Graduate and Professional Education for Students with Disabilities: Examining Access to STEM, Legal, and Health Fields in the United States

Submitted Manuscript – Under Review
International Journal of Disability, Development and Education

Ryan S. Wells & Suzan Kommers
University of Massachusetts Amherst

Graduate and Professional Education for Students with Disabilities: Examining Access to STEM, Legal, and Health Fields in the United States

People with disabilities have been historically marginalized and consistently underrepresented at all levels of education (Cocks, Thoresen, & Lee, 2015; Shandra & Hogan, 2009). In the U.S., the Individuals with Disabilities Act (IDEA) in the 1970s changed the landscape for primary and secondary education, increasing access for many students. In 1990, the Americans with Disabilities Act (ADA) was passed, and since that time students with disabilities have entered postsecondary institutions at greater rates (United States Government Accountability Office, 2009). While in 2001, only about 5% of college students identified as having a disability (Snyder & Hoffman, 2001), more recent estimates put the proportion of undergraduate students with disabilities at approximately 11% (Snyder, de Bray, & Dillow, 2017; Snyder & Dillow, 2013). Despite this growth, only 5% of post-baccalaureate students report having a disability relative to undergraduate students (Snyder et al., 2017). This raises the question of how accessible graduate and professional education is for students with disabilities.

Undergraduate degrees have become the de facto requirement for good incomes and social mobility in the U.S. and graduate and professional degrees have become a more distinguishing factor of hiring for desirable jobs. Therefore, it is essential to examine the ways students with disabilities may not have equitable opportunities to access post-baccalaureate levels of education, disadvantaging them in full participation in the labor market and upward social mobility. While research on college students with disabilities in the U.S. is sparse at all levels (Kimball, Wells, Lauterbach, Manly, & Ostiguy, 2016; Peña, 2014), this is especially true for graduate and professional education. Education researchers know relatively little about the pipeline into and through post-baccalaureate education for students with disabilities.

This study examines the enrollment transition from undergraduate to graduate and professional education and how specific factors at the culmination of a baccalaureate education may play a role in disproportionate access to graduate and professional education for students with disabilities. For example, people with disabilities experience additional costs of living (Mitra, Palmer, Kim, Mont, & Groce, 2017), possibly creating a greater sensitivity to the affordability of graduate education among this population. Moreover, there is evidence that students with disabilities view themselves more negatively (Wright & Stimmel, 1984), and may feel less supported during undergraduate education (Hedrick, Dizen, Collins, Evans, & Grayson, 2010; Moriarty, 2007) or even discouraged from pursuing certain fields of study such as STEM (Nepomuceno et al., 2016), which could lower their expectations for further education (Shandra & Hogan, 2009). Therefore, in addition to examining their representation overall in this transition, we investigate whether in the U.S., there are predictors of graduate and professional education enrollment that operate differently for students with disabilities than for other students. Moreover, we investigate the enrollment transition from undergraduate to graduate and professional education in three post-baccalaureate fields of study: a) science, technology, engineering, and mathematics (STEM), b) legal education, and c) health fields.

We specifically address the following research questions:

1. To what extent is there is a disparity in enrollment in graduate and professional education for students with disabilities relative to other students?
2. To what extent are there disparities in enrollment in STEM, legal, and health fields specifically?
3. What factors are related to enrollment in graduate and professional education differently for students with disabilities relative to other students?

Addressing these questions will first and foremost address a pressing equity concern. In the U.S., students with disabilities are supposed to be legally guaranteed a level playing field in education, yet limited opportunities and systemic barriers continue to diminish their educational progress. As STEM, legal, and health-related occupations provide good incomes, secure employment, and the promise of economic mobility, unequal access to these types of professions is a particular equity concern.

Diversity of experience also has benefits related to innovation and to serving a diverse population well. Doctors with disabilities, for example, are valuable to have not only as physicians for other people with disabilities, but for their diverse viewpoints and experiences with healthcare systems (Khullar, 2017). Graduate and professional schools often recognize the strength of diversity in their students. Disability, however, is a form of diversity that is often not fully considered (Kim & Aquino, 2017), which limits proactive steps graduate schools may take to enroll this group of potential students. By better understanding the graduate school[1] trajectories of students with disabilities, institutions can make changes to policy and practice to benefit this historically underserved group.

Relevant Prior Research

Even though there is relatively little research about graduate education and disability in the U.S., existing literature indicates students with disabilities may not have equitable access or experiences. While this is true broadly, there is also specific evidence of this within each of the fields targeted in this study.

STEM education

[1] We use "graduate school" as a phrase to be synonymous with "graduate and professional education."

The STEM workforce in the U.S. is experiencing a shortage of qualified labor, and organizations such as the National Science Foundation have encouraged broadened participation of people with disabilities in order to partially remedy this situation. Despite this encouragement, only 4.8% of students enrolled in graduate science and engineering fields in the U.S. identified as having a disability (National Science Foundation, 2017). While this is a clear indicator of underrepresentation, there are several factors which may contribute to this phenomenon, which begins with students' experiences in undergraduate education.

STEM undergraduates face pathways that may be more restrictive than other fields and may be seen as a poor fit or unwelcoming to students with disabilities (Alston & Hampton, 2000; Lee, 2011). This may be due to a lack of inclusive pedagogies, inadequate counseling, lack of role models, or inadequate high school preparation (Dunn, Rabren, Taylor, & Dotson, 2012; Moriarty, 2007; Shifrer, Callahan, & Muller, 2013). Even though undergraduate STEM students with disabilities may report similar or better relationships with faculty, they often still perceive their campus environments to be less supportive overall, relative to the general population (Hedrick et al., 2010). In the U.S., there is a legal obligation to provide accommodations in the lab as well as the classroom, though these are often inadequate based on limited technology or on a lack of experience of assigned personnel (Minkara, Weaver, Gorske, Bowers, & Merz, 2015; Nepomuceno et al., 2016). Overall, the undergraduate STEM experiences for students with disabilities may discourage students from pursuing STEM in graduate education, or from continuing their education altogether.

Legal Education

Lawyers need to be capable of responding appropriately to the diverse nature of the communities within which they will work (Israel et al., 2017). People with disabilities can bring

precisely the range of diverse life experiences to the profession that would help in this regard and possess unique skills given their experiences in society (Flockerzie et al., 2017; Jolly-Ryan, 2005). Therefore, people with disabilities should be recruited rather than to avoided. Despite the recognition of the need for diversity, access to law education for students with disabilities is still a largely overlooked issue.

The extant research on students with disabilities within law education most often examines appropriate accommodations (or the lack thereof) once in law school (Adams, 1998; Eichhorn, 1997; Engel & Konefsky, 1990; Runyan & Smith, 1991). Even when accommodations are provided, there are legitimate concerns about the quality of these accommodations, how well they service students with a wide range of disabilities, and how well law schools prepare students for the transition to work (Anderson & Wylie, 2008). Despite this attention to issues of accommodation, there is lack of research concerning initial enrollment in legal education and the underlying causes of underrepresentation of students with disabilities.

An exception to the shortage of research is in the area of high-stakes testing, which for legal education in the U.S. is the LSAT exam. There are claims that the reluctance of postsecondary institutions to provide adequate accommodations is in not in alignment with the ADA. Moreover, there have been concerns about the practice of the Law School Admission Council (LSAC) overriding doctor's determinations of needs for accommodation, even for students who have received accommodations throughout their prior schooling (Dunn, 2013). These findings on LSAT accommodations are examples of a practices that disproportionately affect the access of students with disabilities to law school. Our study does not examine testing but extends this literature by looking at additional factors that may impact enrollment in legal education disproportionately for students with disabilities.

Health-related Education

As with STEM and legal fields, there are a number of reasons why people with disabilities are needed in the health professions. Students with disabilities have diverse experiences with health care themselves, and may have knowledge, skills, empathy, and/or communication skills that are beneficial to patients and the system overall (Khullar, 2017; Tso, 2017). Despite this, there is almost no research examining disability in the health fields broadly, whereas there is some limited discussion of these issues in medical school specifically.

Estimates indicate that only about one to three percent of students in medical school have disabilities (DeLisa & Thomas, 2005; Meeks & Herzer, 2016). A small body of literature examines the factors leading to this underrepresentation. Part of this underrepresentation may have to do with the fact that many medical schools do not always adequately follow the Americans with Disabilities Act in providing reasonable accommodations for students (Zazove et al., 2016). However, the factor most examined for the transition to medical school deals with Technical Standards. These are a set of abilities and characteristics that medical schools deem necessary for students to be admitted, promoted, or graduated. Some see these standards as an outdated concept that hinders diversity (Schwartz, 2009). The technical standards often limit the use of appropriate accommodations to meet the standards and are seen as overly restrictive, limiting the access of those with vision, hearing, mobility, and neurological impairments (Argenyi, 2016; Bagenstos, 2016; McKee, 2016; Schwartz, 2009; Zazove et al., 2016). While these technical standards are an obvious impediment to access in some areas of the medical professions, there is still a need to see if disparities in enrollment in the health-related fields more broadly may be grounded in earlier factors at the culmination of a bachelor's degree.

Data & Variables

This study used data from the Baccalaureate and Beyond Longitudinal Study (B&B:08/12). B&B consists of students who completed their bachelor's degree in the 2007-08 academic year in the U.S. and examined students' education and work experiences over the next four years. Students were sampled from the National Postsecondary Student Aid Study (NPSAS:08), resulting in the B&B sample of 17,170 students. Data was collected from these students one year (2009) and four years (2012) after graduation (Cominole, Shepherd, Siegel, & Socha, 2015). The B&B dataset is the best source to address our research questions for two main reasons. First, these are the most recent nationally generalizable data in the U.S. to examine the post-baccalaureate trajectories for college graduates, which also include information about STEM, legal, and health fields specifically. Second, because B&B is a longitudinal extension of the NPSAS data collection, there is extensive information about the financial situation of students.

Sample

As this study focuses on students who completed a bachelor's degree, the small number of students who graduated from a two-year, or less than two-year institution were excluded from the sample to ensure consistency of definition. Moreover, as we are interested in understanding how an inequitable educational system may result in disparate outcomes for those with disabilities relative to others, students for which disability status was unknown were excluded from the sample, resulting in a sample of 15,700 college graduates.[2] Within this analytic sample, there were 1,260 students with disabilities.

Variables

[2] This and all other sample size values are rounded to the nearest 10 in accordance with restricted data license requirements.

For the dependent variable, we used students' post-baccalaureate enrollment in a Master's degree, post-Master's certificate, or a doctoral degree to indicate enrollment in graduate or professional education as of 2012. Our primary independent variable of interest—disability status—was based on a variable indicating whether, as of 2008, the respondent reported a long-lasting condition such as blindness, deafness, or a severe vision or hearing impairment; a long-lasting condition that substantially limited one or more basic physical activities such as walking, climbing stairs, reaching, lifting, or carrying; or another physical, mental, emotional, or learning condition that had lasted 6 months or more.

Disability information gathered through surveys is imperfect, and reporting can vary based on how questions are asked and other survey design techniques (Lauer, Henly, & Coleman, 2018). Additionally, stigma and confusion about disability status can limit disclosure on surveys (Lindsay, Cagliostro, & Carafa, 2018). Despite these limitations, and particularly given the limited research on students with disabilities to date, we proceed to use these data to indicate disability status. Nonetheless, our findings should be interpreted with this caveat in mind.

The additional variables in this study, for which we explore their relationship to graduate enrollment for students with and without disabilities, included students' undergraduate college experiences and demographic information. College experience covariates include a range of factors that may be directly related to graduate school enrollment but are also salient because they may differ in the way they predict graduate enrollment depending on disability status. Graduate school expectations were measured with an indicator of the highest level of education that the respondent expected to complete, as of 2008, their final year in college. The cumulative loan amount borrowed for undergraduate education through 2008 was also included, as was an

indicator for financial dependence. Additional covariates to predict graduate enrollment include undergraduate GPA, STEM major, attendance at a selective institution, whether students had dependents, whether they were full-time students, and whether they held a job while enrolled.

Demographic covariates included gender, underrepresented racial minority status (Black/African American, Hispanic/Latino, American Indian, Alaska Native, Native Hawaiian or other Pacific Islander, and multi-racial), age, first generation status (indicating none of the students' parents completed a college degree), immigrant status (those who immigrated to the U.S. or for whom one or both parents were foreign-born), and income. Disability intersects in important ways with these other demographic characteristics (Evans, Broido, Brown, & Wilke, 2017; Kim & Aquino, 2017) and therefore they are important to include as factors that may predict graduate school enrollment differently for students with disabilities relative to others.

Missing data

The percentage of missing values ranged from nearly zero for some demographic variables to as high as 8 % for the variable indicating if students were enrolled in a STEM major. Only 12,070 of the 16,110 students in the sample would have been available for complete cases analysis. We address this issue with multiple imputation, under the assumption of missingness at random (Schafer & Graham, 2002). We include all variables in the imputation model, including the primary sampling unit, strata, and weights given the complex-survey design used to collect the data (Heeringa, West, & Berglund, 2010). Stata 13's 'mi impute chained' command generated 50 imputed datasets. Analyses run on each dataset were pooled according to Rubin's (1987) rules. Imputed values compare reasonably to observed values and results using listwise deletion are similar to MI, so imputed results are presented.

Design and Methods

Our analyses consisted of four main steps. First, we utilized descriptive statistics to understand our sample. We further examined mean values for all variables for students with and without disabilities and tested whether group mean differences were statistically significant by using t-tests for the continuous, and Chi-Square tests for the dichotomous variables.

Second, we investigated the relationship between disability status and graduate and professional enrollment via logistic regression. This is the appropriate technique given the binary nature of our dependent variables: a) enrollment in any graduate or professional education, b) enrollment in STEM, c) enrollment in law school, and d) enrollment in a health fields. We included variables for disability status and the sets of covariates described above, represented in the following equation:

$$y = \beta 0 + \beta 1 * \textit{Disability Status} + \beta 2 * \textit{Demographics} + \beta 3 * \textit{College Experiences} + \textit{Error}$$

We present regression results as average marginal effects (AMEs) because these are more intuitive and interpretable than other common methods of presentation, such as odds ratios.

As the third part of our analytic strategy, we compared students with disabilities to other students to understand if any of the covariates had similar or different relationships with graduate school enrollment for these groups. For this purpose, we interacted each independent variable with students' disability status. From this regression model, the average discrete change was calculated for each key variable across groups, and statistically compared the resulting probabilities (Long & Mustillo, 2018). The average discrete change indicates the change in probability of enrolling in graduate school, when increasing the independent variable with a discrete amount. For the categorical variables, the discrete change was set to an increase of one

while for the continuous variables we used an increase of a standard deviation. We compared the average discrete changes for the two groups to see if they differed significantly. Those variables that differed in their relationship across groups indicated that these variables impacted students with disabilities differently than other students and thereby were a possible sources of disparity in enrollment for students with disabilities. All analyses accounted for B&B's complex survey design and appropriate weights using Stata's *svy* command (Heeringa et al., 2010).

Results

Descriptive results and mean comparisons

The descriptive results and mean comparisons in Table 1 provide an understanding of our sample and begin to address our first two research questions. First and foremost, 8% of college graduates identified as has having a disability. This is lower than the 11-13% of undergraduate students who report disabilities (Snyder et al., 2017; Snyder & Dillow, 2013). However, it is higher than the estimated 5% of active graduate students with disabilities as reported in an earlier study (Snyder et al., 2017). This indicates a steady erosion of representation in the educational system as the level of education increases. However, the comparison of means on the dependent variables—graduate school enrollment in general and in the STEM legal and health-related fields—do not show statistical differences. In other words, counter to our initial expectations, college graduates with disabilities were not statistically significantly different in their enrollment rates in graduate education broadly, nor in their enrollment in STEM, legal, and health fields specifically.

Despite this similarity, there are key differences between the groups. College graduates with disabilities were less likely to graduate with a STEM major (9% vs. 14%) and had slightly lower GPAs than their peers (3.12 vs 3.27). These two factors are key in being able to access

graduate school, specifically in STEM and health-related fields, and may represent areas of inequity despite similar overall enrollment rates. College graduates with disabilities were also more likely to be older, financially independent, and to have been part time (rather than full time), while being slightly less likely to be first-generation or to have had a job while enrolled in their undergraduate education. Finally, despite what was presumed from reviewing the literature, college graduates with disabilities did not have lower expectations nor higher loan amounts, suggesting that these are not, on average, sources of disparity for this group.

Regression results

Average marginal effects on attending graduate or professional education are presented in Table 2.[3] Non-significant effects of disability support the findings in Table 1—namely, that disability status is not a predictor of enrollment in graduate school (nor in STEM, legal or health fields specifically) among bachelor's degree holders.

Other results in Table 2 indicate what predicts graduate school enrollment for all students, on average. We particularly take note of factors which predict enrollment that were also areas where students with and without disabilities differed, as shown in Table 1. In other words, these are possible indirect ways that students with disabilities are more subtly disadvantaged in the graduate school transition. When looking at overall graduate enrollment in Table 2, predictive factors include age, GPA, and STEM major. Older graduates are less likely to enroll in graduate school, and students with disabilities are older on average. Moreover as noted above, students with disabilities have lower average GPAs and were less likely to be STEM majors, but both of these factors are positive predictors of graduate enrollment. STEM major is also predictive of enrollment in STEM and health fields specifically, and GPA is additionally

[3] Full regression results presented as odds ratios are available upon request.

predictive of enrollment in a health-related field. These results indicate that some of the factors that are significant predictors of graduate school enrollment are also characteristics for which students with disabilities differ from other students.

Comparison of predictors of enrollment by disability

Above, we noted factors that were predictive of enrollment, but for which students with disabilities were different from other students. Table 3 instead shows how the relationship itself between an independent variable and the outcome may differ between students with and without disabilities.[4] In a technical regression sense, we previously showed where the groups may differ in their intercepts, and we now examine where they may differ in their slopes.

When considering the outcome of enrollment in graduate school overall, there were no variables that were differentially predictive for the two groups. When examining STEM, legal, and health enrollment, there were a few differences worth discussing, though all of them are at a significance level that should be treated as suggestive rather than conclusive, given our large sample size.

Having a higher family income (or personal income for those who are financial independent) relates to a higher probability of enrollment in STEM and legal fields for students with disabilities, but not for other students. However, there is also a difference in the way income predicts enrollment in health fields, but in the opposite direction. For students who entered a health-related graduate program, a higher family income was related to a lower probability of enrollment. We do not have an explanation for this discrepancy, but it may be studied further in future research. Higher educational expectations are predictive of enrollment in STEM and legal fields for students with disabilities, but not for other students. This may suggest that while

[4] Only variables that showed differences between groups are presented in Table 3 for space reasons—full results are available upon request.

expectation levels are not different on average, positive expectation may be more important in the transition to graduate school for those with disabilities. Having a job while an undergraduate and attending a selective institutions also reveal some small differences in their predictive power between these groups but are far from definitive and do not lead to definitive conclusions.

Discussion and Implications

Our findings confirm increasingly prevalent underrepresentation for students with disabilities in the U.S. education system. In undergraduate education, around 11% of the student population indicates having a disability (Snyder et al., 2017; Snyder & Dillow, 2013). Our findings show that this drops to 8% among those who successfully attain a bachelor's degree. Among students who actually go on to enroll in graduate school, about 7% report having a disability, according to the data used in our study. This then drops further to 5% of active graduate students, according to recent national estimates (Snyder et al., 2017).

While a leaky pipeline in education is apparent, our results suggest that the transition from attaining a bachelor's degree to enrollment in graduate or professional education within 4 years, is not a place where the leak is most significant. In other words, for students with disabilities who have been able to successfully complete primary and secondary special education, enroll in college, and navigate the complex, expensive, and burdensome system of higher education through to completion of a bachelor's degree, short-term enrollment in graduate school is likely not the most salient disadvantage relative to other students.

Additionally, for this particular group of students, the factors that are associated with a lower probability of enrollment are not disability status itself, but other indirect factors that are more prevalent for students with disabilities. Having completed a STEM degree is a necessary or at least highly desirable characteristic for STEM graduate admission and also for many health-

related fields. However, students with disabilities are less likely to have majored in STEM. This may be due to an unwelcoming environment or lack of inclusive practices (Alston & Hampton, 2000; Dunn et al., 2012; Lee, 2011; Moriarty, 2007; Shifrer et al., 2013).

When predictors of graduate enrollment were examined for differing influences between students with and without disabilities, conclusive findings were not apparent, but a few suggestive findings are worthy of future research. Given that income may operate differently as a predictor for students with disabilities than for other students, more attention to costs and financial differences are warranted for this population. This is in line with earlier studies indicating that people with disabilities experience higher average costs of living (Mitra et al., 2017). Differences in the predictive nature of educational expectations are also worthy of further inquiry. Perhaps students with disabilities need to have higher expectations, or feel the need for more degrees, in order to navigate a discriminatory educational and employment system.

The implications of this research for educational institutions and practitioners, are in two main areas: early pipeline barriers and non-traditional pathways. While the direct, immediate transition to graduate school for those to attain a bachelor's degree did not differ by disability status, differences that did emerge show an inequitable pipeline leading to the bachelor's degree. Educational systems that do not serve students with disabilities well and result in lower academic achievement early in the pipeline, create challenges for students later in attaining a bachelor's degree, and also for transitioning to graduate school.

Students with disabilities in this study had higher average ages, were more likely to be financially independent, and were more often part-time rather than full-time students, demonstrating that the "traditional" way we often conceptualize college students is less likely to be appropriate for this population. These characteristics overlap with common conceptualizations

of "non-traditional" students in U.S. higher education (Bean & Metzner, 1985). Therefore, if policies and practices related to the graduate school transition were adopted to better serve the 74% of students who have at least one nontraditional student characteristic (U.S. Department of Education, 2015), they would also better serve many students with disabilities.

In addition to the research suggested above, scholars need access to more and better data concerning students with disabilities, from primary education through the highest levels of graduate education, and beyond into the labor market. These data collections should utilize oversampling, in order to study low-incidence disabilities and to allow studies of specific disability types. Other predictors of graduate and professional education participation are also needed beyond those that were available in the dataset for this study, such as testing accommodations and specific aspects of the admissions processes. Finally, qualitative research will be needed to make sense of the suggestive findings revealed in this study, but also to surface additional factors that may be leading to the leaky educational pipeline for students with disabilities as the progress toward the possibility of graduate or professional education.

References

Adams, S. J. (1998). Leveling the floor: Classroom accommodations for law students with disabilities. *Journal of Legal Education*, *48*(2), 273–296.

Alston, R. J., & Hampton, J. L. (2000). Science and engineering as viable career choices for students with disabilities: A survey of parents and teachers. *Rehabilitation Counseling Bulletin*, *43*(3), 158–164. https://doi.org/10.1177/003435520004300306

Anderson, A., & Wylie, N. (2008). Beyond the ADA: How clinics can assist law students with "non-visible" disabilities to bridge the accommodations gap between classroom and practice. *Clinical Law Review*, *15*(1), 1–53.

Argenyi, M. (2016). Technical standards and deaf and hard of hearing medical school applicants and students: Interrogating sensory capacity and practice capacity. *The AMA Journal of Ethic, 18*(10), 1050–1059. https://doi.org/10.1001/journalofethics.2016.18.10.sect1-1610

Bagenstos, S., R. (2016). Technical standards and lawsuits involving accommodations for health professions students. *The AMA Journal of Ethic, 18*(10), 1010–1016. https://doi.org/10.1001/journalofethics.2016.18.10.hlaw1-1610

Bean, J. P., & Metzner, B. S. (1985). A conceptual model of nontraditional undergraduate student attrition. *Review of Educational Research*, *55*(4), 485–540. https://doi.org/10.3102/00346543055004485

Cocks, E., Thoresen, S. H., & Lee, E. A. L. (2015). Pathways to employment and quality of life for apprenticeship and traineeship graduates with disabilities. *International Journal of Disability, Development and Education*, *62*(4), 422–437. https://doi.org/10.1080/1034912X.2015.1025714

Cominole, M., Shepherd, B., Siegel, P., & Socha, T. (2015). *2008/12 Baccalaureate and Beyond Longitudinal Study (B&B:08/12). Data File Documentation. NCES 2015-141*. Retrieved from https://eric-ed-gov.silk.library.umass.edu/?id=ED560733

DeLisa, J. A., & Thomas, P. (2005). Physicians with disabilities and the physician workforce: A need to reassess our policies. *American Journal of Physical Medicine & Rehabilitation*, *84*(1), 5–11. https://doi.org/10.1097/01.PHM.0000153323.28396.DE

Dunn, C., Rabren, K. S., Taylor, S. L., & Dotson, C. K. (2012). Assisting students with high-incidence disabilities to pursue careers in science, technology, engineering, and mathematics. *Intervention in School and Clinic*, *48*(1), 47–54. https://doi.org/10.1177/1053451212443151

Dunn, E. (2013). An opportunity to be heard: A call for impartiality in the law school admission council's disability accommodation review process. *Boston College Journal of Law and Social Justice, 33,* 183–216.

Eichhorn, L. A. (1997). *Reasonable accommodations and awkward compromises: Issues concerning learning disabled students and professional schools in the law school context* (SSRN Scholarly Paper No. ID 1296104). Retrieved from Social Science Research Network website: https://papers.ssrn.com/abstract=1296104

Engel, D. M., & Konefsky, A. S. (1990). Law students with disabilities: Removing barriers in the law school community. *Buffalo Law Review, 38,* 551–590.

Evans, N. J., Broido, E. M., Brown, K. R., & Wilke, A. (2017). *Disability in higher education: A social justice approach*. San Francisco, CA: Jossey-Bass.

Flockerzie, R., Allman, M. R., Zappala, M. F., Goldstein, D., Shin, W., & Suggs, N. (2017). Breaking down barriers: session II: Making the bar more inclusive. *Widener Law Review, 23*, 187–210.

Hedrick, B., Dizen, M., Collins, K., Evans, J., & Grayson, T. (2010). Perceptions of college students with and without disabilities and effects of STEM and non-STEM enrollment on student engagement and institutional involvement. *Journal of Postsecondary Education and Disability, 23*(2), 129–136.

Heeringa, S. G., West, B. T., & Berglund, P. A. (2010). *Applied survey data analysis*. Boca Raton, FL: Chapman & Hall.

Israel, M., Skead, N., Heath, M., Hewitt, A., Galloway, K., & Steel, A. (2017). Fostering "quiet inclusion": Interaction and diversity in the Australian law classroom. *Journal of Legal Education*, *66*(2), 332.

Jolly-Ryan, J. (2005). *Disabilities to exceptional abilities: Law students with disabilities, nontraditional learners, and the law teacher as a learner*. *6*, 40.

Khullar, D. (2017, July 11). Doctors with disabilities: Why they're important. *The New York Times*. Retrieved from https://www.nytimes.com/2017/07/11/upshot/doctors-with-disabilities-why-theyre-important.html

Kim, E., & Aquino, K. C. (2017). *Disability as diversity in higher education: Policies and practices to enhance student success*. New York, NY: Routledge.

Kimball, E., Wells, R. S., Lauterbach, A., Manly, C. A., & Ostiguy, B. (2016). Students with disabilities in higher education: A review of the literature and an agenda for future research. In M. Paulsen (Ed.), *Higher Education: Handbook of Theory and Research* (Vol. 31, pp. 91–156). The Netherlands: Springer.

Lauer, E. A., Henly, M., & Coleman, R. (2018). Comparing estimates of disability prevalence using federal and international disability measures in national surveillance. *Disability and Health Journal*, 1–8. https://doi.org/10.1016/j.dhjo.2018.08.008

Lee, A. (2011). A comparison of postsecondary science, technology, engineering, and mathematics (STEM) enrollment for students with and without disabilities. *Career Development for Exceptional Individuals*, *34*(2), 72–82.

Lindsay, S., Cagliostro, E., & Carafa, G. (2018). A systematic review of barriers and facilitators of disability disclosure and accommodations for youth in post-secondary education. *International Journal of Disability, Development and Education*, *65*(5), 526–556. https://doi.org/10.1080/1034912X.2018.1430352

Long, J. S., & Mustillo, S. A. (2018). Using predictions and marginal effects to compare groups in regression models for binary outcomes. *Sociological Methods and Research*. doi: https://doi.org/10.1177/0049124118799374

McKee, M. (2016). Medical schools' willingness to accommodate medical students with sensory and physical disabilities: Ethical foundations of a functional challenge to "organic" technical standards. *The AMA Journal of Ethic*, *18*(10), 993–1002. https://doi.org/10.1001/journalofethics.2016.18.10.medu1-1610

Meeks, L. M., & Herzer, K. R. (2016). Prevalence of self-disclosed disability among medical students in us allopathic medical schools. *JAMA*, *316*(21), 2271–2272. https://doi.org/10.1001/jama.2016.10544

Minkara, M. S., Weaver, M. N., Gorske, J., Bowers, C. R., & Merz, K. M. (2015). Implementation of protocols to enable doctoral training in physical and computational chemistry of a blind graduate student. *Journal of Chemical Education*, *92*(8), 1280–1283. https://doi.org/10.1021/ed5009552

Mitra, S., Palmer, M., Kim, H., Mont, D., & Groce, N. (2017). Extra costs of living with a disability: A review and agenda for research. *Disability and Health Journal*, *10*(4), 475–484.

Moriarty, M. A. (2007). Inclusive pedagogy: Teaching methodologies to reach diverse learners in science instruction. *Equity & Excellence in Education*, *40*(3), 252–265. https://doi.org/10.1080/10665680701434353

National Science Foundation. (2017). *Women, minorities, and persons with disabilities in science and engineering: 2017* (Special Report No. 17–310). Retrieved from National

Science Foundation, National Center for Science and Engineering website: http://www.nsf.gov/statistics/wmpd

Nepomuceno, G. M., Decker, D. M., Shaw, J. D., Boyes, L., Tantillo, D. J., & Wedler, H. B. (2016). The value of safety and practicality: Recommendations for training disabled students in the sciences with a focus on blind and visually impaired students in chemistry laboratories. *Journal of Chemical Health and Safety*, *23*(1), 5–11. https://doi.org/10.1016/j.jchas.2015.02.003

Peña, E. V. (2014). Marginalization of published scholarship on students with disabilities in higher education journals. *Journal of College Student Development*, *55*(1), 30–40. https://doi.org/10.1353/csd.2014.0006

Runyan, M. K., & Smith, J. F. (1991). Identifying and accommodating learning disabled law school students. *Journal of Legal Education*, *41*(3), 317–349.

Schafer, J. L., & Graham, J. W. (2002). Missing data: Our view of the state of the art. *Psychological Methods*, *7*(2), 147–177. https://doi.org/10.1037//1082-989X.7.2.147

Schwartz, M. (2009). Technical standards for admission to medical school: Deaf candidates don't get no respect. *Buffalo Public Interest Law Journal*, *28*, 31–70.

Shandra, C. L., & Hogan, D. P. (2009). The educational attainment process among adolescents with disabilities and children of parents with disabilities. *International Journal of Disability, Development and Education*, *56*(4), 363–379. https://doi.org/10.1080/10349120903306616

Shifrer, D., Callahan, R. M., & Muller, C. (2013). Equity or marginalization? The high school course-taking of students labeled with a learning disability. *American Educational Research Journal*, 0002831213479439. https://doi.org/10.3102/0002831213479439

Snyder, T. D., & Dillow, S. A. (2013). *Digest of education statistics, 2012* (No. NCES 2014015). Washington, DC: National Center for Education Statistics.

Snyder, T. D., & Hoffman, C. M. (2001). *Digest of education statistics, 2000* (No. NCES 2001-034). Washington, DC: National Center for Education Statistics, Office of Educational Research and Improvement, U.S. Department of Education.

Snyder, T. D., de Bray, C., & Dillow, S. A. (2017). *Digest of education statistics, 2016* (No. NCES 2017-094). Washington, DC: National Center for Education Statistics, Institute of Education Sciences, U.S. Department of Education.

Tso, S. (2017). Disabled graduate-entry medical student experience. *The Clinical Teacher*, *15*(2), 109–113. https://doi.org/10.1111/tct.12653

U.S. Department of Education. (2015). *Demographic and enrollment characteristics of nontraditional undergraduates: 2011-12 (We Tables No. NCES2015- 025) (pp. 1–76).* Retrieved from https://nces.ed.gov/pubs2015/2015025.pdf

United States Government Accountability Office. (2009). *Higher education and disability: Education needs a coordinated approach to improve its assistance to schools in supporting students*. Retrieved from http://www.gao.gov/products/GAO-10-33

Zazove, P., Case, B., Moreland, C., Plegue, M. A., Hoekstra, A., Ouellette, A., … Fetters, M. D. (2016). U.S. medical schools' compliance with the Americans with disabilities act: Findings from a national study. *Journal of the Association of American Medical Colleges*, *91*(7), 979–986. https://doi.org/10.1097/ACM.0000000000001087

Tables and Figures

Table 1. Means and Standard Errors of the Estimates, for all variables

Variable	All Students (N=15,770) Mean	SE	Students with Disabilities (N=1,260) Mean	SE	Students without disabilities (N=14,500) Mean	SE	Difference
Disability	0.08	0.00	--	--	--	--	
Female	0.58	0.01	0.58	0.02	0.57	0.01	-0.01
Underrepresented minority	0.21	0.01	0.22	0.02	0.21	0.01	-0.01
Age (standardized)	0.05	0.02	0.22	0.07	0.03	0.02	-0.19**
Income (standardized)	0.22	0.02	0.16	0.05	0.22	0.02	0.06
First-generation	0.45	0.01	0.40	0.02	0.45	0.01	0.05+
Immigrant status	0.22	0.01	0.25	0.02	0.22	0.01	-0.02
Financially dependent	0.62	0.01	0.53	0.03	0.63	0.01	0.10**
Has dependents	0.14	0.01	0.15	0.02	0.14	0.01	-0.01
GPA (on a scale of 1-4)	3.26	0.01	3.21	0.03	3.27	0.01	0.06+
STEM major	0.14	0.01	0.09	0.01	0.14	0.01	0.05*
Selective institution	0.30	0.02	0.31	0.03	0.30	0.02	-0.01
Fulltime	0.61	0.01	0.53	0.03	0.61	0.01	0.08*
Job while enrolled	0.75	0.01	0.70	0.02	0.75	0.01	0.05+
Expected graduate degree	0.73	0.01	0.73	0.02	0.73	0.01	0.00
Amount borrowed (standardized)	-0.10	0.02	-0.01	0.06	-0.11	0.02	-0.10
Enrolled in graduate education	0.35	0.01	0.32	0.02	0.35	0.01	0.03
STEM	0.03	0.00	0.02	0.01	0.03	0.00	0.01
Legal	0.03	0.00	0.04	0.01	0.03	0.00	-0.01
Health	0.06	0.00	0.06	0.00	0.05	0.01	0.00

Note. All reported sample sizes are rounded to the nearest 10 in accordance with NCES restricted data license.
Significant differences from between students with and without disabilities indicated.
** $p<0.001$, * $p<0.01$, + $p<0.05$ (two-tailed tests)

Table 2. Average marginal effects on attending graduate or professional school

Variables	Enrollment	STEM	Legal	Health
Disability	0.001	-0.006	0.006	0.056
	(0.024)	(0.018)	(0.021)	(0.038)
Expects master	0.272**	0.008	0.000	-0.032
	(0.012)	(0.019)	(0.022)	(0.031)
Amount borrowed	0.005	0.003	-0.003	-0.002
	(0.006)	(0.004)	(0.006)	(0.009)
Female	0.019	-0.052**	-0.055**	0.132**
	(0.013)	(0.011)	(0.013)	(0.015)
Underrep. minority	0.067**	-0.033*	-0.002	-0.015
	(0.015)	(0.012)	(0.016)	(0.018)
Age	-0.035**	-0.001	-0.053+	0.016
	(0.010)	(0.008)	(0.026)	(0.013)
Income	0.013	-0.004	0.004	0.006
	(0.007)	(0.005)	(0.005)	(0.009)
First-generation	0.002	0.008	-0.011	-0.037+
	(0.014)	(0.011)	(0.013)	(0.018)
Financially dependent	0.048+	-0.006	-0.018	-0.021
	(0.020)	(0.016)	(0.027)	(0.028)
Having dependents	0.056+	-0.000	-0.027	-0.025
	(0.023)	(0.018)	(0.021)	(0.027)
GPA	0.147**	-0.015	0.019	0.057*
	(0.014)	(0.010)	(0.014)	(0.020)
STEM major	0.061*	0.340**	-0.066**	0.172**
	(0.018)	(0.030)	(0.012)	(0.027)
Selective institution	0.051**	-0.019	0.054*	-0.015
	(0.015)	(0.010)	(0.017)	(0.015)
Fulltime	0.013	-0.012	0.004	-0.027
	(0.013)	(0.010)	(0.014)	(0.017)
Job while enrolled	-0.003	-0.025+	0.002	0.024
	(0.014)	(0.011)	(0.012)	(0.017)
Observations	15,770	5,480	5,480	5,480

Note: Standard errors in parentheses. All reported sample sizes are rounded to the nearest 10 in accordance with NCES restricted data license.
**p<0.001; *p<0.01; +p<0.05

Table 3. Group comparisons for enrolling in graduate or professional education: Average Discrete Change
(only variables with significant differences in Average Discrete Change between groups are shown)

	Overall			STEM			Legal			Health		
Variables	No Disab	Disab	Diff	No Disab	Disab	Diff	No Disab	Disab	Diff	No Disab	Disab	Diff
Expects master	0.269**	0.317**	0.048	0.003	0.076*	0.073+	-0.008	0.095*	0.103+	-0.021	-0.164	-0.143
	(0.013)	(0.042)		(0.020)	(0.028)		(0.023)	(0.033)		(0.031)	(0.128)	
Female	0.02	0.005	-0.015	-0.050**	-0.077+	-0.028	-0.056**	-0.035	0.022	0.138**	0.070	-0.068
	(0.014)	(0.047)		(0.011)	(0.031)		(0.013)	(0.045)		(0.016)	(0.059)	
Age	-0.035**	-0.036	-0.001	0.001	-0.034+	-0.035+	-0.054	-0.036	0.018	0.014	0.041	0.027
	(0.010)	(0.029)		(0.008)	(0.014)		(0.028)	(0.027)		(0.013)	(0.034)	
Income	0.014	0.003	-0.011	-0.006	0.020+	0.026*	0.001	0.035+	0.034+	0.011	-0.061	-0.072+
	(0.007)	(0.027)		(0.005)	(0.009)		(0.005)	(0.014)		(0.009)	(0.032)	
Selective	0.054**	0.012	-0.043	-0.013	-0.087*	-0.073+	0.053*	0.071	0.018	-0.010	-0.076	-0.066
	(0.016)	(0.046)		(0.011)	(0.031)		(0.017)	(0.049)		(0.016)	(0.060)	
Obs.	15,570			5,480			5,480			5,480		

Source: Education Longitudinal Study (ELS 2002/2012)
Note: **p<0.001; *p<0.01; +p<0.05