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# Factors Associated with Proficient Braille Skills

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## Abstract

**Introduction:** The purpose of this study was to investigate factors associated with having proficient braille skill, with a specific interest in employment status.

**Method:** Survey data were collected in 2021 and 2022 from 449 employed and unemployed people with low vision and people who were blind, all of whom were legally blind. Proficient braille skill was the dependent variable in two logistic regression models (full sample model and totally blind only model) that included age category, age of blindness onset, sex, education level, non-visual disability, level of vision loss, assistive technology (AT) skill level, and employment status as independent variables.

**Results:** We found that people who (a) experienced visual impairment at a younger age, (b) were blind or had less functional vision, (c) were younger, (d) were female, (e) had higher self-reported AT skill, and (f) were employed were more likely to have proficient braille skills.

**Discussion:** Multiple variables were related to proficient braille skill, some anticipated based on previous research (younger age of blindness onset, less functional vision, employment) and some unexpected (younger age, being female, greater AT skill). Although employment had a small association with proficient braille skill for the entire sample, it had a stronger association for people who were totally blind. Higher rates of proficient braille skills among people between the ages of 21-30 may be a consequence of laws passed in the 1990s.

**Implications:** With easy access to braille in the form of refreshable braille technology, it is more important than ever that people with visual impairments of all ages have the opportunity to learn braille. Additional resources for learning braille as well as support and encouragement are needed, particularly for youth and adults who acquire vision loss.

## Factors Associated with Proficient Braille Skills in Adults

The braille system for reading and writing has been a mainstay of literacy for people who are blind or have low vision (i.e., visually impaired) in the United States for over a century. Advances in audio technology may have led to a general misconception that braille is no longer necessary, but many professionals in the field are strong proponents of braille and believe in its importance to the success of people with visual impairments. Braille is the only path to literacy for people who cannot access print. Braille allows for immediate and independent access to text and provides the same information as print, such as spelling and document formatting (Englebretson et al., 2023; Harris et al., 2023). For people with low vision, braille can be a more efficient reading method compared to print and reduces visual fatigue and strain (Mangold & Mangold, 1989). Braille users have outlined many ways in which the tactile system has been useful to their lives, including personal tasks such as organizing and labeling, following recipes, jotting down notes, and reading for pleasure (Huebner, 1989; Mack, 1984; Schroeder, 1996; Wencil, 1989). D'Andrea (2012), investigating high school and college students who used braille, reported unanimous support for braille learning.

Braille's value in the education of children with visual impairments has been studied for years (D’Andrea, 2009). Research has focused primarily on braille instructional methods and factors associated with braille learning achievement. More recent studies have investigated braille reading on electronic devices such as refreshable braille displays. Portable refreshable braille devices allow input using braille or a QWERTY keyboard, and often include speech access. The studies generally supported that student learning via electronic braille was as effective as learning via paper braille (Bickford & Falco, 2012; Hoskin et al., 2022). Reading speeds using braille displays were found to be similar to those using paper braille (McCarthy et al., 2023). Reading braille on paper, particularly for young children, remains important so that efficient two-handed reading techniques are learned as well as text formatting conventions such as indentation and headings which may not be present in electronic files (Swenson, 2016).

Recognizing the centrality of braille to the education of children with visual impairments, other research investigated the preparation of teachers of students with visual impairments (TVIs) for teaching braille. In the 1980s and 1990s, professionals and advocacy organizations expressed alarm over a possible drop in the numbers of braille readers as reflected in the federal quota registration numbers at the American Printing House for the Blind (Spungin, 1989). This concern led to the passage of a number of "braille bills," state legislation promoting braille instruction in schools (Spungin & Huebner, 2017). It also led to the addition of language in the 1997 reauthorization of the Individuals with Disabilities Education Act (IDEA) that braille instruction be provided to students with visual impairments, unless the educational team deemed it inappropriate (IDEA, 2004, Section 1414 (d)(3) (B) (iii)). One reason cited for the decrease in numbers of braille readers was that some TVIs felt unprepared to teach braille reading and writing (Wittenstein, 1994). Several professionals called for standards for braille skills competence in personnel preparation programs or national standards to improve children's braille learning outcomes (Amato, 2002; D'Andrea et al., 2009; Lewis et al., 2012). More recently, Farrand and colleagues (2022) found that university programs were using braille proficiency exams and suggested that requiring state level tests to obtain licensure and developing common standards for competency could be helpful in ensuring that TVIs are prepared to teach braille.

Fewer studies have evaluated braille acquisition for adults who experienced vision loss. One such study investigated braille use for adults who had decreased tactile sensitivity due to diabetes and found that braille character identification was possible given enough time, concluding that braille should be an option considered for diabetic adults (Harley et al., 1985). Another study documented that adults receiving braille instruction found braille useful but that infrequent instruction led to lengthy amounts of time for learning; the author suggested that this could lead to abandonment of braille for the immediacy of using audio content (Pester, 1993). More recently, institutional factors such as lack of equipment and support for new braille learners who are older adults was found to be an impediment to learning, as was negative perceptions of braille among professionals and consumers (Martiniello, Haririsanati, & Wittich, 2022). Factors associated with success in braille learning included motivation and self-identification, social factors such as support from family and friends, and positive views about braille (Martiniello, Haririsanati, & Wittich, 2022).

Despite widespread beliefs about the importance of braille to success in life among its users and many professionals, research that explores the relationship between braille use and employment is limited. Two studies investigated the relationship between using braille in childhood and current employment status. Ryles (1996) reported that adults with congenital visual impairments who learned braille as children had a higher rate of employment than those who learned braille later in life or relied on print. Silverman and Bell (2018) found that, when controlling for age of onset and vision status, primary braille readers (who learned braille as children and used it as their primary reading medium) were more likely to be employed than all others, and secondary braille readers (who used print as their primary reading medium in childhood) were more likely to be employed than non-braille readers. They hypothesized that braille literacy helps people develop a positive disability identity, contributing to the results and leading to greater success in life. Two studies documented a relationship between employment and braille, using simple univariate (chi-square) analyses: Bell and Mino (2013) reported that braille readers were employed at a higher rate than visually impaired adults who did not read braille and Bell and Silverman (2018) reported that people who used braille at least weekly were more likely to be employed than those who did not.

We know little about how many people have braille skills and use braille in everyday life, or factors that are associated with braille skills. Current research about the number of adults who read braille or use braille in everyday life is lacking. A recent systematic literature review documented that, despite assertions about braille literacy rates by many authors and an assumption that braille usage is declining, data do not exist to determine braille literacy rates in the U.S. (Sheffield et al., 2022).

Only a few studies have specifically investigated factors associated with braille skills. One study documented that the age of blindness onset was an influential factor in braille reading fluency as well as in developing tactile sensitivity and suggested that braille learning should begin "as early as possible" (Oshima et al., 2014, p.131). Another study investigated correlates of braille reading speed among adults and found that greater tactile acuity, greater braille reading frequency, and younger age at braille learning were associated with faster reading speed (Martiniello, Barlow, & Wittich, 2022). Other studies have provided support for learning braille at an early age, with early braille readers receiving similar reading ability scores as typically-sighted print readers and much higher scores than legally blind students who had no or infrequent braille instruction (Bell et al., 2013; Ryles, 1997) and having faster reading speeds (Trent & Truan, 1997). Another study investigated relationships between braille reading accuracy and gender, age at vision loss, and level of education, and found some differences in performance, including that females, students who were adventitiously blind, and elementary students made more braille reading errors (Argyropoulos & Papadimitriou, 2015).

Our previous study about refreshable braille technology use at work found that proficient braille skills were the strongest predictor of using refreshable braille technology (McDonnall, Sessler-Trinkowsky, and Steverson, 2024). Therefore, we wanted to determine factors that are associated with having proficient braille skills. In addition, we wanted to determine the relationship between employment and having proficient braille skills when other factors were controlled, for our entire sample of legally blind people versus only for people who are totally blind. Our research questions were:

1. What factors are associated with proficient braille skills among legally and totally blind adults who are working or interested in working?
2. Is the relationship between employment status and proficient braille skills different for all people who are legally blind compared to only those who are totally blind?

## Method

### Data Source/Sample

Data were obtained from a 5-year panel study about assistive technology (AT) use in the workplace by people with visual impairments. Criteria for study inclusion were being visually impaired, age 21 or older, currently employed (and planning to work for the next four years) or unemployed but looking for work, use of AT at work (employed) or regular AT use (unemployed), and living in the United States or Canada. Potential study participants were recruited through consumer organizations, social media, a research registry, listservs, and blindness-specific websites beginning in January 2021. Interested individuals completed a screening survey to determine eligibility, and qualified applicants were assigned to either the employed sample or unemployed sample.

The research team developed the initial survey instruments, which were reviewed by people with visual impairments, representatives of blindness organizations, and technology company representatives. The surveys were then revised based on the feedback and pilot tested by people with visual impairments. Additional revisions were made based on the pilot test feedback before implementing the surveys. The Institutional Review Board for the Protection of Human Subjects of the authors' university determined that the study was exempt.

## Data Collection

Data were collected through Qualtrics, an online survey tool, although participants had the option to complete the survey via telephone. Online participants, who comprised most study participants (90%), were emailed a personal survey link. Telephone surveys were conducted by members of the research team. Survey 1 was administered to the employed sample in 2021 and resulted in 314 completed surveys. A similar survey was administered to the unemployed sample in 2021, with 102 completed surveys. Further recruitment for employed participants continued into 2022, resulting in an additional 55 participants for the employed sample. These new participants completed Survey 1 items in 2022. Upon completion of the survey, participants were offered a small electronic gift card as a token of appreciation. For this study, data from all respondents who reported being totally blind or legally blind (N=449) were utilized.

## Variables

Participants reported on their braille skills through the question “Would you describe your braille reading skills as…” with four possible response options: (a) no braille skills, (b) minimal braille skills, such as using uncontracted Grade One braille, (c) moderate braille skills, such as some use of contracted Grade Two braille, and (d) proficient braille skills, fluent in contracted Grade Two braille. A dichotomous *braille skill* outcome variable – proficient or not proficient – was created by combining responses for no skill, minimal skill, and moderate skill into a single category of not proficient.

Several independent variables were included in the analyses. Respondent age was calculated from birth month and year subtracted from survey completion month and year. The variable *age category* was created with five categories: 21-30 (reference group), 31-40, 41-50, 51-60, and 61 or older. Respondent *sex* was a dichotomous variable measured as female or male (reference group). *Education level* was created from the respondents' reported highest degree attained and categorized as less than a bachelor's degree, bachelor's degree (reference group), or graduate/professional degree. To measure the *age of blindness onset*, participants were asked, "How old were you when you started having serious difficulty seeing, even with glasses or magnification?" Ages 0-4 were coded as pre-school (reference group), ages 5-18 were coded as K-12, and ages 19 or older were coded as post-school. *Level of vision loss* was a categorical variable measured as totally blind (reference group), legally blind with minimal functional vision, or legally blind with some functional vision. *Non-visual disability* was a dichotomous variable based on a yes or no response to the question "Do you have any other disabilities or chronic health conditions?" *Employment status* was a dichotomous variable with employed coded as yes and unemployed coded as no.

To assess participants' proficiency with AT (*AT skill level*), they were first asked to identify the AT they used on the job (employed group) or used at least monthly (unemployed group) from a list of 28 AT devices, software, and apps. Then, participants rated their perceived skill level for each reported AT on a scale of 1 (beginner) to 10 (advanced). The average rating for all reported AT per person was then calculated to create a continuous variable representing their overall self-perceived AT skill level.

**Data Analysis**

Statistical analyses were performed using SAS 9.4. Descriptive statistics were examined to provide insight into sample characteristics. Logistic regression was used to analyze the relationship between braille proficiency and the independent variables. All eight independent variables were included in the full model. Non-significant variables were then eliminated from the initial model one at a time to determine the best model fit based on change in the Akaike information criterion (AIC) values. To address the second research question, a model was created with totally blind participants (n=264) that included the same variables as the full model except for level of vision loss. Non-significant variables were successively removed to arrive at the model with the best fit based on AIC values. The interaction between age and age of blindness onset was also examined as a predictor, but it was not significant (and not included in the final models).

## Results

Table 1 presents the demographics for the full and totally blind samples. Ages ranged from 21 to 77 years for the full sample and from 21 to 71 years for the totally blind sample. Most participants were white, female, and highly educated. Average self-perceived AT skills were high for most but ranged from 3 to 10 (full sample) and 4 to 10 (totally blind sample).

Table 2 presents logistic regression results for the final full sample and totally blind models. Non-significant variables in the first model (education: Wald $X^2$=0.27, $p$ = .87; non-visual disability: Wald $X^2$=0.24, $p$ = .63) were removed sequentially to evaluate impact on the model. After removing education from the model, the AIC decreased significantly. The removal of non-visual disability did not significantly improve the AIC; therefore, this variable was retained in the final model. The likelihood ratio for the full sample final model was statistically significant, $X^2$ (12, $N$ = 449) = 227.56, $p$ < .001, Nagelkerke $R^2$ = .53. Significant variables in the model were age category, age of blindness onset, vision loss level, sex, average AT skill, and being employed. Participants in the 41-50 and 51-60 age categories had lower odds of having proficient braille skills compared to those aged 21-30. Braille proficiency percentages by age category for both samples are presented in Table 3. Participants who experienced their vision loss in K-12 and post-school also had lower odds of having proficient braille skills compared to those who experienced vision loss pre-school. Participants who were totally blind had higher odds of having proficient braille skills compared to those who were legally blind. Females had higher odds of having proficient braille skills.

Education (Wald $X^2$=0.14, $p$ = .93) and non-visual disability (Wald $X^2$=0.44, $p$ = .51) were also non-significant variables in the totally blind model. The AIC decreased significantly after removing education but did not significantly improve with the removal of non-visual disability. The likelihood ratio for the totally blind final model was statistically significant, $X^2$ (10, $N$ = 264) = 126.11, $p$ < .001, Nagelkerke $R^2$ = .55. Significant variables for this model were the same as the full sample final model, but the strength of some relationships differed. In particular, employed people who were totally blind had odds 3.92 times higher of having proficient braille skills than unemployed people who were totally blind, compared to 1.93 times higher odds for the full sample.

## Discussion

The purpose of our study was to determine factors associated with having proficient braille skills, utilizing a large sample of employed and unemployed respondents who were legally blind or totally blind. This is the first study to our knowledge to evaluate factors associated with braille proficiency among adults, and we utilized multiple logistic regression models to simultaneously evaluate the association of several independent variables. We found that braille skill was associated with several variables, including age of blindness onset, with people who experienced blindness between the ages of birth to 4 much more likely to have proficient braille skills. People who experienced blindness pre-school age were more than 3 times as likely to have proficient braille skills compared to people who experienced blindness between ages 5 and 18 and more than 16 times as likely compared to those who experienced blindness at age 19 or later.

This finding suggests that people who experience blindness early in life may be more likely to have the opportunity to learn braille. Experiencing blindness before school, braille may also have been their primary reading medium to obtain literacy. If so, this would have likely resulted in much more time spent on braille instruction than for children and youth who experienced blindness after learning to read print. Odds of having proficient braille skills are much smaller for people who experienced blindness as an adult, and only 11.5% of them reported having proficient braille skills compared to 73.5% who experienced blindness pre-school. This suggests the need to provide support for learning braille and to encourage braille use among adults with later-onset vision loss.

In addition, braille skill differed by vision level: people who were totally blind were more likely to have proficient braille skills than those who were legally blind with minimal functional vision and much more likely than those who were legally blind with some functional vision. It is perhaps not surprising that people who have more functional vision are less likely to have proficient braille skills, but people who are legally blind with minimal functional vision could undoubtedly benefit from braille as much as those who are totally blind. Perhaps those who are legally blind are less likely to be offered, or to take, the opportunity to learn braille.

Current age also had a strong relationship with braille skill. People in the youngest age group (age 21-30) had significantly higher odds of having proficient braille skills compared to people between the ages of 41 and 60. This youngest group had the highest percentage of proficient braille users compared to all other age groups, followed by those aged 31-40 and those aged 61 and older. Almost all totally blind participants between the ages of 21 and 30 had proficient braille skills. Proficient braille skill rates were not as high when considering the entire sample but were still above 82% for those in the youngest age group. Participants in this youngest age group would have gone through school after the legislative efforts to promote braille instruction for students with visual impairments in the 1990s. In addition, refreshable braille technology became more commonly available in the early 2000s. Both of these facts may help explain the high rate of braille proficiency among the youngest study participants.

Sex was another significant predictor of braille skill, with females about twice as likely to report proficient braille skills. The only other research that included gender as a factor related to braille skill was a small study of 21 children which found that males made fewer braille errors (Argyropoulos & Papadimitriou, 2015). Our findings may be associated with documented gender differences in reading. One study reported a “sizeable” reading score gap favoring girls across 37 countries, although the size of the gap varied by country (van Hek et al., 2019). Another study documented that girls are more motivated readers, have more positive attitudes toward reading than boys, and have higher reading ability (Logan & Johnston, 2009). It may be that learning braille appealed more to females in our study because they were more interested in and motivated to read, thus explaining their higher odds of having proficient braille skills.

Higher average self-rated AT skill level was also significantly associated with proficient braille skills. The size of the relationship was modest when considering only 1 point difference in AT skill level, but if a participant had an average AT skill level that was 3 points higher (e.g., 6 versus 9 or 7 versus 10), they would have odds 3.43 times higher of having proficient braille skills. Reasons for the relationship between AT skill level and proficient braille skills are not clear, although people who have proficient braille skills are more likely to utilize braille technology (McDonnall, Sessler-Trinkowsky, and Steverson, 2024). Perhaps utilizing these additional technologies that often required self-teaching (McDonnall, Steverson, and Boystun, 2024) may have resulted in greater self-perceived AT skills.

Employment had a small association with proficient braille skill for the entire sample. However, when only considering people who were totally blind, a stronger association between the variables was found: people who were totally blind and employed had odds almost four times higher of having proficient braille skills than those who were unemployed. Our findings suggest that proficient braille skill may represent an employment advantage, particularly for people who are totally blind. This coincides with previous research that supported an association between adult employment and using braille as a reading medium in childhood (Ryles, 1996; Silverman & Bell, 2018). Our findings are broader in terms of the characterization of braille – we did not consider when braille was learned, but rather the current level of braille skill.

## Limitations

A limitation of this study is that our sample may not be representative of all workers and job seekers with visual impairments. Our sample includes representatives from most states in the U.S., but it consisted of volunteers and their interest in or skill level with AT may have prompted their participation. In particular, the braille proficiency reported by participants may not be representative of all people who are legally blind or totally blind. Because data were collected via survey, it is subject to inadvertent or intentional response errors. It is important to emphasize that our study can only address associations between variables; thus, it does not document that proficient braille skills predict being employed. Also, unemployment status was reported in the latter half of 2021, during the COVID-19 pandemic, so some participants may have been temporarily unemployed for that reason.

**Implications**

Although our sample is not representative of the entire population of people with visual impairments, it is encouraging that most young people in our study had proficient braille skills. With the proliferation of consistently advancing refreshable braille technology, braille is part of modern technology today that is readily available to people with visual impairments. In the recent past, school systems had to rely on embossed braille for students who used it – books, textbooks, worksheets, etc. – often resulting in significant cost and delay. Older adults who were braille readers rarely had access to information in this medium. The ease with which students and professionals can now access electronic material in braille has vastly improved their access to information. The increased availability of braille also suggests that engaging materials can be found for wide audiences which may increase interest in reading, particularly for boys and men learning braille.

Although braille access is now easy, it is not inexpensive. The high price of refreshable braille technology represents an impediment to its use for some, perhaps many, people (McDonnall, 2023; Martiniello et al., 2022). These devices should no longer be considered a luxury item but an essential tool for independent living and work. Reducing the cost of braille devices would make them available to a wider market. State and private agencies can consider loaner programs for adults to try various devices before purchasing them and prepare service providers to teach their use.

Our findings suggest that developing proficient braille skills at any time in life may be valuable, but most people in our sample who experienced blindness after age 4 were not proficient with braille. The opportunity to learn braille should be available to children, youth, and adults regardless of the age they experience visual impairment. It appears that resources for learning braille are too limited, even for people who experience blindness while in elementary or secondary school. Schools should reassure families that braille is a viable and up-to-date medium for early learning and provide adequate support for TVIs who teach braille literacy and technology. Resources are likely even more limited for those who experience visual impairment after secondary school. There may not be enough well-qualified professionals to teach braille, and individuals, particularly adults, may not receive encouragement – or even receive discouragement – for learning braille (Leland, 2023; Martiniello et al., 2022). Mentorship programs, such as Braille Zoomers in Canada (www.brailleliteracycanada.ca/en/programs/zoomers) and the Braillists Foundation in the U.K. (www.braillists.org/), have been successful in supporting adults who wish to learn braille by creating online resources, support listservs, online book clubs, and access to equipment. Similar programs in the U.S. could be established and partner with rehabilitation agencies and programs for older blind individuals.

## Conclusion

We found that people who (a) experienced blindness at a younger age, (b) were totally blind or had less functional vision, (c) were younger, (d) were female, (e) had higher self-reported AT skill, and (f) were employed were more likely to have proficient braille skills. There has been a great deal of interest in the field as to whether use of braille or having braille skills is associated with employment. Although our results are not definitive, they add some additional evidence to existing research that supports an association between braille and employment (Bell & Mino, 2013; Bell & Silverman, 2018; Ryles, 1996; Silverman & Bell, 2018). Our study did not include employment status as an outcome variable as other studies have done, but evaluated factors associated with braille proficiency and found that being employed was significantly associated with braille proficiency even when controlling for multiple other factors. The stronger relationship between braille proficiency and employment for people who were totally blind suggests that braille may be particularly valuable for this group in terms of employment success.

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**Table 1**

*Participant Demographics for Full Sample and Totally Blind Sample*

| Variable | Full Sample (*N*=449) | Totally Blind Sample (*N*=264) |
|---|---|---|
| Age – *M (SD)* | 44.61 (12.37) | 44.20 (12.46) |
| Sex | | |
| Female | 60.4 | 58.0 |
| Male | 39.6 | 42.1 |
| Race | | |
| Asian | 6.1 | 6.8 |
| Black/African American | 7.6 | 6.1 |
| White | 76.6 | 78.8 |
| Other race or mixed race | 9.8 | 8.3 |
| Hispanic/Latino ethnicity | | |
| Yes | 9.8 | 10.6 |
| No | 90.2 | 89.4 |
| Education level | | |
| < Bachelor's degree | 26.1 | 28.0 |
| Bachelor's degree | 36.5 | 38.6 |
| Graduate degree | 37.4 | 33.3 |
| Age of blindness onset | | |
| Pre-school | 63.9 | 68.9 |
| K-12 | 16.7 | 16.3 |
| Post school | 19.4 | 14.8 |
| Level of vision loss | | |
| Totally blind | 58.8 | 100.0 |
| Legally blind (minimal functional vision) | 24.3 | 0.0 |
| Legally blind (some functional vision) | 16.9 | 0.0 |
| Non-visual disability | | |
| Yes | 39.6 | 37.9 |
| No | 60.4 | 62.1 |
| Employment status | | |
| Employed | 78.4 | 80.7 |
| Unemployed | 21.6 | 19.3 |
| AT skill level – *M (SD)* | 7.90 (1.39) | 8.06 (1.28) |

Note. Numbers in the table are percentages with the exception of Age and AT skill level, which are means and standard deviations.

**Table 2**

*Results of Logistic Regression Models for Full and Totally Blind Samples*

| Variable | *B* | *SE* | $X^2$ | *p* | OR | 95% CI |
|---|---|---|---|---|---|---|
| **Full Sample** | | | | | | |
| Intercept | -1.41 | 1.02 | 1.91 | .17 | | |
| Age Category (ref.=21-30) | | | | | | |
| 31-40 | -0.82 | 0.47 | 3.07 | .08 | 0.44 | [0.18, 1.10] |
| 41-50 | -1.66 | 0.48 | 11.95 | <.001 | 0.19 | [0.07, 0.49] |
| 51-60 | -1.56 | 0.49 | 9.95 | .002 | 0.21 | [0.08, 0.55] |
| 61+ | -0.97 | 0.57 | 2.91 | .09 | 0.38 | [0.13, 1.16] |
| Age of blindness onset (ref.=Pre-school) | | | | | | |
| K-12 | -1.14 | 0.32 | 12.24 | <.001 | 0.32 | [0.17, 0.61] |
| Post-school | -2.81 | 0.41 | 47.00 | <.001 | 0.06 | [0.03, 0.14] |
| Sex - Female | 0.74 | 0.27 | 7.47 | .006 | 2.09 | [1.23, 3.55] |
| Level of vision loss (ref.=Totally blind) | | | | | | |
| Legally blind (minimal functional vision) | -1.06 | 0.30 | 12.81 | <.001 | 0.35 | [0.19, 0.62] |
| Legally blind (some functional vision) | -2.93 | 0.40 | 55.02 | <.001 | 0.05 | [0.03, 0.12] |
| Non-visual disability | 0.15 | 0.28 | 0.27 | .60 | 1.16 | [0.67, 1.99] |
| Average AT skill | 0.41 | 0.11 | 14.58 | <.001 | 1.51 | [1.22, 1.86] |
| Employed | 0.66 | 0.33 | 3.92 | .048 | 1.93 | [1.01, 3.72] |
| **Totally Blind Sample** | | | | | | |
| Intercept | -0.69 | 1.53 | 0.20 | .65 | | |
| Age Category (ref.=21-30) | | | | | | |
| 31-40 | -0.93 | 0.76 | 1.51 | 0.22 | 0.39 | [0.09, 1.74] |
| 41-50 | -2.15 | 0.76 | 7.97 | .005 | 0.12 | [0.03, 0.52] |
| 51-60 | -1.91 | 0.80 | 5.68 | .02 | 0.15 | [0.03, 0.71] |
| 61+ | -0.98 | 0.90 | 1.19 | .27 | 0.38 | [0.07, 2.18] |
| Age of blindness onset (ref.=Pre-school) | | | | | | |
| K-12 | -1.97 | 0.44 | 19.69 | <.001 | 0.14 | [0.06, 0.33] |
| Post-school | -3.61 | 0.60 | 36.70 | <.001 | 0.03 | [0.01, 0.09] |
| Sex - Female | 0.99 | 0.40 | 6.10 | .02 | 2.68 | [1.23, 5.87] |
| Non-visual disability | -0.30 | 0.42 | 0.51 | .48 | 0.74 | [0.33, 1.69] |
| Average AT skill | 0.33 | 0.15 | 4.68 | .03 | 1.39 | [1.03, 1.88] |
| Employed | 1.37 | 0.47 | 8.36 | .004 | 3.93 | [1.55, 9.95] |

Note. Full sample N=449. Totally blind sample N=264.

**Table 3**

*Braille Skills for Full and Totally Blind Samples by Age Category*

| | Overall (*N*=449) | | Totally Blind (*N*=264) | |
|---|---|---|---|---|
| Age Category | Proficient Braille Skills | Less Than Proficient Braille Skills | Proficient Braille Skills | Less Than Proficient Braille Skills |
| 21-30 | 82.3 | 17.7 | 92.7 | 7.3 |
| 31-40 | 67.2 | 32.8 | 79.7 | 20.3 |
| 41-50 | 47.2 | 52.8 | 61.9 | 38.1 |
| 51-60 | 39.2 | 60.8 | 55.6 | 44.4 |
| 61+ | 59.6 | 40.4 | 75.0 | 25.0 |