Predictors Associated with College Attendance and Persistence Among Students with Visual Impairments

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Abstract

Students who are blind or visually impaired are attending college at higher rates than ever before but are not achieving comparable academic outcomes to peers without disabilities. The variables that are associated with success in the college context among students who are blind or visually impaired have not been quantitatively examined. In this study, the researchers analyzed data from the second National Longitudinal Transition Study (NLTS2; SRI International, 2000). The NLTS2 provided a nationally representative sample of youth who were blind or visually impaired. The authors sought to determine statistical predictors of college attendance and persistence. College persistence was defined as earning 30 credits, equivalent to the attainment of sophomore status. An earlier exploratory factor analysis had identified factors, which the authors used in in this study to perform the regression analyses of attendance and persistence. Parent expectation of a youth's attendance was the variable most strongly associated with college attendance. Youth whose parents expected them to attend college were nearly eight times as likely to attend, compared with youth whose parents did not expect them to attend college. The student's ability to find academic help from sources outside of university-provided supports was the variable most strongly associated with persisting to at least 30 credits. Students who reported finding help outside of university-provided supports were four times as likely to persist to 30 credits. Recommendations are made to school personnel, university personnel preparation programs, and university disability services professionals.

Keywords: blind, visually impaired, NLTS2, college, transition

Each fall, eager students who are blind or visually impaired (blind/VI) arrive on college campuses along with other freshmen to begin their journey toward graduation. Many of these students, their parents, and professionals in their support networks may approach the college experience with a sense of optimism. However, of those who began college in 2009, as many as 70% of students at two-year institutions and 46% at four-year institutions did not graduate from the same institution within 150% of the normal time (U.S. Department of Education [USDOE], 2017). This rate has remained stable within 2% for ten years.

Prior research has shown students who are blind/VI begin postsecondary programs at a rate of approximately 71% (Newman et al., 2011), which actually is slightly higher than the general population (68.1%; BLS, 2011), or of students with all disabilities considered as a group (67%; Newman et al., 2011). Students' chances of success are dependent on circumstances that the students, parents, or staff in disability services offices may not be able to control or change. What are the factors that are associated with persisting or not? To what extent are they inherent or external to the students and associated with their prior experiences? And, in either case, what are the implications for supporting success? The current study sought to answer some of these questions about students who are blind/VI by exploring characteristics and experiences starting in high school that were associated with greater likelihood of attending college and of persisting to earn 30 credits. This investigation was made possible by access to a longitudinal data set.

Literature Review

Higher education is important for many reasons, but a primary reason is that it makes a difference in employment rates and salaries. Youth with disabili-

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ties tend to have lower levels of both education and income than the general population (Newman et al., 2011), and they are less likely to be employed (O'Neill, Kaczetow, Pfaller & Verkuilen, 2017; Yelin & Trupin, 2003). Jobs with better salaries usually require higher levels of education than jobs with lower salaries, whether or not job seekers have disabilities (Carnevale & Fry, 2000), and people with disabilities who do not attend postsecondary school are more likely to be unemployed (Madaus, Grigal, & Hughes, 2014; Newman et al., 2011; Yelin & Trupin, 2003). Parents, general and special education teachers, and disability services professionals could make a difference in the lives of youth with disabilities by supporting academic success throughout the school years that could result in good salaries and high standard of living.

Individual demographics comprise the backdrop of each student's story, revealing risk and resilience factors that highlight the extra support needs of specific groups, as well as factors that may be associated with greater success. Demographic variables should be included in studies of persistence, but other factors could play a role. These might include skills learned at school and exposure to other experiences or availability of certain supports. These characteristics and experiences can change throughout the school and college years due to maturity, intervention, and access or availability of supports. Results of prior research, reviewed in the sections that follow, provide preliminary evidence for some skills and experiences associated with college success for students with disabilities as a larger group. These include, among others, academic achievement in high school, a sense of self-determination, and social skills. The present study investigated these features but also investigated characteristics specific to blindness and visual impairment that could be associated with college success, such as use of braille or large print, use of computer access technology and level of skills to move around campus effectively.

Demographic Descriptors

A youth's demographics, such as race, gender, family history, and socioeconomic status may play an important role in understanding outcomes. For complex social-historical reasons, members of racial minority groups with and without disabilities have lower college completion rates (Yamamoto & Black, 2013) and are three times less likely to be engaged in either employment or education after high school than non-minority youth (Benz, Yovanoff, & Doren, 1997). Although the vocational rehabilitation system is intended to operate on a level playing field, African Americans are less likely to receive financial support for college through the vocational rehabilitation system (Boutin & Wilson, 2012). Gender is also a factor in postsecondary outcomes.

Females with disabilities have fewer positive adult outcomes than males, although this may be more due to parent expectations of young women's ability to achieve (Hogansen, Powers, Geenen, Gil-Kashiwabara, & Powers, 2008). When Boutin and Wilson (2012) examined individual vocational rehabilitation plans, they noted that females with disabilities are more likely to pursue university training as a part of a vocational rehabilitation plan than males, who may pursue other options. They speculated, however, that this may reflect the growing number of females in the general population pursuing higher education.

In addition to race and gender demographics, family history may play a role in academic success. Being a member of the first generation in a family to attend college is recognized as a risk factor for dropping out, whether a student has disabilities or not (Chen, 2005). Having a disability increases the risk: first generation students with disabilities have lower grade point averages (Lombardi, Murray, & Gerdes, 2012) and higher drop-out rates (Lombardi et al., 2012; Pascarella, Pearson, Wolniak, & Terenzini, 2004), especially when faced with financial stress (Lombardi et al., 2012).

Regardless of disability status, greater financial stress may be a reflection of lower socioeconomic status, which has been noted as a barrier to postsecondary education (Karpur, Nazarov, Brewer, & Bruyere, 2014; Lee, Rojewski, Gregg, & Jeong, 2014; Madaus et al., 2014). If the student's high school is urban or is lower in socioeconomic composition (Niu & Tienda, 2012), lower academic outcomes are more common, attributed to having fewer resources that would support postsecondary persistence.

Preparation for Academics

Some evidence suggests that youth who are blind/VI may be less academically prepared than their peers without disabilities. Using the college preparedness index that they had devised, Horn and Berktold (1999) found that only 13.9% of students who are blind/VI were defined as adequately qualified for a four-year college experience. In the same study, the remaining 86.1% of students who are blind/VI were reported to be only minimally qualified or to be minimally to somewhat qualified. Moreover, twice as many students who are blind/VI take remedial math and English in high school, compared to students without disabilities (Newman et al., 2011). This allows them to complete high school, but may not

prepare them for the demands of college level work, raising the question of how students who are blind/VI decide whether to go to college. College students may also vary in their use of disability services offices.

Using Disability Services in College

Disability services personnel are present at every college that receives federal funding, which is virtually every campus in the nation. These professionals do not seek out students who need help, rather, they are present and must wait for students to self-disclose their disabilities and support needs. Although 87% of students with disabilities in a nationally representative study sample had received disability accommodations while in high school (Newman et al., 2011), only 19% of those who went on to college received some type of disability-related accommodation or support there. Notably, college students who are blind/VI received academic supports provided by the college at a rate of 59%, but their higher self-disclosure rate has not been investigated thoroughly, and this figure still indicates that 41% of those who received accommodations in high school do not disclose their disability. Perhaps, students who are blind/VI disclose at higher rates because they need more supports, or they may find it easier to request accommodations because their disability is obvious. Seeking help outside of formal supports provided by the college is common among students with and without disabilities (McCall, 2014; Newman et al., 2011). Whether or not they also used supports provided by the college, one study indicated that 52% of students who are blind/VI found academic help on their own (Newman et al., 2011).

Disability Disclosure

Disclosing their disabilities when in college is an indicator of a student's level of self-advocacy skills, one aspect of the self-determination construct. In a qualitative focus group study, students reported that, although they considered self-determination and self-advocacy important to success in college, they tried at first not to disclose their disabilities (Getzel & Thoma, 2008). After failing classes, those who disclosed their disabilities (to professors or disability support personnel) and requested accommodations reported being more successful. This is not surprising, given that higher levels of self-determination are associated with success in secondary education (Copeland, Hughes, Agran, Wehmeyer, & Fowler, 2002). Other evidence suggests, however, that college instructors may not always understand the needs of individual students when they do try to communicate their needs and preferences to instructors (Myers & Bastian, 2010).

Self Determination

Self-disclosure of disabilities may be associated with self-determination skills, so it is worth considering whether self-determination skills can be learned. Some evidence suggests that self-determination is not static; it can be increased among youth with disabilities through instruction in autonomy, self-advocacy, and psychological empowerment (Cobb & Alwell, 2009; Wehmeyer, Palmer, Shogren, Williams-Diehm, & Fowler, 2013). Having higher levels of self-determination is useful only if a youth has opportunities to use those skills, however; some reports indicate that blind/VI youth not only have lower levels of self-determination but also fewer opportunities to practice self-determination skills than youth who are not blind/VI (Robinson & Lieberman, 2004; Sacks, Wolffe, & Tierney, 1998).

Self-determination also may interact with individual demographic characteristics, such as race and gender. Among all students with and without disabilities, Latino students reported higher self-determination skills than Anglo students (Rodriguez & Cavendish, 2012). Among males, but not females, ethnicity explained a significant amount of the variance in self-determination after controlling for family environment in this study.

High school may be one place for blind youth to practice self-determination, but only if they are included in general education classrooms and other mainstream activities. Inclusion in general education, that is, learning in a classroom alongside students without disabilities, has been associated with better educational outcomes in a number of studies, though not specifically for students who are blind/VI (Goodman, Hazelkorn, Bucholz, Duffy, & Kitta, 2011; Halpern, Yovanoff, Doren, & Benz, 1995; McCall, 2014). In the college setting, all students work together in the same settings, regardless of disability, and it is not known whether students who are blind/VI who experienced inclusive settings in high school will have more success in college. Self-empowerment and independence might be indicators of success in navigating the campus, especially for those who have better orientation and mobility skills.

Orientation and Mobility Skills

The ability to get around on campus, finding buildings, classrooms, and people would be valuable to any student, but results of outcomes research have been mixed in this area for students who are blind/VI. Orientation and mobility (O&M) skills refer to travel using alternative techniques to accommodate vision loss. These skills have a relationship to college success. Wolffe and Kelly (2011) found a positive

association between the receipt of O&M instruction and attending postsecondary education up to four years after high school, but the same association was not found when youth were two years older. O&M interventions may interact with other characteristics, as well. For example, although Cameto and Nagle (2007) found no differences in O&M skills related to age, gender, or race/ethnicity, they did note better scores on a measure of indoor campus O&M skills among students who were had higher incomes, who did not have additional disabilities, and who were visually impaired rather than totally blind. Even when students are deemed to be in need of O&M instruction, however, experts do not always agree on the specific skills needed by students with low vision in comparison with students who are totally blind (Wall Emerson & Corn, 2006). Although Wolffe and Kelly (2011) explored O&M skills in relation to postsecondary education, receiving orientation and mobility skills has not been connected with college persistence or any other measures of success in the extant literature. Use of technology is another skill area in which students who are blind/VI receive varying levels of instruction in high school.

Technology Use

Vision-based descriptors might change over time, particularly among youth with progressive eye diseases. Such descriptors could indicate whether the student is totally blind or losing vision during high school and college. Whether the characteristic is immutable or changing slowly over time, a student identified as at-risk may be helped by various interventions during the college years. Reading acuity and preferred reading medium may change over time, especially as a result of degenerative eye conditions. Many youths do not use exclusively one reading medium and may use varied assistive technology to access printed text as a result of problems with accessibility and the demands of college work (D'Andrea, 2012). Thus their degree of technology use in elementary and upper grades may be an important consideration.

Youth with visual impairment frequently use technology to access curriculum, but may not be receiving as much opportunity to learn how to use it. Fewer than half of elementary school youth with visual impairments use assistive technology (Kelly, 2009). Although more technology use would be expected as students who are blind/VI mature, Kelly (2011) found less than half of older youth were using technology. In both of Kelly's studies, parental involvement was positively associated with use of technology.

Internet use is important as well. Youth who are blind/VI are not engaged in using the internet to the same extent as their peers (Kelly & Wolffe, 2012), but postsecondary education is five times more likely among those who do use the internet for social communication. Other social skills do not involve technology, but are also important to college students who are blind/VI.

Social Skills

Social activities may be among the most prominent aspects of college life for all students. This is no different for youth who are blind/VI, but visual impairment can be a barrier to development of social skills (Zebehazy & Smith, 2011). Higher levels of social skills during the school years are associated with positive post-school outcomes among blind/VI youth (Botsford, 2013). In qualitative studies, college students in general note the importance of social skills and relationships. In prior research, successful students with a variety of disabilities reported having a personally significant relationship with one adult, either a faculty member or counselor in the office of student services (Barber, 2012; Getzel & Thoma, 2008). Relationships with peers, parents, and other family members were noted as important to successful students, as well as taking advantage of support groups and academic supports on campus (Getzel & Thoma, 2008). Blind/VI youth have been determined to have social skills levels equal to or higher than youth with other disabilities, but unfortunately they have only moderate levels of social skills compared to the general population, according to Gresham and Elliott's (1990) Social Skills Rating System (Zebehazy & Smith, 2011).

Independent Living Skills

In addition to social skills, college students must be able to take care of their personal needs in hygiene, cooking, and other areas. Students who have mastered these skills of independent living may have an advantage over students who need more support in self-care, as indicated by research that shows that they are more likely to attend postsecondary education (Blackorby, Hancock, & Siegel, 1993; Heal & Rusch, 1995). What is not known is whether independent living skills are associated with success in postsecondary education among students who are blind/VI. Parents not only teach many of the independent living skills to their own children, but each parent has an expectation of the child's adult outcomes, as well.

Parent Expectations

Doren, Gau, and Lindstrom (2012) explored data from a nationally representative sample of youth with learning disabilities or cognitive disabilities, finding that parent expectations have a large effect on adult success of individuals with disabilities. However, the same study revealed that the level of parent expectations may depend on the type of disability. The interplay of parent expectations with student outcomes is complex. It is not clear whether expectations drive outcomes or to what extend the type of disability drives the level of parent expectations.

Longitudinal Analysis to Study Outcomes of Students

Experimental or quasi-experimental techniques are often used to measure the effectiveness of interventions to teach skills that may increase achievement, whether a student is considered at risk or not (Hulley et al., 2001). However, even the best cross-sectional intervention study cannot connect skills or experience with longer term outcomes. To reliably compare outcomes, a study must use measure individual characteristics and experiences at the beginning (and often at several intermediate collection points), and then collect outcomes data at a later date (Trochim, 2001). This kind of analysis requires a large number of participants which makes such research an expensive and logistically difficult endeavor (Hulley et al.).

Although longitudinal cohort studies using large numbers of participants are expensive and difficult to conduct, their importance is recognized. Federal education legislation, including the updated IDEA in 2004, mandated research into effective educational interventions and predictors of positive outcomes. Government funding has allowed researchers to collect the large amounts of data needed to conduct a study of outcomes. The NLTS2 is an example of a longitudinal study that focused on youth characteristics and high school experiences and collected data every two years over a ten-year span (SRI International, 2000). By the end of the study, data had been collected that revealed the young adult outcomes of study participants.

Based on the literature reviewed, the investigators in the present study sought to explore the effects of various interventions, risk factors, skills, and prior and current experiences in association with academic outcomes in college. The following research questions guided this study.

1. Based on information available during high school, what demographic and disability descriptors, variables from the home and school contexts, youth skill areas, and work-related experiences are associated with the attendance of blind/VI students at two- and four-year colleges?
2. What variables measured during high school and in college and rehabilitation services contexts are associated with the outcome of college persistence among blind/VI students, when persistence is defined as completing freshman year (achieving 30 college credits)?

Methods

Data and Sample

The NLTS2 data set includes five waves of data collected over ten years' time with the same participants by asking informants (parents or youth) to respond to a set of questions about the youth's characteristics and experiences. Youth were surveyed in Waves 2 through 5. In the first wave only, teachers reported on disability characteristics such as use of accommodations and features of each youth's classroom experiences. A transcript summary was created after Wave 5 with complete transcripts. Approximately 10,000 students were subjects of the study.

Some 820 youths were eligible for special education services as a result of visual impairment. Individuals who are blind/VI were oversampled in the NLTS2, that is, the number of such participants represented a larger percentage of the study sample than are in the actual population. If these participants had not been oversampled, the sample size of blind/VI participants would have been too small for analysis. The oversampling is accounted for by application of sampling weights to represent proportions in the actual population.

Although the youngest students were only 13 during Wave 1, they were 21 by Wave 5. These participants had time to begin attending college and to persist to at least 30 credits, the equivalent of completing the freshman year of college. Persistence to 30 credits is a common early landmark for measurement of college success. Investigators chose this measure of success because the NLTS2 data did not include a sufficient number of participants with college completion data to perform desired analyses. Potential independent predictor variables were identified from all five waves of NLTS2 data collection.

Participants

The researchers used three inclusion criteria to identify participants: (1) having an educational diagnosis of visual impairment; (2) participation in a direct assessment of self-determination, self-concept, and academic achievement, administered in Wave 2;

and (3) having attendance and persistence outcomes recorded in the data set. The second criterion was used to limit study participants to blind/VI youth whose functional abilities allow them to reliably express answers to questions and to read independently (Wagner, Newman, Cameto, & Levine, 2006), skills that would be essential for attending college. Of the 420 blind/VI NLTS2 participants for whom direct assessment results were recorded in the data set, college attendance data were recorded for only approximately 280 participants. Among those who attended, persistence data was recorded for approximately 200 participants.

Outcome (Dependent) Variables

Two outcome variables were defined—attendance and persistence. The *Attendance* outcome was represented by a collapsed variable made of two dichotomous items in Wave 5, by selecting participants with positive answers to either of the following questions: "youth *ever* attended any two-year college in any wave" and "youth ever attended four-year college in any wave." The *Persistence* outcome variable represented achieving at least 30 college credits. This variable was created by collapsing variables in Wave 5, recording answers to questions whether the student had graduated, and if not, whether the student had earned 30 or more credits by Wave 5.

Potential Predictor (Independent) Variables

Demographic and disability variables. Researchers analyzed predictors of attendance (beginning college) and persistence, in relation to predictor variables suggested by the literature review. These included demographic and disability descriptive variables selected because of their role in prior studies. Predictor variables also included four factors derived from previous exploratory factor analysis on the same data set (see Schuck, 2015; Academic Achievement, Independence, Social Skills, and Non-Academic Skills). In addition, researchers included variables identified in adult outcome studies of individuals who had received special education services in high school (Test et al., 2009). Additional variables related to college and rehabilitation agency services were included in the analysis of persistence.

Demographic and disability descriptive variables included *Gender, Race, Urbanicity* (of high school), *First Generation Status*, and *Income*. Four variables in the analysis described disability features: *Braille, Large Print, O&M* (during high school), and presence of *Additional Disabilities*. *Gender* was a dichotomous variable. *Race* was recoded into four dichotomous variables, White, African-American, Hispanic, and Asian/Pacific Islander/Alaska Native/Native American/Multiracial/Other with white as the category of reference. *Urbanicity* of the participant's school was recoded for analysis into three dichotomous variables, rural, suburban, and urban. *First Generation Status* was a dichotomous variable. Student's Household *Income* was recoded into three dichotomous variables based on the NLTS2 categories: low ($25,000 or less), middle (more than $25,001 through $50,000) and high ($50,001 or more). Use of *Braille* (for the direct assessment), use of *Large Print,* receiving *Orientation and Mobility* (O&M) instruction from a school program and *Additional Disability* were dichotomous variables. The *Additional Disability* variable indicated whether the participant had at least one disability in addition to the educational diagnosis of visual impairment.

Home context -- parent expectations and family support. Values of the ordinal variable, *Parent Expectations (that participant would attend college)*, were 1 = definitely won't, 2 = probably won't, 3 = probably will, and 4 = definitely will. Initially this variable was coded for analysis as four dichotomous variables, but retaining the separate categories "definitely won't" and "probably won't" resulted in a quasi-complete separation of the data. Therefore, the researchers collapsed the two into one variable "will not." The researchers maintained the categories "probably will" and "definitely will" as independent dichotomous variables in order to preserve variation in the data. The scale variable *Student Support* was based on parent-reported family support, with values that ranged from 2 to 8.

Student skill areas -- independent living, academic, self-determination, social, and non-academic skills. Four of the student skill area variables used in the current analysis were identified in previous exploratory factor analysis (Schuck, 2015). These multi-dimensional factors represent latent constructs, derived from 17 independent variables in the NLTS2 data. The factors were *Academic Achievement* (representing 5 scale scores on *Woodcock Johnson III*; Woodcock, McGrew, & Mather, 2001), *Independence* (representing 4 scores of self-determination and self-advocacy), *Social Skills* (representing four scores on the *Social Skills Rating Scale*), and *Non-academic Skills* (representing four non-academic school activities, such as Fine Arts).

Two additional variables described student skill areas: high school *Grade Point Average (GPA)* and *Independent Living Skills*. *Independent Living Skills* was a composite factor comprising the sum of two other scale totals from the NLTS2 data. High school *Grade Point Average* was a variable found in the Transcript Summary.

Two employment related variables were used in the analysis: *Paid Work* and *Career Awareness*. *Paid Work* was found in the Wave 5 Parent/Youth Survey. *Career Awareness* was drawn from the Transcript Summary, identifying whether the student took a pre-vocational course in high school.

School program variables. Teacher-reported level of inclusion in general education was represented by a composite variable, *Inclusion*. The values of this scale variable were 0 (not included in any core subjects) to 4 (100% included; all 4 core subjects). Missing subject areas were recorded as 0 (not included in that subject). If two subjects were missing, the case was dropped from the analysis. The degree of interagency collaboration in the participant's individualized education planning (IEP) meeting had values 1 and 2: 1 = "school and parent only at meeting" and 2 = "school and parent with any number of additional service providers at meeting." Whether the student had a transition program had values 0 = "did not have a transition program" and 1 = "did have a transition program"

Sample Size for Variable Inclusion

College attendance data were recorded for 280 participants. Using a power of .8 and α of .10, a sample size of 210 would identify effects of .20 or smaller (Hulley et al., 2001). Variables with data on 210 or more participants were retained in the attendance analysis. *Student Support, Inclusion, Interagency Collaboration, and Transition Program*, were dropped from the attendance analysis at this point. Variables that remained (rounded to nearest 10 as per data use license) were *Grade Point Average* (*n* = 230), *Academic Achievement* (270), *Independence* (270), *Social Skills* (280), *Non-Academic Skills* (270), *Parent Expectations* (270), *Independent Living Skills* (280), *Career Awareness* (230), and *Paid Work* (280). Of these variables, six were continuous variables, one ordinal, and two dichotomous. Dummy variables were created for the one ordinal variable, *Parent Expectations.*

The persistence analysis incorporated dichotomous variables from the college context, including seeking academic help outside of formal supports provided by the college (*Got Help On Own*), disclosure of disability (*College Knew of Disability*), and use of academic services provided by the college (*Got Help from College*). *Got Help from College* combined those who received general academic help and those who received help from the service for students with disabilities. Finally, the analysis included three rehabilitation context variables: whether the student received *O&M After High School, Career Counseling,* or *Assistive Technology* provided by the rehabilitation agency.

Results

First, data were cleaned, and frequency distributions examined for the attendance and persistence analysis samples. Frequency data for the persistence analysis only are shown here, in Table 1. Among the 200 youth who had parent- or student-reported data on persistence, 170 also had parent-reported data on whether the youth had a secondary disability. Almost 50 of the 170 were reported to have a secondary disability in addition to a diagnosis of visual impairment. Table 2 below shows the frequency of additional disabilities as confirmed by parents. It is evident that at least some of the students have a visual impairment, ADHD, and a health impairment.

Sample means of continuous variables are found in Tables 3 and 4. Continuous variables were tested for evidence of collinearity. Tolerance and VIF statistics met the requirements to demonstrate little if any collinearity between the independent variables.

Weighting of Variables

It was necessary to weight the data due to the stratified, clustered study design of the NLTS2 and the under- or over-sampling of particular groups of participants. By weighting the data, final results reflected the proportions attributable to the actual population of blind/VI youth across the nation. Wave 2 direct assessment data weights were used for the analysis of attendance because the predictor variables were largely drawn from Wave 2, and Wave 5 weights for the analysis of persistence because both the outcome and many predictor variables were selected from Wave 5.

After forced entry of the independent variables, the researchers selected final logistic regression models based on the size and significance of estimated coefficients measured by Wald F statistics. None of the possible two-way interaction terms were statistically significant in the regression model at the level of α = .10 for both the attendance model and the persistence model. For the final models, the researchers retained variables whose Wald statistics were significant at the level of alpha = .10. The researchers determined the percentage of cases predicted by each model and assessed goodness of fit using Nagelkerke's *R* squared.

Analysis of Attendance

After a chi square analysis of attendance, the variables *Middle Income* (x^2=7.60, adj *F*=4.74, *p*=.03), *Rural* (4.84, 7.15, .01) and *Suburban Urbanicity*

(4.29, 4.98, .03), *Additional Disability* (16.04, 18.64, .00), and two levels of *Parents Expectations*, not (57.96, 67.52, .00) and will (26.48, 23.61, .00) were retained for regression analysis. Continuous variables *Academic Achievement, Independence, Social Skills,* and *Non-academic Skills, High School Grade Point Average* and *Independent Living Skills* were also used in the regression analyses.

The researchers experimented with a number of models of attendance. *Parents Expect Not to Attend, Academic Achievement,* and *Grade Point Average* were significant at α =.10 (actually even at .05) in our initial model and were retained for further exploration. *Academic Achievement* and *Grade Point Average* did not show multicollinearity when tested. In exploration of the regression solution, the exponentiated β of *Social Skills* was sometimes statistically significant, depending on other variables that were included in the model. Therefore, *Social Skills* was further explored in creation of the final model presented here.

Development of Final Model of Attendance

The final model accounted for 40.1% of the variance (Nagelkerke's *R* squared = .401), correctly predicting group membership 86.9% of the time (attendance 95.8%, non-attendance 41.6%). Youth whose parents expected them to attend college (i.e., did not expect them not to attend, as the question was worded) were more likely to attend college by almost eight times (Wald = 9.43, p = .003, Exp (β) = 7.72). Grade Point Average ranged from 0.879 to 4.000 in this sample, with a possible range of 0 to 4.000. For every one-point increase in grade point average, youth were 1.18 times more likely to attend college (Wald = 7.12, p = .010, Exp (β) = 1.18). The values of the Academic Achievement factor varied from 122.89 to 591.74 in this sample, but had a possible range from zero to 834. For every one-point increase in the value of the Academic Achievement factor, the likelihood of attendance increased slightly, just one percent (Wald = 4.85, p = .031, Exp (β) = 1.01). To look at this measure another way, every 100-point increase in the Academic Achievement factor results in a 100% increase or doubling of the likelihood of attendance. Finally, youth with higher scores in Social Skills were slightly more likely to attend college. The social skills variable ranged from 5.63 to 15.94 in this sample, but the factor has a possible range from 1.29 to 15.94. For every one point increase in the value of the Social Skills factor, youth were 1.21 times more likely to attend college (Wald = 2.785, p= .100, Exp (β) = 1.205). This variable was included in the final model, although it is on the borderline of a Type 1 error, at α = .10. The final model is shown in Table 5.

Analysis of Persistence

College persistence data were recorded for 200 participants. Using a power of .8 and α =.10, a sample size of 150 would identify effects of approximately .20 or less (Hulley et al., 2001, p. 89). This is about 75% of the total *n*. Because of sample sizes of less than 150, *Student Support, Inclusion, Interagency Collaboration,* and *Transition Program* were dropped from the analysis at this point. Variables that remained with sample sizes over 150 were *Grade Point Average, Academic Achievement, Independence, Social Skills, Non-Academic Skills, Parent Expectations, Independent Living Skills, Career Awareness, Paid Work, Career Counseling, Assistive Technology, O&M From Rehab, Got Academic Help from College,* and *Got Help On Own* (not from college academic services).

After a chi square analysis of persistence, the categorical variables *Large Print* (x^2 = 7.00, adj F = 5.91, p = .02), *Got Help on Own* (x^2 = 13.87, adj F = 10.08, p = .00) and *Other Race* (x^2 = 2.56, adj F = 3.45, p = .07), and *Additional Disability* (x^2 = 6.81, adj F = 4.61, p = .04) were retained for regression analysis. Continuous variables *Academic Achievement, Independence, Social Skills,* and *Non-academic Skills, High School Grade Point Average* and *Independent Living Skills* were also used in the regression analyses. The sample size of our final model was 150. Two-way interaction terms were tested among the variables that were significant in the initial model. None of the two-way interaction terms proved to be statistically significant in an intermediate model.

Development of Final Model of Persistence

In exploratory models, *Independent Living* shifted widely depending on what other variables were included in the model, but *Additional Disability* remained more stable. For that reason, *Additional Disability* was retained for the final model, but *Independent Living* was removed from the model. The final model is shown in Table 6.

The final model accounted for 22.4% of the variance (Nagelkerke's *R* squared = .224). This model correctly predicted group membership 71.3% of the time (persistence 84.2%, non-persistence 57.9%). Three variables had positive effects on the outcome of college persistence. A student who was recorded as having an additional disability was more than twice as likely to persist to 30 credits as a student who did not report an additional disability (Wald = 4.21, p = .045, Exp (β) = 2.41). A student who used large print to take the direct assessment was three and a half times as likely to persist than a student who was not reported to use large print (Wald = 4.43, p = .040, Exp (β) = 3.56). A student who reported getting help with

academics outside of the formal supports offered by the college was four times as likely to persist (Wald = 10.61, p = .002, Exp (β) = .04). It should be noted, however, that the variable *Additional Disability* was not statistically significant in intermediate models. The variable was retained in the final model because it was stable and significant in most of the exploratory modelling performed to create the final model.

Discussion and Recommendations for Further Research

The participants in this study had taken a direct assessment of self-determination, self-concept, and academic achievement as a part of the second wave of data collected by the NLTS2. This inclusion criterion limited study participants to blind/VI youth whose functional abilities would allow them to reliably express answers to questions and to read independently (Wagner et al., 2006), creating a group of participants that were expected to be able to perform academically, with or without additional disabilities. Among these participants, 80.6% went on to attend at least one college class. This is a larger percentage than has been estimated by other studies, but no comparisons have previously been made using this particular cohort that eliminated students with additional disabilities who were unable to take an assessment of reading and other academic skills. Three features of each student's data helped to predict attendance. These were parent expectations, academic skills, and social skills. If a parent's expectation that the youth would not attend college was zero, that is, if the parent expected the youth would attend college, the participant was almost eight times as likely to attend college. Two indicators of academic skills, High School Grade Point Average and the Academic Achievement factor, both had small predictive effects on the outcome of college attendance. Finally, the measure of social skills had a small but statistically significant effect on college attendance among blind/VI youth. The influence of the social skills variable, however, should be considered in light of its shifting significance level in the models as other variables were eliminated.

In 2009, 53.8% of all college students who entered a four-year institution in 2009 went on to complete a degree in the same university (USDOE, 2017). In contrast, a similar percentage (i.e., 52.6%) of the students who are blind/VI in the present study who started college persisted to earn 30 credits, attaining just sophomore status. It is very difficult to determine how many of the students in the present study sample went on to complete college, but at sophomore year, there were already fewer than the general population of college students. Presumably, fewer would complete a degree. In spite of the financial assistance that may be provided through rehabilitation agencies, almost half of students who are blind/VI "stop out" or drop out of college before attaining a degree.

In the regression model of persistence to 30 credits, two variables were stable and contributed to the results: using large print and getting academic help outside of services provided by the college. Using large print might indicate better vision throughout the elementary and high school years, contributing to the positive result. These two variables were statistically and practically significant in their positive effect on college persistence of students who are blind/VI.

The results indicate that different factors may be associated with lack of persistence for blind/VI youth compared to youth in the general population. Demographic variables are often associated with lower academic achievement for youth with disabilities, such as race (Benz et al., 1997; Peter & Horn, 2005; Rodriguez & Cavendish, 2012) and first-generation status (Lombardi et al., 2012). These did not correlate to college attendance among students who are blind/VI in chi square analyses. This may indicate that special education and rehabilitation agencies are uniformly serving youth regardless of these factors. For some youth who are blind or have visual impairments, the individualized approach and specialized resources might provide support that helps the student to overcome factors that usually predict non-persistence.

As observed by others, parent expectations form a complex construct (Chiang, Cheung, Hickson, Xiang, & Tsai, 2012; Powers, Geenen, & Powers, 2009; Rodriguez & Cavendish, 2012). Parent expectations may increase with the expanding skills of a young person reaching adulthood, but may be affected by the type of disability. Blindness and visual impairment might also have a complex relationship with parent expectations. In fact, the type of disability acted as a moderator between expectations and outcomes in the findings of Doren and colleagues (2012). If having low vision and having no vision at all are considered separately as different disabilities, the degree of vision loss may have the same moderating effect between parent expectations and the outcome of college attendance. However, the NLTS2 did not provide a comprehensive view of the reading media of youth who have visual impairments. Degree of vision loss and similarly, presence of additional disabilities are characteristics worthy of further research. For example, parent expectations have been found to moderate positive outcomes among youth with autism (Chiang et al., 2012). Given that more than 6% of blind children also have autism (Baio, et al., 2014), there may

be important information to be gained by looking at the two disabilities together. The finding of the importance of parent expectations for student success supports the findings of other researchers (Lombardi et al., 2012; Pascarella et al., 2004).

In the NLTS2 data collection, two questions asked if students had received help from disability services or general help with schoolwork not based on disability. A third question asked if students found academic help elsewhere, that is, got help on their own outside of any campus-based services. One of the most interesting aspects of the present study is that independent help-seeking behavior (i.e., a positive answer to the question, *Got Help on Own*) had a large effect size in the final model. Independent help-seeking behavior may function as part of the construct of self-determination, but in this study, *Got Help on Own* was part of a series of questions that investigated student use of various sources of academic help. This variable was not gathered as part of the self-determination scale embedded into the NLTS2. Students who persisted to sophomore year were four times as likely as those who did not persist to find academic help somewhere other than through formal supports offered by the college. This is positive, as it points to the potential value of teaching students specific strategies and behaviors for seeking out help on their own. If help-seeking behavior is viewed as a self-determination skill, this study confirms prior research regarding college attendance and persistence for students with disabilities as a larger group, which did not disaggregate or include blind students (e.g., Getzel & Thoma, 2008).

Although self-determination skills (as represented by the *Independence* factor) did not emerge as significant in the model, the ability to find academic help independently could be an aspect of self-advocacy, a critical element among self-determination skills. Further research into independent help-seeking instruction is needed. Further analysis using the same NLTS2 data, might also shed light on self-advocacy as a potential mediator of the effect of independent help-seeking on persistence. This would have to be performed with a larger population from within the NLTS2 data set, for instance with all participants, with any disability, who attended college.

The sample for this study included only students who had taken the Woodcock Johnson III assessment, indicating that they were capable of answering questions and expressing themselves in written form. This study used the students' cumulative high school grade point average, and the results of the Woodcock Johnson III, as measures of academic skills levels. The two variables performed similarly in the regression model. Further research could add to our understanding of the value of the GPA for predicting student attendance in college.

Several factors were derived in previous analysis (see Schuck, 2015) from the results of the NLTS2 version of the Woodcock Johnson assessment in combination with observations of parents. Rehabilitation counselors may be able to use the results of this assessment in college preparatory programs for blind/VI youth. For example, rehabilitation counselors might use the same parent-reported measure of social skills that was used in the NLTS2 direct assessment. A single assessment should not by any means be used to deny youth an opportunity to attend college, but may be useful to identify students who could benefit from extra support services, tutoring, or pre-college preparatory experiences.

Neither use of braille nor use of large print correlated with college attendance in chi square analyses, that is, there is not a strong relationship between these variables and attendance. Once attending, reading medium was associated with persistence. However, the reading media variables in this study were based only on the medium used for the direct assessment in the NLTS2. Some students use various media, including large print, audio, and braille, selecting a particular medium for each task in school. Research into the reading media selected by college students who are blind/VI is recommended to look at the next stage of education beyond high school.

Fewer than 50 of the approximately 200 students who were in the sample were confirmed by parents to have an additional disability. In addition, there may be others with additional disabilities, or undiagnosed additional disabilities, that were not confirmed by a parent. Having an additional disability had an unexpected positive effect on the likelihood to persist in college. The unexpectedness of this finding raises questions about the construction of the variable, or whether multiple disabilities actually play a role in college persistence. Students who have an additional disability were almost two and a half times as likely to persist as those who do not have an additional disability. This is counter-intuitive and contradicts the findings of Fichten and her colleagues (2016) among Canadian college students. The result may indicate that youth in high school who learn compensational strategies for learning disabilities and ADHD go on to use these strategies in college and are successful.

In considering this result, the composition of the sample is critical. The inclusion criterion of participation in the Wave 2 general assessment, including the Woodcock-Johnson academic assessments limited the sample to those who could perform academically and answer questions about themselves and their ex-

periences, regardless of the presence of any additional disability. Given their ability to take the assessment, participants with an additional disability may have had a milder disability. Results of the present study may indicate that students who have both a visual and a secondary impairment are more likely to seek out support services or help from family or friends, and then to persist.

However, it is also important to consider this result in light of its instability in the models and its relationship to independent living skills. Level of independent living skills and presence of and additional disability might be expected to vary inversely. In addition, of the students who had additional disabilities, 56% had a health impairment which could include diabetes or multiple sclerosis, in which vision loss sets in later in high school or young adulthood. Students may have had the benefit of using regular sized print and visual materials through school. Given the expected inverse variation and the high percentage of participants that had a health impairment, independent living skills and additional disability variables should be explored in a mediation analysis.

This study adds to the literature because it disaggregated blind youth, but also because it disaggregated the blind youth who were able to take the direct assessment from those who were not able to take it. This separation based on the ability to take the assessment produced a sample of students who presumably could do academic work, leaving out students with severe or multiple disabilities. This approach may be helpful for future NLTS2 analyses.

Limitations

Among limitations to the study, data collection began approximately fifteen years ago. Regulations surrounding transition planning and services changed after IDEA 2004. Younger youth in the study may have been disparately affected by the changes, but age was not used as a covariate in this study because the direct assessment was performed when youth were of similar ages.

Students who used large print to take the direct assessment were 3.5 times as likely to persist to 30 college credits as students who did not use large print. The data did not identify audio or regular-size print users. Generalizability of the results of the present study is limited by the disability descriptors chosen by the designers of the NLTS2. A spectrum of reading media is used by individuals who are blind/VI, and one individual may use several media, depending on the device being used. Persistence should be explored with this range of media choices in the future.

The results of this study indicate that a student with an additional disability is 2.4 times as likely to persist as one whose only disability is blindness, which is an unexpected result. The small sample size could have affected this result. Students who used large print to take the direct assessment recorded were 3.6 times as likely to persist. Finally, finding help outside of college—provided academic supports was associated with a student being four times as likely to persist to 30 credit hours. All of these results would be stronger if confirmed with larger samples, which may be possible in the future, but the NLTS2 offered an opportunity to study the first reasonably large longitudinal data set and was the best available at the time.

Conclusion

In light of the strong effects of parent expectations on attendance and of independent help-seeking on persistence, it may be necessary to systematically address the expectations of parents and self-determination in college within professional personnel preparation programs at the university level. Parents may be the most able to identify whether their children might succeed in college, and this knowledge may drive the child's own expectations. However, high school teachers of blind/VI youth may be able to show parents with lower expectations that their children have capabilities that will allow them to succeed in college. Teacher education programs should build in discussions of ways to increase youth skills, but also to raise parent expectations of what individuals who are blind/VI can achieve. Such discussion might also promote high expectations among pre-service teachers of blind youth. When a student visits the college campus and the office of services for students with disabilities, a disabilities professional may also be able to help parents to be optimistic and have high expectations of their high school age children who are investigating college education. Disabilities services professionals should continually communicate their expectations that all students can succeed.

The strongest predictor of persistence, getting academic help outside of college services, may be likened to a measure of self-advocacy and using effective help-seeking behaviors. The transfer from a parent-driven factor to a student-driven factor is analogous to the process that youth go through to separate from family and become independent adults. For professionals who work with students who are blind/VI, this study points to the development of independent, help-seeking skills as an important feature of pre-college training programs in high schools and vocational rehabilitation programs. Students need to learn to

brainstorm solutions and find resources to support their own learning whether or not the college provides adequate services. Offices who serve students with disabilities on campus should go beyond ADA compliance to help students who are blind/VI, and indeed all students with disabilities, to develop appropriate help-seeking skills that will carry over into adult employment and other settings. As expectations rise and students learn to seek help on their own, students who are blind/VI may be more likely to complete college and move on to independent employment.

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Table 1

Frequencies of Categorical Variables for Persistence Analysis

		Percent that Persisted		
		Unwtd	Wtd	SE
All respondents (*n**=200)		47.1	52.6	6.6
Gender (*n*=180)	Male	45.3	61.0	6.1
	Female	49.4	44.0	10.4
Additional Disability (*n*=180)	No	47.6	46.5	8.3
	Yes	46.3	68.2	6.9
Race/Ethnicity (*n*=180)	White	49.2	51.9	8.1
	African-American	32.3	48.6	10.0
	Hispanic	55.0	65.3	16.4
	Asian/Pac Isl/AK Native/ Native Amer/Multi/Other	66.7	14.2	14.5
Income (*n*=170)	Low<25000	36.8	49.4	10.3
	25000< Middle<50000	52.9	60.0	9.5
	50000<High	48.8	49.4	9.6
First Generation Status (*n*=170)	No	50.9	60.0	5.2
	Yes	40.7	39.7	11.3
Braille (*n*=180)	0 No	47.8	49.0	8.1
	1 Yes	45.4	64.2	6.9
Large Print (*n*=180)	0 No	46.6	47.0	6.9
	1 Yes	48.4	70.2	8.1
OM services (*n*=200)	0 No	45.1	46.4	9.7
	1 Yes	50.0	59.4	6.1

Continued

Urbanicity (*n*=170)	Rural	46.7	62.0	10.8
	Suburban	46.4	57.9	8.1
	Urban	51.4	58.4	9.2
Parent Expectations (*n*=170)	Definitely Will Not	100.0	100.0	0.0
	Probably Will Not	75.0	82.3	14.3
	Probably Will Attend	42.2	50.8	11.3
	Definitely Will Attend	47.5	51.4	7.7
Career Awareness (*n* =150)	No	49.4	51.3	8.2
	Yes	45.3	51.4	10.1
Transition Program (*n* =140)	No	30.0	42.3	12.8
	Yes	44.1	43.0	8.7
Paid Work in High School (*n* =180)	No	47.1	54.5	9.0
	Yes	46.8	50.6	7.8
Assistive Technology After HS (n =180)	No	41.8	44.7	8.1
	Yes	50.5	56.0	7.9
Career Counseling After HS (*n*=180)	No	48.1	52.4	7.5
	Yes	46.0	52.7	9.7
College Knew of Disability (*n*=120)	No	50.0	60.3	21.3
	Yes	47.7	50.0	6.8
Got Help on Own (*n*=150)	No	42.5	35.6	7.5
	Yes	54.9	65.9	8.1

Note. * All unweighted *n* rounded to nearest 10 as per restricted-use data license

Table 2

Additional Disability Confirmed by Parent (n < 50)

Parent-confirmed additional disability	Frequency	% with disability that persisted
ADHD	47.9	43.4
Autism	0.0	NA
Deaf/blind	0.0	NA
Developmental delay	8.3	50.0
Down Syndrome	0.0	NA
Emotional Behavioral Disorder	0.0	NA
Health Impairment	56.25	40.7
Hearing Impairment	0.0	NA
Learning Disability	22.9	54.5
Mental Retardation [sic]	2.1	100.0
Multiple impairments	0.0	NA
Physical or orthopedic impairment	20.8	50.0
Speech impairment	2.1	100.0
Traumatic brain injury	2.1	100.0

Table 3

Distributions of Continuous Variables —Attendance Model

			Range	
	Mean	Standard Error	Minimum	Maximum
Academic Achievement (270*)	388.07	5.32	122.89	591.74
Independence (270)	102.03	0.72	68.35	124.63
Social Skills (280)	12.59	0.14	5.63	15.94
Non-Academic Skills (270)	7.10	0.09	3.63	10.20
Independent Living Skills (280)	17.46	0.21	7	zt 24
Grade Point Average (230)	3.01	0.07	0.879	4.000

Note. * All unweighted *n* rounded to nearest 10 as per restricted-use data license

Table 4

Distribution of Continuous Variables – Persistence Model

	Mean	Standard Error	Range	
			Minimum	Maximum
Academic Achievement (200*)	401.49	5.67	122.89	591.74
Independence (200)	101.74	0.80	68.35	123.12
Social Skills (200)	12.98	0.16	5.63	15.94
Non-Academic Skills (200)	7.18	0.12	3.65	10.20
Independent Living Skills (200)	17.62	0.26	11	24
Grade Point Average (170)	3.07	0.06	0.879	4.00

Note. * All unweighted *n* rounded to nearest 10 as per restricted-use data license

Table 5

Model of Attendance

	Sig	95% Confidence Interval		
		Lower	Exp(β)	Upper
Intercept	.01	0.00	0.00	0.01
Parents Expect Youth prob or def will NOT attend				
Yes (Ref)				
No	.00	2.04	7.72	29.23
Academic Achievement	.03	1.00	1.01	1.02
Social Skills	.10	0.96	1.21	1.51
Grade Point Average	.01	1.18	1.93	3.16

Table 6

Model of Persistence

		95% Confidence Interval		
Paremeter	Sig.	Lower	Exp(β)	Upper
Intercept	.11	1.96	10.67	58.26
Presence of Additional Disability				
No (Ref)				
Yes	.05	1.02	2.41	5.68
Used Large Print for Assessment				
No (Ref)				
Yes	.04	1.06	3.56	11.91
Got Academic Help Outside of Formal Services				
No (Ref)				
Yes	.00	1.71	4.04	9.53