Predictors of College Attendance and Persistence among Blind and Visually Impaired Students

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PREDICTORS OF COLLEGE ATTENDANCE AND PERSISTENCE AMONG BLIND AND VISUALLY IMPAIRED STUDENTS

by

Lydia A. Schuck

A dissertation submitted to the Graduate College in partial fulfillment of the requirements for the degree of Doctor of Philosophy Interdisciplinary Health Sciences Western Michigan University August 2015

Doctoral Committee:

Robert S. Wall Emerson, Ph.D., Chair
Nickola W. Nelson, Ph.D.
Dae S. Kim, Ph.D.
Completion of a college degree is a positive outcome for any young adult. The purpose of this three-paper dissertation was to explore the latent constructs and other variables that may be associated with postsecondary education outcomes of youth who are blind or visually impaired. The samples were drawn from a 10-year longitudinal study of youth with disabilities, the National Longitudinal Transition Study 2. The sample of the first study comprised 420 youth (all Ns rounded to nearest 10 to meet data restrictions) who had taken the direct assessment recorded in the dataset. Exploratory factor analysis of 17 variables reported by parents and school personnel yielded four factors representing latent constructs in the data. The four factors were characterized as academic achievement, independence, social skills, and non-academic skills. The second study used these four factors and other variables measured during high school in logistic regression models of college attendance to investigate characteristics predictive of college attendance among the 280 youth who ever attended. Results indicated that youth who are blind or visually impaired attend two- or four-year colleges at a very high rate (80.6%). Students whose parents expected them to attend college were more than eight times as likely to attend. Students with higher grade point averages in high school were almost two times as likely to attend. Those with higher social skills showed a smaller
odds ratio of being 1.2 times more likely to attend. The third study investigated predictors of persistence in college, adding variables measured during college, including rehabilitation agency and academic supports. Of the 200 youth remaining in the sample, just 52.6% attained 30 credits or sophomore status during the study period. Results indicated that students who found academic help outside of services provided by the college were four times as likely to persist. Students who used large print were 3.6 times as likely to persist. Results imply that blind/VI youth attend college in spite of demographic differences such as low income and persist at rates similar to the general population. Future research should explore deeper aspects of relationships between variables and longer term outcomes.
ACKNOWLEDGMENTS

In memory of Jim and Charlotte, Stevie Wonder’s Piano Teacher, and Alice who all believed I could do whatever I wanted.

Fred and Mary, and Geer, you taught me about blindness. Mr. Benson and Paul and Chantal, you helped me discover my abilities as a teacher.

Thanks to my committee, Rob Wall Emerson, Nicki Nelson, and Dae Kim. You made this project better by contributing time, expertise, and patience.

Thanks to Amy Curtis and Kieran Fogarty in the IHS program, and to my fellow cohort members, who freely shared their research ideas and professional experience.

And the most thanks go to the people to whom I belong: To Nate’s family, who welcomed me when I insisted on marrying him. To Mom and Dad, who were the first very smart people I met! To Judy, from whom I learned what a dissertation is, and who is still a vibrant academic thinker.

Finally, to Nathan, Anna, Mary, and Audrey: you are all my reasons.

Lydia A. Schuck
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CHAPTER I

INTRODUCTION TO THE THREE STUDIES

An estimated 70% of blind and visually impaired (blind/VI) students who go to high school enroll in at least one college course, with an average of 4.3 months between high school graduation and college enrollment (Newman et al., 2011). However, only 42.8% of blind/VI participants in the second National Longitudinal Transition Study (NLTS2) had completed a two- or four-year degree up to eight years after high school graduation (Newman et al., 2011). Fewer than half of the blind/VI students who begin a postsecondary education program complete the program. This is in spite of special education services, financial support through the Rehabilitation Act, and college support services for students with disabilities.

Additionally, more jobs now require higher levels of academic achievement of all students than ever before (Carnevale & Fry, 2000). Although staying in college is important to all students, persisting in college has a larger impact on the employment outcomes of students with disabilities than students without disabilities (Yelin & Trupin, 2003). Enrollment and persistence in college are positive adult outcomes experienced by some blind/VI youth.

The aim of this three-study dissertation is to analyze the factor structure of variables measured while students are in high school (Study One), and then to explore the skills and characteristics associated with attendance of blind/VI youth at two- or four-year college courses (Study Two), and those associated with these students’ persistence
to the attainment of at least 30 semester hours of college credit, equivalent to sophomore status (Study Three).

It can be difficult to discover and summarize the experiences of blind/VI youth, but many clues are found within data that have been gathered through the second National Longitudinal Transition Study (NLTS2; SRI International, 2000). Secondary analysis of these data allows researchers to work with a relatively large number of participants, particularly given the low incidence of the population of students who are blind/VI. The NLTS2 data gathering process involved 10,000 youth with disabilities, who were ages 13 to 16 years at the outset of the study, and who were followed through five waves of data collected every two years from 2000 to 2010. Among those 10,000 participants were youth in low incidence disability groups, including those who were blind/VI. Low incidence populations were oversampled to enhance research opportunities for these less-studied groups. They included approximately 820 blind/VI youth (SRI International, 2000).

**Study One: Latent Constructs Describing Blind and Visually Impaired Youth in the National Longitudinal Transition Study 2**

Study One of this dissertation applied methods of exploratory factor analysis to seek latent constructs among observed variables collected for the NLTS2 data set. Although data were collected from teachers, youth, and parents, the unit of analysis for all NLTS2 data collection was the individual youth who was transitioning to adulthood. In Study One, factor analysis of the NLTS2 data sought evidence of latent constructs using variables observed in school and at home. It addressed Research Question 1:

*What direct assessment and parent- and teacher-reported variables (measured among blind and visually impaired 16- to 18-year-olds) from the NLTS2 dataset*
may be empirically verified as factors representing latent constructs potentially associated with attendance or persistence in college?

**Study Two: Factors Associated with College Attendance of Blind and Visually Impaired Young Adults**

Study Two was designed to evaluate logistic regression models of factors and variables based on information available as youth complete high school, with attendance in two- or four-year college as the outcome. Study Two incorporated the factors identified in Study One, adding single independent variables which represent the potential predictors of positive adult outcomes in postsecondary education for youth with all kinds of disabilities. These included dichotomous variables that were not used in the factor analysis. It addressed Research Question 2:

*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?*

**Study Three: Factors Associated with College Persistence of Blind and Visually Impaired Students**

Study Three employed a similar analysis as in Study Two, but with college persistence as the outcome, and including single variables, such as use of college services for students with disabilities and receiving career counseling, measured after high school. It addressed Research Question 3:

*What variables measured during high school and in college and rehabilitation services contexts are associated with the outcome of college persistence among blind and visually impaired students?*

The Rehabilitation Act of 1973, as amended in 1998, supports the development of employment goals among people who are blind/VI, as well as those with other disabilities. For youth whose employment goals require postsecondary education, the
Rehabilitation Act provides funding for education that is necessary to achieve the client’s goal. This may lead agency counselors to recommend enrolling in college, without suggesting other options.

There are a number of reasons why so many blind youth elect to attend college. Rehabilitation professionals in Crudden and Sansing’s (2011) qualitative study observed that it is possible that blind/VI youth are not aware of their options or that few other options exist. In the same study professionals observed that students may not have the independent living or computer skills to pursue employment.

Given the lower completion rate of blind/VI students, it appears that some youth may be unprepared to complete a college program. Research is needed to begin to determine the relative impact of academics, independent living skills, self-determination skills, social skills, blindness specific skills, such as use of braille and travel with a cane, and other factors associated with adult outcomes of blind/VI individuals. This dissertation research was designed to help teachers, parents, rehabilitation providers, and youth themselves to understand factors that are needed for success in college.

**Potential Contribution of Proposed Research**

The research made a number of important contributions to the literature and practice. The analysis of Study One potentially adds new understanding of factors related to blindness to the body of literature describing research based on NLTS2 data. These factors may be used by other researchers when researching outcomes of blind/VI youth. The factors were applied in Studies Two and Three to develop regression models of attendance in college education (Study Two) and persistence to sophomore status (Study
Recommendations are made for future research into interventions that may be associated with positive outcomes in postsecondary education for blind/VI youth.

As a result, teachers of blind/VI youth, rehabilitation counselors and teachers, transition specialists, family, and college personnel may be able to provide interventions to increase the likelihood of success in adulthood for blind/VI young adults. At this point, the literature is almost silent on blindness-related practices and skill areas that can predict positive postsecondary outcomes for youth who are blind/VI students. It is possible that some factors have not yet been identified, and that practitioners may use the existing and future information to target effective transition services to blind/VI youth while still in high school and while in college.

References


CHAPTER II
LATENT CONSTRUCTS DESCRIBING BLIND AND VISUALLY IMPAIRED YOUTH IN THE NATIONAL LONGITUDINAL TRANSITION STUDY 2

Success in young adulthood can be defined many ways. For example, achievement in and completion of postsecondary education, employment with a decent wage, and living independently from parents could be said to be positive outcomes for all young adults. However, what if there are barriers to any of these outcomes? In fact, evidence shows that youth with disabilities are not succeeding in college and employment to the same extent as youth without disabilities (Newman et al., 2011). Many factors could be contributing to these outcomes, both positive and negative.

The current investigation is an exploratory factor analysis of variables that may be associated with college and career readiness for youth who are blind or have visual impairments (blind/VI) as found in the National Longitudinal Transition Study 2 (NLTS2). Factors identified in this study may be used by researchers to more effectively understand the observed experiences and characteristics of blind/VI youth in their transition to adulthood.

Many youth without disabilities have poor educational and employment outcomes (Barber, 2012). However, research using data collected for the second National Longitudinal Transition Study (NLTS2; SRI International, 2000) has shown that postsecondary completion rates of students with disabilities were lower than rates for similar-aged students in the general population (41% vs. 52%) (Newman et al., 2011). Young adults with disabilities also earned an average of $10.40 per hour compared with
$11.40 per hour for young adults in the general population. Finally, young adults with disabilities were less likely to live independently than peers in the general population (45% vs. 59%).

For youth with disabilities, education that leads to employment is especially important (Yelin & Trupin, 2003). A larger percentage of jobs than ever before require education beyond a high school diploma. Furthermore, jobs that have higher salaries are generally associated with higher levels of postsecondary education (Carnevale & Fry, 2000).

Not all students who begin college go on to complete a degree. Among the general population, the cost of tuition can be a barrier to persisting to completion of a degree (Yelin & Trupin, 2003). However, blind/VI youth who work with rehabilitation services are eligible to receive training leading to a job goal with funding under the provisions of the Rehabilitation Act of 1973. Youth who do not have disabilities have a higher employment rate than youth with disabilities (Yelin & Trupin, 2003). A youth with disabilities who does not attend postsecondary school is likely to be unemployed (Newman et al., 2011).

Overall, individuals with disabilities are more likely to live in poverty than their counterparts without disabilities (27.9% as compared to 12.5%; DaNavas-Walt, Proctor, & Smith, 2011). The ratio is a bit better for people with disabilities in the age range 18 to 64, with 15% of those with disabilities in poverty, compared to 7.8% of those without disabilities. The statistics highlight the real experience of young adults with disabilities: they are more likely to be unemployed and to live in poverty.
Two broad categories of youth characteristics may affect their adult outcomes. Some of the differences in adult outcomes between students with and without disabilities may be tied to demographic and disability characteristics; others may be tied to student experiences and skills. Demographic and disability characteristics are generally not determined or affected by educational interventions, whereas student skills and experiences may be changed by events in their educational lives.

Demographic characteristics associated with poor postschool outcomes in prior research include low socioeconomic status (Karpur, Nazarov, Brewer, & Bruyere, 2014), membership in the first generation of the family to attend college (Lombardi, Murray, & Gerdes, 2012), and race (Newman et al., 2011), among others. Disability-specific characteristics, such as use of braille or a cane, or the presence of additional disabilities, may also be associated with outcomes for students who are blind or visually impaired. Both demographic and disability characteristics may be considered risk factors that would identify a student as a candidate for receiving additional support services.

In contrast, some characteristics may be addressed by educational intervention, which has implications for planning. These characteristics include skill and experiences that have been found to be associated with positive postsecondary outcomes. Students who do not have skills and experiences that lead to better outcomes may benefit by intervention through school or rehabilitation services to support positive adult outcomes in education and employment.

Several studies have examined whether blind/VI youth are receiving intervention to increase skills and to give students experiences that may improve their adult outcomes. Some of these interventions address the needs of blind/VI students beyond the core
curriculum in which all students receive instruction. These may include skills in independent living, career awareness, or self-determination, identified by McDonnall (2009, 2010a, 2010b) and Wolff and Kelly (2011) in association with positive employment outcomes among blind/VI youth.

**National Longitudinal Transition Study 2**

Many demographic and disability characteristics for describing a youth who is blind/VI are recorded among the data collected for the second National Longitudinal Transition Study (NLTS2). The NLTS2 was designed by SRI International (2000) to gather longitudinal data for approximately 10,000 youth with disabilities. Data were collected in five waves approximately two years apart beginning in 2000.

The NLTS2 is a particularly rich source of information about youth with all kinds of disabilities, including approximately 820 youth who received special education services under the diagnostic category of visual impairment. When working with a dataset that includes both a large sample size and a large number of variables, as does the NLTS2 (SRI International, 2000), it is appropriate to consider scientific techniques to reduce the number of variables to make them more manageable (Field, 2009; IBM, 2012: Kline, 1994).

One approach to such a large data set is to perform an exploratory factor analysis. Factor analysis has several applications. One of these is to identify factors representing hypothesized latent constructs in the data. The factors are created from groups of variables that together explain a large amount of shared variance found in the data. Therefore, exploratory factor analysis simplifies the data structure for subsequent
Many of the skills and experiences potentially associated with post-high school success are found in the NLTS2 data. In their analysis using the first NLTS data set, Blackorby, Hancock, and Siegel (1993) identified factors that represented constructs underlying the data on youth with all disabilities. They then applied the factors to a regression analysis of young adult outcomes, finding that inclusion in general education and independent living self-care skills act as statistically significant predictors of engagement in postsecondary education. No similar research has been found related specifically to blindness and using the NLTS2 dataset. The current investigation was designed to fill this gap. The factors identified in this study may be used in the future by others as they research the conditions and adult outcomes experienced by blind/VI youth.

As a result of the search of background literature, this study is proposed to answer the following question:

*What direct assessment and parent- and teacher-reported variables (measured for blind and visually impaired 16- to 18-year-olds) from the NLTS2 dataset may be empirically verified as factors representing latent constructs potentially associated with enrollment or persistence in college?*

**Methods**

**Data Source**

Variables from individual, family, and school contexts that may be associated with college and career readiness among blind/VI youth were identified in the NLTS2 dataset. The NLTS2 study created a nationally representative sample of youth receiving special education services in local districts and schools for the blind. The universe of schools was stratified by geographic region, district enrollment, and district/community
wealth (SRI, International, 2000). Because of this the Complex Samples module of SPSS 22 was used to weight the data to reflect the effects of the cluster and stratified sampling plan of the NLTS2. The Wave 1 Parent Survey weights were used to present the frequencies of demographic and disability descriptive variables. Weighted data are not used for factor analysis procedures.

Approval to conduct this study was obtained from the Human Subjects Institutional Review Board of Western Michigan University prior to initiating the investigation of the data, citing the secondary analysis of survey data. The author of this study was an authorized user of the data set.

Participants

All participants had visual impairment as their primary educational diagnosis, qualifying them to receive special education services. Among the over 10,000 total NLTS2 participants, the sample included approximately 820 visually impaired youth.

This study specifically addressed measurements associated with the in-school, family, and individual experiences and attributes of blind/VI youth who were expected to be able to compete academically in a college setting. Therefore, participants for the current study were subject to two inclusion criteria. The first was that the participant had received special education services because of an educational diagnosis of visual impairment as indicated by the youth’s school at the outset of the study. The second criterion was that the participant was able to participate in a direct assessment of self-determination, self-concept, and academic achievement that was part of the NLTS2 data collection (recorded with Wave 2 data).
This second criterion limited the sample to blind/VI youth who had functional abilities that allowed them to express answers to questions, to think through an appropriate academic problem, and to consider the abstractions of self-determination and self-concept (SRI International, 2000). These were the students who were most likely to be considered candidates for postsecondary education, which would include few, if any, students with significant cognitive or communicative disabilities. Approximately 420 blind/VI NLTS2 participants met the inclusion criteria. A preponderance of missing data eliminated the use of 16 of the cases.

The final sample comprised approximately 410\(^1\) cases. This sample size was adequate to perform an exploratory factor analysis (Field, 2009; Thompson, 2004). However, the sample size of the Orientation and Mobility Skills variable, as measured by the TAPS curriculum, was less than 180 for each of the eight TAPS items, so the TAPS variables are handled in separate but parallel procedures throughout this study. Two potential variables of interest were removed from the list of included variables before any further analysis because they provided data for fewer than 350 cases, the number selected as minimum for this analysis. The Woodcock Johnson Applied Problems subscale was removed for this reason, as was the Family Support Scale.

**Procedures**

**Demographic and Disability Descriptive Variables.** In general, the variables of interest in this study fell into two categories. One category comprised variables that represented unchangeable individual characteristics, such as demographic and disability

\(^1\) All unweighted sample sizes have been rounded to the nearest 10 in compliance with restricted data-use license.
descriptive variables. The second category comprised features of youths’ skills and experiences that could be affected by interventions or services.

Demographic variables included age, gender, three categories of income, presence of additional disabilities, six categories of race, status as a member of the first generation of the family to attend college, and using English for the direct assessment. Disability descriptive variables included use of braille for the direct assessment, use of large print, and receiving orientation and mobility services as reported by parents and school program. These variables were included in this study only to describe the sample. Table 2.1 displays the descriptive variables and their frequencies in the sample.

Table 2.1

*Description of Sample*

<table>
<thead>
<tr>
<th>Demographic or Disability Descriptor</th>
<th>Percent Frequencies</th>
<th>Standard Error</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Unweighted</td>
<td>Weighted</td>
</tr>
<tr>
<td>Gender ( n = 410^9 )</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>52.6</td>
<td>49.5</td>
</tr>
<tr>
<td>Female</td>
<td>47.4</td>
<td>50.5</td>
</tr>
<tr>
<td>Race ( n = 410 )</td>
<td></td>
<td></td>
</tr>
<tr>
<td>White</td>
<td>61.1</td>
<td>62.8</td>
</tr>
<tr>
<td>African American</td>
<td>22.7</td>
<td>19.7</td>
</tr>
<tr>
<td>Hispanic</td>
<td>13.3</td>
<td>13.6</td>
</tr>
<tr>
<td>Asian/Pacific Islander</td>
<td>1.7</td>
<td>2.5</td>
</tr>
<tr>
<td>Alaska Native/Native American</td>
<td>0.7</td>
<td>0.6</td>
</tr>
<tr>
<td>Multi/Other</td>
<td>0.5</td>
<td>0.8</td>
</tr>
<tr>
<td>Income ( n = 380 )</td>
<td></td>
<td></td>
</tr>
<tr>
<td>25,000 or under</td>
<td>33.5</td>
<td>30.6</td>
</tr>
<tr>
<td>25,001 to 50,000</td>
<td>31.4</td>
<td>32.2</td>
</tr>
<tr>
<td>Over 50,000</td>
<td>35.1</td>
<td>37.2</td>
</tr>
<tr>
<td>Urbanicity ( n = 390 )</td>
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<tr>
<td>Rural</td>
<td>7.2</td>
<td>13.8</td>
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<tr>
<td>Suburban</td>
<td>44.7</td>
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<tr>
<td>Urban</td>
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Variables Measuring Youth Skills and Experiences. In contrast to static descriptive variables, some NLTS2 variables measure skills areas in which students may still respond dynamically to external factors such as instruction, or internal ones, such as self-directed new learning. Thus, a student may be able to demonstrate change over time in certain areas, perhaps as influenced by intervention. One example is the measure of self-determination skills, which was directly assessed by a trained NLTS2 employee working face-to-face with the participant.

A second example of a skill area in which a student’s performance might be influenced by learning would be orientation and mobility (O&M). The level of a
participant’s O&M skills was measured for the NLTS2 by teacher observation of the student’s O&M skills in school, using the curriculum Teaching Age-Appropriate Purposeful Skills (TAPS; Pogrund et al., 1995). However, the sample size of the Orientation and Mobility Skills variable, as measured by the TAPS curriculum, was less than 180 for each of the eight TAPS items, so the TAPS variables are handled in separate but parallel procedures throughout this study.

Factor analysis is a procedure to compare the ways that these items vary, potentially providing insight into latent structures underlying the collection of variables. Use of braille or large print and a variable recording whether the youth received O&M services were considered for inclusion in the exploratory factor analysis but were retained among the disability descriptive variables. In contrast, the TAPS variables measure the level of O&M skills and are appropriate for a factor analysis.

The direct assessment in NLTS2 was performed in Wave One or Wave Two of data collection, when each participant was 15 or 16 years old. The time of administration depended on the age of the youth at the outset of the NLTS2 data collection. In this way, all of the youth were assessed at a similar age, regardless of their age at the outset of the study. Age is not included as a covariate in the exploratory factor analyses because the data were collected when youth were of similar ages.

Fifteen variables, which are listed in Table 2.2, were drawn or created from the Wave One Parent Survey results. Nine single item variables were simply renamed for this study, and are described using the item from the survey itself. Six variables were identified as single items in the data set, but were actually subscale sums created by SRI International solely from Wave One data.
A set of 10 variables was created from the direct assessment administered during Wave One or Wave Two, whenever the participant was age 15 or 16. The direct assessment included a shorter version of the ARC Self-Determination Scale (Wehmeyer & Kelchner, 1995), created for the NLTS2. The NLTS2 version of the ARC Self-Determination Scale includes the 22 items that had the highest factor loadings in validation research of the original instrument, drawn from three of the ARC’s subscales: autonomy, self-realization, and psychological empowerment. Also gathered during the direct assessment were ratings on the Student Self-Concept Scale (Gresham & Elliott, 1993), comprising two subscales, confidence and importance. Each of these five subscales was summed for use in the analysis, shown in Appendices B and C.

Five scales of the Woodcock Johnson III (WJIII) assessment of academic achievement were also drawn from the direct assessment. This version of the WJIII was created specifically for the NLTS2 (SRI International, 2000; Woodcock, McGrew, & Mather, 2001). The NLTS2 version of the WJIII comprised six scales that exist in the data as six subscale scores, one of which included fewer than 350 cases. That subscale, Applied Problems, was dropped from the analysis. The final 10 direct assessment variables are shown in Table 2.3 below.
<table>
<thead>
<tr>
<th>Variable Names</th>
<th>Description</th>
<th>Values</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nlts2</td>
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</tr>
<tr>
<td>Np1socassertskill(^a)</td>
<td>Assert ((N = 410)) Social Assertion Subscale Sum Of Np1g1[A, B, D, And F]</td>
<td>0 – 8</td>
</tr>
<tr>
<td>Np1selfcontrolskill(^a)</td>
<td>Self-Control ((N = 410)) Social Self-Control Subscale Sum Of Np1g1e_Rev And Np1g1[C, G, And I]</td>
<td>0 – 8</td>
</tr>
<tr>
<td>Np1soccoopskills(^a)</td>
<td>Cooperation ((N = 410)) Social Cooperation Subscale Sum Of Np1g1[J And K] And Np1g1h_Rev</td>
<td>0 – 6</td>
</tr>
<tr>
<td>Np1mental Skill(^a)</td>
<td>Mental Skills ((N = 400)) Functional Mental Skills Scale Sum Of Np1g4[A, B,And C, D]</td>
<td>4 – 16</td>
</tr>
<tr>
<td>Np1houserespskill_R(^a)</td>
<td>Household Responsibilites Scale ((N = 410)) Sum Of Np1g5[A, B, C, And D]</td>
<td>4 – 16</td>
</tr>
<tr>
<td>Np1selfcareskills(^a)</td>
<td>Selfcare ((N = 410)) Self-Care Skills Sum Of Np1g3[A And B]</td>
<td>2 – 8</td>
</tr>
<tr>
<td>Np1g2a</td>
<td>Organized ((N = 410)) How Good Is S/He At Being Well Organized</td>
<td>1 Not At All Good 2 Not Very Good 3 Pretty Good 4 Very Good</td>
</tr>
<tr>
<td>Np1g2b</td>
<td>Performing ((N = 390)) How Good Is S/He At Performing Arts</td>
<td>As Above</td>
</tr>
<tr>
<td>Np1g2c</td>
<td>Creative ((N = 400)) How Good Is S/He At Creative Arts</td>
<td>As Above</td>
</tr>
<tr>
<td>Np1g2d</td>
<td>Sensitive ((N = 410)) How Good Is S/He At Being Sensitive To Others</td>
<td>As Above</td>
</tr>
<tr>
<td>Np1g2e</td>
<td>Mechanical ((N = 400)) How Good Is S/He At Mechanical Skills, Like Building</td>
<td>As Above</td>
</tr>
<tr>
<td>Np1g2f</td>
<td>Computer ((N = 400)) How Good Is S/He At Using A Computer</td>
<td>As Above</td>
</tr>
<tr>
<td>Np1g2g</td>
<td>Athletic ((N = 410)) How Good Is He/She At Physical/Athletic Activities</td>
<td>As Above</td>
</tr>
<tr>
<td>Np1g2h</td>
<td>Humor ((N = 410)) How Good Is S/He At Having A Sense Of Humor</td>
<td>As Above</td>
</tr>
<tr>
<td>Np1j2</td>
<td>Parentexpect ((N = 360)) Parent Expects Youth To Attend Postsecondary Institution</td>
<td>1 Definitely Won’t 2 Probably Won’t 3 Probably Will 4 Definitely Will</td>
</tr>
</tbody>
</table>

\(^a\) See Appendix A for item descriptions and survey questions.
A missing values analysis was performed using SPSS. Analysis of missing values among the approximately 410 cases and 26 variables revealed that only one variable, Autonomy, was missing more than 5% of the cases. Autonomy was a scale variable, created by summing 15 ordinal variables. A rule was applied for the current study to replace missing values among the 15 ordinal variables, as follows: if one or two of the 15 individual ordinal variables that comprise the autonomy scale were missing, they were replaced by the mean of the remaining 14 or 13 individual variables comprising the scale. This procedure replaced one variable for 13 cases, and two variables for 10 cases. After
this procedure, there were no study variables remaining with more than 5% missing data. The same procedure had been used by the study creators to complete other scales in the data set with one or two missing items (SRI International, 2000). SRI International had also previously replaced missing data with data from a subsequent wave of data collection, when appropriate.

Values were missing for 11 cases of both the braille and the Large Print variables. For these 11 cases, it was assumed that the participant used ordinary print, and therefore both the braille and the Large Print values were set to zero. No further replacement of missing values was performed. Only variables with 350 or more valid cases, after replacing some missing data, were included in the factor analysis. Descriptive statistics of the variables are found in Appendix D.

Analytical Procedures

Factor Analysis: Phase One. The analyses were performed using the Statistical Package for the Social Sciences, version 22. When a factor analysis includes ordinal variables, SPSS employs coding from the R statistical language, an open source package. The appropriate R packages were downloaded for the analyses used in the current study.

After the variables of interest were identified, the data were cleaned and correlations are examined. Among the variables of interest, any variables that did not correlate in the heterogeneous correlation function (HETCOR) of SPSS at the level of at least \( r = .3 \) were eliminated from the analysis.

The HETCOR procedure of SPSS 22 provided the Pearson, polyserial, and polychoric correlations for correlations among all of the study variables. Pearson correlations were calculated between pairs of continuous variables. Polyserial
correlations were calculated between pairs of variables comprising one ordinal and one continuous variable. Finally, polychoric correlations were calculated between pairs of ordinal variables.

**Factor Analysis: Phase Two.** The second general phase of the analysis was the derivation of the factor solution. This phase included determining the correct number of factors to be derived, identifying an initial factor solution, rotating the solution, and verifying the reliability of the solution. Listwise deletion was selected to handle missing values in the analysis. Two-step polychoric factor analysis procedures were used. The principal components procedure was used to create the initial solution. The correct number of factors to retain in the final factor solution was determined using a scree plot and the R procedures for factor analysis, and confirmed by the scree plot, Velicer’s MAP analysis, and the Very Simple Structure test.

The final factor solution was the result of several rotations of the initial factor solution. Rotation of the solution is part of the process of generating a parsimonious and simple solution, explaining variance without adding unnecessary complexity. A number of initial solutions and rotations were tried before selecting the one that most logically interpreted the data (Thompson, 2004).

A varimax rotation supplied a solution that was simple, completely separating four factors. Variables and their pattern coefficients for a four factor solution are displayed in the results section from those with highest through those with lowest pattern coefficients, with their associated commonality measures. If variables with smaller pattern coefficients were retained in the factor solution, the result would be more factors
with much lower importance. For this reason, variables with pattern coefficients below 0.4 were dropped from the analysis.

When the final factor solution was determined, each factor was entered into the data set as a new continuous level variable, reflecting the portions of the factor contributed by each variable. Each variable’s pattern coefficient acted a multiplier in the expression that defined the factor scores for each case of the data. This was accomplished by creating a new variable for each factor. Each new variable takes on the sum of the products of the pattern coefficients multiplied by their respective variable values for each case within the data, with an eye toward future use in regression analyses.

Results

Factor Analysis: Phase One

Results of the HETCOR analysis are show in Table 2.4 below. Correlations greater than or equal to .300 are in bold print. Four variables that did not correlate above .3 with any other variables (Empowerment, Self-Care Skills, Social Assertion, and Arts) were dropped from the exploratory factor analysis at this point.

A similar analysis was performed using the eight ordinal variables that measured the TAPS curriculum-based assessment items. The SPSS 22 HETCOR procedure was applied again, which provided the necessary polychoric correlation values of the TAPS items (see Table 2.5).
Table 2.4

Heterogeneous Correlations

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<td>0.084</td>
<td>0.158</td>
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<td>-0.175</td>
<td>0.153</td>
<td>0.120</td>
<td>0.041</td>
<td>0.135</td>
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<td>0.079</td>
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<td>0.121</td>
<td>0.096</td>
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<td>0.011</td>
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<td>0.074</td>
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<td>0.069</td>
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<td>Comp</td>
<td>0.117</td>
<td>0.088</td>
<td>0.015</td>
<td>-0.016</td>
<td>0.057</td>
<td>0.207</td>
<td>0.112</td>
<td>0.100</td>
<td>0.174</td>
<td>0.489</td>
<td>0.246</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Athl</td>
<td>0.289</td>
<td>0.079</td>
<td>0.140</td>
<td>0.186</td>
<td>0.050</td>
<td>0.221</td>
<td>0.163</td>
<td>0.231</td>
<td>0.073</td>
<td>0.056</td>
<td>-0.056</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Humor</td>
<td>0.141</td>
<td>0.076</td>
<td>0.199</td>
<td>0.025</td>
<td>0.173</td>
<td>0.164</td>
<td>0.094</td>
<td>0.287</td>
<td>0.285</td>
<td>0.153</td>
<td>0.027</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Conf</td>
<td>0.188</td>
<td>0.396</td>
<td>0.089</td>
<td>0.132</td>
<td>0.232</td>
<td>0.016</td>
<td>0.016</td>
<td>0.011</td>
<td>0.273</td>
<td>0.032</td>
<td>-0.028</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Imp</td>
<td>0.138</td>
<td>0.126</td>
<td>-0.035</td>
<td>0.015</td>
<td>0.312</td>
<td>-0.031</td>
<td>0.039</td>
<td>-0.093</td>
<td>0.269</td>
<td>0.057</td>
<td>-0.047</td>
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</tbody>
</table>

Table 2.4—Continued
Table 2.5

*TAPS Heterogeneous Correlations*

<table>
<thead>
<tr>
<th>TAPS</th>
<th>a</th>
<th>b</th>
<th>c</th>
<th>d</th>
<th>e</th>
<th>f</th>
<th>g</th>
<th>h</th>
</tr>
</thead>
<tbody>
<tr>
<td>a</td>
<td>1.000</td>
<td>.696</td>
<td>.558</td>
<td>.324</td>
<td>.417</td>
<td>.352</td>
<td>.196</td>
<td>.401</td>
</tr>
<tr>
<td>b</td>
<td>.696</td>
<td>1.000</td>
<td>.953</td>
<td>.685</td>
<td>.671</td>
<td>.612</td>
<td>.327</td>
<td>.687</td>
</tr>
<tr>
<td>c</td>
<td>.558</td>
<td>.953</td>
<td>1.000</td>
<td>.857</td>
<td>.732</td>
<td>.706</td>
<td>.521</td>
<td>.796</td>
</tr>
<tr>
<td>d</td>
<td>.324</td>
<td>.685</td>
<td>.857</td>
<td>1.000</td>
<td>.796</td>
<td>.808</td>
<td>.771</td>
<td>.748</td>
</tr>
<tr>
<td>e</td>
<td>.417</td>
<td>.671</td>
<td>.732</td>
<td>.796</td>
<td>1.000</td>
<td>.985</td>
<td>.762</td>
<td>.692</td>
</tr>
<tr>
<td>f</td>
<td>.352</td>
<td>.612</td>
<td>.706</td>
<td>.808</td>
<td>.985</td>
<td>1.000</td>
<td>.851</td>
<td>.760</td>
</tr>
<tr>
<td>g</td>
<td>.196</td>
<td>.327</td>
<td>.521</td>
<td>.771</td>
<td>.762</td>
<td>.851</td>
<td>1.000</td>
<td>.811</td>
</tr>
<tr>
<td>h</td>
<td>.401</td>
<td>.687</td>
<td>.796</td>
<td>.748</td>
<td>.692</td>
<td>.760</td>
<td>.811</td>
<td>1.000</td>
</tr>
</tbody>
</table>

*Note.* Correlations greater than .3 are marked with bold type.

**Factor Analysis: Phase Two**

Twenty variables were then explored in the main factor analysis. Trials of several numbers of factors to retain and of several rotations led to the elimination of the variables *Household Skills* and *Mental Skills*, which were consistently left out of factors identified in each trial. An initial solution was obtained, using polychoric 2-step procedures and principal components extraction of factors, with communalities ranging from 0.377 to 0.827. However, the initial solutions did not completely separate the variables between the factors. Some variables were associated with more than one factor.

As the final solution emerged, it was clear that the variable, *Organized*, did not fit conceptually with the four other variables suggested by the analysis. When the hypothesized factor solution was tested without the *Organized* variable, the factor solution accounted for a larger amount of variance. The *Organized* variable therefore was
not retained in the final factor solution, below. Taken together the four rotated factors explained 58.39% of the variance in the data.

The four factors are displayed in Table 2.6 below. F1, labelled *Academic Achievement*, was based on five Woodcock Johnson III subscale sum items (reference) with pattern coefficients ranging from .724 to .904. F2, labeled *Independence*, included the two items from the *Arc’s Self-Determination Scale* and two items from the *Student Self-Concept Scales* with pattern coefficients averaging .705 to .790. F3, labeled *Social Skills*, included two subscales sums of the SSRS and 2 single item variables with pattern coefficient ranging from .646 to .776. Finally, F4, labeled *Non-academic Skills*, included four single-items variables with pattern coefficients ranging from .532 to .742. Rotated variances are shown in Table 2.7 below.

**TAPS Factor Analysis**

Exploratory Factor Analysis of the TAPS items resulted in a two-factor solution, shown below. TAPS F1 represents items d through h of the checklist, and is labeled TAPS Higher Skills. TAPS F2 represents items a through c, and is labeled TAPS Lower Skills. The TAPS analysis accounted for 86.56% of the shared variance of the TAPS items. Table 2.8 below displays the structure of the two TAPS factors. Table 2.9 shows the rotated variances and cumulative shared variance.
Table 2.6

Structure of Four Factors

<table>
<thead>
<tr>
<th>Pattern Coefficients (Loadings)</th>
<th>F1 Academic Achievement</th>
<th>F2 Independence</th>
<th>F3 Social Skills</th>
<th>F4 Non-Academic Skills</th>
</tr>
</thead>
<tbody>
<tr>
<td>Synonyms</td>
<td>.904</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Social Studies</td>
<td>.858</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Passage Comprehension</td>
<td>.849</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Science</td>
<td>.838</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Calculation</td>
<td>.724</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Confident</td>
<td>.790</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Self-Realization</td>
<td>.744</td>
<td>.205</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Autonomy</td>
<td>.735</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Important</td>
<td>.705</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Social Self Control</td>
<td></td>
<td>.776</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Social Cooperation</td>
<td></td>
<td>.749</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Humor</td>
<td>.648</td>
<td>.337</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sensitive</td>
<td>.646</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Athletics</td>
<td></td>
<td>.742</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mechanical</td>
<td></td>
<td>.732</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Computers</td>
<td>.224</td>
<td>.552</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Performing Arts</td>
<td>.234</td>
<td>.532</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note. Loadings below .200 are suppressed from display in this chart. Pattern coefficients are bolded for each factor.

Table 2.7

Rotated Variance Explained

<table>
<thead>
<tr>
<th></th>
<th>Sums of Squared Loadings</th>
<th>% Variance</th>
<th>Cumulative %</th>
</tr>
</thead>
<tbody>
<tr>
<td>F1</td>
<td>3.66</td>
<td>21.52</td>
<td>21.52</td>
</tr>
<tr>
<td>F2</td>
<td>2.28</td>
<td>13.42</td>
<td>34.95</td>
</tr>
<tr>
<td>F3</td>
<td>2.04</td>
<td>11.98</td>
<td>46.93</td>
</tr>
<tr>
<td>F4</td>
<td>1.95</td>
<td>11.46</td>
<td>58.39</td>
</tr>
</tbody>
</table>
Table 2.8

*Structure of 2 TAPS Factors After Quartimin Rotation*

<table>
<thead>
<tr>
<th>Pattern Coefficients (Loadings)</th>
<th>TAPS F1</th>
<th>TAPS F2</th>
</tr>
</thead>
<tbody>
<tr>
<td>g) Locates unfamiliar place by numbering systems</td>
<td><strong>1.029</strong></td>
<td>-.238</td>
</tr>
<tr>
<td>f) Executes route in another building with directions</td>
<td><strong>.972</strong></td>
<td>-.019</td>
</tr>
<tr>
<td>e) Executes route within building with verbal directions</td>
<td><strong>.866</strong></td>
<td>.129</td>
</tr>
<tr>
<td>d) Creates new routes between familiar places indoors</td>
<td><strong>.839</strong></td>
<td>.154</td>
</tr>
<tr>
<td>h) Orient self to unfamiliar room</td>
<td><strong>.693</strong></td>
<td>.331</td>
</tr>
<tr>
<td>a) Travels using sighted guide to familiar locations</td>
<td>-.117</td>
<td><strong>.910</strong></td>
</tr>
<tr>
<td>b) Travels indoors using rotely learned routes</td>
<td>.175</td>
<td><strong>.889</strong></td>
</tr>
<tr>
<td>c) Travels to other areas using rotely learned routes</td>
<td>.468</td>
<td><strong>.638</strong></td>
</tr>
</tbody>
</table>

Table 2.9

*TAPS Rotated Variance Explained*

<table>
<thead>
<tr>
<th></th>
<th>Sums of Squared Loadings</th>
<th>% Variance</th>
<th>Cumulative %</th>
</tr>
</thead>
<tbody>
<tr>
<td>TAPS1</td>
<td>5.63</td>
<td>70.38</td>
<td>70.37</td>
</tr>
<tr>
<td>TAPS2</td>
<td>1.29</td>
<td>16.18</td>
<td>86.56</td>
</tr>
</tbody>
</table>

**Discussion**

A four-factor structure for 17 out of the 20 items was evident for the main analysis, based on an exploratory factor analysis. The selection of a four-factor solution yielded factors that were conceptually consistent. Factor 1, *Academic Achievement*, reflects scores on subtests of the Woodcock Johnson III (WJIII) assessment that were
created especially for the NLTS2 data collection. It is logical that these five scales would load on one factor, as they were the only items that measured academic achievement. One of the significant advantages of having a factor based on the WJIII scales is that the assessment was administered in a form adapted for use by blind and visually impaired students, with braille formats used as needed. It is no small feat to adapt an instrument that relies in some places on visual interpretations of maps, diagrams, and math concepts.

Factor 2, *Independence*, brought together two of the four subscales of the *Arc’s Self-Determination Scale* (Wehmeyer & Kelchner, 1995; *Arc’s Scale*). One subscale, Self-Regulation, does not appear among the NLTS2 variables because the crafters of the NLTS2 used only the 22 *Arc’s Scale* items that had the highest loadings on the factors of the *Arc’s Scale*. One other scale, Psychological Empowerment, was eliminated from the factor analysis after the examination of correlation. The two scales remaining, Autonomy and Self-Realization, were determined through the exploratory analysis to form a factor with the Confident and Important scale totals from Gresham and Elliott’s (1990) instrument, the *Student Self-Concept Scales*.

When the Autonomy and Self-Realization subscales were identified as loading on the same underlying factor as the Confident and Important subscales of the *Student Self-Concept Scales*, the combination was considered. The name *Independence* was chosen for the new variable because the four items that comprise the factor all connote the independence of mind and direction that a young adult in transition to adulthood may or may not have.

Factor 2, *Independence*, may be a useful latent construct to investigate in future research for a number of reasons. First, the four subscale scores were all created from
teacher-administered items within the NLTS2. This makes the factor more reliable and exempt from any inter-rater reliability issues. Second, the Arc’s Scale and the Student Self-Concept Scale are both easy to use and available online. This adds practical usefulness to the Independence factor. If the factor is found to be statistically useful in future research for predicting youth outcomes, it will be easy to measure this factor among blind youth.

Finally, the two instruments, the Arc’s Scale and the Student Self-Concept Scales, are both validated instruments, which increases user confidence in the validity of the factor. However, the reliability of the factor and the availability of the instruments are not very helpful if the factor is not found to be useful. It remains to be seen if the Independence factor acts as a predictor of positive post-school outcomes.

Factor 3, Social Skills, is based completely on parent-reported items in the NLTS2. It includes sums from the parent-reported items on the Social Self-Control and Social Cooperation subscales drawn from Social Skills Rating System. These were embedded into the parent survey of the NLTS2 Wave 1. Together with the items, Humor and Sensitive, which are single parent-reported ordinal items, this factor was named Social Skills, to represent the interpersonal nature of all four of the items that comprise the factor. With its mix of items, the pattern coefficients of F3 might have been expected to vary more, but were close in value.

Social skills, in general, have been determined to have a positive association with positive adult outcomes in postsecondary education, employment, and independent living (Test et al., 2009). This study has not explored whether the Social Skills factor will have an association with positive adult outcomes. If this factor is found to be associated with
positive outcomes in college education, the component measures may provide a useful and simple way to measure skills in a school or rehabilitation learning setting. However, it is important that the Social Skills Rating Scales, Humor, and Sensitive items are all reported by the same informants. In later waves of data collection, youth reported the Humor and Sensitive items, potentially affecting the validity and reliability of the factor.

The two parent-reported items from Factor 3, Humor and Sensitive, are single item variables, as are the four items of Factor 4, Non-academic Skills. These four items were questions that inquired into the youth’s athletic skills, ability using computers, performing arts skills, and mechanical skills. It is important to note that this factor is measured with only four parent-reported ordinal items of the NLTS2. Both Factors 3 and 4, Social Skills and Non-academic Skills, have the advantage of being drawn from only one source, the parents. This potentially increases the reliability of the information used to create each of the factors and reduces concerns about inter-rater reliability of items within the factor.

Analysis of the eight TAPS items resulted in two factors. The TAPS Lower Skills factor captures three variables related to rote learning and with greater support from an O&M professional. The TAPS Higher Skills factor comprises five variables measuring skills in new settings and with a lower level of support from the instructor. Although there were fewer than 200 cases represented by the eight TAPS variables, and 300 is the minimum suggested by Field (2009), the TAPS factors were derived as a first exploration of this method of analysis.
Limitations

A limitation is noted in the construction of the F3 Social Skills factor. Two subscale sum values and two single-item ordinal values load on this factor. The remaining three factors are each formed from only single items or only subscale sum items. At the time the study was planned, it was decided not to use the individual subscale items in the factor analysis, since the subscale items have already been found to load on single constructs. Further investigation into this limitation may be needed to explore the balance of the single item humor and sensitivity against the subscale sum items.

Recommendations for Further Research

Further research is recommended to explore the use of the four factors in regression analyses of the outcomes of college attendance and persistence. If any of these four factors is found to be significant as an independent predictor of positive outcomes, the factor should be examined further to determine its usefulness in pre-college rehabilitation counseling. Research designs that include a comparison group of students without disabilities would be most helpful. Even a small group of blind students could be examined in ways not previously possible, given that there has not previously been comparison group data available in the NLTS.

The analysis presented in this paper adds to the literature by demonstrating a way to explore and identify factors that represent latent constructs in the NLTS2. The analysis reduced 17 variables to four factors using a population of blind/VI youth. A strength of the factors is that each of the four factors comprises variables from only one
source of report, either the direct assessment or the parent survey. This approach may be useful for researchers of other disability groups.

The results of this exploratory factor analysis might be used to assist the work of rehabilitation and education service providers. The four factors may be used to identify student support needs. Demographic and disability-related variables may be identified as risk factors. In addition to those risk factors, however, Academic Achievement, Independence, Social Skills, and Non-academic Skills factors may simplify the planning of needed remediation, contributing to the success of blind/VI youth as they transition to adulthood.

References


CHAPTER III

FACTORS ASSOCIATED WITH COLLEGE ATTENDANCE OF BLIND AND VISUALLY IMPAIRED YOUNG ADULTS

This paper explores the factors that influence positive adult outcomes for youth with disabilities, specifically youth who are blind or visually impaired (blind/VI). Positive outcomes in adult life can be described in a number of ways. For example, being employed or getting more education would be considered positive outcomes. Living above the poverty level, or earning above minimum wage also would be considered positive outcomes. In this study, positive outcomes were measured as attendance at a two- or four-year college.

Students with disabilities may face particular obstacles in their transition to adulthood. Youth with disabilities tend to have lower levels of education and income than the general population (Newman et al., 2011) and are less likely to be employed (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). However, postsecondary education is even more important for people who have disabilities (Yelin & Trupin, 2003). Several studies have shown that youth with disabilities who do not attend postsecondary school are likely to be unemployed (Madaus, Grigal, & Hughes, 2014; Newman et al., 2011; Yelin & Trupin, 2003).

Although it is beneficial to have a college degree to attain better outcomes in adulthood, youth in most disability categories enroll in college at a lower rate than
individuals in the general population (60% vs. 67%; Newman et al., 2011). In contrast to the lower attendance of youth with most disabilities and to the general population, however, more than 70% of blind/VI youth attend at least one class in college (Newman et al., 2011). It is not clear what variables may be associated with this higher rate of attendance among blind youth. The current study is designed to explore the characteristics, skills, and experiences of youth who are blind/VI in association with their attendance of at least one class in college.

Outcomes of Young Adults with Disabilities

Quantitative research into the adult outcomes of youth with or without disabilities is sometimes based on data collected through large federally mandated research studies. The second National Longitudinal Transition Study (NLTS2; SRI International, 2000) is one such federally sponsored data gathering effort. It offers a nationally representative sample of a large group of youth with disabilities, with data collected longitudinally. The NLTS2 followed approximately 10,000 youth over five waves of data collection spanning approximately 10 years. In each wave, the same participants answered a new set of questions about characteristics and experiences of youth with disabilities in transition to adulthood. Parents, teachers, and youth responded to the survey questions, but individual youth were always the unit of study. The NLTS2 is also distinctive in its inclusion of a direct assessment of youths’ academic, social, and other skills, assessments that were administered face-to-face with youth by trained NLTS2 personnel.

It is difficult to conduct demographic and disability related research with the target population of youth with visual impairments. The NLTS2 is particularly useful for studying the post-high school outcomes of young adults who are blind or visually
impaired blind/VI because blindness is a low-incidence disability, and few studies include enough participants to use statistical techniques to examine adult outcomes of blind/VI youth. Approximately 820 participants in the NLTS2 study were identified as recipients of special education services with visual impairment as the primary educational diagnosis. The youth were ages 13 through 16 at Wave One, and all were young adults by Wave Five (Cameto & Nagle, 2007).

**Demographics in Association with Outcomes**

As described below, gender, race, having parents who did not attend college (first generation student status), and having a low family income are demographic categories that may be associated (positively or negatively) with college attendance. Among blind youth, additional descriptors may include the presence of an additional disability and the use of braille or large print as a reading medium.

Looking first at gender, females in the general population have higher two- and four-year college attendance rates than males (Peter & Horn, 2005). Considering all types of postsecondary education options, however, the attendance of young men and young women with disabilities does not differ significantly by gender, at approximately 60% for each group (Newman et al., 2011). Among students with disabilities, females are more likely than males to attend four-year colleges rather than two-year programs (Peter & Horn, 2005). Initial analyses of the NLTS2 data showed that blind/VI youth attend college at a higher rate than youth with other disabilities (Newman et al., 2011). However, that picture of blind youth as high in attendance does not provide insight into the factors associated with attendance beyond the disability label. In addition, many factors have been identified alone, not in concert with other variables.
In addition to gender, race and ethnicity may be associated with college attendance. Members of ethnic minority groups both with and without disabilities are three times less likely to be engaged in either employment or education after high school than those of non-minority youth (Benz, Yovanoff, & Doren, 1997). One study showed that African Americans were more likely to attend a two-year college or a vocational technical program after high school than a four-year college (Peter & Horn, 2005). The relationship of race and ethnicity with postsecondary outcomes among students with and without disabilities may be very complex and hard to understand completely.

Status as a member of the first generation of a family to attend postsecondary education also has been identified as a risk factor for non-completion among students with disabilities (Lombardi, Murray, & Gerdes, 2012; Pascarella, Pierson, Wolniak, & Terenzini, 2004). Lombardi and colleagues reported group comparisons indicating that first generation students had lower grade point averages, lower levels of family and peer support, and higher levels of financial stress than other students. After controlling for a broad range of demographic characteristics, individual skills, and college factors, Lombardi and colleagues also found that status as a first generation college student accounted for significantly lower grade point average among these students than among other students. However, the same study showed that it was the financial stress associated with being a first generation student with disabilities that most strongly predicted leaving college before completing a degree.

Whether or not they are first generation college students, all students may experience financial stress because of a low family income level. Madaus, Grigal, and Hughes (2014) noted that college enrollment among NLTS2 participants is significantly
and negatively affected by belonging to a family with income less than $50,000. As an indirect effect of low income level, Madaus and colleagues determined that attending a high-poverty high school limits student achievement, which in turn affects access to postsecondary educational opportunities. Madaus and colleagues looked at students with high incidence disabilities, not blind/VI students. This is still a new area of investigation among blind/VI youth.

Both low socioeconomic status (Karpur, Nazarov, Brewer, & Bruyere, 2014) and the cost of tuition (Yelin & Trupin, 2003) are barriers to postsecondary education. However, blind/VI youth are eligible to receive training leading to a job goal with funding under the provisions of the Rehabilitation Act of 1973. No research has been found that examined association of full or partial tuition funding through the vocational rehabilitation system with college attendance of blind/VI students.

Having an additional disability is also a demographic descriptive feature among blind/VI individuals. Among youth with disabilities in the United States, the NLTS2 data indicate that approximately 60% have only one disability. Another 21% have one coexisting disability, and the remaining 19% have two or more disabilities in addition to visual impairment (Cameto & Nagel, 2007). Among blind/VI youth with one or more coexisting disabilities, the most common are intellectual disability (41%) and learning disabilities (37%). The presence of additional disabilities such as these could be expected to affect the college attendance status of youth with visual impairments; however, this is not yet known.

For youth who have visual impairments, additional factors may affect postsecondary outcomes. One factor may be the use of braille, large print, or switching
between the two. It is difficult to examine the use of reading media in association with outcomes in young adulthood because many youth do not exclusively use one reading medium and may use assistive technology to access print text (D’Andrea, 2012). A youth whose vision loss is attributable to a degenerative diagnosis may find that reading acuity changes significantly over time. Students in D’Andrea’s qualitative study indicated that the demands of college work and problems with accessibility required them to use both braille and speech access to text.

Ryles (1996) explored the effects of learning braille at different ages. Among individuals who were able to use large print in childhood and switched to braille in adulthood, Ryles found that earlier learning of braille was positively and statistically significantly associated with being employed. Use of braille versus large print was inconclusive in association with educational outcomes.

**Beyond Demographic and Disability Characteristics**

In addition to demographic and disability characteristics that remain largely unchanged through childhood, transition services may provide youth with skills and experiences associated with positive adult outcomes in education. A number of research projects have explored the nature of these skills and experiences. One prominent project was the work of the National Secondary Transition Technical Assistance Center (NSTTAC), a research and technical assistance project funded by the U.S. Department of Education Office of Special Education Programs. In their systematic review of correlational research literature, NSTTAC used the standards of the Institute for Education Science (IES) to evaluate the level of evidence (strong, moderate, potential, or low) for transition-related predictors of adult outcomes based on studies conducted since
1984. NSTTAC also rated the quality of each study according to the quality indicators established by the Council for Exceptional Children (Thompson, Diamond, McWilliam, Snyder, & Snyder, 2005). Based on the number and quality of studies with high or moderate levels of evidentiary support, NSTTAC named 14 predictors that were associated with positive adult outcomes in education. Predictors with a moderate level of support include inclusion in general education, paid work experience, parent expectations, vocational education, and having a transition program. Predictors with a potential level of support include career awareness, interagency collaboration, occupational courses, self-determination, independent living skills, social skills, and student support features. The literature review of the current study was designed to examine the NSTTAC-identified predictors and other literature.

Youth learn a number of skills at home that will be useful in adult life. These independent living skills may include personal management skills needed to interact with others, daily living skills, and financial and healthcare literacy (Rowe et al., 2014). In several studies, students who had higher levels of independent living skills were more likely to be engaged in postsecondary education (Blackorby, Hancock, & Siegel, 1993; Heal & Rusch, 1995). Students were disaggregated by disability category to some extent, with blind students included in the sensory impairment category.

As youth grow up, they also experience their parents’ expectations for their success and independence in adulthood. Doren, Gau, and Lindstrom (2012) (also cited in the NSSTAC comprehensive review) used a secondary analysis of NLTS2 data in order to examine the effects of parents’ expectations of both graduation and participation in postsecondary education. They examined expectations, finding that disability type
moderated the effect of expectations on both graduation and postsecondary participation. Parent expectations were a significant predictor of adolescent autonomy, which in turn predicted better adult outcomes.

Benz, Yovanoff, and Doren (1997) found in their longitudinal study that students with and without disabilities who reported high social skills were more likely to be productively engaged two years after high school. An interesting result of NLTS2 research is that having a college degree is associated with having more social experiences (Newman et al., 2011). Botsford’s (2013) meta-analysis of three studies conducted among 1,229 blind/VI youth, identified a moderate positive effect of social skills. Zebehazy and Smith (2011) found that although blind/VI youth had social skills levels equal to or higher than youth with other disabilities, they had only moderate levels of social skills overall, according to the *Social Skills Rating System* (Gresham & Elliott, 1990) used in the NLTS2. However, even with this knowledge about the social skills of blind/VI youth, it is still not known whether social skills are related to college attendance rates.

Researchers have extensively investigated self-determination among various disability groups (Cobb & Alwell, 2009; Copeland, Hughes, Agran, Wehmeyer, & Fowler, 2002). Youth with all kinds of disabilities have been shown to increase their skill levels after instruction, increasing their capacity to exercise autonomy and self-advocacy, as well as increasing their level of psychological empowerment (Cobb & Alwell, 2009; Wehmeyer, Palmer, Shogren, Williams-Diehm, & Soukup, 2013). Higher levels of self-determination are associated with a greater number of positive outcomes (Copeland et al., 2002; Test et al., 2009; Wehmeyer et al., 2013). Greater self-
determination is also associated with higher grades in school (Copeland et al., 2002). Self-determination is one of the few NSTTAC predictor areas in which several studies have been completed with blind/VI youth as participants.

Robinson and Lieberman (2004) studied the relationship of visual impairment, age, and gender with self-determination, yielding clues to the needs of blind/VI youth to increase their ability to be self-determining. However, the ability or skill of self-determination is only half of the picture: youth must also have opportunities to practice the skill. Robinson and Lieberman sought to discover whether the number of opportunities youth have to practice self-determination differ based on degree of visual impairment, gender, or age. A self-report questionnaire administered at a sports camp revealed that older students (aged 16-23) were not given any more opportunities to exercise self-determined behavior than the younger students (aged 8-15). This might seem counter-intuitive since youth may be expected to see increases in the number of opportunities they have to make their own decisions as they grow up. Blind/VI students with a greater level of visual impairment had fewer opportunities for self-determination at school and in healthcare (Robinson & Lieberman, 2004). In addition to having fewer opportunities for self-determination at school, blind youth are described as being more passive and having fewer opportunities to exercise choice-making, in comparison with sighted youth (Sacks, Wolffe, & Tierney, 1998).

Self-determination also may interact with ethnicity. Rodriguez and Cavendish (2012) studied the levels of self-determination and family environment characteristics reported by 157 Anglo and Latino students with and without disabilities. Although girls with disabilities have been reported to have poorer transition outcomes than boys with
disabilities (Doren & Benz, 2001), girls in Rodriguez and Cavendish’s study reported higher levels of self-determination, which in turn was positively associated with success in postsecondary education.

Rodriguez and Cavendish (2012) further noted that family environments that encourage independence were associated with self-determination in females. Among students with and without disabilities, Latino students reported higher self-determination skills than Anglo students, the first time such a result had been reported (Rodriguez & Cavendish, 2012). For males, ethnicity explained a significant amount of the variance in self-determination after controlling for family environment, but there was no such effect found among females. Powers, Geenen, and Powers (2009), however, noted in their study of expectations and outcomes of youth in transition to adulthood that lower outcomes may be more associated with expectations than with self-determination skills. Possible associations between self-determination and college attendance among blind/VI youth have not been identified in the literature.

A skill area that is frequently considered among blind/VI youth is the area of orientation and mobility (O&M). Attending college in any campus setting requires students to be able to find buildings and to move safely between locations. It has been difficult to learn more about college success in association with O&M skills, but research increased after the NLTS and NLTS2 data were collected. More studies have been conducted investigating the association of O&M skills with employment than with education, and results have been mixed in identifying any associations between O&M skills as measured using the TAPS curriculum and adult outcomes. For instance, 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 not in data collected two years later, up to six years after participants finished high school.

NLTS2 data on O&M instruction included a variable that indicated whether the student received instruction during the first or second wave of data collection. The skill level of students who did receive O&M instruction was assessed with a checklist assessment from the curriculum *Teaching Age-Appropriate Personal Skills (TAPS; Pogrund et al., 1995)*. This checklist was embedded into the Wave One School Program survey. Cameto and Nagle (2007) examined the data that were collected with the checklist. They found no differences in orientation and mobility skills among NLTS2 participants related to age, gender, or race/ethnicity. However, orientation and mobility skills did differ along other variables. Cameto and Nagle noted that youth whose families have higher incomes were significantly better at soliciting help inside a building than youth with middle or lower socioeconomic status. Students without additional disabilities outperformed those with additional disabilities. Those identified as visually impaired outperformed those who were identified as totally blind in almost all areas. However, in these studies of the level O&M skills of blind/VI youth, there was no attempt to determine association of skills with adult outcomes such as attendance in postsecondary education programs.

Among youth who are blind/VI, there are a few clues to the prevalence of the use of assistive technology. Kelly’s (2009) analysis of the Special Education Elementary Longitudinal Study results showed that fewer than half of youth with visual impairments were using assistive technology in the elementary and middle school years. Kelly (2011) took another look at the problem of access to assistive technology, this time with older
youth, through an analysis of the NLTS2 data. Kelly again found that not all youth with visual impairments were using assistive technology, and in both studies, parental involvement was statistically significantly associated with use of technology.

Kelly and Wolff (2012) looked more specifically at Internet use among youth who are blind/VI, finding that these youth are not engaged in using the Internet to the same extent as their peers. In fact, almost 60% of the youth were using the Internet. However, they found that youth who were engaged in postsecondary education were over five times more likely to be using the Internet for social communication. These three studies tell us something of the frequency of use of assistive technology among blind/VI youth in longitudinal data collections. However, they do not look at a combination of youth skills factors in association with attendance in college.

**Employment Related Factors**

Career awareness is defined as learning about occupations and their educational requirements (Rowe et al., 2014) and was also identified by NSTTAC in their systematic review. The importance of work-related experience was explored in a study conducted by Benz et al. (1997). They found that having higher career awareness was positively associated with productive engagement in education or employment after high school. Halpern, Yovanoff, Doren, and Benz (1995) followed a group of youth with all disabilities for three years, finding that having taken single occupational courses and participating in vocational education programs increased the likelihood that individuals would participate in postsecondary education (Halpern et al., 1995). Holding one or more paid jobs during high school is also associated with increased high school graduation
rates and participation in postsecondary education among youth who have a variety of disabilities (Benz, Lindstrom, & Yovanoff, 2000; Bullis, Davis, Bull, & Johnson, 1995). Work-related factors have been more extensively examined than other areas among the population of blind/VI youth. McDonnall (2010) studied the relationship of paid work experiences with the postschool outcome of employment in the NLTS2 data, confirming that paid work experiences are an important predictor for blind/VI youth. However, McDonnall did not seek any association with postsecondary education.

**School Program Features**

Inclusion in general education has emerged as an important feature of school programs among students with disabilities who are later successful in post-high school education (Blackorby et al., 1993; McCall, 2014). Inclusion is defined as having access to the general curriculum and being in class with peers who do not have disabilities (Rowe et al., 2014). Flexer, Daviso, Baer, Queen, and Meindl (2011) analyzed the results of a survey based on the design of the first NLTS, finding strong support for inclusion as a predictor of postsecondary education, even after they controlled for gender, disability, and minority status.

Halpern, Yovanoff, Doren, and Benz (1995) identified the positive association between school program features and success in postsecondary education. These features were inclusion in general education, student support, and participation in a select group of courses. In contrast to these results, however, a study of over 67,000 students with mild disabilities in a southern state found only mildly positive effects of inclusion (Goodman, Hazelkorn, Bucholz, Duffy, & Kitta, 2011). Although there was a 62%
increase in the percentage rate of inclusion over six years, high school graduation rates did not change significantly, remaining below 30%.

Halpern and colleagues (1995) also noted that students with disabilities who received assistance in transition planning during their senior year of high school were more likely to participate in postsecondary education than those who did not receive such assistance. Looking at goal-setting as a form of transition planning, Benz and colleagues (2000) reported that students who had established four or more goals in a transition program were more likely to engage in postsecondary education. In a survey of 103 students with mild to moderate disabilities, however, Williams-Diehm and Lynch (2007) found that only 10.7% of youth knew the purpose of a transition plan. Students knew few details of the plan in place, but 77% reported that teachers did listen to what the student wanted during the planning.

Part of transition planning and service provision is the interaction of the various stakeholders in the process. Interagency collaboration as an evidence-based predictor of participation in postsecondary education represents the use of cross-agency, cross-program, and cross-disciplinary processes with collaborative efforts as a defining characteristic (Rowe et al., 2014). For deaf and hard-of-hearing students, having more agencies involved in the transition to adulthood was associated with engagement in postsecondary education (Bullis et al., 1995). However, parent participation in the development of informational material by an interagency council was also associated with success in postsecondary education (Repetto, Webb, Garvan, & Washington, 2002).
**Research Question**

Many factors reviewed above may have an impact on youth who have visual impairments. Although all youth face some obstacles to positive adult outcomes, blind/VI youth may not experience the same barriers, given the high rate of college attendance of blind/VI youth. As a result of the literature reviewed, the research question for this study is as follows:

*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?*

**Methods**

**Design**

This study explored factors that were potentially associated with college attendance of blind and visually impaired young adults. The study used data from the NLTS2. The analysis employed logistic regression procedures to determine the best model to fit the data, in which the dependent variable was attendance in at least one class in a two- or four-year college program, not including vocational or other postsecondary training programs. In addition to demographic and disability descriptor variables, potential predictor variables were selected to operationalize the predictors identified by NSTTAC and in other literature.

Approval of this study was obtained from the Human Subjects Institutional Review Board of Western Michigan University, citing the secondary analysis of survey data. The NLTS2 study data were used under a restricted-use data license. The study plan was reviewed and approved by the Institute for Education Sciences, the federal
agency that supervises any work with the data. The author was authorized as a user of the dataset.

**Participants**

Participants were identified from in the NLTS2 data using three inclusion criteria: (1) receiving services under an educational diagnosis of visual impairment; (2) participation in the Wave Two direct assessment of self-determination, self-concept, and academic achievement; and (3) having an attendance outcome recorded in the data set. The second criterion limits the study sample to blind/VI youth who have functional abilities that allow them to reliably express answers to questions and to read independently in print or in braille (Wagner, Newman, Cameto, & Levine, 2006). Of the 420 blind/VI NLTS2 participants for whom direct assessment results were recorded in the data set, college attendance data were included for only approximately 280 participants, comprising the sample of interest for this study. The youth were ages 13 through 16 at Wave One, and all were young adults by Wave Five. All youth in the study were in at least 7th grade when the study began (Cameto & Nagle, 2007).

**Outcome (Dependent) Variable**

The outcome is represented by a collapsed variable made of two dichotomous items in Wave Five: “youth ever attended any two-year college in any wave” and “youth ever attended four-year college in any wave.” This variable, Attendance, was constructed with two values, 0 = no, and 1 = yes.

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2 All unweighted sample sizes have been rounded to the nearest 10 in compliance with restricted data-use license.
Potential Predictor (Independent) Variables

Potential independent predictor variables were identified from five waves of NLTS2 data collection, conducted two years apart. Parents, contacted at every wave, and youth, contacted in Waves Two through Five, reported on the characteristics and experiences of the youth participants. In the first wave of data collection only, teachers reported on disability characteristics, such as use of accommodations, and features of each youth’s classroom experiences in the school program survey. A transcript summary was created after Wave Five for all participants for whom complete transcripts were available. Individual youths were the unit of analysis throughout the study.

This section describes selection and construction of the independent variables investigated in this study. Seven categories of variables were investigated. As displayed in Table 3.1 below, they included demographic and disability descriptive variables selected because of their role in prior studies of persistence, four factors derived from earlier research (Chapter II in this dissertation; Academic Achievement, Independence, Social Skills, and Non-Academic Skills) and 12 variables identified in NSTTAC’s systematic review as evidence-based predictors of positive outcomes in postsecondary education for students with disabilities (Test et al., 2009). Finally, two orientation and mobility skills identified in prior research (Chapter II of this dissertation) were included to investigate their relationships with the dependent variable.
Table 3.1

Variable Description

<table>
<thead>
<tr>
<th>Category</th>
<th>Variable Name in Current Study</th>
<th>( n ) &lt;sup&gt;a&lt;/sup&gt;</th>
<th>Variable Type</th>
<th>NLTS2 Instrument</th>
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<td>Dichotomous</td>
<td>School Program Survey (see Appendix E)</td>
</tr>
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<td></td>
<td>Race</td>
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<td>Categorical (4 categories)</td>
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<td>Urbanicity</td>
<td>270</td>
<td>Categorical (3)</td>
<td>Parent Survey Wave One and Two (see Appendix E)</td>
</tr>
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<td></td>
<td>First Generation Status</td>
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<td>Dichotomous</td>
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<tr>
<td></td>
<td>Income</td>
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<td>Categorical (3)</td>
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<td>Dichotomous</td>
<td>Wave Two Direct Assessment</td>
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<td>Dichotomous</td>
<td>Parent Survey Waves One and Two</td>
</tr>
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<td>Dichotomous</td>
<td></td>
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<td>Dichotomous</td>
<td>School Program Survey</td>
</tr>
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<td>Continuous</td>
<td>Chapter II of this dissertation</td>
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<td>Independence</td>
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<tr>
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<td>Social Skills</td>
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<td>Non-academic Skills</td>
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<td>Scale 6-24</td>
<td>Parent Survey Wave One (see Appendix F)</td>
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<tr>
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<td>Career Awareness</td>
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<td>Dichotomous</td>
<td>Transcript Summary</td>
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<td>Paid Work (in High School)</td>
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<td>Dichotomous</td>
<td>Parent Survey</td>
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Table 3.1—Continued

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<th>NLTS2 Instrument</th>
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<td>Scale 2-8</td>
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<td>Scale</td>
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<tr>
<td>(TAPS)</td>
<td>TAPS Lower Skills</td>
<td>120</td>
<td>Scale</td>
<td></td>
</tr>
</tbody>
</table>

\(^a\) All unweighted \( n \) rounded to nearest 10 per data use agreement.

**Demographic and Disability Descriptive Variables.** The sample was described according to demographic and disability descriptors, as shown in Appendix E. *Gender* was coded as a dichotomous variable. *Race* had four categories: White, African American, Hispanic, and Other. The *Other* category included the collapsed NLTS2 categories of Asian/Pacific Islander, Alaska Native/Native American, and Multi/Other. A dichotomous variable was created for each of the four race categories in the current study. The demographics were collected in the year 2000 using the established federal categories at that time; thus, the category Hispanic was considered a race, not an ethnicity.

*Income* of the student’s household was recoded into three dichotomous variables for analysis, using categories designed by NLTS2 authors. Low was defined as $25,000 or less, middle was defined as more than $25,001 through $50,000, and high was defined as $50,001 or more. *Urbanicity* of the participant’s school included three categories—
rural, suburban, and urban—and was recoded for analysis into three dichotomous variables. Having been assessed in Braille and having been assessed in Large Print were two dichotomous variables. Looking at the two together, any particular student may have been recorded as using braille, large print, neither, or both during the assessment. Having used English during the assessment was initially included in the analysis plan, but through correspondence with SRI International it was determined that the data for this variable were collected incorrectly. The variable was not retained in the analysis.

The participant’s status as a member of the first generation in a family to attend college (hereafter First Generation Status) was a dichotomous variable, the reverse of data that recorded whether either of the participant’s parents attended school beyond high school. A value of 0 indicated that the student was not a member of the first generation of the family to attend postsecondary education, that is, one parent was educated beyond high school. A value of 1 indicated that the student was among the first generation of the family to attend postsecondary education.

Receiving Orientation and Mobility (O&M) instruction from a school program was a dichotomous variable. This variable was reported in the parent survey (see Appendix E). Participants for whom parents did not report O&M instruction were cross-checked with the school program survey. If either the school or the parent or both reported that the student received O&M services, the variable took the value of 1.

The presence of an Additional Disability considered only whether the participant had an additional disability, not the number of disabilities a participant had. A value of 0 indicated no additional disability, and 1 indicated the presence of at least one disability in addition to the educational diagnosis of visual impairment.
Home Context – Parent Expectations and Family Support. The variable

Parent Expectations indicates the likelihood that the youth would finish a two- or four-year degree in the future. As reported by parents in the parent survey, values of this ordinal variable 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. However, on further exploration, it was determined that keeping “definitely won’t” and “probably won’t” as independent dichotomous variables resulted in a quasi-complete separation of the data. Therefore, the two variables were collapsed into one.

The categories “probably will” and “definitely will” were maintained as independent dichotomous variables in order to preserve variation in the data. The Student Support variable was operationalized based on parent-reported family support. Values of this scale variable ranged from 2 to 8.

Student Skill Areas – Independent Living, Academic, Self-Determination, Social, and Non-Academic Skills. The level of a student’s Independent Living Skills was operationalized as the sum of NLTS2 items that reported self-care skills and household responsibility, as shown in Appendix F. Values of this scale variable ranged from 6 to 24.

The participant’s academic skills were represented in the analysis by two predictor variables. The first was the high school Grade Point Average, operationalized from a composite variable created by SRI International, located in the NLTS2 Summary of Transcripts instrument. A value for high school Grade Point Average was recorded for each NLTS2 participant for whom complete transcripts were submitted. The second academic skill variable was Academic Achievement. The variable Academic
Achievement, a factor derived in a prior study (see Chapter II of this dissertation) included scores from five scales of the Woodcock Johnson III assessment.

The participant’s level of self-determination was represented by another factor identified in prior research (see Chapter II of this dissertation), Independence. The variable was formed from the empowerment and autonomy subscale values of The Arc’s Self-Determination Scale, and the confidence and importance subscale values of the Student Self-Concept Scales.

The participant’s level of social skill was represented by the Social Skills factor from prior research (see Chapter II of this dissertation), which was formed from two scales of the Social Skills Rating Scale and two single items from the NLTS2 representing Humor and Sensitivity. The last variable of the youth skills category was the Non-Academic Skills factor derived from prior research (see Chapter II of this dissertation) that represented the level of the participant’s skills in several areas. This variable was formed from four single NLTS2 items representing athletic, computer, performing arts, and mechanical skills.

Employment Related. Two variables were identified in the NLTS2 data as representing employment-related characteristics. Whether the student had paid work during the high school years was operationalized based on the Wave Five Parent/Youth Survey item. Values of the Paid Work dichotomous variable were 0 = “did not have paid work during high school,” and 1 = “did have paid work in high school.” The level of the participant’s career awareness was operationalized based on whether the student took a pre-vocational course in high school, an NLTS2 item from the Transcript Summary.
Values of the *Career Awareness* dichotomous variable were 0 = “did not take a prevocational course,” and 1 = “did take a prevocational course.”

Two of the 14 NSTTAC predictors were not identified as independent items in the NLTS2 data. These were whether the student had participated in vocational education and or taken occupational courses. These predictor variables were omitted from the analyses in this study.

**School Program Features – Inclusion in General Education, Interagency Collaboration, and Transition Program.** The participant’s level of inclusion in general education was represented by a composite variable based on teacher report in the school program survey. The variable *Inclusion* was created by combining four dichotomous NLTS2 items that represented the four core subjects: mathematics, language arts, social studies, and science. If a student took a subject in a general education setting, the subject variable value was 1. If the student took the subject in any other setting, the subject variable was 0. Therefore, the values of the inclusion scale variable were:

0 = not included in any core subjects;

1 = 25% included (only one core subject),

2 = 50% included (two core subjects),

3 = 75% included (3 core subjects), and

4 = 100% included (all 4 core subjects).

If data were present for three of the core subjects for any case, and one subject was missing, the missing item was recorded as a 0 = not included. If two subjects were missing, the case was considered to be missing the composite Inclusion variable.
The Interagency Collaboration variable measures the number of participants in the participant’s individualized education planning (IEP) meeting. Values of this ordinal variable were 1 = “school and parent only at meeting” and 2 = “school and parent with any number of additional service providers at meeting.” Values of the variable Transition Program were 0 = “did not have a transition program” and 1 = “did have a transition program.”

**Determining Appropriate Sample Size for Variable Inclusion**

After selecting and constructing the variables of interest to this study, sample sizes were considered for each variable. College attendance data were recorded for 280 participants. Eighty participants did not attend college, versus 200 who did attend college. A rule of thumb suggests having 20 cases of the desired outcome variable for every independent variable included in the regression analysis. According to this rule, 10 variables would be appropriate to model attendance. Using a power of .8 and alpha of .10, a sample size of 210 would identify effects of .20 or smaller (Hulley et al., 2001, p. 89). Variables with data on 210 or more participants were retained in the analysis. Student Support ($n = 200$), Inclusion ($n = 190$), Interagency Collaboration ($n = 200$), and Transition Program ($n = 190$), were dropped from the analysis at this point. Variables that remained after eliminating those with small sample sizes were Grade Point Average ($n = 230$), Academic Achievement ($n = 270$), Independence ($n = 270$), Social Skills ($n = 280$), Non-Academic Skills ($n = 270$), Parent Expectations ($n = 270$), Independent Living Skills ($n = 280$), Career Awareness ($n = 230$), and Paid Work ($n = 280$). Of the nine remaining independent predictor variables, six were continuous variables, one ordinal,
and two dichotomous. Dummy variables were created for the one ordinal variable, Parent Expectations.

**TAPS Variables**

In addition to the disability descriptive variable reporting whether the youth received O&M services through the school, an O&M assessment was included in the Wave One school program survey of the NLTS2. This assessment comprised eight items in a checklist taken from the TAPS (Pogrund et al., 1995) curriculum. The data regarding O&M skills of youth are difficult to find, and few, if any, studies have reported eight data points on so many youth. However, the sample size of youth for whom these data were reported was small, approximately 170 cases. The sample was large compared to previous research, but too small to retain in the main regression analysis. Therefore, a separate and parallel analysis of the TAPS data was performed in this study.

The two O&M factors were derived from prior research (see Chapter II of this dissertation) from the TAPS curriculum assessment (Pogrund et al., 1995). The first factor represented the last five items in the TAPS checklist. This factor was named *TAPS Higher Skills*. The second factor was formed from the first three TAPS items and named *TAPS Lower Skills*. The two TAPS factors had fewer than 200 cases each. Although this is a small number of cases, opportunity for exploration of the factors as predictors outweighed the concern for sample size. A regression analysis was used to explore the association of these two TAPS factors, with college attendance as the outcome variable. Regression analysis was performed and results reported following the main analysis results below.
Analysis

**Weighting of Variables.** It was necessary to weight the data so that the results would reflect that actual population of blind/VI youth across the nation. For each respondent at each wave of data collection, a weight was calculated by the NLTS2 study designers (SRI International, 2000) to reflect the under- or over-sampling of particular groups of participants. Characteristics that determined the stratum and cluster were included, reflecting the SRI study design. Weights from the collection of direct assessment data were used to determine standard errors of population estimates of the mean and other statistics. All unweighted sample sizes are rounded to the nearest 10 when reported, in accordance with the restricted-use agreement for use of the NLTS2 data.

The SPSS 22 Statistics Complex Samples module was used to create a sample plan file for the sample of 280 participants. This file contained the weighting information based on the direct assessment weights, which was employed in the SPSS analyses. All analyses were performed using weighted data.

The data were cleaned and frequency distributions of variables were examined. The sample is described by demographic and disability descriptors in Table 3.2 (below). Sample means of continuous variables are found in Table 3.3 (below). Each category of categorical variables is shown in Table 3.2 below with the percentage of each category that attended college. Categorical variables that were found through chi-square analysis to be significantly associated with the outcome of college attendance were then placed in a logistic regression analysis of college attendance of blind/VI youth.
Each logistic regression model was created using forced entry of the independent variables. Selection of the final model of attendance was based on the statistical significance and size of estimated coefficients in the regression equations. Wald $F$ statistics were used to measure the significance of the regression coefficients. The percentage of cases predicted by each model was determined. Goodness of fit was assessed using Nagelkerke’s $R$ squared.

After the initial analysis, variables whose Wald statistics were significant at the level of alpha = .10 were retained in the model. The alpha level of .10 was used because of the exploratory nature of the analysis. The possibility of making a Type I error, retaining a variable that should not be retained, was weighed against the possibility of a Type II error. It was determined that, in this exploratory study, it would be better to take the chance of making a Type I error rather than missing something that might potentially be important to the study.

**Analysis of Interaction Terms and Final Regression Model.** Interaction terms were created using all of the variables whose Wald statistics were significant in the initial model. The retained variables and interaction terms were entered into a regression analysis using forced entry. Variables with Wald statistics at the .10 level were retained and are shown in the results section.
Table 3.2

Percent of Blind/VI Youth that Attended College According to Independent Predictor

<table>
<thead>
<tr>
<th>Predictor</th>
<th>Unwtd</th>
<th>Wtd</th>
<th>SE</th>
</tr>
</thead>
<tbody>
<tr>
<td>All respondents (n = 280(^a))</td>
<td>72.3</td>
<td>80.6</td>
<td>2.4</td>
</tr>
<tr>
<td>Gender (n = 280)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>70.9</td>
<td>80.5</td>
<td>3.4</td>
</tr>
<tr>
<td>Female</td>
<td>74.0</td>
<td>80.7</td>
<td>3.4</td>
</tr>
<tr>
<td>Had Additional Disability (n = 280)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>81.5</td>
<td>86.8</td>
<td>2.2</td>
</tr>
<tr>
<td>Yes</td>
<td>57.8</td>
<td>66.2</td>
<td>4.8</td>
</tr>
<tr>
<td>Race/Ethnicity (n = 280)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>White</td>
<td>72.4</td>
<td>80.6</td>
<td>3.3</td>
</tr>
<tr>
<td>African-American</td>
<td>71.7</td>
<td>79.5</td>
<td>5.7</td>
</tr>
<tr>
<td>Hispanic</td>
<td>75.0</td>
<td>84.0</td>
<td>6.7</td>
</tr>
<tr>
<td>Asian/Pacific Islander/Alaska Native/Native American/Multi/Other</td>
<td>60.0</td>
<td>68.9</td>
<td>24.0</td>
</tr>
<tr>
<td>Income (n = 270)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low≤25000</td>
<td>64.4</td>
<td>74.2</td>
<td>5.2</td>
</tr>
<tr>
<td>25000&lt;Middle≤50000</td>
<td>66.3</td>
<td>70.3</td>
<td>6.6</td>
</tr>
<tr>
<td>50000&lt;High</td>
<td>81.1</td>
<td>91.2</td>
<td>2.5</td>
</tr>
<tr>
<td>First Generation College (n = 260)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>76.4</td>
<td>81.2</td>
<td>3.1</td>
</tr>
<tr>
<td>Yes</td>
<td>66.0</td>
<td>79.7</td>
<td>4.2</td>
</tr>
<tr>
<td>Assessed in Braille (n = 280)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0 No</td>
<td>73.0</td>
<td>79.6</td>
<td>2.9</td>
</tr>
<tr>
<td>1 Yes</td>
<td>70.1</td>
<td>84.3</td>
<td>4.8</td>
</tr>
<tr>
<td>Assessed in Large Print (n = 280)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0 No</td>
<td>70.7</td>
<td>81.6</td>
<td>2.7</td>
</tr>
<tr>
<td>1 Yes</td>
<td>75.8</td>
<td>77.7</td>
<td>4.9</td>
</tr>
<tr>
<td>Rec’d O&amp;M services (n = 280)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0 No</td>
<td>74.0</td>
<td>78.8</td>
<td>4.3</td>
</tr>
<tr>
<td>1 Yes</td>
<td>71.3</td>
<td>81.7</td>
<td>2.8</td>
</tr>
<tr>
<td>Parent Expectations (n = 270)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Parents Expect NOT</td>
<td>29.8</td>
<td>29.8</td>
<td>10.4</td>
</tr>
<tr>
<td>Probably Will Attend</td>
<td>70.5</td>
<td>81.0</td>
<td>3.9</td>
</tr>
<tr>
<td>Definitely Will Attend</td>
<td>90.1</td>
<td>92.2</td>
<td>2.0</td>
</tr>
<tr>
<td>Career Awareness (n = 230)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>76.9</td>
<td>84.7</td>
<td>3.1</td>
</tr>
<tr>
<td>Yes</td>
<td>75.9</td>
<td>78.3</td>
<td>4.1</td>
</tr>
<tr>
<td>Transition Program (n = 190)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>75.0</td>
<td>76.2</td>
<td>7.7</td>
</tr>
<tr>
<td>Yes</td>
<td>73.1</td>
<td>82.9</td>
<td>3.2</td>
</tr>
<tr>
<td>Paid Work High School (n = 280)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>67.4</td>
<td>77.9</td>
<td>5.2</td>
</tr>
<tr>
<td>Yes</td>
<td>74.3</td>
<td>81.4</td>
<td>2.8</td>
</tr>
<tr>
<td>Urbanicity (n = 270)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rural</td>
<td>69.6</td>
<td>65.9</td>
<td>6.1</td>
</tr>
<tr>
<td>Suburban</td>
<td>75.2</td>
<td>84.5</td>
<td>3.3</td>
</tr>
<tr>
<td>Urban</td>
<td>69.2</td>
<td>77.2</td>
<td>4.0</td>
</tr>
</tbody>
</table>

\(^a\) All unweighted n rounded to nearest 10 per data use agreement.
Table 3.3

*Distributions of Continuous Variables*

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean</th>
<th>Standard Error</th>
<th>Minimum</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Academic Achievement (270)</td>
<td>388.07</td>
<td>5.32</td>
<td>122.89</td>
<td>591.74</td>
</tr>
<tr>
<td>Independence (270)</td>
<td>102.03</td>
<td>0.72</td>
<td>68.35</td>
<td>124.63</td>
</tr>
<tr>
<td>Social Skills (280)</td>
<td>12.59</td>
<td>0.14</td>
<td>5.63</td>
<td>15.94</td>
</tr>
<tr>
<td>Non-Academic Skills (270)</td>
<td>7.10</td>
<td>0.09</td>
<td>3.63</td>
<td>10.20</td>
</tr>
<tr>
<td>Independent Living Skills (280)</td>
<td>17.46</td>
<td>0.21</td>
<td>7</td>
<td>24</td>
</tr>
<tr>
<td>Grade Point Average (230)</td>
<td>3.01</td>
<td>0.07</td>
<td>0.879</td>
<td>4.000</td>
</tr>
</tbody>
</table>

*a* All unweighted n rounded to nearest 10 per data use agreement.

**Results**

Contingency tables and the chi-square statistic were used to examine relationships of independent variables with the outcome variable. Chi-square test results are shown in Table 3.4. After chi-square analyses were complete, variables that did not demonstrate an association with the outcome of attendance at a .05 level were eliminated from the analysis. Therefore, the variables *Gender, Race, First Generation Status, Braille, Large Print, O&M, Paid Work,* and *Career Awareness* were eliminated from the analysis at this point.

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. Collinearity diagnostics are displayed in Appendix H.

**Initial Regression Modeling**

Demographic and disability descriptive variables that were associated with the outcome of *Attendance* were *Income, Urbanicity,* and *Additional Disability.* The
variables *Parents Expect Not to Attend* and *Parents Expect Definitely Will Intend* were the only other categorical variables retained for the regression analysis. Continuous variables included in the regression analysis were the four factors *Academic Achievement*, *Independence*, *Social Skills*, and *Non-academic Skills*, as well as *High School Grade Point Average* and *Independent Living Skills*.

The dependent outcome, *Attendance*, was defined as having attended a college course in any wave of the data. Table 3.2 shows the percent of the youth that attended college for each categorical independent predictor variable. The mean, standard error, and range of each continuous variable is shown in Table 3.3.

A chi-square analysis was used to determine which independent dichotomous and ordinal variables were associated with the dependent variable. *Middle Income*, *Rural and Suburban Urbanicity*, *Additional Disability*, and two levels of *Parents Expectations* were found to have a significant association with the outcome of attendance. See Table 3.4 below.

In the main logistic model, three variables contributed significantly to predicting college attendance, at the alpha level of $p = .10$. In fact, these three were all statistically significant at $p \leq .05$. These were *Parents Expect Not to Attend*, *Academic Achievement* and *Grade Point Average*. The initial model accounted for 39.8% of the variance (Nagelkerke’s $R$ squared = .398). This model correctly predicted group membership 86.9% of the time. The model predicted attendance 95.8% of the time and non-attendance 41.8% of the time. The initial model is shown in Tables 3.5 and 3.6.
Table 3.4

*Chi-Square Analysis of Categorical Variables and Dependent Variable*

<table>
<thead>
<tr>
<th>Variable</th>
<th>$\chi^2$</th>
<th>Adjusted $F$</th>
<th>$p$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td>0.00</td>
<td>0.00</td>
<td>.96</td>
</tr>
<tr>
<td>Secondary Disability</td>
<td>16.04</td>
<td>18.64</td>
<td>.00</td>
</tr>
<tr>
<td>Braille</td>
<td>0.65</td>
<td>0.60</td>
<td>.44</td>
</tr>
<tr>
<td>O&amp;M</td>
<td>0.35</td>
<td>0.34</td>
<td>.56</td>
</tr>
<tr>
<td>Career Awareness</td>
<td>1.57</td>
<td>1.68</td>
<td>.20</td>
</tr>
<tr>
<td>Transition Program</td>
<td>2.93</td>
<td>1.76</td>
<td>.18</td>
</tr>
<tr>
<td>Assessed in English</td>
<td>6.37</td>
<td>5.97</td>
<td>.02</td>
</tr>
<tr>
<td>1st generation</td>
<td>0.09</td>
<td>0.09</td>
<td>.76</td>
</tr>
<tr>
<td>Assessed in Large Print</td>
<td>0.55</td>
<td>0.55</td>
<td>.46</td>
</tr>
<tr>
<td>Low income</td>
<td>2.24</td>
<td>1.98</td>
<td>.16</td>
</tr>
<tr>
<td>Mid income</td>
<td>7.60</td>
<td>4.73</td>
<td>.03</td>
</tr>
<tr>
<td>High income</td>
<td>15.34</td>
<td>17.17</td>
<td>.00</td>
</tr>
<tr>
<td>White</td>
<td>0.00</td>
<td>0.00</td>
<td>.99</td>
</tr>
<tr>
<td>Black</td>
<td>0.0</td>
<td>0.04</td>
<td>.84</td>
</tr>
<tr>
<td>Hispanic</td>
<td>0.23</td>
<td>0.21</td>
<td>.65</td>
</tr>
<tr>
<td>Other</td>
<td>0.38</td>
<td>0.33</td>
<td>.57</td>
</tr>
<tr>
<td>Rural</td>
<td>4.84</td>
<td>7.15</td>
<td>.01</td>
</tr>
<tr>
<td>Suburban</td>
<td>4.29</td>
<td>4.98</td>
<td>.03</td>
</tr>
<tr>
<td>Urban</td>
<td>0.22</td>
<td>0.24</td>
<td>.63</td>
</tr>
<tr>
<td>Parents Expect NOT</td>
<td>57.96</td>
<td>67.52</td>
<td>.00</td>
</tr>
<tr>
<td>Expect probably will</td>
<td>0.01</td>
<td>0.01</td>
<td>.93</td>
</tr>
<tr>
<td>Expect definitely will</td>
<td>26.48</td>
<td>23.61</td>
<td>.00</td>
</tr>
<tr>
<td>Parameter</td>
<td>Sig.</td>
<td>95% Confidence Interval</td>
<td></td>
</tr>
<tr>
<td>-----------------------------------------------</td>
<td>------</td>
<td>-------------------------</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Lower</td>
<td>Exp(β)</td>
</tr>
<tr>
<td>Intercept</td>
<td>.00</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>Parent Expectations of Attendance</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Probably Will (ref)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Probably or Definitely Will NOT</td>
<td>.02</td>
<td>0.03</td>
<td>0.14</td>
</tr>
<tr>
<td>Parents Expect Def. Will</td>
<td>.82</td>
<td>0.24</td>
<td>0.86</td>
</tr>
<tr>
<td>Presence of Additional Disability</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No (ref)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>.58</td>
<td>1.38</td>
<td>7.43</td>
</tr>
<tr>
<td>Income</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>High (ref)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Middle</td>
<td>.27</td>
<td>0.59</td>
<td>1.96</td>
</tr>
<tr>
<td>Low</td>
<td>.27</td>
<td>0.60</td>
<td>1.91</td>
</tr>
<tr>
<td>Urbanicity</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Urban (ref)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rural</td>
<td>.21</td>
<td>0.69</td>
<td>1.90</td>
</tr>
<tr>
<td>Suburban</td>
<td>.98</td>
<td>0.42</td>
<td>0.99</td>
</tr>
<tr>
<td>Academic Achievement</td>
<td>.03</td>
<td>1.00</td>
<td>1.01</td>
</tr>
<tr>
<td>Independence</td>
<td>.74</td>
<td>0.97</td>
<td>1.01</td>
</tr>
<tr>
<td>Social Skills</td>
<td>.18</td>
<td>0.93</td>
<td>1.18</td>
</tr>
<tr>
<td>Non-Academic Skills</td>
<td>.79</td>
<td>0.73</td>
<td>1.05</td>
</tr>
<tr>
<td>Independent Living Skills</td>
<td>.87</td>
<td>0.83</td>
<td>1.02</td>
</tr>
<tr>
<td>Grade Point Average</td>
<td>.04</td>
<td>1.03</td>
<td>1.82</td>
</tr>
</tbody>
</table>
Table 3.6

*Predictive Value of Attendance Model*

<table>
<thead>
<tr>
<th>Attendance</th>
<th>Percentage Correct</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>41.8</td>
</tr>
<tr>
<td>1</td>
<td>95.8</td>
</tr>
<tr>
<td>Overall Percentage</td>
<td>86.9</td>
</tr>
</tbody>
</table>

**Interaction Terms and Final Model**

*Parents Expect Not to Attend, Academic Achievement, and Grade Point Average* were included in the final model. In exploration of the regression solution, *Social Skills* sometimes had a statistically significant exponentiated $\beta$, depending on what other variables were included in the model accounting for some of the variance. Therefore, *Social Skills* was further explored in creation of the final model. Two-way interaction terms were created between the four variables remaining in the analysis. However, none of the interaction terms were found to have a role in the regression model at the level of $\alpha = .10$.

Four variables contributed significantly to the explanatory value of the final main logistic model. The model accounted for 40.1% of the variance (Nagelkerke’s $R^2$ squared = .401). This model correctly predicted group membership 86.9% of the time. The model predicted attendance 95.8% of the time and non-attendance 41.6% of the time. Youth whose parents expected them to attend college (did not expect them not to attend) were more likely to attend college by almost eight times ($Wald = 9.43, p = .003, \text{Exp}(\beta) = 7.72$). 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, \( p = .010, \exp(\beta) = 1.18 \)). 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, \( p = .031, \exp(\beta) = 1.01 \)). 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, \( p = .100, \exp(\beta) = 1.205 \)). This variable was included in the final model, although it is on the borderline of a Type 1 error, at \( \alpha = .10 \). The final model is shown in Tables 3.7 and 3.8.

Table 3.7

*Final Model of Attendance (n = 250 rounded)*

<table>
<thead>
<tr>
<th></th>
<th>95% Confidence Interval</th>
<th>Sig</th>
<th>Lower</th>
<th>Exp(( \beta ))</th>
<th>Upper</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td></td>
<td>.01</td>
<td>0.00</td>
<td>0.00</td>
<td>0.01</td>
</tr>
<tr>
<td>Parents Expect Youth probably or definitely will NOT attend</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes (ref)</td>
<td></td>
<td>.00</td>
<td>2.04</td>
<td>7.72</td>
<td>29.23</td>
</tr>
<tr>
<td>No</td>
<td></td>
<td>.03</td>
<td>1.00</td>
<td>1.01</td>
<td>1.02</td>
</tr>
<tr>
<td>Academic Achievement</td>
<td></td>
<td>.10</td>
<td>0.96</td>
<td>1.21</td>
<td>1.51</td>
</tr>
<tr>
<td>Social Skills</td>
<td></td>
<td>.01</td>
<td>1.18</td>
<td>1.93</td>
<td>3.16</td>
</tr>
<tr>
<td>Grade Point Average</td>
<td></td>
<td>.01</td>
<td>1.18</td>
<td>1.93</td>
<td>3.16</td>
</tr>
</tbody>
</table>
Table 3.8

*Predictive Value of Attendance Model*

<table>
<thead>
<tr>
<th>Attendance</th>
<th>Percentage Correct</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>43.6</td>
</tr>
<tr>
<td>1</td>
<td>95.8</td>
</tr>
<tr>
<td>Overall</td>
<td>86.9</td>
</tr>
</tbody>
</table>

**Discussion**

This study yielded several important results related to the attendance in college of blind/VI young adults. First, in this data, 72.3% (unweighted) and 80.6% (weighted) of young blind/VI adults attended at least one class in college. This is a larger percentage than the estimated rate of attendance of youth with other disabilities (60%) and youth without disabilities (67%). Second, if the parents’ 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. Third, two indicators of academic skills, High School Grade Point Average and the Academic Achievement factor, had similar 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 variables were eliminated.

The results indicate that blind/VI youth may not experience the same barriers to college attendance as youth in the general population. Typical barriers 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), were not correlated to attendance of blind/VI youth in chi-square analyses. This may indicate that special education and rehabilitation are uniformly serving youth regardless of these factors. This result could indicate that receiving special education or rehabilitation services influence the life course of youth with disabilities who are members of racial minority groups or whose parents did not attend college.

As observed by others, parent expectations form a complex construct (Chiang, Cheung, Hickson, Xiang, & Tsai, 2012; Doren et al., 2012; Powers et al., 2009; Rodriguez & Cavendish, 2012). Parent expectations of youth may grow with the expanding skills of a young person reaching adulthood, but may be affected by the type of disability. Blindness and visual impairments might have an even more complex relationship with the expectations of parents than other disabilities. 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 or 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. Degree of vision loss and similarly, presence of additional disabilities are characteristics worthy of further researched. 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, 2008), there may be important information to be gained by looking at the two disabilities together.

The association between parent expectations and student success is commonly addressed in the college attendance and persistence literature as factors that support
positive outcomes in postsecondary education (Lombardi et al., 2012; Pascarella et al., 2004). Academic achievement can be measured in a number of ways. This study used the students’ cumulative high school grade point average, and the results of the Woodcock Johnson III assessment as academic variables that might contribute to models predicting the likelihood that a student will go to college. 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.

The NLTS2 version of the Woodcock Johnson assessment may be especially useful in the future because it was created in a special version for youth who use braille. Rehabilitation counselors may be able to use the results of this assessment in college preparatory programs for blind/VI youth. This assessment should not by any means be used to deny youth an opportunity to attend college, but to identify students who may benefit from extra support services, tutoring, or pre-college academic preparatory experiences.

Neither use of braille nor use of large print correlated with college attendance in chi-square analyses. This is an important result, possibly indicating that youth are using appropriate media during junior high school and high school. However, the reading media variables in this study were based on what medium was used to take the direct assessment in the NLTS2. 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.

Certain variables that correlated with the outcomes of attendance and non-attendance in the chi-square analysis did not produce statistically significant results in the
regression analysis. These were household income, urbanicity of the participant’s high school, and the presence of additional disabilities. These participant characteristics should be investigated further. The chi-square test indicated an association with attendance, but the data in this sample were not distributed in a way that resulted in statistical significance at the level of .10.

**Limitations**

There were some limitations to the study. The data collection began approximately 15 years ago. Regulations surrounding transition planning and services changed after the Individuals with Disabilities Education Act (IDEA, 2004). Therefore, the data may not reflect the same constructs among today’s population of blind/VI youth. Younger youth in the study may have been disparately affected by the IDEA changes, but age was not used as a covariate in this study because the direct assessment was performed when youth were of similar ages. The secondary analysis of data may inhibit generalizability of the results. The analysis did not control for school setting, a continuum that could range from neighborhood school to residential school in another state. This may affect any conclusions about urbanicity of the school or inclusion in mainstream settings. Those who did not attend college may be more likely to be lost to the study, because they may not have a consistent record of email or postal address for receiving surveys.

**Implications**

The results of this study indicate that parent expectations may play a role in the decisions of students to attend or not attend college. Further research is needed, looking at parent attitudes toward blindness and the effects of interventions to increase parent
expectations. Additional research is needed to further explore the variables that had smaller effects on the outcome variable, social skills, grade point average, and the academic achievement factor.

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 approach may be helpful for future NLTS2 analyses.

References


CHAPTER IV
FACTORS ASSOCIATED WITH COLLEGE PERSISTENCE
OF BLIND AND VISUALLY IMPAIRED STUDENTS

The journey of any student from enrollment to completion of a two- or four-year college degree program may be filled with obstacles and surprises. The same barriers faced by students without disabilities may also be encountered by students with disabilities, including students who are blind and visually impaired (blind/VI). However, students with disabilities may face additional barriers and difficulties related to their disabilities. Taken together, students with disabilities attend postsecondary education programs at a lower rate than the general population (60% vs. 67%; Newman et al., 2011). College attendance, however, is not the main problem for students who are blind or visually impaired. Prior research showed that blind/VI students attend postsecondary programs at a rate of approximately 71%, higher than every other disability group except hearing impaired students (Newman et al., 2011). The question addressed by the current study is the degree to which students who are blind or visually impaired persist in their college attendance once they are enrolled. This study also explored factors that might affect the continued attendance of blind and visually impaired students in postsecondary education.

In a comparison of college expectations, students with and without disabilities reported that they believed that current educational experiences have a positive relationship with their future outcomes (Ochs & Roessler, 2001). This perception of the value of education is rooted in reality. Some of the benefits of attaining a four-year
degree are outlined in the *Higher Education: Gaps in Access and Persistence Study* (Ross et al., 2012). Although 85% of adults with at least a bachelor’s degree were employed in 2010, only 67% of those whose highest level of education was high school diploma were employed. The median earnings level of all young adults who were age 25 through 34 in 2010 was $36,000, but these data included young adults who did and did not have bachelor’s degrees. The median earnings level of just those who had bachelor’s degrees was $51,000.

The term *first- to second-year persistence* is commonly used to describe the attainment of 30 college credits, the equivalent of reaching sophomore status (National Student Clearinghouse, 2015; hereafter *persistence*). As an early measure of college success, it is important for colleges and universities to monitor the rate of persistence of students. If students are to go beyond merely enrolling or attending one class, however, they must be ready to perform to the expectations of postsecondary level education, whether or not they have a disability.

The second National Longitudinal Transition Study (NLTS2, SRI International, 2000) showed that blind/VI students who did not have additional disabilities started college right out of high school at a rate of 80% (see Chapter III of this dissertation). What is not known is how many of these students persist in college to at least 30 credit hours, and what factors affect the college success of blind/VI students. Their success might depend on how prepared they are to do college level academic work.

Horn and Berktold (1999) developed their “4 year college qualification index” to quantify the academic preparedness of youth with disabilities. The index is a measure based on ACT or SAT scores, an aptitude test, high school grade point average (GPA),
and class rank. The index showed that although a majority of youth with disabilities (all types) aspired to attain a college degree, fewer than half of them were even minimally qualified to attend college. Among blind/VI youth, only 13.9% were considered adequately prepared according to the four-year college qualification index. The remaining 86.1% of blind/VI youth were either minimally qualified or minimally to somewhat qualified. This is supported by the findings of Newman and colleagues (2011), who found that twice as many blind/VI students take remedial math and English in high school, compared to students without disabilities. This may allow them to graduate from high school, but may not prepare them for the demands of college level work.

Models of College Persistence

Theoretical models of persistence in college go beyond mere measurement of the outcome, positing factors and relationships between factors that may act in a systematic way to encourage or hinder the persistence of students. Tinto’s (1975) Social Integration Model states that student interactions with social and academic systems drive student decisions to persist or to leave college. His model has been widely used in community college research. Tinto’s model is focused on the outcomes of first-time students who are not long out of high school, a population similar to the present study. However, Tinto’s model did not account for the needs and decisions of students who have disabilities.

A model of persistence developed by Terenzini and Reason, as described by Reason (2009), incorporates what they believed to be a broader range of influences on student experiences than in Tinto’s (1975) model. This model included students’ precollege experiences and characteristics, the organizational context, the peer
environment, and individual student experiences at college. But, like Tinto’s model, the unique needs and experiences of students with disabilities are not a part of Terenzini and Reason’s model of persistence.

A third conceptual model of persistence considers not only the effects of disability but also considers another potential barrier, being a member of the first generation of college students in a family. This model, which was developed by Lombardi, Murray, and Gerdes (2012), sorts student characteristics into three categories: background, college factors, and student status as first generation or continuing generation student. The background category includes gender, ethnicity, and type of disability. The category of college factors include self-efficacy, family and peer support, accommodations for disability, and financial stress. It was the overlap of these categories that affected the performance of the student.

A large amount of data is needed to perform statistical analyses with a large group of independent variables. To explore the later outcomes of youth in association with independent variables, longitudinal data are needed. The NLTS2 (SRI International, 2000) is appropriate for analyses of the outcome of persistence in postsecondary education. Although the youngest students in the NLTS2 dataset were 13 when data collection began, they were 21 during the last wave of data collection. This longitudinal period allowed time for the participants to complete at least 30 credits, the equivalent of completing the freshman year of college.

The NLTS2 followed approximately 10,000 youth over five waves of data collection spanning approximately 10 years. In each wave, efforts were made to contact the same participants so they could answer a new set of questions about characteristics
and experiences of youth with disabilities in transition to adulthood. Approximately 820 NLTS2 participants were identified to be recipients of special education services with visual impairment as their primary educational diagnosis. Parents, teachers, and youth responded to survey questions, but individual youth were always the unit of observation within the study. Trained NLTS2 personnel administered face-to-face assessments of youth skills as one part of the Wave Two data collection. All of these features of the NLTS2 make it uniquely suited to the exploration of college persistence in youth with disabilities.

Postsecondary success may be influenced by race, socioeconomic status, gender, first generation status, and other population demographics. For example, although funding for university training is provided for people with disabilities of all races through the rehabilitation system, African Americans with disabilities are less likely to receive this funding (Boutin & Wilson, 2012). Members of racial minority groups have lower persistence and completion rates (Yamamoto & Black, 2013), as do those who have lower socioeconomic status (Lee, Rojewski, Gregg, & Jeong, 2014; Madaus, Grigal, & Hughes, 2014) or who attended high schools that have an economic composition that is less affluent (Niu & Tienda, 2012). Females have fewer positive adult outcomes than males, although this may be more due to parent expectations of young women’s ability to achieve, rather than a disability factor (Hogansen, Powers, Geenen, Gil-Kashiwabara, & Powers, 2008). In contrast, Boutin and Wilson (2012) noted that females are more likely to receive university training as a part of a rehabilitation plan than males, but they also commented that this may reflect the growing numbers of females in the general population pursuing higher education.
Many of the characteristics and experiences that affect the college journey of youth with disabilities may be measured while the youth is still in high school. Some are descriptive of demographic and disability-related features. However, conditions and experiences measured after students leave high school may also be associated with success in college. Some of these issues are related to the college context. Others are measured as part of the student’s relationship with the vocational rehabilitation system.

**College Program Features**

Successful students with disabilities are a good source for information of what helps a student be successful in a college setting. Getzel and Thoma (2008) carried out a series of structured interviews, exploring self-determination and self-advocacy strategies that students reported were needed to persist in college. Students affirmed that self-determination skills were important to success in college. Several students said that they had tried not to disclose their disabilities, but then failed in classes. These students went on to use self-advocacy by disclosing a disability and requesting services, finding more success after receiving services. However, at the same time, NLTS2 data reveal that only 28% of postsecondary students with any disability disclose a disability to instructors (Newman et al., 2011).

Although 87% of NLTS2 participants were reported to have received disability accommodations while in high school (Newman et al., 2011), only 19% of those who went to college received some type of accommodation or support at the college because of their disability. This large difference may indicate that some students have found ways to accommodate their own learning needs by the time they go to college or it may show that students do not want to reveal their disabilities. During high school, teachers
know who has a disability and what sort of disability it is if a student has an IEP. Some disabilities are more obvious, including visual impairments. College students with visual impairments may need more supports, or they may find it easier to request accommodations for an obvious disability: they received academic supports provided by the college at a rate of 59%.

Many colleges offer a variety of general academic support services to all students. Students with disabilities also have the option of receiving accommodations provided by the college. Seeking help outside of formal supports provided by the college is also common among students with disabilities (McCall, 2014; Newman et al., 2011). Among NLTS2 participants attending four-year colleges, 40% found help with academic work outside of formal supports through the college. Fewer community college students, 32%, found help outside of the supports provided by the college (Newman et al., 2011). Blind/VI students also found supports outside of the college. Whether or not they also used supports provided by the college, 52% found academic help on their own.

College graduates with disabilities have reported that having a personally significant relationship with one adult, either a faculty member or counselor in the office of services for students with disabilities, was very important to college success (Barber, 2012; Getzel & Thoma, 2008). Students in Getzel and Thoma’s qualitative study also indicated the value of establishing friendships with peers, joining support groups on campus, and seeking out support services on campus. Parents and other family members also were described as playing an important role in encouraging and supporting students. In order to increase the possibility that students will find needed support during college, Barber (2012) has recommended additional training for faculty members to understand
how to best support students who approach faculty members to receive accommodations or other supports.

Being a student whose parents did not attend college may also affect student outcomes. Participants in the 1988 National Educational Longitudinal Study (NELS) who were members of the first generation of a family to attend college experience lower completion rates, even if they began college with the intention of earning a degree (Chen, 2005). Chen’s analysis of the NELS data controlled for high school academics and student background characteristics, finding that first generation students are not less likely to persist to sophomore status, but they are less likely to complete a degree. Lombardi et al. (2012) determined that, among college students with disabilities, being a first generation student is associated with lower GPAs, lower family and peer support, and greater financial stress. Financial stress may be lower, however, among some students with disabilities, including students who are blind/VI, because of the funding available through the rehabilitation system.

Rehabilitation System Factors

Blind/VI students who have developed an individual plan for employment (IPE) with the state’s rehabilitation agency may receive funding of college level training if postsecondary education is necessary to reach their employment goals (Rehabilitation Act of 1973). The cost of college was identified by 17% of NLTS2 participants as their reason for dropping out. In fact, it was the most frequently named reason for leaving postsecondary education in that study (Newman et al., 2011). Receiving funding of college level training as a part of rehabilitation services is one reason why blind students
might be expected to persist at a higher rate than students in the general population, who do not have financial support of the Rehabilitation Act.

Supports that could be provided by rehabilitation agencies for blind/VI students, in addition to financial support, include provision of career counseling, assistive technology devices, and orientation and mobility services. Career counseling may result in the type of relationship with an adult identified by Barber (2012) as important for college success. Furthermore, career counseling through the rehabilitation system parallels career-related high-school experiences that are considered evidence-based predictors of positive adult outcomes in postsecondary education (Test et al., 2009).

Independent living skills are strongly associated with success in postsecondary education (Test et al., 2009). Orientation and mobility (O&M) instruction after high school may contribute to increased independent living skills, but has not yet been determined to be associated with college success. Researchers at the contracting firm SRI International summarized the variables related to O&M in the NLTS2 (Cameto & Nagle, 2007).

NLTS2 does not ask whether a student needs to have O&M instruction, only whether a student received it. Even when students are deemed to be in need of O&M instruction, experts often do not agree on the specific skills needed by students with low vision in comparison with students who are totally blind (Wall Emerson & Corn, 2006). Receiving O&M training could separate the population of students who were identified as visually impaired while in school into groups differing by severity of impairment. That is, students with more limited vision may be more likely to receive O&M services. However, even with this consideration, those who have a degenerative diagnosis may not
have received O&M instruction while in high school, but yet would need to have the training as a young adult. Altogether, with these uncertainties of the meaning of the O&M variable in the individual context, receiving O&M training may at least be considered as another contact with an adult who may become personally important to the student, as suggested by qualitative studies of adults with disabilities who were successful in college (Barber, 2012; Getzel & Thoma, 2008).

In addition to O&M training, a rehabilitation agency may provide technology to access text materials, such as laptop computers, which would otherwise be too expensive for a student to purchase. Having a higher level of self-determination and skills using assistive technology is associated with positive adult outcomes in employment (McDonnall, 2009). In contrast, students with visual impairments who use a computer for homework have similar academic achievement to students who do not (Zhou, Griffin-Shirley, Kelley, Banda, & Lan, 2012). Students who are blind/VI may be studying in technology-oriented programs, but even those not moving toward careers in technology use assistive devices with braille or speech access to perform ordinary functions at college. Access technology is provided to students by the school district during high school. In college, students must obtain accommodations themselves. The rehabilitation system will often provide needed access technology.

**Research Question**

The present study examined persistence of blind/VI youth in college, in association with variables identified in prior research. Based on the literature reviewed here, the present study was designed to answer the following question:
What variables measured during high school and in college and rehabilitation services contexts are associated with the outcome of college persistence among blind and visually impaired students?

Methods

Exploration of the study variables employed logistic regression, in which the dependent variable was persistence. Persistence was defined as graduation from a two- or four-year college program or having completed at least 30 credit hours with enrollment during Wave Five of the NLTS2. Variables employed in a previous study (i.e., Chapter III of this dissertation), which were measured during high school, were placed into the analysis of persistence with several additional variables measured after high school. Variables were operationalized from data drawn from the NLTS2.

Design and Human Subjects Protection

Approval of this study was obtained from the Human Subjects Institutional Review Board of Western Michigan University, citing the secondary analysis of survey data. The NLTS2 data were accessed under a restricted-use data license. The author of this study was authorized as a user of the data set. The data were on an isolated computer in a protected environment with access limited only to approved members of the research team, in accordance with the restricted data-use license. As required by the license, any raw numerical data presented in this dissertation have been rounded to the nearest 10.

Secondary Data Analysis and NLTS2 Dataset

The present study is a secondary analysis of the NLTS2 data set. Five waves of data were collected, two years apart. Parents, contacted at every wave, and youth, contacted in Waves Two through Five, reported on the characteristics and experiences of the youth participants. In the first wave of data collection only, teachers reported on
disability characteristics, such as use of accommodations, and features of each youth’s classroom experiences. Individual youth were the unit of analysis throughout the study.

Participants

The sample for this study rounded to 200\(^3\) blind/VI NLTS2 subjects who attended college and for whom persistence data is recorded in the data set. These participants were identified by three inclusion criteria: (1) status as an NLTS2 participant receiving services under an educational diagnosis of visual impairment; (2) participation in the Wave Two direct assessment of self-determination, self-concept, and academic achievement; and (3) attendance in at least one class in a two-year or four-year college setting. The second criterion limits the study sample to blind/VI youth who have functional abilities that allow them to reliably express answers to questions and to read independently in print or in braille (Wagner, Newman, Cameto, & Levine, 2006). Of the approximately 420 blind/VI NLTS2 participants that were determined by a teacher to be capable of the direct assessment, persistence data were included for the approximately 200 participants, comprising the sample of interest for this study.

Measures

The dependent variable under examination was whether the student persisted to graduation or gained at least 30 credits with enrollment reported at Wave Five. This variable, Persisted, was operationalized with two values, 0 = no, and 1 = yes.

Five independent variables were used to describe participant demographics: Gender, Race, Urbanicity (of high school), First Generation Status, and Income. Four

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\(^3\) All unweighted sample sizes are rounded to the nearest 10 in compliance with restricted data-use license.
variables in the analysis described disability features: Braille, Large Print, O&M (during high school), and presence of Additional Disabilities.

Four of the student skill area variables were factors identified in previous exploratory factor analysis (see Chapter II of this dissertation). These multi-dimensional factors represent latent constructs, derived from 17 independent variables. The factors were Academic Achievement, Independence, Social Skills, and Non-academic Skills. The Independence factor represented self-determination and self-advocacy.

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, as detailed in Appendix F. 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 variable, which identified whether the student took a prevocational course in high school. Two variables were based on the home context: Parent Expectations and Student Support. Three high school program variables were Inclusion, Interagency Collaboration, and having a Transition Program.

The college context group of variables included whether the student got academic help outside of formal supports provided by the college (Got Help On Own), whether the college knew of the disability (College Knew of Disability), whether the student used any academic services provided by the college (Got Help from College). Finally, the analysis included three rehabilitation programming variables: whether the student received O&M
After High School, Career Counseling, or Assistive Technology provided by the rehabilitation agency.

Frequency distributions of variables were examined. The sample is described by demographic and disability descriptors in Appendix I. Categories of variables are shown in Table 4.1.

Table 4.1

*Categories of Variables*

<table>
<thead>
<tr>
<th>Variable Group or Context</th>
<th>Variable Name in Current Study</th>
<th>n</th>
<th>Variable Type</th>
<th>NLTS2 Instrument</th>
</tr>
</thead>
<tbody>
<tr>
<td>Demographic Descriptors</td>
<td>Gender</td>
<td>180</td>
<td>Dichotomous</td>
<td>School Program Survey</td>
</tr>
<tr>
<td></td>
<td>Race</td>
<td>180</td>
<td>Categorical (4 categories)</td>
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<td></td>
<td>Urbanicity of School</td>
<td>170</td>
<td>Categorical (3)</td>
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<tr>
<td></td>
<td>First Generation Status</td>
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<td>Dichotomous</td>
<td>Parent Survey Wave One (see Appendix I)</td>
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<tr>
<td></td>
<td>Income</td>
<td>170</td>
<td>Categorical (3)</td>
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</tr>
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<td>Disability Descriptors</td>
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<td>Large Print</td>
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<td>Dichotomous</td>
<td>Parent Survey Waves One and Two</td>
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<td>O&amp;M</td>
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<tr>
<td></td>
<td>Additional Disability</td>
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<td>Dichotomous</td>
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a: n indicates the number of participants with complete data.
Table 4.1—Continued

<table>
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<tr>
<th>Variable Group or Context</th>
<th>Variable Name in Current Study</th>
<th>$n^a$</th>
<th>Variable Type</th>
<th>NLTS2 Instrument</th>
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</thead>
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<td><strong>Student Skill Areas</strong></td>
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<td>Continuous</td>
<td>Wave Two Direct Assessment and Parent Survey</td>
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<td>Independence $^b$</td>
<td>200</td>
<td>Continuous</td>
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</tr>
<tr>
<td></td>
<td>Social Skills $^b$</td>
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<td>Continuous</td>
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<td></td>
<td>Non-academic Skills $^b$</td>
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<td>High School GPA</td>
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<td>Independent Living Skills</td>
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<td>Scale (6-24)</td>
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<td>Paid Work</td>
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<td><strong>Home Context</strong></td>
<td>Parent Expectations</td>
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<td>Scale (1-4)</td>
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<td></td>
<td>Student Support</td>
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<td>Scale (2-8)</td>
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<td>Interagency Collaboration</td>
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<td>Inclusion</td>
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<td>Scale (0-4)</td>
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<td><strong>College Context</strong></td>
<td>Got Help On Own (outside formal supports)</td>
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<td></td>
<td>Got Help From College</td>
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<td>Dichotomous</td>
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<td><strong>Rehabilitation Program Context</strong></td>
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<td>Dichotomous</td>
<td>Wave Five Parent/Youth Survey (see Appendix G)</td>
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<td>Dichotomous</td>
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<td>Received Assistive Technology</td>
<td>180</td>
<td>Dichotomous</td>
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</tbody>
</table>

$^a$ All unweighted sample sizes rounded to nearest 10 as per restricted data-use license

$^b$ Factors derived from previous research (see Chapter II of this dissertation)
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 4.2 below shows the frequency of the disabilities confirmed by parents. It is evident that at least some of the students have a visual impairment, ADHD, and a health impairment.

Table 4.2

**Additional Disability Confirmed by Parent (n < 50)**

<table>
<thead>
<tr>
<th>Parent-Confirmed Additional Disability</th>
<th>Frequency</th>
<th>Percent with This Disability that Persisted</th>
</tr>
</thead>
<tbody>
<tr>
<td>ADHD</td>
<td>47.9</td>
<td>43.4</td>
</tr>
<tr>
<td>Autism</td>
<td>0.0</td>
<td>NA</td>
</tr>
<tr>
<td>Deafblind</td>
<td>0.0</td>
<td>NA</td>
</tr>
<tr>
<td>Developmental delay</td>
<td>8.3</td>
<td>50.0</td>
</tr>
<tr>
<td>Down Syndrome</td>
<td>0.0</td>
<td>NA</td>
</tr>
<tr>
<td>Emotional Behavioral Disorder</td>
<td>0.0</td>
<td>NA</td>
</tr>
<tr>
<td>Health Impairment</td>
<td>56.25</td>
<td>40.7</td>
</tr>
<tr>
<td>Hearing Impairment</td>
<td>0.0</td>
<td>NA</td>
</tr>
<tr>
<td>Learning Disability</td>
<td>22.9</td>
<td>54.5</td>
</tr>
<tr>
<td>Mental Retardation [sic]</td>
<td>2.1</td>
<td>100.0</td>
</tr>
<tr>
<td>Multiple impairments</td>
<td>0.0</td>
<td>NA</td>
</tr>
<tr>
<td>Physical or orthopedic impairment</td>
<td>20.8</td>
<td>50.0</td>
</tr>
<tr>
<td>Speech impairment</td>
<td>2.1</td>
<td>100.0</td>
</tr>
<tr>
<td>Traumatic brain injury</td>
<td>2.1</td>
<td>100.0</td>
</tr>
<tr>
<td>All</td>
<td>NA</td>
<td>45.8</td>
</tr>
</tbody>
</table>
Analysis

**Weighting of variables.** The data were cleaned and missing data replaced as far as possible. The NLTS2 sample was created to be nationally representative, which was accomplished through cluster and stratification of districts and schools. As a result, it was necessary to weight the data to reflect the real population of blind/VI youth in the country. For this study, participant data were weighted with Wave Five weights because the outcome variable and several of the independent variables were selected from Wave Five. The SPSS 22 Statistics Complex Samples module was used to create a sample plan file. This file contained the weighting information based on the direct assessment weights, which was employed in the SPSS analyses. All analyses were performed using weighted data. All unweighted sample sizes are rounded to the nearest 10 when reported, in accordance with the restricted-use NLTS2 data license.

Each logistic regression model was created using forced entry of the independent variables. Selection of the final model of attendance was based on the statistical significance and size of estimated coefficients in the regression equations. Wald F statistics were used to measure the significance of the regression coefficients. The percentage of cases predicted by each model was determined. Goodness of fit was assessed using Nagelkerke’s $R^2$ squared.

**Results**

Descriptive analyses were performed. The sample is described through population demographics and disability-related characteristics. Demographic variables were race, gender, household income, and school urbanicity, which were drawn from Waves One and Two. Disability-related characteristics, such as use of braille, receiving
O&M instruction in high school, and presence of other disabilities, were found in the Wave 1 data. Table 4.3, below, displays the percent that persisted according to categorical variables.

Table 4.3

*Percent of Blind/VI Youth that Persisted in College for Each Categorical Variable*

<table>
<thead>
<tr>
<th>Category</th>
<th>Percent that Persisted in College</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Unwtd</td>
</tr>
<tr>
<td>All respondents ((n^2 = 200))</td>
<td>47.1</td>
</tr>
<tr>
<td>Gender ((n = 180))</td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>45.3</td>
</tr>
<tr>
<td>Female</td>
<td>49.4</td>
</tr>
<tr>
<td>Additional Disability ((n = 180))</td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>47.6</td>
</tr>
<tr>
<td>Yes</td>
<td>46.3</td>
</tr>
<tr>
<td>Race/Ethnicity ((n = 180))</td>
<td></td>
</tr>
<tr>
<td>White</td>
<td>49.2</td>
</tr>
<tr>
<td>African-American</td>
<td>32.3</td>
</tr>
<tr>
<td>Hispanic</td>
<td>55.0</td>
</tr>
<tr>
<td>Asian/Pacific Islander/Alaska Native/Native American/Multi/Other</td>
<td>66.7</td>
</tr>
<tr>
<td>Income ((n = 170))</td>
<td></td>
</tr>
<tr>
<td>Low (\leq 25000)</td>
<td>36.8</td>
</tr>
<tr>
<td>Middle (25000 &lt; \leq 50000)</td>
<td>52.9</td>
</tr>
<tr>
<td>High (\leq 50000)</td>
<td>48.8</td>
</tr>
<tr>
<td>First Generation Status ((n = 170))</td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>50.9</td>
</tr>
<tr>
<td>Yes</td>
<td>40.7</td>
</tr>
<tr>
<td>Braille ((n = 180))</td>
<td></td>
</tr>
<tr>
<td>0 No</td>
<td>47.8</td>
</tr>
<tr>
<td>1 Yes</td>
<td>45.4</td>
</tr>
<tr>
<td>Large Print ((n = 180))</td>
<td></td>
</tr>
<tr>
<td>0 No</td>
<td>46.6</td>
</tr>
<tr>
<td>1 Yes</td>
<td>48.4</td>
</tr>
<tr>
<td>OM services ((n = 200))</td>
<td></td>
</tr>
<tr>
<td>0 No</td>
<td>45.1</td>
</tr>
<tr>
<td>1 Yes</td>
<td>50.0</td>
</tr>
<tr>
<td>Urbanicity ((n = 170))</td>
<td></td>
</tr>
<tr>
<td>Rural</td>
<td>46.7</td>
</tr>
<tr>
<td>Suburban</td>
<td>46.4</td>
</tr>
<tr>
<td>Urban</td>
<td>51.4</td>
</tr>
</tbody>
</table>
Table 4.3—Continued

<table>
<thead>
<tr>
<th></th>
<th>Percent that Persisted in College</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Unwtd</td>
<td>Wtd</td>
<td>SE</td>
</tr>
<tr>
<td><strong>Parent Expectations</strong></td>
<td></td>
<td>100.0</td>
<td>100.0</td>
<td>0.0</td>
</tr>
<tr>
<td>$(n = 170)$</td>
<td>Definitely Will Not</td>
<td>75.0</td>
<td>82.3</td>
<td>14.3</td>
</tr>
<tr>
<td></td>
<td>Probably Will Not</td>
<td>42.2</td>
<td>50.8</td>
<td>11.3</td>
</tr>
<tr>
<td></td>
<td>Probably Will Attend</td>
<td>47.5</td>
<td>51.4</td>
<td>7.7</td>
</tr>
<tr>
<td></td>
<td>Definitely Will Attend</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Career Awareness</strong></td>
<td>No</td>
<td>49.4</td>
<td>51.3</td>
<td>8.2</td>
</tr>
<tr>
<td>$(n = 150)$</td>
<td>Yes</td>
<td>45.3</td>
<td>51.4</td>
<td>10.1</td>
</tr>
<tr>
<td><strong>Transition Program</strong></td>
<td>No</td>
<td>30.0</td>
<td>42.3</td>
<td>12.8</td>
</tr>
<tr>
<td>$(n = 140)$</td>
<td>Yes</td>
<td>44.1</td>
<td>43.0</td>
<td>8.7</td>
</tr>
<tr>
<td><strong>Paid Work in High School</strong></td>
<td>No</td>
<td>47.1</td>
<td>54.5</td>
<td>9.0</td>
</tr>
<tr>
<td>$(n = 180)$</td>
<td>Yes</td>
<td>46.8</td>
<td>50.6</td>
<td>7.8</td>
</tr>
<tr>
<td><strong>Assistive Technology After HS</strong></td>
<td>No</td>
<td>41.8</td>
<td>44.7</td>
<td>8.1</td>
</tr>
<tr>
<td>$(n = 180)$</td>
<td>Yes</td>
<td>50.5</td>
<td>56.0</td>
<td>7.9</td>
</tr>
<tr>
<td><strong>Career Counseling After HS</strong></td>
<td>No</td>
<td>48.1</td>
<td>52.4</td>
<td>7.5</td>
</tr>
<tr>
<td>$(n = 180)$</td>
<td>Yes</td>
<td>46.0</td>
<td>52.7</td>
<td>9.7</td>
</tr>
<tr>
<td><strong>College Knew of Disability</strong></td>
<td>No</td>
<td>50.0</td>
<td>60.3</td>
<td>21.3</td>
</tr>
<tr>
<td>$(n = 120)$</td>
<td>Yes</td>
<td>47.7</td>
<td>50.0</td>
<td>6.8</td>
</tr>
<tr>
<td><strong>Got Help On Own</strong></td>
<td>No</td>
<td>42.5</td>
<td>35.6</td>
<td>7.5</td>
</tr>
<tr>
<td>$(n = 150)$</td>
<td>Yes</td>
<td>54.9</td>
<td>65.9</td>
<td>8.1</td>
</tr>
</tbody>
</table>

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

After selecting and constructing the variables for the present study, sample sizes were considered for each variable. College persistence data were recorded for 200 participants. Using a power of .8 and alpha of .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 after eliminating those with small sample sizes 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).

The mean, standard error, and range of each continuous variable is shown in Table 4.4 below.

Table 4.4

Distribution of Continuous Variables

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean</th>
<th>Standard Error</th>
<th>Minimum</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Academic Achievement (200)</td>
<td>401.49</td>
<td>5.67</td>
<td>122.89</td>
<td>591.74</td>
</tr>
<tr>
<td>Independence (200)</td>
<td>101.74</td>
<td>0.80</td>
<td>68.35</td>
<td>123.12</td>
</tr>
<tr>
<td>Social Skills (200)</td>
<td>12.98</td>
<td>0.16</td>
<td>5.63</td>
<td>15.94</td>
</tr>
<tr>
<td>Non-Academic Skills (200)</td>
<td>7.18</td>
<td>0.12</td>
<td>3.65</td>
<td>10.20</td>
</tr>
<tr>
<td>Independent Living Skills (200)</td>
<td>17.62</td>
<td>0.26</td>
<td>11.00</td>
<td>24.00</td>
</tr>
<tr>
<td>Grade Point Average (170)</td>
<td>3.07</td>
<td>0.06</td>
<td>0.879</td>
<td>4.00</td>
</tr>
</tbody>
</table>

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

Contingency tables and the chi-square statistic were used to examine relationships with the outcome variable, persistence. Chi-square test results are shown in Table 4.5 below.

At this point in the analysis, only variables with F values that were statistically significant with an alpha = .10 were retained in the analysis, along with continuous variables. Dichotomous variables retained for the binary logistic regression analysis were Additional Disability, First Generation Status, Assessed in Large Print, Got Help On Own, Other Race, and Parents Expect Not. Continuous variables were Academic
Achievement, Social Skills, Independence, Non-Academic Skills, Independent Living Skills, and high school Grade Point Average.

Table 4.5

Chi-Square Analysis of Association with Persistence

<table>
<thead>
<tr>
<th></th>
<th>n</th>
<th>$\chi^2$</th>
<th>Adjusted F</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td>200</td>
<td>5.12</td>
<td>2.22</td>
<td>.14</td>
</tr>
<tr>
<td>Additional Disability</td>
<td>200</td>
<td>6.81</td>
<td>4.61</td>
<td>.04</td>
</tr>
<tr>
<td>Braille</td>
<td>200</td>
<td>2.94</td>
<td>2.09</td>
<td>.15</td>
</tr>
<tr>
<td>O&amp;M in High School</td>
<td>200</td>
<td>0.13</td>
<td>0.07</td>
<td>.79</td>
</tr>
<tr>
<td>Career Awareness</td>
<td>180</td>
<td>0.00</td>
<td>0.00</td>
<td>.99</td>
</tr>
<tr>
<td>1st generation</td>
<td>190</td>
<td>6.40</td>
<td>3.15</td>
<td>.08</td>
</tr>
<tr>
<td>Assessed in Large Print</td>
<td>200</td>
<td>7.00</td>
<td>5.91</td>
<td>.02</td>
</tr>
<tr>
<td>Low income</td>
<td>190</td>
<td>0.15</td>
<td>0.09</td>
<td>.77</td>
</tr>
<tr>
<td>Mid income</td>
<td>190</td>
<td>1.34</td>
<td>0.99</td>
<td>.32</td>
</tr>
<tr>
<td>High income</td>
<td>190</td>
<td>0.38</td>
<td>0.13</td>
<td>.72</td>
</tr>
<tr>
<td>White</td>
<td>200</td>
<td>0.07</td>
<td>0.02</td>
<td>.88</td>
</tr>
<tr>
<td>Black</td>
<td>200</td>
<td>0.20</td>
<td>0.19</td>
<td>.67</td>
</tr>
<tr>
<td>Hispanic</td>
<td>200</td>
<td>2.14</td>
<td>0.74</td>
<td>.40</td>
</tr>
<tr>
<td>Other</td>
<td>200</td>
<td>2.56</td>
<td>3.45</td>
<td>.07</td>
</tr>
<tr>
<td>Rural</td>
<td>190</td>
<td>0.16</td>
<td>0.12</td>
<td>.73</td>
</tr>
<tr>
<td>Suburban</td>
<td>190</td>
<td>0.05</td>
<td>0.03</td>
<td>.87</td>
</tr>
<tr>
<td>Urban</td>
<td>190</td>
<td>0.01</td>
<td>0.00</td>
<td>.95</td>
</tr>
<tr>
<td>Parents Expect NOT</td>
<td>200</td>
<td>4.69</td>
<td>3.45</td>
<td>.07</td>
</tr>
<tr>
<td>Expect probably will</td>
<td>200</td>
<td>0.22</td>
<td>0.11</td>
<td>.75</td>
</tr>
<tr>
<td>Expect definitely will</td>
<td>200</td>
<td>0.42</td>
<td>0.20</td>
<td>.75</td>
</tr>
<tr>
<td>OM after High School</td>
<td>180</td>
<td>3.01</td>
<td>1.50</td>
<td>.23</td>
</tr>
<tr>
<td>AT from agency</td>
<td>180</td>
<td>1.90</td>
<td>1.42</td>
<td>.24</td>
</tr>
<tr>
<td>Career counseling agency</td>
<td>180</td>
<td>0.00</td>
<td>0.00</td>
<td>.98</td>
</tr>
<tr>
<td>Got Help On Own</td>
<td>150</td>
<td>13.87</td>
<td>10.08</td>
<td>.00</td>
</tr>
<tr>
<td>Got Help From College</td>
<td>150</td>
<td>1.23</td>
<td>0.62</td>
<td>.44</td>
</tr>
</tbody>
</table>

* All unweighted n rounded to nearest 10 as per restricted data-use agreement.
Initial Regression Model

Variables that had been retained were then placed into a binary logistic regression analysis, using forced entry of all of the variables. Results of the analysis are shown in Tables 4.6 and 4.7.

Table 4.6

Initial Regression Model

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Sig.</th>
<th>Lower</th>
<th>Exp(β)</th>
<th>Upper</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>.28</td>
<td>0.00</td>
<td>0.14</td>
<td>29.73</td>
</tr>
<tr>
<td>Presence of Additional Disability</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes (Ref)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>.08</td>
<td>0.06</td>
<td>0.27</td>
<td>1.18</td>
</tr>
<tr>
<td>Used Large Print for Assessment</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes (Ref)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>.01</td>
<td>0.04</td>
<td>0.15</td>
<td>0.57</td>
</tr>
<tr>
<td>Got Academic Help Outside of Formal Supports</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes (Ref)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>.00</td>
<td>0.05</td>
<td>0.13</td>
<td>0.38</td>
</tr>
<tr>
<td>Race: Native American, Asian, Pacific Islander, Multi and Other</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes (Ref)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td></td>
<td>3.56</td>
<td>47.35</td>
<td>630.54</td>
</tr>
<tr>
<td>Income</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>50,001 and over (Ref)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>25,001 – 50,000</td>
<td>.55</td>
<td>0.40</td>
<td>1.47</td>
<td>5.26</td>
</tr>
<tr>
<td>25,000 and under</td>
<td>.97</td>
<td>0.15</td>
<td>0.96</td>
<td>6.25</td>
</tr>
<tr>
<td>Member of First Generation in Family to Attend College</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes (Ref)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>.30</td>
<td>0.57</td>
<td>1.83</td>
<td>5.85</td>
</tr>
<tr>
<td>Parent Expectations of Attendance</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Definitely Will (Ref)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Probably or Definitely Won’t</td>
<td>.42</td>
<td>0.05</td>
<td>0.43</td>
<td>3.47</td>
</tr>
<tr>
<td>Probably Will=0</td>
<td>.16</td>
<td>0.70</td>
<td>2.38</td>
<td>8.10</td>
</tr>
<tr>
<td>Independent Living</td>
<td>.06</td>
<td>1.00</td>
<td>1.15</td>
<td>1.34</td>
</tr>
<tr>
<td>Grade Point Average</td>
<td>.74</td>
<td>0.32</td>
<td>0.85</td>
<td>2.29</td>
</tr>
</tbody>
</table>
Table 4.7

*Predicted Outcomes of Model of Persistence*

<table>
<thead>
<tr>
<th></th>
<th>Percentage Correct</th>
</tr>
</thead>
<tbody>
<tr>
<td>No</td>
<td>0</td>
</tr>
<tr>
<td>Yes</td>
<td>1</td>
</tr>
<tr>
<td>Overall Percentage</td>
<td></td>
</tr>
</tbody>
</table>

The initial regression model accounted for 43.5% of shared variance. It predicted non-persistence correctly 74.6% of the time, and persistence 79.2% of the time. However, the sample size had dropped below 120, leading to further examination of this initial model. It was at this point that the weaknesses of the modelling process became apparent.

Variables whose Wald statistics were significant at the level of alpha = .10 were retained to use in further modelling. The alpha level of .10 was used because of the exploratory nature of the analysis. The possibility of making a Type I error, retaining a variable that should not be retained, was weighed against the possibility of a Type II error. It was determined that, in this exploratory study, it would be better to take the chance of making a Type I error rather than missing something that might potentially be important to the study.

All of the variables which were not statistically significant at an alpha level of .10 were removed. Variables retained at this point were *Additional Disability, Large Print, Got Help On Own, Other Race*, and *Independent Living Skills*. 
Analysis of Interaction Terms and Final Regression Model

Interaction terms were created using all of the variables whose Wald statistics were significant in the initial model. The retained variables and interaction terms were entered into a regression analysis using forced entry. Variables with Wald statistics at the .10 level were retained and are shown in the results section.

Two-way interaction terms were created, using all of the variables that were statistically significant \( (p \leq .10) \) in the initial model. None of these terms were statistically significant in the model. An intermediate model was created, using variables that were statistically significant in the initial model. The intermediate model is shown in Tables 4.8 and 4.9.

Table 4.8

Intermediate Regression Model of Persistence \( (n = 150) \)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Sig.</th>
<th>95% Confidence Interval</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>.03</td>
<td>0.00</td>
</tr>
<tr>
<td>Presence of Additional Disability</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes (Ref)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>.29</td>
<td>0.17</td>
</tr>
<tr>
<td>Used Large Print for Assessment</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes (Ref)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>.06</td>
<td>0.10</td>
</tr>
<tr>
<td>Got Academic Help Outside of Formal Supports</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes (Ref)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>.05</td>
<td>0.10</td>
</tr>
<tr>
<td>Race: Native American, Asian, Pacific Islander, Multi and Other</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes (Ref)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>.00</td>
<td>0.54</td>
</tr>
<tr>
<td>Independent Living</td>
<td>.39</td>
<td>0.88</td>
</tr>
</tbody>
</table>
Table 4.9

*Predicted Outcomes of Intermediate Model of Persistence*

<table>
<thead>
<tr>
<th></th>
<th>Percentage Correct</th>
</tr>
</thead>
<tbody>
<tr>
<td>No</td>
<td>0</td>
</tr>
<tr>
<td>Yes</td>
<td>1</td>
</tr>
<tr>
<td>Overall Percentage</td>
<td></td>
</tr>
</tbody>
</table>

In the intermediate model, the number of cases had risen over 150, but the amount of shared variance dropped to 25.6%. *Independent Living* and *Additional Disability* had risen in statistical significance over the alpha level of .10, showing instability of the model. *Other Race* had a very large confidence interval, and showing that it was a highly skewed variable. Non-persistence was predicted correctly 68.5% of the time, and persistence was predicted correctly 80.0% of the time.

**Development of Final Model**

In exploratory models, *Independent Living* shifted widely depending on what other variables were included in the model, but *Additional Disability* had 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 Tables 4.10 and 4.11 below. The reference categories were reversed at this point to make the B coefficients positive. As a result, the Exp(β) in the table below are much larger (reciprocals) than in the tables above. Otherwise, this model and the one above are almost the same, because the three remaining variables are still statistically significant in the model, the number of cases is still 150, and the amount of shared variance accounted
for in this model was just a little lower, at 22.4%. Non-persistence was correctly predicted 57.9% of the time, and persistence was predicted correctly 84.2% of the time.

Table 4.10

*Final Regression Model*

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Sig.</th>
<th>95% Confidence Interval</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>.11</td>
<td>1.96</td>
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<tr>
<td>Presence of Additional Disability</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No (Ref)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>.05</td>
<td>1.02</td>
</tr>
<tr>
<td>Used Large Print for Assessment</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No (Ref)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>.04</td>
<td>1.06</td>
</tr>
<tr>
<td>Got Academic Help Outside of Formal Services</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No (Ref)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>.00</td>
<td>1.71</td>
</tr>
</tbody>
</table>

Table 4.11

*Predicted Outcomes of Final Model of Persistence*

<table>
<thead>
<tr>
<th>Percentage Correct</th>
</tr>
</thead>
<tbody>
<tr>
<td>No</td>
</tr>
<tr>
<td>Yes</td>
</tr>
<tr>
<td>Overall Percentage</td>
</tr>
</tbody>
</table>

The final model accounted for 22.4% of the variance (Nagelkerke’s $R^2$ square = .224). This model correctly predicted group membership 71.3% of the time. The model predicted persistence 84.2% of the time and non-persistence 57.9% of the time. 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, \( p = .045 \), \( \text{Exp(}\beta\text{)} = 2.41 \)). A student who was recorded as using large print to take the direct assessment in high school was three and a half times as likely to persist than a student who was not reported to use large print (Wald = 4.43, \( p = .040 \), \( \text{Exp(}\beta\text{)} = 3.56 \)). A student that reported getting help with academics outside of the formal supports offered by the college was four times as likely to persist (Wald = 10.61, \( p = .002 \), \( \text{Exp(}\beta\text{)} = 4.04 \)). It should be noted, however, that the variable Additional Disability was not statistically significant in the intermediate model. 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**

The results of the study indicate that 52.6% of the blind/VI students who had attended at least one college class persisted to 30 college credits. Using large print and getting academic help somewhere other than through services provided by the college were the two variables that were stable throughout the analysis. These two variables were statistically and practically significant in their positive effect on college persistence of blind or visually impaired students.

The fact that 52.6% of blind/VI students who start college persist to sophomore status is an important result. It is likely that even fewer blind/VI students ever gain a two- or four-year college degree. Given that approximately 67% of the general population of college students complete college (Newman et al., 2011), blind/VI students appear to be lagging behind in persistence. In spite of the financial assistance that may
be provided through rehabilitation agencies, almost half of blind/VI students are drop out of college before attaining a degree.

Some variables alternated between significance and non-significance in the final stages of the regression exploration. 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. This variable was drawn from the direct assessment data collection, which did not identify audio or regular-size print users. Use of braille and/or large print were not reported independently, that is, some students may have been reported to use braille and print to take the direct assessment. Presumably the students who did not use large print were users of braille or normal print. Because of the problems with collection of this variable, the result is not necessarily a statistical or practical endorsement of large print over normal print or over braille. The reading media variables were identified in the direct assessment data as a record of what reading medium was used for taking the assessment. Using audio was not one of the options. Some students who rely on audio may have worked in a medium that was not their preferred medium, be it large print, regular size print, or braille. Persistence should possibly be explored in light of medium used in college, not for the direct assessment administered early in the NLTS2 study.

Having an additional disability had an unexpected positive effect on the likelihood to persist in college. 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 difficult to interpret. It 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 important also to consider this result in light of its instability in the models and its relationship to independent living skills. In the initial and intermediate models, both having an additional disability and independent living skills were similar in level of statistical significance, first below .10 in the initial model, then well above .10 in the intermediate model. Level of independent living skills and presence of and additional disability might be expected to vary inversely. In addition, of the students that had additional disabilities, 41% had a health impairment. Given the expected inverse variation and the high percentage that had a health impairment, independent living skills and additional disability variables should be explored in a mediation analysis.

Some variables were associated with the outcome of persistence (e.g., gender), with high chi-square values, but were not statistically significant. This could have been caused by lack of normal distribution due to the small sample size.

All of the students in this study had the same primary disability diagnosis for educational purposes. However, the diagnosis could be explored further as a variable using severity of vision loss, reading medium, or type of additional disabilities present to differentiate between “types” of visual impairment. Some of this information may be derived from other variables within the NLTS2 data.

In this study only Got Help On Own had a large enough sample to be retained in the model and was statistically significant in the chi-square analysis. One of the most interesting aspects of the present study is that independent help-seeking behavior has a large effect size in the final model. Students who persisted to sophomore year were four times as likely as other participants 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 finding help such as asking friends and family members, creating study groups, or using community tutoring services.

Self-determination skills, embedded in the Independence factor from previous research (see Chapter II of this dissertation), did not emerge as significant in the model. However, the effect of being able to find academic help independently could certainly be an aspect of self-advocacy, a critical element among self-determination skills. Further research into independent help-seeking is needed, and an intervention study would be a reasonable way to examine this behavior. One possible approach could be an analysis of self-advocacy as a mediator of the effect of independent help-seeking on persistence.

Not being a first generation college student had a large odds ratio in the model, but was not statistically significant. Further exploration with a larger sample would be needed to determine whether the odds ratio is consistent in a larger group. Similarly, parent expectations were not statistically significant, but a student whose parent reported the expectation that the student “probably will” attend college was 2.3 times more likely to persist than other students.

Interpreting the results of the regression model was not simple. The chief barrier in identifying implications for researchers and practitioners was the continual balance between effect size or odds ratio and the statistical significance of each variable explored in this analysis. In the intermediate and final models, the small sample size contributed to the instability of the model, making it difficult to decide which variables to retain and which to remove. Variables which were not statistically significant, but had large chi-
square values or large effect sizes in the regression model are particularly worthy of further investigation.

The results of this study indicate that, in this nationally representative sample, 52.6% of blind/VI students persist to 30 credit hours. A student with an additional disability is 2.4 times as likely to persist as one whose only disability is blindness. Fewer than 50 of the approximately 200 students who were in the sample were confirmed by parents to have an additional disability. 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. If help-seeking behavior is viewed as a self-determination skills, this study confirms prior research that did not disaggregate or include blind students.

References


CHAPTER V
SYNTHESIS OF THREE STUDIES

Attainment of postsecondary education is one of the many ways to measure successful transitions to adult life roles among youth with disabilities. Having a postsecondary education is associated with higher income over the lifespan of individuals with and without disabilities (Yelin & Trupin, 2003). The aim of this three-study dissertation was to examine characteristics and experiences of youths who are blind or visually impaired (blind/VI) measured during and after high school in association with the outcomes of college attendance and persistence.

Study One was designed to derive factors that represented latent constructs underlying 17 variables measured while youth who are blind/VI were in high school. In Study Two, factors derived in Study One were combined with variables from the home context, student skill areas, work and career factors, and school program features. These were explored in association with attendance of blind/VI youth in two- or four-year college courses. Variables that were measureable in college and rehabilitation services were added to the model in Study Three, with a longer term outcome: persistence to at least 30 credit hours, that is, sophomore status.

Study One: Latent Constructs Describing Blind and Visually Impaired Youth in the National Longitudinal Transition Study 2

What direct assessment and parent- and teacher-reported variables (measured among blind and visually impaired 16- to 18-year-olds) from the NLTS2 dataset may be empirically verified as factors representing latent constructs potentially associated with attendance or persistence in college?
The exploratory factor analysis yielded four factors based on latent constructs in the direct assessment and parent- and teacher-reported data: (1) academic achievement, (2) independence, (3) social skills, and (4) non-academic skills. Academic Achievement represented five subscales of the Woodcock Johnson III achievement assessment (Woodcock, McGrew, & Mather, 2001). Independence was similar to self-determination with the addition of student-estimated self-confidence variables. The Social Skills factor was formed from the summed subscales of the Social Skills Rating System (Gresham & Elliot, 1990) and two additional parent-reported variables, Humor and Organized. Finally, Non-academic Skills was formed from four single parent-reported variables: Athletic, Fine Arts, Performing Arts, and Computer Skills.

What could not be hypothesized at this point was whether these factors would be effective in models of college attendance and persistence. The completion of Studies Two and Three were designed to explore the effect of the factors in association with the outcomes of college attendance and persistence.

**Study Two: Factors Associated with Attendance of Blind and Visually Impaired Young Adults in Two- and Four-Year Colleges**

*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?*

This study was designed to identify predictors of the outcome of attendance in at least one course in a two- or four-year college. Results indicated that NLTS2 participant blind/VI youth in this nationally representative sample attended two- or four-year colleges at a very high rate (80.6%; see Chapter III). The statistically significant independent predictors that remained in the final model were parent expectations, high
school grade point average, and, to some extent, social skills. Students whose parents expected them to attend college were more than seven times as likely to attend college. Students with higher grade point averages in high school were almost two times as likely to attend college. Social skills showed a smaller effect, with an odds ratio of just over one.

**Study Three: Factors Associated with College Persistence of Blind and Visually Impaired Students**

*What variables measured during high school and in college and rehabilitation services contexts are associated with the outcome of college persistence among blind and visually impaired students?*

Study Three used the same variables as Study Two, with the addition of three variables from the college context and three from the rehabilitation program context. The outcome of Study Three was persistence to attainment of 30 college credits, or sophomore status. However, only one of the six variables added in Study Three, measuring whether the student had gotten academic help outside of the college services offered, had a large enough number of cases and a statistical association with the outcome to be retained in the regression analysis.

Unfortunately, Study Three revealed a few barriers to persistence to 30 credit hours. Approximately 52% of the youths who attended college went on to persist to this achieve this indicator of very early success. The data do not tell us whether those who had reached 30 credit hours but had not yet graduated went on to attain a degree. Results indicated that students who found academic help outside of services provided by the college were four times as likely to persist. Students who used large print were 3.56
times as likely to persist, and students who had an additional disability were over two times as likely to persist to 30 credits.

**Discussion**

Although the TAPS checklist data had a very small sample size and did not form a regression model of attendance, there was value to performing an analysis using these data. Study Two results support the reliability and internal validity of the TAPS curriculum checklist that measured students’ abilities to navigate inside of buildings. The sequential nature of the checklist items works well for development of curriculum for individual learners. However, an assessment approach based on broader constructs measured at many skill levels might add more to the predictive capacity of the assessment results. Study One, in particular, adds to the literature by demonstrating a method to analyze potential latent constructs underlying TAPS curriculum checklists.

New legislation may lead to the gathering of new kinds of data among students out of high school longer than one year. The Workforce Innovation and Opportunity Act of 2014 (WIOA) brings new emphasis on the involvement of vocational rehabilitation service providers in the schools, which may result in group comparisons of interventions with students. In addition, the WIOA puts a great deal of funding into services for out-of-school youth, which may increase the number of youth with disabilities who go on to reach positive adult outcomes even if there is a gap between high school and the time these youth move on to adult life roles.

Study One contributes to the literature by exploring a means of reducing the number of variables to be handled in a regression analysis of factors related to blindness based on NLTS2 data. Latent constructs underlying the data structure were identified,
although not all of the four factors based on the constructs were statistically significant as predictor variables in final regression models. These factors may be used by other researchers when researching outcomes of blind/VI youth, and the method could be applied to other disability groups in the dataset.

Studies Two and Three contribute to the literature by identifying student skills, characteristics, and experiences that are associated with attendance and persistence in college. These identified variables both support and are supported by the literature reviewed.

Future research is recommended into interventions that may be associated with positive outcomes in postsecondary education for blind/VI youth. As result, teachers of blind/VI youth, rehabilitation counselors and teachers, transition specialists, family, and university personnel may be able to provide more interventions to apply both before and during the college experience to increase the likelihood of success in college. With 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.

Parent expectations that a student would attend college was measured as a “no” response to the question of whether the student would probably or definitely attend college. This variables had a strong effect on the model of attendance. In the persistence model, the large of effect of expectations on attendance presumably created a sample of students whose parents were highly likely to expect them to attend. Parent expectations
should be further investigated in the manner of Doren, Gau, and Lindstrom in their 2012 article.

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.

**Limitations**

The creation of factors through exploratory factor analysis may have concentrated variation into the factors, and lost some of the distinctive features of the scale sums. For example, the Study One factor Independence was not statistically significant in either of the models for attendance or persistence. The fact that the variable was not statistically significant may say more about the internal structure of the variable than about its potential importance in the model. This could be remediated by using a bigger data set with a control group of students without disabilities. The exploratory nature of this study must be considered in interpretation and future use of the factors.

The NLTS2 data collection began in 2000. A major reauthorization of the main special education law occurred in 2004. Regulations based on the law were released in 2006, affecting the way that transition services are planned and provided for youth with disabilities. Secondary analysis may limit the generalizability of the results. In addition, some factors of potential interest were not analyzed, including the type of school setting. Type of school setting may affect variables such inclusion in general education, work experience opportunities and urbanicity of the school versus the family’s home
community. It may be more difficult to follow students who do not attend or persist in college, since college records can be a source of updated contact information on participants. This could limit the generalizability of the results since more students who did not attend college may have been lost to data collection.

Possibly the biggest limitation presented by the NLTS2 is the lack of control or comparison groups, limiting the types of analysis that can be used. Other limitations are that some known predictors among youth with all disabilities were not represented in the dataset, and could not be explored among blind/VI youth. Finally, the result that having an additional disability is positively associated with persistence certainly raises questions about the construction of that variable.

**Recommendations for Further Research**

Based on these three studies of the NLTS2 data, some recommendations may be made regarding future research. There may be other ways to assess college readiness, and statistical modelling techniques will be more effective if the number of participants were larger. Newer techniques, such as propensity score analysis, could increase the exploration of the NLTS2 in new ways.

Continued surveillance of young adult outcomes is needed. Every state is now required to collect data on student outcomes one year after high school. These data are provided to the United States Department of Education. It is not clear whether outcomes just one year out of high school provide a valid and reliable measure of the situation of young adults with disabilities after graduation. Outcomes data collected later might be more representative of the eventual outcomes of youth with disabilities. However, it may be difficult for school districts to collect longer term outcomes data, given the mobility of
the American population and other obstacles. The current data in the NLTS2 and future youth transition data could be explored in new ways that overcome some of the problem of small sample sizes using propensity score analyses and other newer statistical techniques.

**Conclusion**

Although a large percentage of blind/VI youth attend college, only about half go on to complete freshman year, and presumably fewer still achieve two- or four-year degrees. The high rate of college attendance is a positive sign, but in order for individuals with visual impairments to attain the higher wages and better long-term adult outcomes associated with having a college degree, students must be prepared to be successful once they are in college. This is a complex issue, and in addition to academic skills, students need a range of other skills and support to succeed. Parent expectations proved to be a very important predictor variable, but even this one factor is very complex and may be influenced by a number of other factors. Research should continue looking into the outcomes of young adults with visual impairments to maximize their adult opportunities and achievements.

**References**


Appendix A

Wave 1 Parent Survey Variables
<table>
<thead>
<tr>
<th>Name</th>
<th>Items</th>
<th>Item Values</th>
</tr>
</thead>
<tbody>
<tr>
<td>np1Fam SupScale</td>
<td>(np1E7) How often adult spoke to youth about his/her school experiences</td>
<td>1 Never</td>
</tr>
<tr>
<td>np1Fam Summed Scale</td>
<td>(np1F8) How often adult helps youth with homework</td>
<td>2 Rarely</td>
</tr>
<tr>
<td>np1Fam Values Range</td>
<td>2 – 8</td>
<td>3 Occasionally</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4 Regularly</td>
</tr>
<tr>
<td>np1Soc AssertSkill</td>
<td>(np1G1a) How often youth joins group activities</td>
<td>0 Never</td>
</tr>
<tr>
<td>np1Soc Summed Scale</td>
<td>(np1G1b) How often youth makes friends easily</td>
<td>1 Sometimes</td>
</tr>
<tr>
<td>np1Soc Values Range</td>
<td>0 – 8</td>
<td>2 Very often</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0 – 2 As above</td>
</tr>
<tr>
<td>np1Self ControlSkil</td>
<td>(np1G1c) How often youth ends disagreements calmly</td>
<td>0 Never</td>
</tr>
<tr>
<td>np1Self Summed Scale</td>
<td>(np1G1d) How often youth seems self-confident</td>
<td>1 Sometimes</td>
</tr>
<tr>
<td>np1Self Values Range</td>
<td>0 – 8</td>
<td>2 Very often</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0 – 2 As above</td>
</tr>
<tr>
<td>np1SociCoopSkil</td>
<td>(np1G1e) How often gets into situations resulting in trouble</td>
<td>0 Never</td>
</tr>
<tr>
<td>np1SociCoop Summed</td>
<td>(np1G1f) How often youth starts conversations</td>
<td>1 Sometimes</td>
</tr>
<tr>
<td>np1SociCoop Scale</td>
<td>(np1G1h) How often youth behaves at home</td>
<td>2 Very often</td>
</tr>
<tr>
<td>np1SociCoop Values</td>
<td>0-6</td>
<td>0 – 2 As above</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>np1Mental Skill</td>
<td>(np1G1Ia) How well does s/he tell time on a clock</td>
<td>1 Not at all well</td>
</tr>
<tr>
<td>np1Mental Scale</td>
<td>(np1G1Ib) How well does s/he read and understand common signs</td>
<td>2 Not very well</td>
</tr>
<tr>
<td>np1Mental Summed</td>
<td></td>
<td>3 Pretty well</td>
</tr>
<tr>
<td>np1Mental Scale</td>
<td></td>
<td>4 Very well</td>
</tr>
<tr>
<td>np1Mental Values</td>
<td></td>
<td>1 – 4 As above</td>
</tr>
<tr>
<td>Range: 4 – 16</td>
<td>(np1G4c) How well does s/he count change</td>
<td></td>
</tr>
<tr>
<td>(np1G4d) How well does s/he look up telephone numbers</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(np1G4e) How well does s/he get to places outside the home</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| Range: 4 – 16 | (np1G5a_r) How often does s/he fix his/her own breakfast | 1 Never |
| (np1G5b_r) How often does s/he do laundry was recoded from (np1G5b) How often does s/he do laundry | 2 Sometimes |
| (np1G5c_r) How often does s/he straighten up his/her own room was recoded from (np1G5c) How often does s/he straighten up his/her own room | 3 Usually |
| (np1G5d_r) How often does s/he buy a few things at the store was recoded from (np1G5d) How often does s/he buy a few things at the store | 4 Always |

| Range: 2 – 8 | np1G3a How well youth dresses him or herself | 1 Not at all well |
| np1G3b How well youth feeds him or herself | 2 Not very well |
| 1 – 4 As above | 3 Pretty well |
| 1 – 4 As above | 4 Very well |

| Braille | ndaBraille Took Assessment in Braille | 0=no; 1=yes |
| Large Print | ndaLprint Took assessment in Large Print | 0=no; 1=yes |

1 Created by SRI International
Appendix B

Direct Assessment Autonomy, Self-Realization, and Empowerment Variables
<table>
<thead>
<tr>
<th>Variable Name</th>
<th>Scale and Subscale Individual Items Summed to Create Scale Value</th>
<th>Single Item Values</th>
</tr>
</thead>
<tbody>
<tr>
<td>Autonomy</td>
<td>ndaSdA_PersItem I keep my personal items together</td>
<td>1 Not when I have the chance</td>
</tr>
<tr>
<td>Scale Values</td>
<td>ndaSdB_PersCare I keep good personal care and grooming</td>
<td>2 Sometimes</td>
</tr>
<tr>
<td>Range: 13 – 52</td>
<td>ndaSd1_MakeFriends I make friends with other kids my age</td>
<td>3 Most of the time</td>
</tr>
<tr>
<td></td>
<td>ndaSd2_KeepAppts I keep my appointments and meetings</td>
<td>4 Every time I have the chance</td>
</tr>
<tr>
<td></td>
<td>ndaSd3_PlanWeekend I plan weekend activities that I like to do</td>
<td></td>
</tr>
<tr>
<td></td>
<td>ndaSd4_School I am involved in school-related activities</td>
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<tr>
<td></td>
<td>ndaSd5_Volunteer I volunteer in things that I am interested in</td>
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<tr>
<td></td>
<td>ndaSd6_Restaurants I go to restaurants that I like</td>
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<tr>
<td></td>
<td>ndaSd7_CareerInt I do school and free time activities based on career interests</td>
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<tr>
<td></td>
<td>ndaSd8_ImproveChances I work on schoolwork that will improve career chances</td>
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<tr>
<td></td>
<td>ndaSd3_PlanWeekend I plan weekend activities that I like to do</td>
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<tr>
<td></td>
<td>ndaSd10_Work I work to earn money</td>
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<td></td>
<td>ndaSd11_JobTraining I am/have been in career/job training</td>
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<td></td>
<td>ndaSd12_ChOOSEGifts I choose gifts for family/friends</td>
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<td></td>
<td>ndaSd13_Spend I choose how to spend personal money</td>
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<td>Self-Realization</td>
<td>ndaSd14_LikePeople I can like people even if I don't agree with them</td>
<td>1 Never agree</td>
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<tr>
<td>Scale Values</td>
<td>ndaSd15_DoBest I know what I do best</td>
<td>2 Sometimes agree</td>
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<tr>
<td>Range 5 – 20</td>
<td>ndaSd16_LikeSelf I like myself</td>
<td>3 Usually agree</td>
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<td></td>
<td>ndaSd17_Limitations I know how to make up for my limitations</td>
<td>4 Always agree</td>
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<td></td>
<td>ndaSd18_Confident I am confident in my abilities</td>
<td></td>
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<tr>
<td>Empowerment</td>
<td>ndaSd19_Choices RE: choices, I usually…</td>
<td>1 I make my own choices</td>
</tr>
<tr>
<td>Scale</td>
<td></td>
<td>2 Other people make choices for me</td>
</tr>
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</table>
ndaSd20_Decisions RE: decisions, I usually...
1 I can make my own decisions
2 Other people make decisions for me

ndaSd21_WorkLuck RE: getting what I want, I usually...
1 I can get what I want by working hard
2 I need good luck to get what I want

ndaSd22_QuitKeepup RE: failure, I usually...
1 It is no use to keep trying because it will not change things
2 I keep trying even after I get something wrong

ndaSd23_GoodChoices RE: choices, I usually...
1 I usually do not make good choices
2 I usually make good choices

ndaSd24_Make Choices RE: choices made, I usually...
1 My choices will not be honored
2 I will be able to make choices that are important to me

Appendix C

Student Self-Concept Scales Variables
## Student Self-Concept Scales Variables

<table>
<thead>
<tr>
<th>Study Variable</th>
<th>Individual Items</th>
<th>Single Item Values</th>
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<tbody>
<tr>
<td>Important Summed Scale Values</td>
<td><em>(ndaSc8a_1) I can follow classroom rules</em></td>
<td><em>(ndaSc8a_1) 0 = not at all 1= not sure 2 = important</em></td>
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<tr>
<td></td>
<td><em>(ndaSc8a_2) I can take turns in games/activities</em></td>
<td><em>(ndaSc8a_2) 0 – 2 As above</em></td>
</tr>
<tr>
<td></td>
<td><em>(ndaSc8a_3) I am fun to be with</em></td>
<td><em>(ndaSc8a_3) 0 – 2 As above</em></td>
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<tr>
<td></td>
<td><em>(ndaSc8a_4) I can do my homework on time</em></td>
<td><em>(ndaSc8a_4) 0 – 2 As above</em></td>
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<tr>
<td></td>
<td><em>(ndaSc8a_5) I can do things to be liked by classmates</em></td>
<td><em>(ndaSc8a_5) 0 – 2 As above</em></td>
</tr>
<tr>
<td></td>
<td>*(ndaSc8a_6) I am proud of who I am</td>
<td><em>(ndaSc8a_6) 0 – 2 As above</em></td>
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<tr>
<td></td>
<td><em>(ndaSc8a_7) I can listen when teacher is presenting lesson</em></td>
<td><em>(ndaSc8a_7) 0 – 2 As above</em></td>
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<td></td>
<td><em>(ndaSc8a_8) I can talk calmly w/kids my age when we disagree</em></td>
<td><em>(ndaSc8a_8) 0 – 2 As above</em></td>
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<td><em>(ndaSc8a_9) I am a nice person</em></td>
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<td><em>(ndaSc8a_10) I can speak in class when called on</em></td>
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<td></td>
<td><em>(ndaSc8a_11) I can make friends easily</em></td>
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<td><em>(ndaSc8a_13) I can finish school work easily</em></td>
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<td><em>(ndaSc8a_14) I can tell classmates when feelings hurt</em></td>
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<td></td>
<td><em>(ndaSc8a_15) I can look as nice as peers</em></td>
<td><em>(ndaSc8a_15) 0 – 2 As above</em></td>
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<td><em>(ndaSc8b_1) 0 = not at all 1= not sure 2 = confident</em></td>
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<td><em>(ndaSc8b_2) I can take turns in games/activities</em></td>
<td><em>(ndaSc8b_2) 0 – 2 As above</em></td>
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<td><em>(ndaSc8b_3) I am fun to be with</em></td>
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<td><em>(ndaSc8b_4) I can do my homework on time</em></td>
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<td>*(ndaSc8b_6) I am proud of who I am</td>
<td><em>(ndaSc8b_6) 0 – 2 As above</em></td>
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<td><em>(ndaSc8b_7) I can listen when teacher is presenting lesson</em></td>
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<td><em>(ndaSc8b_8) I can talk calmly w/kids my age when we disagree</em></td>
<td><em>(ndaSc8b_8) 0 – 2 As above</em></td>
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<td>ndaSc8b_9 I am a nice person</td>
<td>0 – 2 As above</td>
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<tr>
<td>-----------------------------</td>
<td>---------------</td>
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<td>ndaSc8b_10speak I can speak in class when called on</td>
<td>0 – 2 As above</td>
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<tr>
<td>ndaSc8b_11friend I can make friends easily</td>
<td>0 – 2 As above</td>
<td></td>
</tr>
<tr>
<td>ndaSc8b_12easy I am easy to like</td>
<td>0 – 2 As above</td>
<td></td>
</tr>
<tr>
<td>ndaSc8b_13wrk I can finish school work easily</td>
<td>0 – 2 As above</td>
<td></td>
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<tr>
<td>ndaSc8b_14feel I can tell classmates when feelings hurt</td>
<td>0 – 2 As above</td>
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<tr>
<td>ndaSc8b_15look I can look as nice as peers</td>
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Appendix D

Distributions of Categorical Variables Study 1
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<th>Variable</th>
<th>Description</th>
<th>Categories</th>
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<td>Organized</td>
<td>How good is s/he at being well organized</td>
<td>1 Not at all good</td>
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<td></td>
<td></td>
<td>2 Not very good</td>
<td>27.8</td>
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<tr>
<td></td>
<td></td>
<td>3 Pretty good</td>
<td>40.1</td>
</tr>
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<td></td>
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<td>4 Very good</td>
<td>20.2</td>
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<tr>
<td>Performing</td>
<td>How good is s/he at performing arts</td>
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<td></td>
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<td>2 Not very good</td>
<td>19.2</td>
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<td></td>
<td></td>
<td>3 Pretty good</td>
<td>36.2</td>
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<td>4 Very good</td>
<td>35.4</td>
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<td>Creative</td>
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<td></td>
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<td></td>
<td>3 Pretty good</td>
<td>26.4</td>
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<td></td>
<td></td>
<td>4 Very good</td>
<td>31.2</td>
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<td>How good is s/he at being sensitive to others</td>
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<td>2.2</td>
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<td></td>
<td>2 Not very good</td>
<td>9.4</td>
</tr>
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<td>3 Pretty good</td>
<td>32.6</td>
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<td></td>
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<td>4 Very good</td>
<td>55.8</td>
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<td>Mechanical</td>
<td>How good is s/he at mechanical skills, like building</td>
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<tr>
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<td></td>
<td>2 Not very good</td>
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<td>3 Pretty good</td>
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<td>4 Very good</td>
<td>18.8</td>
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<td></td>
<td></td>
<td>2 Not very good</td>
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<td></td>
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<td>3 Pretty good</td>
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<td>4 Very good</td>
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<td>Athletic</td>
<td>How good is he/she at physical/athletic activities</td>
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<td></td>
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<td>32.8</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3 Pretty good</td>
<td>32.3</td>
</tr>
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<td></td>
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<td>Humor</td>
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Appendix E

Distribution of Study 2 Categorical Variables
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<th>Variable Name</th>
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<th>Unwtd Percent</th>
<th>Weighted Percent</th>
<th>Std. Error</th>
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<td>Gender (n=280)</td>
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<td>Hispanic</td>
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Appendix F

Construction of Study 2 and 3 Independent Living Skills Variable
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<th>Description</th>
<th>Scale</th>
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<tr>
<td>np1HouseRespSkill_r</td>
<td>Household responsibilities scale; Sum of np1G5[a, b, c, and d]</td>
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<tr>
<td>np1SelfCareSkills</td>
<td>Sum of np1G3[a and b] [how well youth dresses and feeds him or herself]</td>
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<tr>
<td>Created for this study</td>
<td>IndLivingSkills Sum of np1G5[a, b, c, and d] and np1G3[how well youth dresses and feeds him or herself]</td>
<td>6 – 24</td>
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Appendix G

Study 3 Wave 5 Parent/Youth Survey Independent Variables
<table>
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<th>Variable Category</th>
<th>Study 3 Variable Name</th>
<th>NLTS2 variable</th>
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<tr>
<td>Youth skill areas</td>
<td>Got Help On Own (outside formal supports)</td>
<td>np5S3n_S4l_S5m_K6m1_K7j1_K8j1</td>
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<td>O&amp;M After High School</td>
<td>np5T10a_C1a_o_ever</td>
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<td>College Program</td>
<td>College Knows of Disability</td>
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<td>Used Accommodations</td>
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<td>Rehabilitation</td>
<td>Career Counseling</td>
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<td>Program</td>
<td>Received Assistive Technology</td>
<td>np5T10a_C1a_j_ever</td>
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Appendix H

Tests for Multicollinearity: Tolerance and Variance Inflation Factors
Tests for Multicollinearity: Tolerance and Variance Inflation Factors

<table>
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<th>Attendance</th>
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<th>Independence</th>
<th>Social Skills</th>
<th>Non-Academic Skills</th>
<th>Independent Living Skills</th>
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Appendix I

Distribution of Study 3 Categorical Variables
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Appendix J

Human Subjects Institutional Review Board
Letter of Approval
Date: August 15, 2014

To: Dae Kim, Principal Investigator
Lydia Schuck, Student Investigator for dissertation
Nickola Nelson, Co-Principal Investigator
Paula Kohler, Co-Principal Investigator
Robert Wall Emerson, Co-Principal Investigator

From: Amy Naugle, Ph.D., Chair

Re: HSIRB Project Number 14-08-16

This letter will serve as confirmation that your research project titled “College Enrollment and Persistence of Blind and Visually Impaired Students” has been approved under the exempt category of review by the Human Subjects Institutional Review Board. The conditions and duration of this approval are specified in the Policies of Western Michigan University. You may now begin to implement the research as described in the application.

Please note: This research may only be conducted exactly in the form it was approved. You must seek specific board approval for any changes in this project (e.g., you must request a post approval change to enroll subjects beyond the number stated in your application under “Number of subjects you want to complete the study”). Failure to obtain approval for changes will result in a protocol deviation. In addition, if there are any unanticipated adverse reactions or unanticipated events associated with the conduct of this research, you should immediately suspend the project and contact the Chair of the HSIRB for consultation.

Reappraisal of the project is required if it extends beyond the termination date stated below.

The Board wishes you success in the pursuit of your research goals.

Approval Termination: August 14, 2015