilities is interacting with parent expectations in our model.

Upon closer examination of the data, our results suggest that when additional disabilities are high and parent expectations are moderate to high, youth who are deaf-blind are very likely to be working longer than 6 months, but when parent expectations for these youth are low, they are very unlikely to hold a job for this length of time. Parent expectations appear to be particularly important for youth with additional disabilities in this model, which may be associated with the fact that many youth with deaf-blindness and numerous additional disabilities require parental assistance and other supports to obtain and maintain a job (Petroff, 2001). Our findings suggest that, if parents commit to the idea that their child can work, their child is very likely to work. The fact that the additional disabilities variable only had a significant relationship with the continuous employment outcome may indicate that when youth with significant disabilities obtain a job and have adequate supports in place, they are more likely to stay in that job. Youth with less significant disabilities may be more likely to leave a job to participate in postsecondary education or to pursue other employment opportunities.

Another significant predictor of continuous employment after high school was receipt of vocational education services. This variable is considered a significant predictor of post-high school employment for youth with other disabilities (e.g., Chiang, Cheung, Li, & Tsai, 2013; Wolffe & Kelly, 2011), although researchers have defined it in different ways. Our variable could include receipt of career counseling, help finding a job, job skills training, or vocational education courses, and almost all youth who obtained these services received them from their schools. The fact that vocational education services only predicted continuous employment for youth who are deaf-blind may indicate that these services helped youth find a job that fit their interests and skills, leading to a better job match and sustained employment.

### **Limitations and Suggestions for Future Research**

This study has several limitations that are important to acknowledge. Because of the low incidence of deaf-blindness, our sample was very small, which resulted in limited power to investigate a multivariate model. Each model could support a limited number of predictor variables; therefore, we had to choose which variables to retain based on univariate analyses. We followed a rigorous testing and model development procedure in an attempt to identify the most important predictors of employment for this population, but additional significant predictors might have emerged with a larger sample. Furthermore, the small NLTS2 deaf-blind sample contributes to relatively large standard errors, and caution is required when interpreting estimates with large standard errors. Large amounts of missing data on some variables of interest also limited the variables we could include in our multivariate models. Although we used multiple imputation to handle missing data, some variables (e.g., self-determination, self-advocacy) had extensive missing data and were not viable options for our models. These variables and others that may be important predictors of employment for youth with deaf-blindness warrant future research attention. Researchers could also explore the mechanisms through which parent expectations may influence employment for this population. Qualitative research focusing on parents of youth who are deaf-blind who have high expectations can provide insight into key factors that influenced these expectations. Another avenue to explore in relation to youth who are deaf-blind is the influence of professionals' expectations on parents' expectations, and the resulting effect of these collective expectations on youths' expectations, actions, and outcomes.

One of our significant predictors, vocational education services, includes a rather wide array of potential services that youth could have received. Unfortunately, the broad nature of this variable prohibited us from determining the specific vocational education service(s) that youth received, which would have enabled us to include greater specificity in our recommendations for

practice. Finally, the NLTS2 data is becoming dated, as the last wave of data collection took place more than seven years ago. However, NLTS2 is the only nationally representative data source on a large number of deaf-blind youth that is available to researchers to date. NLTS 2012, the successor to NLTS2, is currently underway. Once post-school outcome data from NLTS 2012 become publicly available, that dataset will provide an opportunity for researchers to build upon this study's findings regarding youth who are deaf-blind.

### **Implications for Practice**

Educational and rehabilitation professionals, schools, and parents can do several important things to increase the chances that youth who are deaf-blind will achieve employment after high school. First, because parent expectations regarding future employment are a strong predictor of post-high school employment for this population, professionals should educate parents about employment possibilities for their children. Information and materials provided to parents must be accessible, understandable, and user-friendly (Pleet-Odle et al., 2016). Some parents may have doubts about a child with deaf-blindness, and potentially multiple other disabilities, being capable of holding a job in our society (Petroff, 2001, 2010). Our results indicate that parent expectations are particularly important for continuous employment after high school for youth with a greater number of additional disabilities; however, these parents could potentially have more doubts about their children's future employability.

Coinciding with a broad recommendation for early transition services for children with deaf-blindness (Zatta & McGinnity, 2016), educational professionals can begin discussing work possibilities with parents much earlier than the typical transition age, such as in early elementary school. Exposing parents to the idea that their child is capable of working early in the child's life can help parents form positive expectations about future employment when their child is young.

Exposure to individuals with deaf-blindness who work in various types of jobs can also facilitate high expectations, and having successfully employed individuals who are deaf-blind serve as role models or mentors to youth can have positive benefits for both parents and youth (Bruce & Parker, 2012; Pleet-Odle et al., 2016). Deaf-blind consumer and family organizations are one source of exposure to individuals who are deaf-blind and to family members who are advocates for their children (Bruce & Parker, 2012). Informing parents about these organizations and encouraging them to participate can help them form positive attitudes about future employment for their children (Pleet-Odle et al., 2016).

Second, although obtaining paid work experience while in high school is important to future employment, fewer than half of the youth in our study worked for pay at any time during high school. More recent data indicate that only 23% of youth who are deaf-blind had paid work experience in the preceding year (Lipscomb et al., 2017). The combined effects of vision and hearing loss lead to difficulties with communication, concept development, and incidental learning (Zatta & McGinnity, 2016); thus, career education must begin at an early age so children with deaf-blindness become aware of the existence of jobs and develop the prerequisite skills needed for employment. Once youth develop these prerequisite concepts and skills, parents and professionals can support and encourage youth to obtain paid work experiences in the community while in high school. In addition to emphasizing the importance of early work experiences to future employment, professionals can ensure that (a) youths' IEPs include the specialized services needed to prepare them to obtain work experiences, (b) professionals with expertise in deaf-blindness provide these services (Bruce & Parker, 2012; NCDB, 2016), and (c) youth are referred to their state VR agency while in high school. VR counselors can assist youth with employment, reinforce the importance of early work experiences to future employment, and

provide information about employment options. For instance, customized employment matches individuals with jobs that fit their interests, needs, and abilities, and is a viable option for transition-age youth and young adults with deaf-blindness (Zatta & McGinnity, 2016). Parents who expect their child to work in the future are more likely to provide the necessary support, encouragement, and experiences to prepare their child for successful employment.

Third, because vocational education services are important to continuous employment for youth who are deaf-blind, youth should receive these services as a regular part of their high school curriculum. Because even youth on an academic track will benefit from these services, professionals must ensure that all youth who are deaf-blind receive vocational education services (including community-based vocational training) during secondary school (Petroff, 2010).

### **Conclusion**

Despite their diverse characteristics and complex needs (NCDB, 2016), youth with deaf-blindness are an under-researched group, particularly when it comes to post-school outcomes. Given the very limited literature available on transition-age youth who are deaf-blind and the fact that no previous NLTS2 studies have focused on this population, this study is an important initial step in better understanding factors that predict employment for these youth. Although the current study was exploratory in nature, results provide evidence that several predictors of post-school employment for youth with other disabilities (i.e., parent expectations, paid work experiences, and vocational education services) are relevant and applicable to youth with deaf-blindness and should be infused into educational and transition services. This study serves as a baseline for predictors of post-high school employment for youth who are deaf-blind; additional research with more current data, such as the NLTS 2012, should be utilized to extend and confirm this study's findings.

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Table 1

*Correlations Among Variables Considered for Multiple Logistic Regression Analyses*

| Variable                            | 1       | 2      | 3      | 4      | 5      | 6      | 7      | 8      | 9    | 10    | 11     |
|-------------------------------------|---------|--------|--------|--------|--------|--------|--------|--------|------|-------|--------|
| 1. Additional disabilities          | --      |        |        |        |        |        |        |        |      |       |        |
| 2. Work experience                  | -.089   |        |        |        |        |        |        |        |      |       |        |
| 3. Self-care                        | -.482** | .209*  |        |        |        |        |        |        |      |       |        |
| 4. Independent travel               | -.395** | .155   | .544** |        |        |        |        |        |      |       |        |
| 5. Computer use                     | -.312** | .387** | .451** | .424** |        |        |        |        |      |       |        |
| 6. Communication                    | -.475** | .207*  | .664** | .440** | .422** |        |        |        |      |       |        |
| 7. Parent expectations              | -.476** | .346** | .715** | .564** | .606** | .558** |        |        |      |       |        |
| 8. Vocational education services    | -.012   | .219*  | .216*  | .153   | .307** | .121   | .330** |        |      |       |        |
| 9. High school diploma              | -.390** | .067   | .361** | .280** | .244*  | .347** | .540** | .106   |      |       |        |
| 10. Parent involvement              | -.114   | .117   | .133   | .103   | .385** | .061   | .283** | .235*  | .166 |       |        |
| 11. Any post-high school employment | -.050   | .356** | .316** | .340** | .377** | .244*  | .456** | .275** | .178 | .134  |        |
| 12. Continuous employment           | .067    | .263** | .208*  | .135   | .293** | .210*  | .331** | .290** | .195 | .217* | .732** |

*Note.* Weighted  $N = 2820$ .\* $p < .05$ , \*\* $p < .01$

Table 2

*Multiple Logistic Regression Results Predicting Employment for Youth who are Deaf-Blind*

| Model  | Parameter                     | EST   | SE   | 95% CI       | <i>t</i> | OR (95% CI)       |
|--|-------------------------------|-------|------|--------------|----------|-------------------|
| 1. Any post-high school employment ( $R^2 = .24$ ) |                               |       |      |              |          |                   |
|  | Intercept                     | -3.57 | 0.95 | -5.54, -1.60 | -3.74**  | --                |
|  | Additional disabilities       | 0.21  | 0.13 | -0.06, 0.47  | 1.61     | 1.23 (0.95, 1.59) |
|  | Work experience               | 1.08  | 0.44 | 0.18, 1.99   | 2.45*    | 2.96 (1.20, 7.27) |
|  | Vocational education services | 0.65  | 0.43 | -0.22, 1.52  | 1.52     | 1.91 (0.81, 4.55) |
|  | Parent expectations           | 0.46  | 0.16 | 0.14, 0.79   | 2.93**   | 1.59 (1.15, 2.18) |
| 2. Continuous employment ( $R^2 = .19$ )           |                               |       |      |              |          |                   |
|  | Intercept                     | -4.64 | 0.99 | -6.67, -2.61 | -4.68**  | --                |
|  | Additional disabilities       | 0.36  | 0.12 | 0.11, 0.61   | 2.93**   | 1.43 (1.12, 1.83) |
|  | Vocational education services | 0.97  | 0.46 | 0.03, 1.92   | 2.10*    | 2.65 (1.03, 6.79) |
|  | Parent expectations           | 0.52  | 0.15 | 0.22, 0.82   | 3.51**   | 1.68 (1.25, 2.26) |

*Note.* Weighted  $N = 2820$ .

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