

Empirical Article

Assessing English Literacy as a Predictor of Postschool Outcomes in the Lives of Deaf Individuals

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Lower English literacy achievement of deaf students is often hypothesized to be an impediment for successful adult life experiences. Yet, literacy practices that individuals engage in throughout their daily lives are much more complex than what school-based measures of English can capture and particularly so for deaf individuals. A national large-scale data set with a sample of over 1,000 deaf youths was used to assess what, precisely, standardized measures of literacy may predict in terms of postschool outcomes in three domains: life, employment, and education. Regression analyses indicate that these measures predicted some postschool outcomes, but not all, and if significant, only a small amount of variation in the outcomes was explained. Findings suggest that English literacy, particularly the narrow conceptualization of English literacy skills that are measured through school-based assessments, may not play a significant role in the lives of deaf individuals, contrary to expectations.

How literacy is taught, utilized, and potentially mastered is, by far, one of the most discussed, researched, and highly contentious topics in the field of deaf education and deaf studies (Harris & Marschark, 2011). An ERIC database search of literacy and deafness pulls up more than a thousand articles of interest; numerous books have been published that also discuss the topic (e.g., Bruggemann, 2004; Morere & Allen, 2012; Paul, 1998). However, this discussion surrounding literacy, particularly that of English literacy practices, often takes place in a space where the terminology conceptualizes deaf¹ people as “facing challenges” or “struggling” with literacy. As Bruggemann (2004) states, “typically approached

as a problem or a paradox in much of the long-stretching literature, literacy and deaf people have never danced smoothly together (p. 1).” The relationship that deaf people have with literacy is often examined explicitly in school settings through assessments of English skills, but individuals’ literacy practices exist beyond the school setting in a multitude of life experiences from childhood to adulthood and is often broader than what can be captured through school-based assessments. A discussion of life experiences for deaf adults that occur postcompulsory education (i.e., high school), such as independent living, employment, and continuing education, appears to require an aside suggesting that literacy achievement gaps are a detriment to those postschool outcomes (e.g., Marschark, Lang, & Albertini, 2002).

The dialogues about literacy and deaf people often originate from a deficit perspective with the idea that deaf individuals’ literacy development and capacities should be measured against native users of spoken English (for review: see Cline, 1997). When comparing native users of spoken English, who are often monolingual early language learners, with deaf individuals, a largely heterogeneous population with large variability in language exposure and accessibility thereof, the English literacy achievement of those deaf individuals has been found lacking. The English literacy achievement gaps that emerge from those comparisons are often proposed to be a barrier for successful postschool experiences, but in most cases, it has yet to be determined how literacy levels, specifically, are related to those outcomes (e.g., Bat-Chava et al., 1999; Bowe,

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2003; Marschark et al., 2002; Punch, Hyde, & Creed, 2004; Winn, 2007). Literacy does play an important role in adult life experiences, but there are multiple routes toward successful life experiences, such as independent living, employment, and continuing education, which may not necessarily involve school-based literacy practices (Lytle, 1991). These school-based literacy practices need to be examined more explicitly to assess their role as a predictor of postschool outcomes for deaf individuals and not simply outcomes in and of themselves. This analysis shifts the conversation from a discussion of deaf individuals' deficiencies in English literacy to a discussion of the specific role that English literacy plays in the postschool experiences of deaf individuals.

It is important to acknowledge that English literacy as traditionally conceptualized is only one component of a larger umbrella term of literacy that encompasses the use of multiple tools to communicate, negotiate, and navigate the world. How literacy is defined "has changed over time from an elementary 'decoding' of information to a range of more complex and diverse skills and understandings" (Lonsdale & McCurry, 2004, p. 5). In a sociocultural framework, which draws from the work of Vygotsky (1978), the English language serves as one among many semiotic tools that enables communication and representation of meaning. Current literacy researchers and theorists situate their work within the sociocultural perspective in the development of literacy theories ranging from multiliteracies (Cope & Kalantzis, 2000; New London Group, 1996), new literacies (Gee, 2003; Lankshear & Knobel, 2003; Leu, Kinzer, Coiro, & Cammack, 2004), and the social practice approach to literacy (e.g., Papen, 2005), and those theories often overlap and build upon one another. Contemporary perspectives of literacy allow for a more holistic understanding of literacy practices as ways of making meaning across multiple modalities, whether it is linguistic, digital, visual, aural, gestural, or spatial. These literacy practices are increasingly used in the current global, multilingual, and technological society and are a key aspect of adult life experiences for all individuals, deaf or not.

The goal of this article is to examine the role of school-based English literacy skills as a predictor of postschool outcomes for individuals who are deaf. This

article will focus on English literacy practices that are conceptualized and measured through individualized and standardized English literacy assessments administered in schools, as it is those school-based literacy practices that have been proposed to be a deterrent to successful postschool outcomes for deaf individuals. The literature review provides an initial overview of the role of literacy in adult life for the general population. This overview frames a more specific discussion of the role that English literacy may play in postschool experiences of deaf individuals in these three domains: life, employment, and education.

Literacy in Adult Life

National studies of adult literacy rates in the general population offer some perspective on the relationship of literacy with everyday life. Literacy rates do, in fact, show a relationship with multiple adult life outcomes. As may be expected, literacy rates are associated with academic outcomes such as secondary and postsecondary school enrollment and completion (Nguyen, 2010), but literacy also plays a role in other essential adult life experiences. Most notably, the literacy level of adults was strongly associated with the likelihood of accessing and understanding health-related information (Berkman et al., 2004; Kutner, Greenberg, Jin, & Paulsen, 2006). Results from the National Assessment of Adult Literacy (NAAL) data from 2003 provide us with greater understanding of how literacy interacts with multiple adult life experiences in the United States (Kutner et al., 2007). This national snapshot of adult literacy skills showed that approximately 5% of adults in the United States are considered to be nonliterate in English, performing below the category of Below Basic, whereas 12–22% of adults were considered to be engaging with English at Below Basic literacy levels. To provide context for interpreting these findings, the NAAL Below Basic literacy level in adults indicates "no more than the most simple and concrete literacy skills" (Kutner et al., 2007, p. 4).

Among adults who were not still in high school, the NAAL study found that the average literacy rates were higher with each increasing level of education. In looking at employment outcomes, literacy rates were found to have a significant, positive relationship with income, time

employed, and being in the labor force. For adults with the lowest literacy rates, those in the Below Basic category, 51% were not in the labor force and 35% worked full time, as opposed to adults with the highest literacy rates, of which 18% were not in the labor force and 64% worked full time. Findings regarding employment extend into their earning capacity; only 2% of adults with the lowest literacy rates lived in households with incomes of \$100,000 or more, and 41% earned less than \$500 a week. In fact, 35% of adults with the lowest literacy rates reported that their reading skills limited their job opportunities “a lot” (Kutner et al., 2007, p. 54).

Literacy not only has a relationship with employment and academic outcomes but also with life outcomes such as independent living, community involvement, and family relationships (Kutner et al., 2007). Women with higher levels of literacy were less likely to have received public assistance, and if they did, it was for shorter spans of time. Adults with higher levels of literacy volunteered more frequently and were more likely to use the internet to access information and email to communicate. An adult’s individual literacy level also has an impact on the literacy experiences of the broader family unit. Parents with higher literacy rates generally had more educational resources in their home and did more literacy-related activities such as reading to their children and talking to their children on a daily basis about their school day. In contrast, a large percentage of parents with the lowest literacy rates (41%) reported that they did not read to their children at all. This national study shows us that literacy does, in fact, have a relationship with multiple aspects of adult life.

What we know about adult literacy in the general population largely comes from the NAAL data discussed above. It is important in the context of this article to clarify how literacy is conceptualized in each study. The approach used in the NAAL study attempts to capture an overarching idea of literacy, that of *functional* literacy, as it is used in everyday life by adults (Kutner et al., 2007). Functional literacy is a construct that measures literacy using authentic forms of text that are used in everyday life such as job applications, bus schedules, and bank statements in three domains: prose, document, and quantitative. These literacy activities are qualitatively different than what assessments of standardized and individualized literacy

achievement capture in school settings and are used as literacy benchmarks. However, because the literature in deaf education most often limits the discussion to the latter category and argues that the low literacy levels captured by those assessments serve as barriers to successful outcomes for deaf individuals, this study will use school-based measures to determine what this narrow conceptualization of English literacy may predict in terms of outcomes.

Literacy in Adult Life: Deaf Individuals

Researchers in the field of deaf education often posit that the lower literacy achievement of deaf students is an impediment for collegiate success, employment, career preparation, technical skills development, social skills, and income, but it has yet to be determined precisely how literacy levels are related to, or may serve as predictors of, those and related outcomes, (e.g., Akamatsu, Mayer, & Farrelly, 2006; Bat-Chava et al., 1999; Bowe, 2003; Luft, 2000; Marschark et al., 2002; Punch et al., 2004). Research on deaf individuals has looked at various outcomes of interest in adult life, including college attendance, employment (Bullis, Bull, Johnson, & Peters, 1995), engagement, independent living (Bullis & Davis, 1995), college graduation (Cuculick & Kelly, 2003), college readiness, and classroom learning (Convertino, Marschark, Sapere, Sarchet, & Zupan, 2009). In these studies of postschool experiences, only a few selected studies have explicitly assessed English literacy, or aspects thereof, as a predictor of outcomes (Convertino et al., 2009; Cuculick and Kelly, 2003). This is a significant gap in the research surrounding literacy and postschool outcomes for deaf individuals, particularly when considering that many preeminent researchers in the field have proposed that literacy is a deterrent to achieving successful postschool outcomes. The discussion that follows will provide an overview of life experiences for deaf adults within three postschool domains: life, employment, and education.

Life

The research in domains of adult life associated with daily living for deaf individuals is not as robust as in postsecondary education or employment experiences,

yet addressing this aspect of postschool experience is an important consideration. Not all deaf adults enter postsecondary institutions or the work force, and this segment of the deaf community is often increasingly marginalized, particularly when unattended to in research. In a national study of students with disabilities, the National Longitudinal Transition Study-2 (NLTS-2), it was found that 5% of deaf individuals had not been engaged in any type of education, training, or employment since leaving high school (Newman et al., 2011). Attending to life outcomes beyond experiences outside education and career will ensure that this percentage of the population is captured in any analyses of the role of literacy in postschool experiences, in addition to providing a more robust picture of the postschool experiences of deaf individuals above and beyond employment and postsecondary education.

Independent living in and of itself is not the only measure of successful postschool life outcomes, but it is a strong indicator of making self-determined decisions, obtaining needed resources, and the capacity to navigate adult life independently. Individuals with disabilities are generally less likely to live independently than individuals in the general population (45% vs. 59%) and that 51% of deaf individuals do live independently up to 8 years after high school at a significantly higher percentage than some other disability groups (Newman et al., 2011).

The individual psychological outcomes, well-being, and life experiences of deaf individuals are also important considerations, above and beyond their physical living situation. Deaf individuals who are less proficient in the language of the majority, that of English in this context, often experience marginalization and discrimination (Cline, 1997). Little is known of how this experience of language marginalization directly impacts deaf adults' psychological well-being. Even when the educational experiences of hearing and deaf individuals are similar, deaf adults exhibit significantly lower levels of self-esteem and well-being (Weisel & Kamara, 2005). Weisel and Kamara found that deaf individuals' higher education levels, which are often closely entwined with the English literacy skills needed to navigate higher education settings, were associated with lower fear of reaching autonomy yet did not affect self-esteem and well-being.

The experience of being deaf will interact with daily life in multiple ways including independent living and psychological experiences, but most namely with communication and language. Emerging technologies may offer a lens through which to view how deaf individuals engage directly with English as a communication modality and thus use English literacy practices in daily life. Increasing deaf students' access to English literacy through technology (i.e., two-way messaging) may support independence and decision-making skills, for instance (Akamatsu et al., 2006). Regardless of lower English literacy skills, deaf students are actively utilizing technology to communicate, build relationships, and access information (Akamatsu et al., 2006; Lissi & Schallert, 1999; Newman et al., 2011). A majority of deaf adults communicate by computer at least daily (51%), which is a significantly higher percentage than other disability groups (Newman et al., 2011). These indicators demonstrate that deaf individuals are engaging with English in their daily lives, lower English skills notwithstanding. Despite consistent discussion of English literacy as a deficiency, which results in unfavorable adult life outcomes for deaf individuals, it has yet to be investigated specifically how English literacy capacities, specifically, are associated with life outcomes, beyond communication or educational level.

Employment

Generally, deaf adults continue to be underemployed and underpaid when compared to their hearing contemporaries, and this has a greater impact on deaf women (MacLeod-Gallinger, 1992; Schroedel & Geyer, 2000; Winn, 2007). Earnings are generally lower for deaf individuals than those in the general population, as reported in numerous studies (e.g., Newman et al., 2011; Welsh, 1993; Winn, 2007). However, recent national data from the NLTS-2 reveal cautiously optimistic employment rates, with 57% of deaf young adults currently employed and 92% having been employed since high school (Newman et al., 2011). National data show a 66% current employment rate in the general population with comparable age and experience, which is not significantly different from the 60% current employment rates of persons with disabilities in the NLTS-2 study overall (Newman et al.,

2011). On first glance, it may appear that employment trends for deaf individuals are positive. However, an important consideration is that the Newman et al. study collected information from deaf individuals who were recent high school students, up to 8 years after high school. The employment gaps experienced by deaf individuals may become more prevalent over time, as opportunities for advancement do not present themselves (Bullis et al., 1995; Kelly, 2013). Indeed, recent national samples of adults from the ages 21 to 64, who are currently in the work force, show that deaf adults are employed at lower rates than adults without disabilities, at 59–76% (Erickson, Lee, & von Schrader, 2013). Hence, it is important to capture a holistic perspective of the employment experience, attending to factors such as income, opportunities for advancement, and job satisfaction. Those factors may offer a more realistic picture of the employment experiences for deaf adults and impact on their families.

More intangible employment experiences such as opportunities for advancement, relationships with coworkers, and job enjoyment are important to consider, above and beyond simply having a job and earning an income. Individuals spend most of their waking hours at work, often identify significantly with the work they do, and build important relationships with work colleagues. The unique dynamics of the deaf experience, which may or may not involve the literacy capacities of the deaf employee, may come into play in the workplace in multiple dimensions. In fact, deaf individuals are often less likely to feel that they have many chances to work their way up, receive promotions, or take on greater responsibilities (Newman et al., 2011). Deaf individuals' career advancement continually lags behind their hearing peers (Kelly, 2013; Luft, 2000; Welsh, 1993; Winn, 2007). Even when deaf individuals receive the exact same career training and degree as hearing individuals, deaf individuals are less likely to advance to mid- and senior-level management roles in their career and report significantly lower job and career satisfaction, despite significantly higher career commitment and career achievement orientations (Kelly, 2013).

Power and Leigh (2000) point out that deaf individuals may be more significantly affected by the current literacy landscape of the 21st century, which is

increasingly demanding and has fewer available jobs for people with lower literacy skills. Beyond the demands of the current employment climate, the workplace often requires complex communication and interaction strategies that can be problematic for the deaf employee. It is those communication factors that are frequently cited as the primary issue that affects employment outcomes for deaf individuals (Luft, 2000; Winn, 2007). Communication in the workplace involves multiple dimensions, which do not only consist of English literacy skills but also interaction strategies, cultural awareness, self-advocacy skills, and other social skills (Belknap, Korwin, & Long, 1995). The distinction between English literacy skills and communication skills may not always be drawn cleanly, yet it is important to recognize these are two different, albeit often complementary, skills. English literacy skills may be necessary to engage in specific employment processes such as individualized assessments of preferences and strengths, which then lead to jobs appropriate for the individual's personal skills and areas of expertise. Those employment processes may be problematic for the deaf individual with lower English literacy skills (Luft, 2000).

Education

Recent data show positive enrollment trends for deaf individuals enrolled in postsecondary institutions, with enrollment numbers as high as 75% (Newman et al., 2011). An analysis of the change in postsecondary education enrollment over time shows that deaf students are increasingly enrolling in 2- and 4-year institutions, with rates around 37% in 2005, which is a 24–30% statistically significant increase from data collected in 1987 (Wagner, Newman, Cameto, & Levine, 2005). Those trends may not be as optimistic when assessing postsecondary completion for deaf individuals. Studies indicate that a low percentage of deaf students complete their postsecondary programs, with estimates as low as 25–30% graduating with a 2- or 4-year degree (Bowe, 2003; Lang 2002; Stinson & Walter, 1992). More recent data show promising completion rates for deaf students at any type of postsecondary institution (53%), apparently comparable with a completion rate of 52% of the general population of similar age, albeit

with more within-group variability, indicating that among deaf students, the rates of completion differed at higher rates than those in the general population (Newman et al., 2011).

Studies of deaf students' college graduation rates have shown that English literacy levels do show a relationship with graduation rates (Cuculick & Kelly, 2003). Cuculick and Kelly (2003) report descriptive findings on the graduation rates of 903 deaf students at the National Technical Institute for the Deaf and Rochester Institute of Technology (NTID/RIT) and descriptive data on the literacy levels of these students. The highest percentage of students earning baccalaureate degrees was those with reading abilities at the 10th grade level or higher. Deaf students earning either an AAS (Associate of Applied Science) or BS (Bachelor of Science) degree had similar reading averages in the 9th grade levels, whereas those students earning a BFA (Bachelor of Fine Arts) degree had significantly lower reading average than the BS recipients. However, it is of interest that 31% of the students who did not earn degrees were reading at the 10th grade level or above. Of the students who were reading at the highest grade levels, at the 11th grade and 12th grade equivalents, 45% and 52%, respectively, did not earn college degrees. Taking that piece of data into consideration, it appears that higher reading skills may not necessarily predict college graduation. It is also important to consider that students enrolled in baccalaureate degree programs often have to fulfill English-based degree requirements ranging from literacy measures required for enrollment to coursework in English. Thus, the findings showing that the highest percentage of students who earned their baccalaureate degrees had reading levels at the 10th grade or higher may, in actuality, be due to the program expectations, not because of the effects of English literacy skills per se.

To assess the potential effects of literacy on postsecondary academic outcomes as a whole, it is beneficial to take a closer look at the processes involved with college enrollment, retention, and completion. A study of 568 deaf and hard-of-hearing students, summarized across 10 studies taking place at NTID/RIT, used college readiness and classroom learning as the outcomes of interest, measured by college entrance exams and pretest, posttest, and gain scores, respectively (Convertino et al., 2009). The authors examined the effects of numerous

individual difference variables on the outcomes of interest, using variables from four domains: achievement, audiological, communication, and family. Regression analyses showed that the English subscore of the ACT, an standardized college entrance examination, was the highest predictor of college readiness, which was measured by the ACT composite score, accounting for more than 80% of the variance in college readiness. Other assessments of English literacy that were used as college entrance exams also served as positive predictors of college readiness: Michigan test, California test, and NTID reading assessments. However, when looking at classroom learning as the outcome variable of interest, measured by pretest, posttest, and gain scores, those standardized English assessments did not serve as significant predictors of learning. In fact, the Michigan reading score *negatively* predicted posttest and gain scores. The ACT English subscores specifically did not significantly predict any aspect of classroom learning, whereas the best predictor of classroom learning was the ACT composite score. The authors posit that English literacy skills predict college preparation, measured by gaining entry to college, but do not play a significant role in classroom learning (Convertino et al., 2009). This finding may be confounded by the smaller variation in literacy skills in the sample of college students, as those enrolled students, by nature of the college entry requirements, have more similar English proficiency scores than those in the more general population of deaf students, including those who are noncollege bound. In addition, the validity of the finding that English skills, measured by the English subscale of the ACT, predict college readiness may be questionable because the measure of college readiness that was used in the study was the ACT Composite score, 30% of which is the English subscale of the ACT.

In a descriptive study of postschool outcomes in a sample of deaf students in the Pacific Northwest, results showing high literacy levels and high collegiate completion rates led the authors to support the proposal by Convertino et al. that English language ability is related to postsecondary academic success (Appelman, Callahan, Mayer, Luetke, & Stryker, 2012). However, this study was a descriptive study that did not account for confounding variables that could be related to both higher literacy achievement and higher college completion rates. This sample is from a specific school

that reveals higher achievement levels than have been found in other studies of comparable populations, and thus there may be other influencing variables at play (Appelman et al., 2012). The authors recognized that their findings were specific to the population sampled, and thus “in regard to the general population of people with hearing loss. . . the relationship between English-language ability and education, employment, and independent living also merits future research” (Appelman et al., 2012, p. 272).

The Present Study

The purpose of this article is to fill several gaps in the literature, both in terms of literacy as a construct, particularly how it is measured, and the role of literacy in adult life of deaf individuals. First, one goal of this article is to broaden the scope of the work by Convertino et al. (2009) and assess the effects of English literacy on academic outcomes, both in a more general population than students at RIT/NITD and on outcomes in employment and life domains. Literacy has been hypothesized to serve as an impediment for successful employment and independent living for deaf individuals, but no studies found by the authors have explicitly assessed the predictive role of literacy for these outcomes. A second goal of this article is to extend the analysis of Convertino et al. by using alternative assessments of English that may result in different interpretations of the relationship between literacy and postschool outcomes. The Convertino et al. study used the ACT as measures of English skills, and, based on previous researchers’ work assessing the validity of the ACT when used with deaf populations (Bochner & Walter, 2005), the ACT may have decreased validity for students with scores on the lower end of the range (i.e., 15 and below).

This study investigates the predictive role of literacy in postschool outcomes (i.e., life, employment, and education) for deaf individuals through a secondary data analysis approach, using a large-scale federally commissioned data set, the NLTS-2. This data set captures the processes involved with transition for students with disabilities throughout a 10-year span of time, initiating data collection when students were at the age of 13–16 and ending at the age of 23–26. This

data set sampled a highly heterogeneous student population in multiple locations across the United States, with a total participant pool of above 11,000. In this sample, students who were deaf and hard of hearing numbered above 1,000. The data set is a rich source of information about the complex processes involved with transitioning to adulthood, including “characteristics, experiences, and outcomes,” in school and postschool for students with disabilities (Newman et al., 2011, p. 2). More details about this data set will be discussed in Methods section.

Methods

The research questions to be addressed in this study are

- RQ1: How do English literacy skills predict life outcomes?
 - 1a: How do English literacy skills predict living independently?
 - 1b: How do English literacy skills predict positive self-beliefs?
- RQ2: How do English literacy skills predict employment outcomes?
 - 2a: How do English literacy skills predict ever being employed?
 - 2b: How do English literacy skills predict job income?
 - 2c: How do English literacy skills predict job satisfaction?
- RQ3: How do English literacy skills predict educational outcomes?
 - 3a: How do English literacy skills predict postsecondary enrollment?
 - 3b: How do English literacy skills predict postsecondary completion?

Demographic Characteristics

Demographic characteristics previously found to be related with literacy or postschool outcomes for deaf individuals will be accounted for in these analyses. Capturing these demographic characteristics of interest is particularly relevant in research studies using deaf people in the sample, as these individuals are a highly heterogeneous group. Yet, it is beyond the scope of this study to discuss

this variability in great depth, and we are limited to the demographic characteristics that are available in the data set. A brief review of demographic characteristics that consistently emerge in the literature to be related to post-school outcomes for deaf individuals follows.

Family income is an important component of family socioeconomic status (SES), and researchers in the field of deaf education have expressed concern about the lack of the inclusion of SES in research design (e.g., Hauser, 2011). Family income is related to numerous postschool outcomes for the general population, from health, academic achievement, and employment (e.g., Adler et al., 1994; White, 1982). For deaf individuals, family SES was found to be predictive of postcollege occupational success (Welsh, 1982), but not significant predictors of postschool engagement and residential status (Bullis & Davis, 1995). However, research findings showing that school setting (i.e., mainstream vs. residential) has a relationship with postschool outcomes for deaf individuals (e.g., Bullis et al., 1995; Bullis & Davis, 1995) may be confounded by family income variation among school settings or the increased likelihood of students with additional disabilities in residential schools as opposed to mainstream programs (Mitchell, 2004). Tentative relationships between (a) the incidence of additional disabilities and ultimate community success of deaf individuals (Davis & Bullis, 1990) and (b) the likelihood of living independently have been linked (Bullis & Davis, 1995). Another consistent demographic characteristic that has been found to interact with postschool outcomes in the general population as well as in the deaf community is that of gender. Deaf women are more likely to attend college and report higher levels of happiness (Bullis et al., 1995) but generally reveal lower employment rates and income (MacLeod-Gallinger, 1992; Schroedel & Geyer, 2000; Winn, 2007), in addition to higher levels of worry (Lukomski, 2007). To sum, the literature suggests that the following covariates are significant and thus will be included in our analytical models: family income, gender, and the presence of additional disabilities.

Data Collection

This study uses data from the NLTS-2, which was recently released with every wave available for analysis.

The NLTS-2 was commissioned by the U.S. Office of Special Education Programs (OSEP) to better understand the experiences of students with disabilities transitioning from secondary grades into adulthood.

NLTS-2 employed a complex sampling design that incorporated both stratification and weighting to both reduce standard errors and also ensure generalizability. It stratified both at the local education agency level and at the disability level. Local education agencies were stratified based on their region, enrollment size, and district wealth prior to random sampling. The “region” stratification consisted of the categories Northeast, Southeast, Midwest, and West. These categories were previously used by the National Assessment of Educational Progress, the U.S. Department of Commerce, and the U.S. Bureau of Economic Analysis, thus aligning our findings with other large-scale data sets of education and employment outcomes in the United States. The enrollment size stratification was determined by the number of students enrolled in grades 7–12. Local Education Agencies were coded as having a very large enrollment with over 15,000 students, a large enrollment if they had between 4,700 and 15,000 students, a medium enrollment if they had between 1,600 and 4,700 students enrolled, and a small enrollment with students fewer than 4,700 (figures rounded). The final stratification, district wealth, was coded according to the percentage of the students living below the poverty line (also known as the “Orshanky” index; see Fisher, 1992). If 25–43% of the students lived below poverty, district wealth was coded as “low.” If this percentage was between 14 and 24, district wealth was classified as “medium.” Wealth above or below of this range was classified as “high” or “very low,” respectively. Students within these schools were further stratified by disability category to ensure that NLTS-2 had a nationally representative sample for each disability category.

The study obtained longitudinal data from the same cohort of students in five separate waves, beginning in 2001 and following up in 2003, 2005, 2007, and 2009. Every student in NLTS-2 was between 13 and 16 years old on December 1, 2000. Students, parental figures, and school staff provided information through computer-assisted telephone interviews, mail surveys, and direct assessments. Direct assessments, including the

literacy measures used in this study, were only administered in the first two waves. Analysis in this study uses information from Waves 1, 2, and 5: data collected in 2001, 2003, and 2009 from the same cohort.

Measures and Weighting

The covariates and auxiliary variables were collected in Wave 1 of NLTS-2, the independent variable was collected in the second wave, and the dependent variables were collected in the fifth wave of the study. Covariates and auxiliary variables captured demographic information, whereas the dependent variables gave information on education, employment, and life outcomes. The independent variable was a direct assessment of the students' academic achievement in reading. Because Wave 2 had the highest proportion of missing data, the weighting variable from Wave 2 was used in order to provide more accurate estimates, consistent with NLTS-2 user guidelines.

Covariates and auxiliary variables. Demographic data from Wave 1 were used as covariates for the primary analyses and as auxiliary variables for the missing data model. The covariates in this study included additional disability status, gender, and household income. Auxiliary variables for the missing data model included parental education level and whether or not parents had a partner living in the home.

Independent variables. The independent variable in this study, the Woodcock-Johnson III reading measure, was obtained from the direct assessments that were administered in Wave 2. Students were still in high school when this assessment was taken. The Research Edition of the Woodcock-Johnson III Tests of Achievement was used to measure students' academic achievement in reading and is a short form of the published version of Woodcock-Johnson III, with an average reliability of .65 (Wagner, Newman, Cameto, & Levine, 2006).

Dependent variables. Data from Wave 5 served as dependent variables for the analysis. Recall that the seven dependent variables may be organized into

three categories: general life outcomes, employment outcomes, and educational outcomes.

The employment variables included one binary outcome and two continuous (i.e., scaled) variables. The binary outcome reported whether the young adult had ever worked for pay outside of the household after high school. The two continuous employment variables included the youth's hourly wage (if employed) and a composite job satisfaction score. The composite score addressed the youth's satisfaction with compensation, social aspects of the job, and career advancement potential (see Appendix A). The four binary questions were coded as zeros and ones; three questions on a four-point scale were scaled so their maximum value was one and their minimum value was one fourth.

The general life outcomes category included one binary outcome and one continuous outcome. The binary outcome, independent living, was set to one if young adults lived on their own, with a spouse or roommate, or in a dorm or military housing. The continuous outcome was a composite scale of self-beliefs, which asked the student to identify with a range of self-belief statements, grounded in a self-concept theoretical framework (see Appendix B).

Finally, the two binary academic outcomes consisted of data on postsecondary enrollment and completion. The enrollment outcome was set to one if the deaf young adult had ever enrolled in any type of postsecondary institution after high school. The completion outcome was set to one if the deaf young adult had graduated from or completed the program at the postsecondary institution.

Inclusion Criteria and Participants

The inclusion criteria were threefold. First, both parents and the Local Education Agency district roster had to agree that the participant was deaf or hard of hearing. This included students with varying hearing losses, from mild to profound. Second, for participants to be included in an analysis, they had to have nonmissing values for the dependent variable. It is inappropriate to use multiple imputation when the dependent variable is missing, (Allison, 2001). Note that all the dependent variables were collected in the fifth wave of the study. As such, for participants to be included

individuals actually completing their education at those postsecondary institutions. After all, it is not only academic skills that support deaf students' postsecondary retention and completion but also personal factors such as self-beliefs, time management, and motivation (Albertini, Kelly, & Matchett, 2012).

Demographic Characteristics

Although not of the scope of this study, it is still of interest to briefly discuss how demographic characteristics of deaf individuals and their families relate to the postschool outcomes of these individuals. Contrary to expectations within the literature, the demographic characteristics that were included in the models as covariates (gender, family income, and additional disabilities) did not play a significant role in postschool outcomes of deaf individuals in all cases except for one. Family income was significantly related to the likelihood of obtaining gainful employment after high school, with the odds of employment being 1.19 times higher for those individuals whose families reported higher annual family income by \$5,000 increments. In future research, it may be of benefit to examine how other demographic characteristics are associated with postschool experiences for deaf individuals, particularly ethnicity, language, and additional indicators of socioeconomic status such as parental education level.

Limitations

Finally, it is necessary to recognize that there are limitations to this study. The researchers were limited to the sample and variables available in the NLTS-2 data set and thus not able to expand the scope of this work in more detail. Yet, the large sample in the NLTS-2 is a significant advantage to using this data set, especially considering the prevalence of small samples in deaf education research (Luckner, 2006). In addition, because the explicit link between English literacy skills and postschool outcomes for deaf individuals was a largely unexplored area of research, these findings can serve as a starting point for future more detailed investigations using differing sampling approaches and more sensitive data gathering methods designed specifically for the deaf population. Research designed

specifically for the deaf population would be able to capture factors to greater levels of sophistication such as instructional methodology of the educational setting or American Sign Language use and proficiency, as this level of detail was not available in the NLTS-2. One particularly promising line of future research could include investigations of the adult life experiences of deaf adults beyond the age of 25, as the age range in this sample limited our analysis. The researchers also suggest that more comprehensive measures to assess literacy practices that deaf individuals use in their everyday life are necessary to increase understanding of the role that literacy plays in the life of deaf individuals.

Conclusion

To reiterate, the English literacy measures used in this study, and in much of the literature on deaf education, do not fully capture the literacy practices that are used by deaf individuals as they navigate adult life. Literacy practices, as demonstrated by researchers in the New London Group, among others, include multiple ways of making meaning and negotiating understanding. Deaf individuals clearly use a wide range of literacy practices to navigate adult life, which go beyond a grammatical understanding of written English text. Indeed, in national studies of how adult literacy interacts with adult life experiences, it was not those standardized and individualized measures of English skills that were used, but measures of functional literacy (Kutner et al., 2007). The NAAL defines literacy as "using printed and written information to function in society, to achieve one's goals, and to develop one's knowledge and potential" (Kutner et al., 2007, p. 2). It is this more comprehensive perspective of literacy that may help frame the results of this study, particularly when it has been suggested that deaf students do, in fact, achieve higher functional literacy levels than expected (Moore, 2001). Deaf students may not always master traditional school-based measures of English literacy, but these literacy practices are highly specific to the school environment and are not reflective of the lived experience of literacy for deaf individuals.

To take a cohesive view of our findings on the relationship of school-based English literacy skills and overall adult life experiences for deaf individuals, it is

